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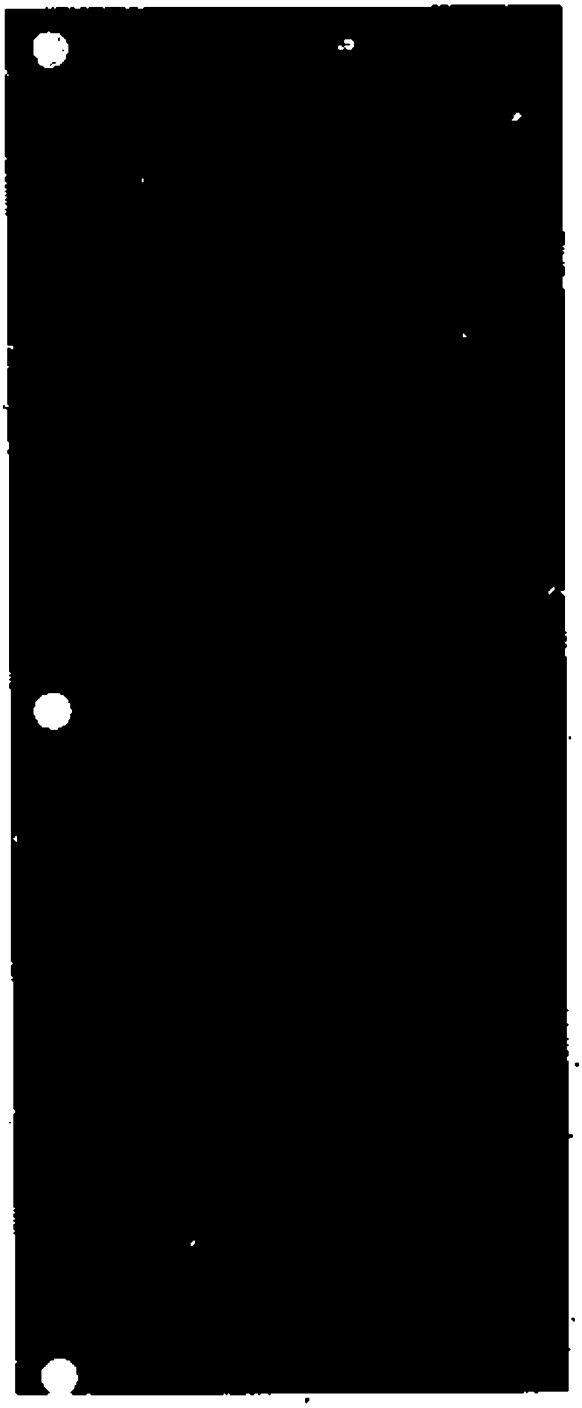

East GERMANY

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This chapter supersedes the transportation and telecommunications coverage in the General Survey dated February 1970

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FIGURES

Transportation and Telecommunications

A. Appraisal (S)

The transportation and telecommunications (telecom) systems of East Germany are generally adequate for current needs and are gradually being improved and expanded to keep capacities in line with increasing requirements of the economy. East Germany's location in the northern European plain makes its transportation facilities especially important for transit of international traffic moving between western Europe and countries of eastern Europe and Scandinavia.

The rail, highway, and telecom networks center on Berlin, from which main lines radiate to serve all areas adequately. The densest sections of the transportation systems lie in the central and southern portions of the country.

Except for some privately owned highway and waterway carriers, transportation and telecom facilities are government owned and operated; control is exercised through elements of the Ministry for Transport and the Ministry for Posts and Telecommunications.

The railroad system is the basis of the transportation network and is the principal long-haul mode. Highway transport is the primary short-haul mover of freight and is becoming more so since an increasing amount of rail short-distance traffic is being diverted to the highways. The complex inland-waterway system—densest among the Eastern European Communist nations—is an important part of the transportation network, but its significance to the economy is not fully conveyed by performance figures.

Of the 852.2 million short tons moved by the three major transport modes in 1972, highways accounted for 62.6% of the total as compared with 34.2% for railroads and 3.8% for inland waterways. In terms of ton-mile performance, the railroads produced 74.4% of the total, highways 22.2%, and waterways 3.4%.

Although the East German pipeline system is sparse it is an important complement to the major surface transportation facilities and in 1970 moved 16.8 million short tons of crude and refined products.

Civil aviation plays a relatively minor role as a means of transportation, being used mainly by officials of government and industry, and for transporting high-priority cargo. Air services are operated by the government's flag carrier INTERFLUG, which has a fleet of 28 to 30 major transport aircraft—all Soviet-manufactured—as well as a mixed fleet of about 80 smaller aircraft. INTERFLUG provides domestic services to key East German cities and international flights to Africa, the Middle East, Austria, Denmark, and the European Communist countries. East Germany has 146 operational airfields, over 50% of which are military. The principal airport for civil-air operations is Schoenefeld in East Berlin. In 1971, INTERFLUG carried some 21,000 short tons of cargo and 921,370 passengers. In April 1972 East Germany's growing

merchant marine comprised 135 ships and, in terms of deadweight tonnage, ranked 23d among the merchant fleets of the world. The fleet plies shipping routes reaching all continents and in 1971 transported 4.8 million long tons of cargo in seaborne trade. This trade is adequately served by five major and 12 minor ports on the Baltic Sea and on rivers flowing into the Baltic.

The rail, highway, and inland waterway systems provide international connections with all adjacent countries. Although border-crossing points are controlled, restrictions have been eased in recent years and more crossings are being opened to civilian traffic.

West Berlin, about 100 miles from West Germany by rail or highway, has a unique transportation problem because access to the city by highway, rail, and inland waterway is via the systems of East Germany. Access is limited to established checkpoints, and strict control over entry is maintained by East German and Soviet authorities. Military surface traffic moving to West Berlin for support of the Western garrison is restricted to one highway and one rail route between Helmstedt, West Germany, and Berlin. Air traffic, both civil and military, is limited to three air corridors.

Plans to improve and expand transportation facilities are reflected in continuing economic programs initiated by the government. However, progress in completing various projects has been slow because of insufficient resources and poor management; as a result, most development and improvement is being done on a priority basis. Railroad projects underway include increasing the automation of facilities, double tracking main-line segments that are now single track, laying heavier rails on main lines, and gradually replacing remaining steam locomotives with diesel or electric units. Highways—mainly primary routes—are being improved by widening narrow segments, resurfacing or rebuilding surfaces, strengthening and widening bridges, eliminating rail crossings, and realigning sharp curves. A major construction project underway is the extension of the autobahn system, with priority being given to completing a route from Berlin to the port of Rostock. Although inland-waterway development has a lower priority, some improvement is taking place, in particular the expansion and modernization of major ports and construction of a container terminal at Riesa; long-range waterway development plans tie in with an overall program coordinated by the Council for Mutual Economic Assistance (CEMA), which aims to interconnect the Elbe, Oder, and Danube rivers. The maritime port of Rostock is scheduled to be developed further by the addition of new container terminals and construction of an offshore oil terminal to accommodate supertankers. The merchant-marine fleet is expected to continue growing and by 1975 number 200 ships totaling 1.8 million deadweight tons. The pipeline network is being expanded with over 100 miles of new lines, recently completed is the 16-mile East German segment of an international CEMA crude-oil line paralleling an existing line that extends from U.S.S.R. oilfields to East Germany's largest refinery at Schwedt.

The telecom system, which provides domestic and international telephone, telegraph, radiobroadcast, and TV services, is adequate. There are over 2.1 million telephones and about 6 million radio sets. TV reaches more than 90% of the population. Telegraph services are available to 23 countries and to West Berlin. Current telecom expansion plans include automating completely the domestic and international telephone system and expanding TV facilities.

B. Strategic mobility (S)

East Germany's major transportation routes, together with its port and airfield installations, could adequately support military logistical operations (Figure 1). The overall transportation complex, however, has certain deficiencies that could impose limitations on any large-scale supply and movement of military forces. Because of the uneven areal distribution of routes, motorized forces are afforded greater mobility in the central and southern parts of the country, where transportation networks are denser than those in the north.

The main rail and highway routes provide for rapid deployment of military forces to all regions and into bordering countries as well. Capabilities of these routes, however, are limited by such factors as the high proportion of single-track rail lines, narrow stretches of highway, and the insufficiency of alternate primary routes, particularly in the northern region. Chief vulnerable points on the rail and highway networks are the major bridges, especially structures over the Elbe and Oder/Neisse river systems.

The waterway network, although limited in its areal distribution, nevertheless affords significant logistical-support routes. Main waterways form an integral part of the international routes that transit East Germany to link Poland and Czechoslovakia with West Germany; these waterways lend themselves to Warsaw Pact logistical support of extended military operations, because they are capable of moving large amounts of rations, POL (petroleum, oil, lubricants), ammunition, construction materials, and equipment. Most

vulnerable are lock-and-dam installations and the shiplifts at Rothensee and Niederfinow, destruction of which would completely close through traffic and cause flooding and restrictive low water levels on the major routes. The simultaneous destruction of the shiplifts and the locks at Niederfinow, Brandenburg, and ESenbuttenstadt[1] would be of particular consequence—all major routes to Greater Berlin would be closed to through traffic from both east and west. Serious interdiction could also be accomplished by destroying ports, repair facilities, and large bridges.

East Germany's merchant fleet could provide substantial sealift logistic support for military operations. Its cargo ships have a combined lift capability of 548,675 long tons, and its tankers could transport about 2.6 million barrels of petroleum products. The sizable number (74 units) of large-hatch, heavy-lift ships could be used extensively to replenish supplies for deployed armed forces as well as to provide sealift capabilities for delivering all known Communist military hardware. The fleet's passenger-carrying ships could lift about 4,500 troops under emergency conditions, and the fleet's four ferries could be used to transport about 2,500 troops on a very short-haul basis. Additionally, with slight modification the 28 fishing vessels in the fleet totaling 87,925 g r t and 54,955 d w t could be converted to military use. Three of East Germany's major maritime ports—Rostock, Wismar, and Stralsund—are the most favorably suited for military logistic use and have a combined estimated military port capacity of 74,500 tons.[2] Rostock, the largest and best equipped, is by far the most suitable, but all three have substantial wharfage for handling military cargo, and each is served by several standard-gage rail lines and several hard-surfaced roads. Sassnitz and Peenemuende, the two remaining major ports, are less than ideal for such operations, not being general-cargo ports and being more limited in clearance facilities.

The two largest ports, Rostock and Wismar, if used as terminals in an east-west maritime movement of Warsaw Pact forces, would permit supplying such forces operating in northern East Germany directly from Soviet Baltic or Soviet inland-waterway ports.

Rostock is the principal supply port for Soviet forces in East Germany. Soviet vessels unload supplies at a military terminal in the Unter Warnow Harbor and at deep-draft wharves in the Overseas Harbor.

The principal disadvantage of East German ports in a military operation is their vulnerability to interdiction. Rostock has a narrow harbor entrance, and Wismar, Stralsund, and Peenemuende all have long and relatively narrow approach channels. Sassnitz is not restricted by an approach channel but does depend on a combination rail-highway bridge for clearance from the island of Ruegen to the mainland.

The civil-air carrier INTERFLUG could provide limited troop and cargo transport services in support of military operations. This support, however, is totally dependent upon provision of supplies and aircraft maintenance services by the USSR. Many of INTERFLUG's skilled aviation personnel are members of the military reserve. East German airfields are distributed throughout the country but are concentrated mainly in the south. Facilities are adequate for routine operations.

The telecom systems could adequately support military requirements. Total disruption of services by military action would be difficult because of the many facilities available for alternate routing. However, unattended radio-relay repeater stations and junction points in the underground cable networks are vulnerable to sabotage. In wartime, complete military control of the telecom facilities would prevail.

FIGURE 1. Soviet forces moving near Berlin, armor on the Outer-Ring railroad line and a truck convoy on the south ring of the Berlin autobahn (C)

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

[2] See footnote, Figure 5.

C. Railroads (C)

The German State Railways (DR) dominates East Germany's transportation system. From Berlin, the hub of the network, routes radiate to all parts of East Germany and to each of the adjoining countries, the other major rail centers are Magdeburg, Leipzig, and, to a lesser degree, Dresden. The lines of greatest strategic importance are those extending westward from Poland through East Germany to West Germany and those extending southward from the Baltic ports of Rostock, Sassnitz, Wismar, and Stralsund into Czechoslovakia and West Germany. East Germany has several international rail connections—all standard gage—with West Germany, Czechoslovakia, and Poland. Connections with Scandinavia are maintained via Baltic Sea train ferries operating from Warnemuende to Gedser, Denmark, and from Sassnitz to Trelleborg, Sweden. The only direct connection between West Germany and West Berlin is through Potsdam on the Braunschweig (West Germany)–Magdeburg-Potsdam line. The Berlin Outer Ring bypasses West Berlin and facilitates transfer of East German rail traffic between radial lines in the Berlin area.

In March 1972 the rail network totaled 9,010 route miles and consisted of 8,810 miles (96%) of standard gage and 200 miles (3%) of meter and narrow gages. Standard-gage double- and multiple-track lines totaled about 1,810 miles, and there were 860 miles of standard-gage electrified lines.

All major cities, industrial areas, mining regions, and major airfields and ports are served by at least one line. The rail net is most dense in the industrialized southwest and least dense in the north. The rail pattern has not been greatly influenced by terrain, and there are no extensive areas to which rail access has been denied because of terrain features.

The operational capability of the DR is barely adequate for normal requirements, and increased agricultural demands in the spring and fall create problems in equipment distribution. Combined with other commercial and military requirements, these demands result in freight-car shortages.

Regardless of its deficiencies, the rail network still provides the principal means of long-haul freight movement and occupies a central position in the northern European transit-traffic picture. Although much of the rail traffic moves between East Germany and the Soviet Union and other Communist countries, there is considerable through traffic that traverses East Germany in movements between Scandinavia and countries of Western Europe.

Recent efficiency moves by the DR resulted in dismantling unproductive lines and closing many freight depots. These were measures taken to concentrate freight traffic to key lines and depots. Other major projects in progress include additional automation of line and yard operations to implement further an automated traffic-control system, replacing remaining steam locomotives with modern diesel and electric locomotives, continued reconstruction of major lines to meet Soviet clearance specifications, continued double tracking of main lines,* installing heavier rail, and increased use of container trains.

East Germany became the first Eastern European Communist country to curtail its electrification program in favor of acquiring Soviet-built diesel locomotives. Because of the extreme financial strain of constructing electrified installations and the ready availability of diesel fuel and diesel locomotives from the U.S.S.R., further electrification is unlikely except for electrified rapid-transit systems connecting major urban areas.

The rail system has about 14,000 bridges (12 feet and over in length) and 69 tunnels. On main lines the bridges have been strengthened or replaced to permit higher axle loadings, but most bridges on the secondary lines are in only fair condition. The bridges are predominantly of steel, but masonry and concrete are also widely used. The 3,430-foot bridge crossing the Elbe River near Wittenberge is the longest on the system. The most important bridge for west to east traffic, including movement between West Berlin and West Germany, is the 2,200-foot structure crossing the Elbe River just east of Magdeburg. The 10,000-foot Oberlind Tunnel near Zella-Mehlis is the longest on the system.

All rails are of the T-section design. The most prevalent rail in use weighs 99 pounds per yard and is produced locally. Heavier rails—102 and 131 pounds per yard—are imported from the U.S.S.R. and are being installed on heavily traveled main routes to increase their load-bearing capabilities. Use of the 131-pound rails on main lines was recommended by the Organization for the Cooperation of Socialist Railroads (OSShD).

Wooden ties are still widely used, but prestressed-concrete ties have been adopted as standard for main-line construction.

Crushed rock is generally used as ballast on all standard-gage lines; gravel and cinders are used on all other lines and in yards. The supply of ballast from domestic quarries is adequate, and the quality is generally good.

Axleload limits vary generally from 16.5 to 22 short tons, but a few major lines have limits as high as 25

*Those sections of line reduced to single track by the Soviets during their occupance of the country following World War II.

short tons. Grades generally do not exceed 1.0% except in the southern mountainous regions where 2.5% grades are encountered. The known minimum radius of curvature on the network, 328 feet, is located between Sangerhausen and Blankenheim in the Harz Mountains.

Modern track-laying machines and maintenance equipment are gradually replacing manual labor; however, insufficient quantities of equipment and personnel shortages are the primary reasons for inadequate construction and maintenance performance. Defective rails and switches and the continual deterioration of ties, rails, and ballast are constant sources of slowdowns and derailments.

Train control throughout the network is accomplished by the absolute-block system (only one train in a block at a time), and automatic train control is in use on most main lines. The more important lines are being considered for Centralized Traffic Control (CTC) throughout, but only sections of the Berlin–Rostock line and the Berlin Outer Ring have been equipped with CTC. Home and distant semaphore signals are widely used but are being replaced by color-light signals. The DR maintains its own nationwide telegraph and telephone nets. Advances in signal equipment, including track diagrammatic safety control, provides for further automation and efficient utilization of locomotives and rolling stock.

Little good-quality fuel is available, and briquettes of locally available brown coal constitute the principal fuel in use. East Germany imports coal from Poland, Czechoslovakia, and the U.S.S.R. but never in sufficient quantities for year-round needs. Attempts have been made to alleviate the shortage, such as converting locomotives to coal-dust and oil firing and mixing low-grade anthracite from the U.S.S.R. and Poland with domestic coal, but none has proven satisfactory. Electrification is confined to the Berlin area and to the dense industrial area encompassing Magdeburg, Erfurt, and Dresden. Electric power for the electrified system is supplied by the Muldenstein thermal powerplant just northeast of Bitterfeld. Crude oil is piped from Mozyr, U.S.S.R., to the refinery at Schwedt, which supplies more than 90% of the total petroleum requirements of East Germany and should be able to satisfy any increases in dieselization of the DR network and industrial demands. The water supply is generally adequate for railroad purposes, but the chemical content is usually so high that treatment is necessary.

In 1970 the railroads carried 209.1 million short tons of freight and produced 22.4 billion short-ton-miles. The principal commodities carried were coal, coke, construction materials, and industrial and agricultural products. The bulk of rail traffic consists of shipments to and from the U.S.S.R. and the Eastern European Communist countries over lines connecting the major terminals of Berlin, Dresden, Leipzig, Erfurt, Halle, and Magdeburg. Soviet forces in East Germany also make considerable use of the rail system for transporting troops and equipment. Electric (16.2%) and diesel (41.5%) traction hauled 57.7% of the freight, the balance (42.3%) was hauled by steam locomotives. The average gross weight of freight trains was 700 short tons, the average net load, 445 short tons. Freight-car turnaround time was about 4 days.

Motive power and rolling stock are numerically adequate for normal traffic requirements. Overhaul and maintenance problems cause temporary shortages of freight cars during peak traffic periods in the spring and fall when agriculture and military transportation demands place a marked strain on equipment. Much of the equipment is in poor condition; however, new and only an exceptional maintenance and repair program has permitted steadily increased railroad performance. Manufacture of steam locomotives was stopped in 1961, and since then production has been devoted to diesel and electric locomotives. In 1973 the locomotive inventory totaled about 7,000 steam, diesel, and electric standard-gage units.

In 1971 the rolling-stock inventory totaled about 143,000 standard-gage freight cars, mainly closed types. Despite domestic production of freight cars, the rate of replacement has been inadequate because most of the equipment produced in East Germany has been exported. Two-axle cars predominate, but these are being replaced by four-axle equipment. The approximately 11,800 standard-gage passenger cars are considered adequate for normal demands. East Germany's membership in the CEMA freight-car pool, which is designed to achieve more efficient car utilization among the Eastern European Communist countries, is helping to ease freight-car shortages somewhat.

East Germany is placing increased emphasis on containerization (shipping freight in standardized metal containers), a service first opened in June 1968. The initiation of container freight service is a significant economic and strategic development in DR operations. Container shipping is growing rapidly and, as new container centers and transfer points open, more shippers are expressing an interest. In their major specifications East German containers meet the requirements of the International Organization for Standardization, Lloyd's Register of Shipping, and the International Union of Railroads (UIC); thus, the containers are adaptable to the European container transport system—aimed at insuring the rapid transport of freight.

The DB is owned and operated by the government and is under control of the East German Ministry for Transport. The network is divided geographically into eight operating districts. In 1969 the DR's staff was about 300,000 personnel. Educational training of railroad employees is limited to the Dresden College of Transport, the only specialized technical college of its type in the country, and to technical schools operated by each district and the larger rail yards. Although various incentive measures helped to stabilize personnel totals, they have failed to attract or produce adequate numbers of trained tractive crews, and overall performance figures have not reflected projected goals.

D. Highways (C)

As a short-haul freight carrier, highway transport is growing in importance to the East German economy. The government, through its rate-fixing power, has been discouraging shippers from using the railroads in other than long-haul operations while emphasizing the use of highway carriers for short hauls. As a consequence, a growing amount of the short-distance traffic traditionally handled by the railroads is being diverted to trucking services.

The highway network comprises about 21,650 miles of classified routes and 29,000 miles of unclassified minor roads. The classified system consists of 8,000 miles of state or national highways (*Staatsstrassen*) and 20,750 miles of district roads (*Bezirksstrassen* or *Landstrassen*). State highways include about 930 miles of autobahns (*Autobahnen*)—limited-access express highways. Highway density is greatest in the southern half of the country where the major industrial and manufacturing centers, urban areas, and mining and agricultural regions are located. The network of paved routes has been gradually increasing in total length as a result of newly constructed parallel roads and the modernization and extension of existing roads. The mileage of paved highways per square mile of area is 68:1 as compared with 33:1 in Poland, 47:1 in Czechoslovakia, and 90:1 in West Germany. The overall condition of the network ranges from poor to good.

There are several important international highway connections with West Germany, Czechoslovakia, and Poland, but many border-crossing points are barricaded and sealed off for political reasons. Within the past few years, however, restrictions have been eased, and more crossings are being opened to traffic. Motor vehicles are carried on the rail ferries connecting East German Baltic ports with Denmark and Sweden.

The autobahn, which are the best roads in the state highway network, generally consist of dual one-lane roadways that have 24-foot-wide concrete pavements and 8-foot shoulders and are separated by a 10- to 20-foot median strip. The median strip on some straight sections of these routes has been filled in and reduced with concrete to provide potential landing areas for aircraft. The state highways, other than the autobahns and district highways generally have surface widths of 14 to 24 feet and are mainly bituminous surfaced, but there are some stretches of cobblestone, crushed stone, stone block, or brick. Recent construction features surface widths of about 24 to 25 feet, and on new construction, shoulders are generally 5 to 8 feet wide. Shoulders of older highways are generally inadequate to allow for offroad parking. Most minor roads are unpaved natural-surface routes serving hamlets, villages, and towns not connected by the state and district networks.

FIGURE 2. Major steel-girder bridge on the autobahn southeast of Zwickau (U/OU)

There are about 30,500 highway bridges, some 4,500 of which are on primary routes. Most bridges are in good condition. The 3,350-foot Uebigau-the Bridge across the Elbe River on an autobahn northeast of Magdeburg, is the longest. The most common types are of steel, concrete and masonry, and although recent construction favors concrete beams, steel bridges are still being built. Capacities range up to 80 short tons, but 100-ton capacities are planned in special instances. Most underpasses are on the state highways, including autobahns. There are no tunnels or ferries on the primary highways. A major steel bridge on an autobahn is shown in figure 2.

FIGURE 3. Rail-highway container-transfer points. Two methods of handling the containers and specialized tractor-trailers used in transporting the containers are shown. (U/OU)

Most highway transportation facilities for passenger and freight are owned and operated by an agency of the Ministry for Transport. Some industrial complexes maintain their own transportation, and a few privately owned enterprises still exist. In recent years a number of motor-transport combines have developed out of the merger of various motor-transport enterprises. These combines are in operation in the districts of Cottbus, Erfurt, Frankfurt, Gera, Halle, Karl-Marx-Stadt, Magdeburg, Neubrandenburg, Potsdam, and Rostock.

The role of highways in the expansion of container service to the most important industrial centers is linked with opening ever-larger collecting and distributing areas served by container transfer points. This has necessitated procurement of special pickup-delivery trailer units. Container delivery and collection is accomplished in many cases by motor vehicles (Figure 3) operating within a radius of about 25 miles of the container transfer point.

In 1971 highway transport carried 545 million short tons of freight and produced 8.0 million short-ton-miles. Normally highway traffic volume peaks each year in late August when the heaviest demands for truck transport occur. In addition to transporting daily supplies for the population, all sectors of the economy have to be provided with adequate stocks prior to the beginning of winter. Furthermore, additional export goods are transported in ordinary drives to meet government-established quotas prior to the end of the year.

Weather conditions influencing traffic include fog (especially in autumn), ice, and snowdrifts up to 20 feet deep in the southern hills. Spring flooding in marshy areas of the north is common. Bottlenecks further restrict traffic and include narrow roads (many of which have high curbs), underpasses, steep grades and sharp curves, and sharp turns in towns and villages.

In 1971 there were 1,529,000 vehicles registered in East Germany (1,267,800 automobiles, 244,000 trucks, and 17,200 buses). Medium trucks and automobiles are produced domestically, but large trucks, including semitrailers, and buses are imported from Czechoslovakia, Hungary, and the U.S.S.R. Some automobiles are imported from Czechoslovakia and the U.S.S.R. A large share of the automobile inventory consists of government-owned cars used primarily for business and official purposes. Most of the privately owned cars belong to the professional and governmental elite.

East Germany produces more than 130,000 cars a year, which is more than one-third of the total Eastern European automobile production.

The Trabant plant at Zwickau, the second largest automobile factory in Eastern Europe, produces more than 80,000 cars a year. Another factory, the Wartburg plant at Eisenach, is also one of the larger plants in Europe and produces about 40,000 cars a year.

East Germany does not have an adequate number of filling stations and repair shops, and chronic shortages of spare parts keep many vehicles out of service for long periods. Moreover, state-owned vehicles always take precedence at service facilities, requiring private cars to wait much longer.

Highway improvement is planned and accomplished within the framework of overall economic development programs. There have been several improvement plans since 1950, but because of poor planning and insufficient funds the few plans that were started have only been partially completed. Only recently, because of greater emphasis on development rather than on politics, has highway-transportation policy become better defined and coordinated. Improvements consist mainly of widening, resurfacing, and reconstructing road surfaces and bases, increasing bridge load capacities and widths, replacing grade crossings with underpasses or bridges, and realigning sharp curves. Among its more important projects, the current highway development program (1965-71) includes an extension of the autobahn system. Autobahn sections under construction or projected are the following: Berlin Circumferential Highway (northern ring), Berlin-Rostock, Halle-Magdeburg, and Dresden-Bad Schandau-Czechoslovakia border. In addition, some reconstruction or improvement is in progress on nearly all primary routes.

Construction and maintenance of the highway system suffers from a lack of construction materials which are generally of inferior quality. Furthermore, there has been a lack of proper construction machines, spare equipment parts, suitable manpower, and sufficient funds. Consequently, projects are seldom completed in the stated timeframe. Construction and maintenance operations are further complicated by wet or marshy terrain in the northern lake country, by densely forested hills in the south and southwest, and, country wide, by inadequate base courses, which result in widespread surface deterioration.

As with the railroads, local work groups, students, and military and prison crews are employed in various repair projects to keep up with the road maintenance program. However, construction of the Leipzig-Dresden autobahn (since completed) and preparation for constructing the Berlin-Rostock autobahn, which is

scheduled to be completed by 1972, have tied up personnel and materials at the expense of the rest of the classified road system.

Construction and maintenance activities are controlled by the Administration for Road Transport under the Ministry for Transport. The Administration, through road construction and maintenance units located in various sections of the country, maintains direct control over major roads and exercises indirect control over other roads by regulating the allocation of funds to districts and municipalities.

E. Inland waterways (S)

The well-developed East German inland-waterway network, which includes the waterways of West Berlin, is a major means of long-haul bulk-commodity supply and distribution for basic industries. The waterways accommodate intensive domestic and international traffic, especially West German transit traffic in the supply of West Berlin. The network has a total navigable length of 1,640 miles. Over 90% of all shipping is accommodated by 24 major waterways affording about 1,040 miles of principal navigation on the following three individual routes and two systems:

Name	Miles of navigability
Havel – Canal	22.1
Oder – Havel – Kanal	57.4
Oder – Spree – Kanal	69.0
Greater Berlin system	68.6
Oder system	130.3
Elbe – Havel system	147.1
Elbe system	545.5
Total	1,040.5

The Elbe and the Oder are interconnected by cross-country waterways which converge on the Berlin area—the city is served by nine major routes (Figure 4). The waterways provide direct connection to West Germany via the Elbe and the Mittelland Kanal, to Poland via the Oder, the Oder-Havel Kanal, and the Oder-Spree Kanal, and to Czechoslovakia via the Elbe. The only significant waterway access from the interior to maritime waters is via the Elbe to

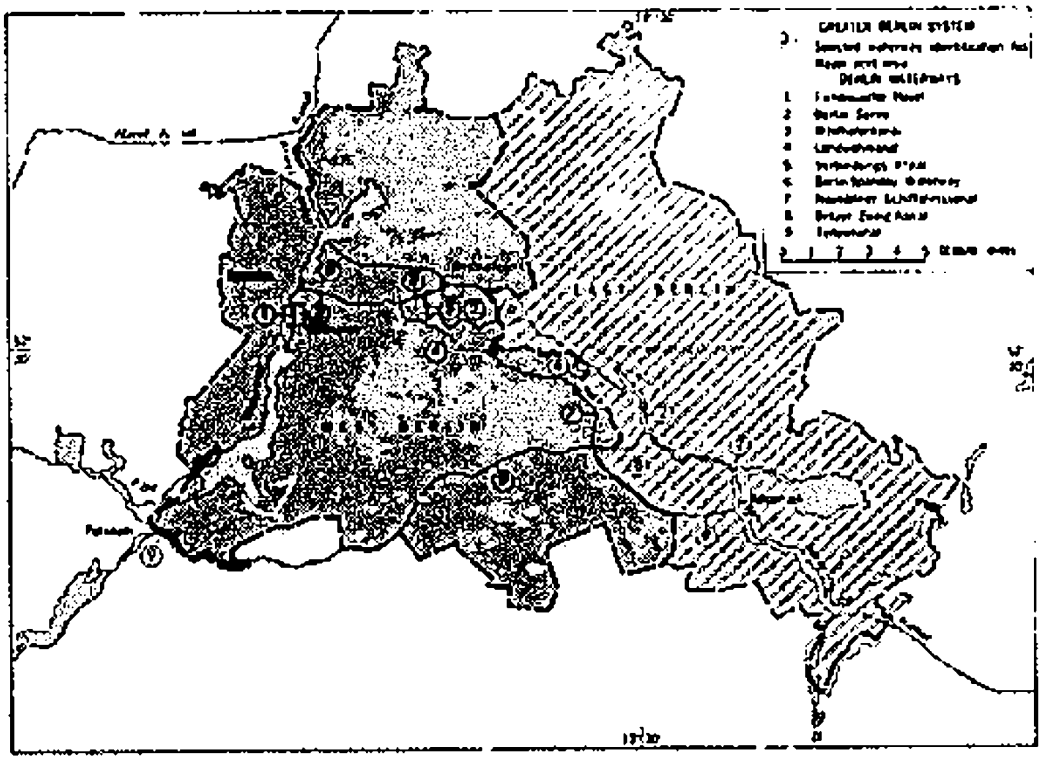

FIGURE 4. Inland waterways in Berlin (C)

Hamburg, West Germany, and via the Oder to Szczecin (Stettin), Poland. The waterways, waterway facilities, and inland fleet are adequate in extent and condition for normal requirements.

The integrated inland-waterway network is regulated, canalized, or otherwise improved throughout. Regulated streams account for 44% of the total major-route navigability, and the remainder is divided among land-cut canals (26%), canalized streams (28%), and other waterway types (1%). Primary regulation is provided by dams, weirs, and pumping stations and is supplemented by channel-control works such as levees, groins, and dikes. The less important waterway routes are generally natural streams, partially improved by the use of channel-control works.

The principal cargoes shipped are ores, metals and scrap; sand, stone, and other construction materials; finished and semifinished metal goods; petroleum products; and grain. Other shipments include chemicals and chemical products, sugar and other foodstuffs, machinery and equipment, manufactures, and general cargo. The density and volume of east-west traffic substantially exceeds that of north-south. Large amounts of cargo are moved annually to, from, and through the pivotal Berlin complex, the greatest volume being carried on waterways in and westward of the city. In 1972, East German carriers hauled 15.2 million short tons and generated 1.3 billion ton-miles. In addition, about 6 million short tons, 90% of which is consumer, industrial, and stockpile goods, are shipped annually by West German carriers from the Federal Republic to West Berlin. Since 1961 the yearly volume of passenger traffic has remained steady at about 2 million.

Waterway operations are performed largely by 400- to 900-ton self-propelled barges and dumb barges of 350- to 1,000-ton capacity. Since 1964 pusher operations have gradually absorbed the greater portion of traffic. About 50% of all tonnage carried by East German operators is transported in 400- to 415-ton pushed barges (figure 5). Most of the Greater Berlin waterways are navigable by 650- to 1,000-ton vessels; restrictive lock dimensions on routes extending eastward limit these passages to 650- to 750-ton vessels. To the west of Berlin the Saale-Unstrut waterway is seasonally and sectionally navigable by 200- to 600-ton craft; all other major waterways accommodate 750- to 1,000-ton craft. The lack of uniform depths on the major north-south routes frequently necessitates seasonal light loading, especially on the Elbe where vessel payloads may be reduced to below 50% of design capacity. Excluding the Elbe and the Oder, fixed structures on the waterways generally limit tug-and-barge operations to in-line formations of two to four barges towed astern or pushed. On the Oder and Elbe the pu[illegible] tugs operate with three and seven barges, respectively. Use of push towing has been expanded in order to reduce the high rate of idle vessel time and the difficulty of maneuvering stem tows on some routes and to alleviate the shortage of skilled bargemen. Operations are aided by a good system of shore-based and floating navigation aids, traffic-control lights at locking facilities, and an extensive radio and telephone waterway communication network.

The principal traffic interruption factors are adverse low- and high-water conditions, ice, and, to a lesser extent, fog. Annually, operating days lost average 45 on the Oder and 17.5 to 25 days on other major waterways. On most waterways a reduction in level can usually be remedied by releasing impounded water. Operations continue through short periods of drift and rim ice, and most main routes are kept open by icebreakers and icebreaker tugs. Allied shipping to and from West Berlin is periodically interrupted or brought to a standstill by military training exercises and calculated East German-Soviet harassment measures.

Structures on the major waterways consist of locks, shiplifts, safety gates, aqueducts, bridges, and regulation works. The greatest concentration is on routes to Berlin and to the west of the city. Distributed among 13 waterways, including seven installations on the Berlin network, are 38 locks. The locks vary in size

FIGURE 5. A 475-horsepower pusher tug and three 445-ton barges operating on the Berlin waterways (U/OUO)

from 15.8 by 18.4 feet to 75ft by 85 feet but are sufficiently uniform on individual routes to accommodate the largest craft normally plying the open channels. Locking cycles range from 15 minutes to more than 2 hours, and lifts vary from 1.7 feet to 118 feet. Single- and parallel-chamber arrangements are most common.

The Rothensee shiplift on the Mittelland Kanal near Magdeburg and the Niederfinow shiplift on the Oder-Havel Kanal near Eberswalde, the most unusual locking installations in the country, facilitate navigation on primary access routes to Berlin. Each can raise and lower 1,000-ton vessels in a 296-foot-long trough having a usable width of 39 feet and a normal water depth of 8.2 feet. One-way passage requires 20 to 25 minutes; the lifts are 49 feet (Rothensee) and 118 feet (Niederfinow).

The known 300 bridge crossings are fixed-span structures and none impose underbridge clearance restrictions for craft normally operating. Small dams, weirs, sluices, and pumping facilities are positioned throughout the waterways, although no one facility is of major importance, collectively they have a great stabilizing effect, particularly on the Elbe to Oder waterways.

Inland ports are mechanized to a fairly high degree for bulk-commodity handling. Slightly over 40% of the principal berthage serves industrial plants or municipal facilities. Noteworthy features of the ports are numerous artificial basins, concrete and masonry quays, the use of mobile equipment to supplement fixed shore facilities, direct quayside rail and/or road clearances, and extensive open storage. Greater Berlin is an outstanding complex comprising two primary West Berlin facilities (Südhafen and Westhafen), one primary East German facility (Rummelsburg-Osthafen), and 24 other port facilities (39 in West Berlin and 12 in East Berlin), most of which are industrial. Other significant East German inland ports are Magdeburg, Riesa, and Dresden on the Elbe, Potsdam on the Elbe-Havel Canal, Eisenhüttenstadt on the Oder-Spree Kanal, Halle on the Saale-Unstrut waterway, and Frankfurt on the Oder. Of only slightly less significance are 13 other East German inland ports. The Greater Berlin complex has 40% of the total berthing available in all ports.

In 1971 the East German inland-cargo fleet had a carrying capacity of 630,000 short tons and consisted of about 1,870 units, 1,600 dumb and 270 self-propelled barges. Estimated total motive power was 270,000 h.p., half of which was provided by 267 tugs, 132 pushers and 215 conventional units. Efforts to standardize the fleet and increase its capability emphasize continued serial production of 400- to 415-ton pusher dumbbarges and 300- to 600-h.p. pusher tugs as well as continued conversion of 650-ton dumb barges to 3000-ton/3600-h.p. self-propelled units capable of moving up to two dumb units. East Germany is working toward standardizing vessel design and operation in Europe by coordinating vessel specifications set by CEMA for Eastern European Communist countries and those set by agreements of the Ministers for Transport for Western Europe for Western European waterway vessels. Within East Germany eight major shipyards and at least 32 secondary yards are responsible for building and repairing units of the fleet. Standardization of craft, serial production, and use of prefabricated units have increased the capability of the yards, which not only fulfill East German requirements but export a considerable number of their new units.

The Ministry for Transport administers inland waterways through its State Secretariat for Shipping. The secretariat operates through two subordinate agencies, the Main Administration for Waterways and the state-owned German Inland Waterways Shipping Company (DBR). The Main Administration for Waterways is responsible for operating, constructing, and maintaining the East German waterways and those within West Berlin; this is accomplished mainly through regional and local offices. The DBR handles nearly all East German waterway shipping. A negligible volume of domestic cargo is moved by a few private operators, most of whom are under highly restrictive DBR charter. Domestic passenger operations are performed solely by the state-owned White Fleet (*Weisse Flotte*).

Development of waterway transport has had a relatively low priority. However, some improvement and modernization of the fleet and waterway facilities has been achieved; for example, the development of pusher operations throughout the network and the enlargement of the important lock at Brandenburg on the Elbe-Havel waterway (Figure 6). Installation of closed-circuit television at locks continues, as does enlargement and modernization of nearly all major ports, especially the industrial facilities at Magdeburg and Eisenhüttenstadt. A container terminal under construction at Riesa was partially operational by the end of 1972. Long-range development plans include straightening the Oder-Spree Kanal, improving regulation of the canals, and construction of a direct connection between the Mittelland Kanal and the Elbe-Havel waterway by means of an aqueduct over the Elbe and a shiplift at Hohenwarthe. The long-range goals of East German inland-waterway

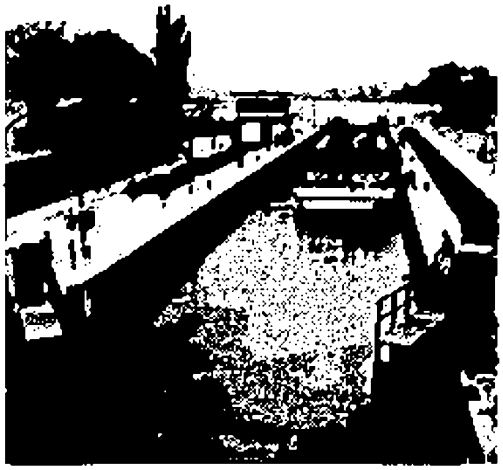

FIGURE 6. Brandenburg lock on the Elbe-Havel waterway. Enlargement of the second chamber was completed during the 1971 navigation season. (U/OU)

development are an integral part of the overall CEMA plan calling for interconnecting the Elbe Oder and Danube in Eastern Europe

F. Pipelines (S)

The development of pipeline systems in East Germany has been spurred by industry's growing preference for liquid or gaseous fuels in place of solid fuels. There are now about 650 miles of trunk pipelines in operation and over 100 miles of lines under construction (Figure 7).

The first CEMA pipeline completed in 1963 transports crude oil directly from the Ural-Volga oilfields of the U.S.S.R. across Poland, to East Germany's largest refinery at Schwedt, a parallel pipeline has been recently completed and will more than double the petroleum throughput to East Germany. A 126-mile pipeline extends from the refinery at Schwedt to the port of Rostock on the Baltic Sea. Another pipeline 212 miles in length, leads from Schwedt to Leuna and serves other large refineries. By processing the natural crude oil from the U.S.S.R., East German refineries no longer are dependent upon supplies of crude oil derived from bituminous coal.

The first significant refined-products pipeline was completed in 1968, about 50 miles in length, it connects the Schwedt refinery with Seefeld, near East Berlin. An extension of this line is under construction from Seefeld to Dresden, a distance of about 170 miles.

A recently completed pipeline transports natural gas from the Magdeburg area to the Schwarze Pumpe industrial combine near Leipzig, a distance of about 155 miles. Imports of Soviet natural gas began to reach East Germany in May 1973 via a pipeline built across Czechoslovakia. The new pipeline supplies industrial areas in the southeast. East Germany continues to improve and expand its network of manufactured-gas pipelines.

G. Ports (S)

East Germany has five major ports (Figure 8): Rostock, Wismar, Stralsund, Sassnitz and Peenemuende, and 12 minor ports. All of the ports are located on the Baltic seacoast or on broad rivers and bays. The eastern half of the coastline along which most of the ports are situated, is very irregular and as a result many ports have natural or improved natural harbors.

Coastal configuration generally favors East German ports, but certain hydrographic and weather factors create limited navigational disadvantages. Among these are shallow depths that prevail along the entire coast and islets, rocks, shoals and shifting sandbars that often encumber the nearshore approaches to harbor entrances. Navigation may also be obstructed by shoaling in bays and channels resulting from the littoral shift of the coastline and from silting due to stream discharge, requiring dredging to maintain navigable depths. Other navigational disadvantages at several major ports are long restrictive approaches and narrow entrance channels. Wismar's two approaches, for instance, are 10 and 14 miles long, and the port's entrance channel narrows at places to 190 feet. Stralsund's main approach is 17 miles long and has a least width of 150 feet, and the channel through Rostock's Unter Warnow harbor is 4½ miles long and narrows at one place to 200 feet.

Ice can also impede navigation. It may be insignificant in protected bays during mild winters but can produce almost complete cover in exceptionally severe winters. The two most important major ports—Rostock and Wismar—are kept open by icebreakers, and Sassnitz is normally not closed by ice. Navigation at Peenemuende is hindered by ice for about 2 weeks each winter, and Stralsund is closed an average of 27 days per winter, between mid-December and early March. Half the major ports are closed by ice from 1 to 2 months each year. Other than weather and the hydrographic factors mentioned, no serious problems affect port traffic. Tides and tidal currents along the coast are negligible, changes in water level being caused principally by winds. Variations in water level of as much as 10 feet above or below mean water level may occur in constricted waters such as at the heads of inlets.

FIGURE 7. Selected pipelines (U)(OU)
(Includes pipelines under construction)

Terminals						
From	To	Length	Diameter	Products transported	Capacity	Remarks
		Miles	*Inches*		*BM/day*	
East Germany-Poland border (near Lietz)	Schwedt	16	30	Crude	*200,000	Initial East German segment of CEMA pipeline; completed in 1963.
Do	do	16	28	do	na	Parallel to initial segment of CEMA pipeline. More than doubles delivery of Soviet crude oil to Schwedt refinery.
Schwedt	Leuna	312	20	do	*180,000	Completed in 1968. Known pumping stations at Schwedt and Peitsa. Parallel pipeline reported under construction.
Leuna	Lutzkendorf	*8	20	do	na	Serves lubricating oil plant at Lutzendorf.
Do	Zeitz	*20	na	do	na	Completed in 1970; serves hydrogenation plant at Zeitz.
Do	Buchen	*20	na	do	na	Serves chemical complex at Buchen.
Rostock	Schwedt	125	18	Crude/refined	*130,000	Completed in 1969. Delivers crude oil to Schwedt refinery; returns refined products to port of Rostock for export.
Schwedt	Rostock	50	12	Refined	*65,000	East Germany's first significant petroleum product pipeline; completed in 1968. Pumping station at Hohenmocker.
Rostock	Dresden	*100	na	do	na	Under construction; completion date not available.
Magdeburg	Schwarze Pumpe	*185	na	Natural gas	na	East Germany's only significant natural-gas pipeline; completed in 1971.
East Germany-Czechoslovakia border (near Sellin)	Leuna	50	36	do	na	East German portion of Transgas system delivering Soviet natural gas to the West. Completed in May 1973.

na Data not available.
*Estimate.

Most of East Germany's maritime trade, which in 1972 amounted to a total port cargo turnover of some 15.9 million tons, is conducted through its major ports. Rostock (including Warnemuende) handles about 50% of the tonnage—about six times the amount handled at Wismar, the second leading seaport. At Rostock (Figure 9) an extensive program of expansion during the past decade, including a completely new deepwater port, has made it one of the prime seaports in the Eastern European Communist countries. Its modern facilities include equipment and storage areas specially designated for containerized cargo, a new and well-equipped petroleum-transfer harbor, and two major shipbuilding yards. Further development of the port may include a new and more efficient specialized container terminal and, in the roads outside the port, construction of an offshore oil terminal capable of accommodating supertankers. Wismar handles mainly bulk cargoes (Figure 10) transferred directly between ship and railroad car; it is also the site of one of the most modern shipbuilding yards in East Germany. Stralsund, the third ranking seaport, is accessible only to small oceangoing vessels but is a key rail center and site of an important shipyard. Sassnitz, important as a terminus of the train ferry between East Germany and Sweden, is an active fishing port and site of a naval operating station. Peenemuende is primarily a naval operating base. The minor ports handle commercial cargoes, accommodate naval vessels, and serve shipbuilding and repair

FIGURE 8. Major ports (S)

NAME; LOCATION; ESTIMATED MILITARY PORT CAPACITY*	ACTIVITIES	HARBOR	BERTHS
Peenemünde, 54°08'N., 13°47'E. 4,000	Headquarters and main base of 1st Flotilla, East German Navy; only commercial facility is large thermal powerplant; 2 small shipyards repair small naval vessels.	Improved river harbor consisting of 2 rectangular-shaped basins; North Basin has water area of about 11 acres; South Basin, about 22 acres; general depth in both basins about 10 ft.; dredged fairway leading into harbor basins has 20-ft. least depth.	Alongside—For 41 small naval vessels. Anchorage—Large number for all sizes of vessels.
Rostock 54°05'N 12°08'E. 44,000	Largest seaport; annual cargo turnover of over 12.0 million tons represents about 80% of all cargo handled in East German seaports; terminus of major RR. lines, national highways connecting with all parts of the country. International rail ferry to Denmark. Country's leading shipbuilding center; has the 2 most productive shipyards; builds dry-cargo ships up to 13,770 d.w.t., effects repairs to oceangoing ships to 15,000 d.w.t., 4 floating drydocks with lifting capacities to 13,000 tons. Principal shipments—manufactured or processed commodities. Principal receipts—raw materials. East Germany's largest petroleum port; connected by pipeline to refinery at Schwedt. Headquarters of East German Navy; large operating naval base at Warnemünde.	Well-protected natural river harbor consisting of 3 divisions: Neue Warnow harbor section, 1½ miles long, 600 to 1,500 ft. wide, 36-ft. depth in main channel; Breitling harbor section, 1½ miles long, 39-ft. channel depth to principal wharves; Unter Warnow section, 4½ miles long, 700 ft. to ⅓ mile wide, 19-ft. least depth in channel.	Alongside—For 22 large, 19 standard, 20 small ocean-type cargo vessels, 14 standard, 13 small coaster-type cargo vessels; 22 lighters; 3 large ocean-type, 5 standard coaster-type tankers; 3 ocean- and river-type tank barges; 33 small naval vessels. Anchorage—Exposed temporary anchorage for numerous ocean- and coaster-type cargo vessels and light cruisers and small naval vessels in roadstead.
Sassnitz, 54°31'N., 13°39'E. 4,000	Naval operating station, provides logistical support to East German and Soviet naval units. International rail ferry to Trelleborg, Sweden. Site of expanding national fishing enterprise; large fleet and fish-processing facilities. Commercial cargo and passenger traffic limited to that handled by ferries; minor floating repairs to naval and fishing craft.	Long rectangular artificial harbor formed by 2 breakwaters; water area about 70 acres, 19½- to 21-ft. general depths.	Alongside—1 small ocean-type cargo vessel, 8 standard, 21 small coaster-type cargo vessels; 3 lighters; 1 standard coaster-type tanker; 7 small naval vessels.
Stralsund, 54°19'N. 13°06'E. 9,000	Third ranking seaport; accessible only to small oceangoing vessels. Major industrial activities, shipping and shipbuilding. Principal shipments—coal, briquets, fertilizers, salt, sugar. Principal receipts—ores, metals, coal, building materials, lumber, grain, fish. Handled 583,207 tons of cargo in 1972. Naval garrison command but not operating base. Important shipbuilding center; has one of most modern shipyards in Europe for building fishing vessels; fourth most productive in gross tonnage in East Germany; floating repairs of all kinds; drydocking repairs limited to 800-ton capacity of largest marine railway.	Improved natural harbor, consisting of 2 divisions separated by a bascule bridge; total water area about 230 acres; general depths in harbor 10 to 20½ feet; controlling depth in main (S.) entrance channel 19½ ft.; controlling depth in N. entrance channel 10½ ft.	Alongside—10 small ocean-type cargo vessels, 8 standard, 19 small coaster-type cargo vessels; 25 lighters, 5 small naval vessels. Fixed mooring—4 small ocean-type cargo vessels. Anchorage—30 coaster-type cargo vessels in roadstead.

Wismar .... 53°54'N., 11°28'E. 16,700	Second largest maritime port; bulk cargoes comprise about 70% of trade. Principal receipts—petroleum, finished metal products, ores, grain, lumber. Principal shipments—potash, salt, sugar, iron ingots. Handled 2,171,206 tons of cargo in 1972. Much of cargo handled transferred directly between ship and RR. cars. Large modern shipyard effects floating repairs to oceangoing ships; largest drydock has lifting capacity of 8,000 long tons. Wharf improvement underway, additional planned; new potash storage shed and granaries planned.	Well-protected artificial harbor reached by dredged channel having 29½-ft. controlling depth; consists of 4 basins at head of bay. Kohlhafen: 1,290 ft. long, 330-ft. average width, 15- to 31-ft. central depths. Ubersechafen: 1,600 ft. long, 180 to 400 ft. wide, 18- to 32-ft. central depths. Alter Hafen: 2,000 ft. long, 40 to 300 ft. wide, 15- to 31-ft. central depths. Werfthafen: 2,000 ft. long, 330 ft. wide, 20- to 31-ft. central depths.	Alongside—For 17 standard, 5 small ocean-type cargo vessels; 5 standard, 2 small coaster-type cargo vessels; 15 lighters; 1 small ocean-type tanker. Fixed mooring—2 standard ocean-type cargo vessels. Anchorage—Sheltered anchorage for numerous ocean- and coaster-type cargo vessels or light cruisers or small naval vessels in Wismar Bucht.

*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.

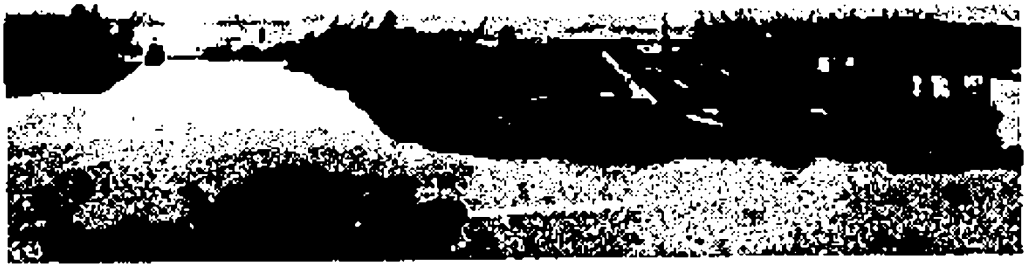

FIGURE 9. Overseas Harbor, Rostock. Looking southwestward. (U/OU)

FIGURE 10. Kaihalen North Wharf, Wismar. Potash is being loaded into ship in foreground. (U/OU)

activities. The most important is Wolgast, site of a large shipyard and a naval supply depot.

East German commercial maritime ports are under direct administration of the state enterprise, the People-owned Enterprise, Seaports (*VEB Seehafen*). Separate enterprises subordinate to this organization exist for administration of each of the three most important ports: *VEB Seehafen*–Rostock, –Wismar, and –Stralsund. *VEB Seehafen* is in turn under the Ministry for Transport's Directorate of Sea Traffic and Port Economy. Dredging, ice-breaking, tug, and salvage operations for maritime ports are conducted by the People-owned Enterprise for Dredging, Towing, and Salvage Operations. Additional state enterprises under direction of the Directorate of Sea Traffic and Port Economy manage specialized port-related shipping operations. These enterprises include the East German Sea Shipping Company (DSR) which manages the maritime shipping lines, the International Chartering and Shipping Company, and the People-owned Enterprise, Ship Chandlers. Predominantly naval ports are under jurisdiction of the East German Navy. The major commercial ports—Rostock, Wismar, Sassnitz, and Stralsund—are adequate for normal shipping requirements and are adaptable for military use.

II. Merchant marine (C)

As of 1 April 1972 the merchant marine comprised 138 ships over 1,000 gross register tons (g.r.t.), totaling 1,043,247 g.r.t. and 1,392,260 deadweight tons (d.w.t.). This represented an increase since 1 July 1969 of 10% in the number of ships, 23% in g.r.t., and 25% in d.w.t. The fleet is now the fifth largest of the Communist countries, following the U.S.S.R., the People's Republic of China, Yugoslavia, and Poland; in terms of deadweight tonnage it ranks 23d among the merchant fleets of the world. The composition of the fleet was as follows:

Type	Number	G.R.T.	D.W.T.
Dry cargo	91	548,052	705,671
Refrigerator cargo	4	20,071	16,714
Container (refitted cargo ship)	1	1,834	2,700
Timber carrier	7	16,325	20,853
Bulk cargo	12	133,721	191,216
Combination passenger/cargo	3	30,339	25,787
Tanker	10	196,991	323,125
Combination tanker/ore carrier	3	50,307	82,860
Passenger	1	11,451	4,775
Ferry	2	13,597	3,300
Train ferry	2	6,420	5,260
Icebreaker	1	2,305	1,022
Training	1	8,130	2,923
Total	138	1,043,247	1,392,260

The training ship, the *Fritz Heckert*, was removed from the active merchant fleet in December 1970 and is moored at Rostock where it houses a specialist school to train 2d and 3d officers.

Local shipyards built 72 (52%) of the 138 ships, and the remaining 66 ships were built abroad, principally in Sweden, West Germany, Norway, the Netherlands, and Denmark.

About 35% of the fleet deadweight tonnage comprises 20 ships of over 10,000 g.r.t. each; and seven ships representing 315,857 d.w.t. or almost 23% of the total d.w.t. are over 21,000 g.r.t. each.

The age of the fleet is indicated in the following tabulation:

Years old	No. of ships
To 5	30
5–10	34
10–20	59
Over 20	15

Except for the training vessel, which is powered by a gas-fired turbine, all ships have diesel propulsion (136 diesel, one diesel electric).

Speed of the fleet is indicated in the following tabulation:

Knots	No. of ships
11–13.9	28
14–16.9	82
17–19.9	23
20–21.5	4

Equipped with large hatches (50 feet or more) are 24 ships totaling 115,393 d.w.t.; 50 ships totaling 325,310 d.w.t. have a heavy-lift capability (10 tons or more), and 20 ships totaling 170,784 d.w.t. have both a large-hatch and a heavy-lift capability.

The merchant marine is owned by the government, and operational control is exercised by two shipping companies, the East German Sea Shipping Company (DSR) and *Deutfracht*. DSR operates 103 merchant ships (91 dry cargo, one container, seven timber carrier, three combination passenger/cargo, one passenger), plus four ferries (two of which carry railroad cars) owned by the German State Railways. *Deutfracht* operates the combination tanker/ore carriers, bulk cargo ships, tankers, and refrigerator cargo ships.

Also under operational control of DSR is a coastal fleet of ships under 1,000 g.r.t. and consisting of 42 dry-cargo ships, 13 container ships, and three tankers. The fleet totals 28,700 g.r.t. and 42,285 d.w.t. Built during the period 1956 to 1972, these vessels are equipped with diesel engines, and their speeds range from 9.5 to 12 knots. East German shipyards built 43 of the ships, 12 were purchased from the Netherlands, and three were built in Poland.

Cargoes transported from East German ports consist chiefly of machinery and industrial equipment, chemicals, rolling stock and other transportation equipment, packaged and bagged freight, coal briquettes, potash, nitrogen, salt, sodium phosphate, photographic materials, and plastics. Bulk goods predominate among imports, especially heavy bulk items such as petroleum products, coal, ore, apatite, and pyrite, followed by light bulk goods such as grain, semifinished products, packaged freight, baled products, bagged freight, barreled cargo, and lumber. In 1971 the ships operated by DSR transported more than 4.8 million long tons of cargo in seaborne trade, an increase of more than 17% over the amount transported in 1970. *Deutfracht* ships transported 4.7 million tons of cargo in 1971, an increase of about 300,000 tons over the 1970 figure.

East Germany established its first overseas trade route to the Mediterranean in 1956. DSR ships now are employed for the most part in regular service to all continents. Ships operated by *Deutfracht* sail mainly in tramp service worldwide. During 1970 the merchant marine made 3,653 calls at 317 ports throughout the world. Although the fleet has increased considerably in recent years, East Germany must continue to utilize a significant number of non-Communist-owned ships to assure movement of its seaborne commerce. Available statistics show that 150 western-flag ships were chartered in 1970, and 54 ships were chartered in the first 7 months of 1971. Charter agreements were made primarily with shipping agents in Greece, West Germany, Norway, Liberia, and France. In 1970 there were 132 voyage charters, six time charters, and one continuous charter. Of the 54 charters in 1971, 49 were voyage charters, four were time charters, and one was a continuous charter.

Passenger service began in January 1960 when the *Volkerfreundschaft* (12,452 g.r.t., and accommodations for 302 passengers) was put in service. This ship is employed on excursion trips in the Baltic, Mediterranean, and Black Seas.

The Government is fully aware of the important role played by shipping in the economic development, welfare, and prestige of the nation. Shipping has become one of the best sources of revenue so far as foreign exchange is concerned, but chartering of foreign ships, with resultant substantial expenditures of foreign exchange, is still necessary. In this connection, East German policy aims to increase the size of the fleet to reduce the need for chartering and to increase foreign exchange earnings. Also, political motivations in building a merchant marine are that a sizable fleet will give the country greater prestige in its pursuit of international recognition as a sovereign state and will strengthen its policy of influencing less-developed countries toward world communism. While there is no official documentation as to East Germany's goals for development of the merchant marine, it is estimated that by 1975 they will have 200 ships totaling 1.8 million d.w.t., and by 1980 there will be 250 ships totaling 2.5 million d.w.t.

About 8,000 officers and seamen are employed aboard the oceangoing and coastal ships. In addition, about 1,100 administrative workers are connected with the maritime fleet. These figures include about 1,300 women, roughly half of whom are employed aboard ships as purser, stewardesses, labor-union organizers, secretaries, and cooks. Foreigners may be hired to serve on East German merchant ships, but only on the basis of interstate agreements or, during cruises abroad, when maintenance of ship operations calls for such a measure. Membership in the Socialist Unity Party of Germany (SED) is not compulsory, but failure of maritime personnel to become members can have an adverse effect on advancement. There is an acute shortage of qualified seamen, especially officers, primarily because of poor working conditions and low pay. The situation was further aggravated when East German industrial concerns instituted a 5-day 43-hour workweek in 1967. In an effort to alleviate this condition, the division of crews into deck and engine-room personnel was abolished in late 1969 and "complex brigades" (*Komplex-brigades*) as general-purpose crews were introduced on merchant ships to reduce the size of crews, to meet the requirements of marine automation, and to have a labor force on hand to work on any part of the ship. Membership is voluntary in the Power, Post, and Transportation Union, one of 15 industrial and nonindustrial unions under the control of the Communist-controlled-and-staffed Free German Trade Union Federation (FDGB), which is the only trade union organization in East Germany. However, it is considered the duty of every worker to join, and membership is almost universal among wage earners.

On 1 September 1969 the Merchant Marine Academy in Ostorfhof Wustrow and the Ernst Thaelmann Engineer School for Ship Engineering at Warnemuende were consolidated into the Maritime School for Navigation and Ship Engineering, which has administrative offices at Warnemuende. Locations of the schools were to remain the same. The Maritime School can train about 1,000 students each year. The DSR Vocational Trade School (BBS), which began operations in February 1967 at Rostock, provides training for apprentice sailors. Newly hired

deckhands, assistant engine attendants, cooks, and stewards attend a 3-week orientation course at the School Center, also located in Rostock.

I. Civil air (C)

Civil-air activities are conducted by the governmental air carrier INTERFLUG, an enterprise responsible for air-transport services, general-aviation services, and operation of civil airports and supporting facilities. INTERFLUG is directly subordinate to the Main Administration for Civil Aviation (HVZL) the civil aviation agency of the Ministry for Transport. The government exercises complete control over all civil-flight activities, and private ownership or operation of civil aircraft is prohibited. It is estimated that in the event of war or other national emergency the full strength of the civil-air transport enterprise would be placed at the disposal of the military.

East Germany is not a member of the International Civil Aviation Organization (ICAO) or of other regulatory bodies for the conduct of international air services. It has entered into formal bilateral air-transport agreements providing for the exchange of scheduled air services with Cuba and all European Communist nations except Albania. Services to Tirane are carried out by a special arrangement between INTERFLUG and an Albanian agency. INTERFLUG, along with the five other Eastern European carriers, is party to the "Six-Pool Agreement," a multilateral accord that promotes cooperation between Communist airlines with special emphasis on pooling revenues on parallel services and a mutual exchange of supporting services. Air-transport agreements or arrangements with non-Communist countries have been negotiated with only a few governments. There are known formal agreements with Iraq, Syria, Sudan, Finland, Egypt, and Ceylon, and evidence suggests that informal agreements or arrangements exist with Algeria, Guinea, Lebanon, Cyprus, Sierra Leone, Denmark, and Austria.

It is under some of these agreements and arrangements that INTERFLUG operates abroad, and East Berlin is served by the carriers of the other European Communist states (except Albania, which has no carrier) and *Cubana de Aviacion*, the Cuban airline. Egyptair, KLM-Royal Dutch Airlines, SAS-Scandinavian Airlines, AUA-Austrian Airlines, and Iraqi Airways are the non-Communist carriers providing scheduled services to East Germany.

Air-transport operations are centered at Schoenefeld Airfield in East Berlin and are used internally for moving government and industry officials and for shifting priority cargo. The small size of East Germany and the efficiency of the rail and road systems limit the demand for domestic air services. On the other hand, continuing efforts are made to expand international operations of INTERFLUG, prompted by East German belief that it can gain a wider degree of international acceptance and prestige by entering into bilateral air-transport agreements with non-Communist states.

INTERFLUG's scheduled domestic network includes year-round service to and between five major cities in East Germany—Rostock, Dresden, East Berlin, Erfurt, and Leipzig. Additional flights are scheduled from East Berlin to Leipzig for short periods in the spring and fall during the international industrial trade fairs. Most domestic flights are routed north and south where longer distances give INTERFLUG a greater time advantage over surface transportation.

International scheduled air services to non-Communist areas are routed from East Berlin to Cairo, Algiers, Bamako, Khartoum, Freetown, and Conakry in Africa and to Nicosia, Beirut, Damascus, and Baghdad in the Middle East. INTERFLUG also provides scheduled service to Copenhagen, Amsterdam, Helsinki, and Vienna. Scheduled flights to European Communist capital cities continue to dominate INTERFLUG's priorities, and additional service is flown regularly to Leningrad and Zagreb. In addition, INTERFLUG schedules summer flights to Bratislava and Tatry, Czechoslovakia, Krakow and Gdansk, Poland, and Kiev and Minsk, U.S.S.R. The carrier's international network is supplemented by charter services to meet increased traffic demands during the spring and fall trade fairs and during the summer vacation months. General-aviation services such as agricultural spraying, sightseeing, medical evacuation and aerial photography are also provided by INTERFLUG.

INTERFLUG's major-transport fleet numbers 28 Soviet-built aircraft, which include two Classic (Il-62) (Figure 11), five Curve (Tu-134) and 12 Coot (Il-18) used primarily on international flights and seven Cook (An-24) used on domestic routes. INTERFLUG operates a mixed fleet of about 30 aircraft and two or three helicopters for cropdusting and other airwork services. These smaller aircraft are adequately maintained and overhauled by INTERFLUG's engineering department, which also performs routine maintenance on the Curve, Coot, and Cook aircraft. Major maintenance and overhaul on the larger transports, such as the Classic, are

FIGURE 11. Soviet-built IL-62 aircraft such as the one shown here are workhorses of INTERFLUG's intercontinental airfleet (U/OU)

performed in the U.S.S.R. Aircraft spare parts and aviation fuels and lubricants are obtained from East Germany's Communist allies.

It is estimated that INTERFLUG employs about [illegible] personnel. Included in this total are about 250 pilots and copilots, 150 other flight personnel (navigators, radiomen, and flight engineers), and 600 maintenance and shop technicians. About 350 of the airline's employees, including 100 pilots and 90 maintenance technicians, are assigned to agricultural and airwork services. INTERFLUG's headquarters, training facilities, and maintenance installations are located at Schonefeld Airfield. A small civil aviation academy operated by the carrier at the airfield offers basic courses for new employees and refresher training for experienced ground flight personnel. INTERFLUG's flight crews and ground technicians are primarily recruited from the East German Air Force and many retain reserve status while employed by the carrier. A few employees are drawn directly from aeroclubs associated with the Society for Sport and Technology (GST), a youth organization that prepares East Germans for service with the armed forces. In addition to training provided at Schonefeld, INTERFLUG crews receive transitional training in the Soviet Union when new types of aircraft are introduced into the civil air fleet.

Soviet Union domination over INTERFLUG operations is so obvious that it is almost taken for granted. The East Germans have consistently purchased their major transport aircraft from the Soviet Union, and their pilots are trained in the Soviet Union. Major repair and overhaul and aircraft fuel is provided by the Soviet Union or one of its Eastern European allies. The civil aviation resources of East Germany continue to remain tightly integrated with and dependent upon the Soviet Union.

J. Airfields (S)

East Germany has [illegible] identified airfields having runways 2,000 feet or greater in length. Military fields number 84, one is joint usage, and [illegible] are civil. The military total consists of 37 airfields having permanent-surface runways in excess of 7,000 feet in length, 31 large nonpermanent-surface dispersal deployment fields, eight highway landing strips, [illegible] large graded earth strips located in military training areas, and 11 smaller airfields which primarily support light aircraft and helicopters at training bases and logistic activities.

Military and civilian aircraft jointly use the maintenance facilities at Dresden Airfield. However, not included in the joint use classification are those military airfields occasionally used by aeroclub light aircraft and civil airfields used on occasion by military transport aircraft or for subsequent jet fighter deployment.

The major airfields are distributed throughout the whole of East Germany, but the majority lie south of an east-west line through Berlin. This condition is a result of most of the dispersal deployment fields being in the south, whereas home bases of military aircraft are about evenly divided between the north and south.

Although they may be considered rather spartan by U.S. standards, East German airfields have adequate support and service facilities for routine operations. Of the 37 permanent-surface military fields, 24 have

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home-based combat aircraft in regimental or greater strength. Others support trainers, transports, or helicopters in large numbers and are used for periodic deployment exercises, and five serve only as deployment bases having no home-based aircraft. Also, certain of the large nonpermanent-surface fields are used regularly for short-term deployment exercises, with temporary support equipment deployed in place during periods of use. Others are used at irregular intervals, and some have no known use. The large graded-earth strips at military training areas have been developed in recent years, but their ultimate purpose has not yet been discerned. It is likely that they will serve logistic aircraft rather than fighter deployments.

Active and passive defenses are present at most airfields. Since 1967, when aircraft-revetment construction began, a program of hardening airfield facilities has been underway, first at airfields occupied by the Soviet Air Force and in 1972 at East German Air Force bases. Hangarettes, each capable of housing one jet fighter aircraft, are for the most part concrete arch structures bunkered with earthen embankments and equipped with heavy metal doors. The usual number of such structures is 40 per airfield. However, at some Soviet-occupied fields there are only 10 hardened hangarettes, but these are larger types, and their basic structure is steel frame rather than concrete arch. Antiaircraft artillery and/or surface-to-air missile sites are on or near most active military airfields.

FIGURE 12. Selected airfields (5)

NAME AND LOCATION	LONGEST RUNWAY SURFACE, DIMENSIONS, ELEVATION ABOVE SEA LEVEL	LARGEST AIRCRAFT NORMALLY REPORTED	REMARKS
	Feet		
Alt Lonnewitz 51°23'N., 13°13'E., 7.5 miles E. of Torgau.	Concrete 8,400 x 200 200	MiG-21 (Fishbed)	Soviet Air Forces; 6 hangars, extensive support facilities; 40 hardened hangarettes
Brieseh 52°03'N., 12°43'E.	Concrete 5,200 x 200 200	Il-28 (Beagle)	Soviet Air Forces; Nonsoviet-built airfield, extensive dispersal parking, 10 steel-frame hardened hangarettes
Dresden 51°08'N., 13°46'E.	Concrete 8,200 x 330 720	Il-14 (Crate)	Joint Repair and maintenance of East German Air Force (DDAF) and INTERFLUG aircraft
Dreesta 51°43'N., 14°22'E.	Concrete 8,200 x 200 200	Il-28 (Beagle)	DDAF, MiG-21 (Fishbed), and MiG-17 (Fresco) aircraft stationed here
Gross Dolln 53°07'N., 13°32'E.	Concrete 11,300 x 260 210	Il-28 (Beagle)	Soviet Air Forces; largest airfield in East Germany, built to Soviet heavy-bomber airfield specifications, 40 hardened hangarettes
Kothen 51°43'N., 11°58'E.	Concrete 8,200 x 200 310	MiG-21 (Fishbed)	Soviet Air Forces; used by jet fighters since 1951, 40 hardened hangarettes
Oranienburg 52°44'N., 13°13'E.	Concrete 8,200 x 170 110	An-8 (Camp)	Soviet Air Forces; POL storage capacity greatly increased in recent years
Peenemunde 54°10'N., 13°47'E.	Concrete 7,900 x 150 100	MiG-21 (Fishbed)	DDAF, hardened hangarette construction underway in 1972
Preschen 51°40'N., 14°38'E., just SE. of Jocksdorf.	Concrete 8,200 x 260 330	MiG-21 (Fishbed)	DDAF, MiG-21 (Fishbed) aircraft stationed here
Schonefeld 52°23'N., 13°31'E.	Concrete 9,800 x 200 152	Tu-104 (Camel)	INTERFLUG, international airport
Welzow 51°35'N., 14°08'E.	Concrete 8,200 x 260 370	Yak-28 (Brewer)	Soviet Air Forces; extensive dispersal parking, separate dispersal area, 10 steel-frame hardened hangarettes
Wernerchen 52°29'N., 13°48'E.	Concrete 8,200 x 260 270	Yak-27 (Mangrove)	Soviet Air Forces; 7 hangars; extensive support facilities 10 steel-frame hardened hangarettes

East Germany's airfield network is fully adequate to support sustained military air operations, and it probably could support additional jet-fighter regiments if the Soviets were to deploy to forward areas. Cross Delta could definitely support Soviet heavy bombers, and several other fields having 8,200-foot runways could sustain medium- or heavy-bomber activities. Details of selected airfields are given in Figure 12.

K. Telecommunications (S)

Telecommunication (telecom) systems in East Germany adequately satisfy political, economic, and military requirements. The development level equals or exceeds the levels attained in other Soviet-oriented countries but is below those of most Western nations. Services include domestic and international telephone, telegraph, radiobroadcast, and TV facilities.

Civil telecom networks are based on a state or district (Bezirk) structure. Construction, administration, and operation of the networks is a task of the Ministry for Post and Telecommunications (MPT). The MPT also has some responsibilities for research and the production of prototype equipment. In 1971 there were 120,000 employees, 67% of which were females. To maintain a high technical level, all technicians are educated in a number of MPT schools. Government wire-line communication, including those of the Ministry for National Defense, are generally transmitted on MPT channels. The German State Railways and the national power system, however, operate their own networks.

The telephone is the primary medium of communication. All urban, most intercity, and part of the international telephone switching circuits are automatic. Exchange switching equipment is mainly of the Strowger selector type, but crossbar equipment is used at a few installations. Approximately 2,185,000 telephones are in use.

Telegrams are accepted at post offices in written form or at telegraph offices by telephone. They are also accepted from subscribers over the telex (private teleprinter subscriber service) network for onward transmission by telegraph offices. Automatic telex links are available to 18 countries. Telegrams are distributed via main telegraph offices in each of the district capitals and by the central telegraph offices in East Berlin and Leipzig.

A black-and-white program is broadcast by 12 regional and seven local TV stations, which, together with 125 low-power rebroadcast stations, reach more than 99% of the population. Since 1961 a second program, in color, has been broadcast by five stations using the SECAM system. National studios in East Berlin and regional studios in Rostock and Leipzig distribute programs over microwave relay links with extension into Poland and Czechoslovakia. As of January 1972 about 4.5 million television sets were in use.

The AM broadcast network has transmitter facilities in 19 cities. East Germany has about 6 million radio sets. AM and FM programs can be received nationwide and, additionally, AM programs are broadcast in foreign languages for international audiences. Program planning is under control of the National Broadcasting Committee. Primary studio and transmitting installations are in East Berlin; secondary studios are in Leipzig and other large communities. Four of the main broadcast transmitter stations are in or near East Berlin. One is in the Koepenick sector of the city, and the others are at Koenigs Wusterhausen, Nauen, and Zehlendorf. The station at Nauen, the largest in the country, has transmitters occupying at least three separate buildings and include HF transmitters used primarily for foreign broadcasts. Transmitters have power outputs of 5, 50, and 100 kilowatts. Key FS facilities are at East Berlin, Bracken, Dequede, Dresden, Gross Inselberg, Leipzig, Madlow, and Schwerin.

The TV network, centered at a new transmitter site in East Berlin, broadcasts two programs. Stations broadcasting Program I use the Western European CCIR-line transmitting standards instead of those used by other Eastern European Communist countries. Stations broadcasting Program II are equipped to broadcast color programs on UHF channels and use the French SECAM transmission system. Stations in Program I and Program II networks are collocated in towers also housing FM transmitter and facilities for distributing TV programs.

The radio-relay network provides supplementary intercity telephone channels and circuits for TV-program distribution. Equipment includes RVG-938 and RVG-960 radio-relay sets providing up to 600 telephone channels and RVG-962 and RVG-961 sets providing two TV channels or one TV channel and 960 telephone channels. RVG equipment is manufactured by RAFENA, a government-owned firm at Radeberg.

The long-distance network consists of a ring of coaxial and multiconductor cables encircling the East Berlin area. The section of the East Berlin Ring that connects Potsdam, Zeuthen, Strausberg, and Bernau has twin Type-17 coaxial cables, each containing one coaxial tube having a 9.1-millimeter

one and eight star quads. These cables provide one TV channel or 960 telephone channels on the coaxial tubes and 480 telephone channels on the star quads. The remaining section of the ring, Bisenthal-Oranienburg-Potsdam, is composed of multiconductor cables; some contain 97 pairs, and some are quadded for carrier-frequency (CF) operation. Cables connect the main long-distance center on Dottitzsee and the Wilhelmstrasse exchange to the East Berlin Ring at Strausberg, Bisenthal, Brandenburg, Potsdam, Zeuthen, and other points. Alternate routes are thus provided if East Berlin switching centers should become inoperative.

The principal routes beyond the East Berlin Ring consist of southern and northern loops that converge at points on the coaxial cable between Magdeburg and Gueldendorf. The southern loop has twin coaxial cables linking Magdeburg, Halle, and Leipzig. Elsewhere on the southern loop, Leipzig, Karl-Marx-Stadt, Dresden, Cottbus, and Gueldendorf are connected by twin eight-pair multiconductor cables. District capitals Gera, Erfurt, and Suhl are connected to the southern loop by a separate outer loop consisting of a variety of multiconductor cables, some of which are carrier-equipped for up to 12 telephone channels. The northern loop begins at Gueldendorf and includes Eberswalde, Neubrandenburg, Stralsund, Rostock, Schwerin, Stendal, and Magdeburg. Most of the cables along this route have eight to 10 pairs, some connected in quads, and are equipped with 60-channel carrier apparatus. East Berlin has the heaviest concentration of telephones. The main exchange, handling two 6,000-line exchanges, is located on Dottitzsee, the second largest exchange is in Leipzig.

International telecom connections are provided by coaxial, multiconductor, and submarine cables; open-wire lines; radio-relay links; and radiotelephone communication facilities. These facilities are interconnected with domestic networks through principal international switching centers in Dresden, East Berlin, Karl-Marx-Stadt, Leipzig, and Rostock. Submarine cables provide telephone and telegraph circuits to Denmark and Sweden. A four-tube coaxial cable interconnecting East Germany with Czechoslovakia, Poland, and the U.S.S.R. is in operation along the route East Berlin-Dresden-Prague-Brno-Katowice-Lvov-Kiev-Moscow. Two of the tubes are being used to exchange TV programs in the Intervision network, and 60-channel CF equipment provides 300 speech channels. The two remaining tubes have a designed capacity of 960 duplex speech channels.

Civil communications between East Germany and West Germany are routed through the Leipzig exchange and are currently limited to 75 telephone and 35 telex channels. East Germany has direct telegraph channels to 22 countries and West Berlin. The international automatic public telegraph (GENTEX) exchange in East Berlin has direct channels to all Warsaw Pact capitals. Fully automatic telex links are available with Budapest, Copenhagen, Helsinki, Moscow, Prague, Sofia, Vienna, Warsaw, and Zurich, and semiautomatic links are in use with Amsterdam, Belgrade, Brussels, Bucharest, Milan, Oslo, and Paris.

Interchange of East Bloc Intervision programs with the West European Eurovision programs is made via the Brocken relay station. International programs are also exchanged over the four-tube coaxial Friendship cable that joins East Berlin, Prague, Katowice, and Moscow.

The Ministry for State Security operates high-frequency radio transmitting and receiving stations. These stations have a worldwide range and are used for communicating with agents, radio monitoring, and administrative purposes.

The Group of Soviet Forces in Germany (GSFG) maintains and operates its own open-wire network. The network connects all Soviet installations in East Germany, and trunk routes are available to the Northern Group of Forces (NGF) headquarters in Legnica, Poland, and back to the Soviet Union. Since 1967 the Soviets have constructed the GSFG Area Communications System (GACS), a fixed microwave radio-relay network of 24 stations whose equipment is housed in underground bunkers. A twin-dish tropospheric-scatter terminal, at Zossen-Zehrendorf, is linked by radio-relay to the NGF, the Central Group of Forces (CGF) headquarters in Milovice, Czechoslovakia, and the Soviet Union. The main GSFG transmitting station is located at Saalow, 5 kilometers west of Zossen.

The East German power system operates a nationwide telecom network over the national power distribution grid.

The East German Socialist Unity Party (SED) maintains and operates a microwave radio-relay network which connects the national headquarters in East Berlin with the party's district (Bezirk) and county (Kreis) offices. The relay network is routed via 67 well-guarded brick or concrete towers that contain RVC-924 and RVC-934 equipment providing eight and 24 telephone channels, respectively.

Communications of the East German Armed Forces are mainly over CF channels in MPT cables. The

communication center is in Strausberg. The Ministry for National Defense (MINDEF) has its own radio-relay network and utilizes the towers of the SED network where convenient. Within the towers, however, the MINDEF has installed its own equipment. Since 1967, microwave radio-relay routes have been constructed between Air Defense Force Headquarters, Eggersdorf, to Air Defense Division Headquarters at Cottbus and Neubrandenburg. The network utilizes RVC-934 24-channel equipment. Terminals are located at the divisional command posts of Kolkwitz and Cudpin.

Radio Augen operates a coastal transmitting station at Lohme and a receiving station at Glowe.

The German State Railways operates a special telecom system entirely independent of MPT facilities. Automatic switching facilities provide telephone and telegraph service. The system is divided into eight zonal directorates with headquarters in East Berlin, Cottbus, Dresden, Erfurt, Greifswald, Halle, Magdeburg, and Schwerin. The primary zonal exchange, at Markgrafenstr. 24, East Berlin, is connected with each zonal directorate exchange. Zonal exchanges generally contain a MPT cable terminal, through which connections with the public telecom system can be made.

The telecom industry consists of 50 or more plants situated principally in the areas of Berlin, Dresden, and Leipzig. Telephone and telegraph equipment, components, cable and wire, television receivers, and radio equipment, including transmitters and radio-relay devices, are produced in quantities sufficient to fill all domestic needs and to allow for exports in significant volume. Tactical radio sets, principally of the "R" series, which are uniform throughout the Warsaw Pact countries, are obtained from other Communist countries, chiefly the Soviet Union.

Telecom equipment factories, universities, technical high schools, and telecom agencies maintain laboratories and institutes where research and development projects are conducted, primarily for producing specific items. State universities, technical high schools, apprentice training programs, and military schools train a sufficient number of telecom technical personnel.

Several development plans have been made, including the complete automation of domestic and international telephone systems. The TV system is being expanded by installing a UHF network.

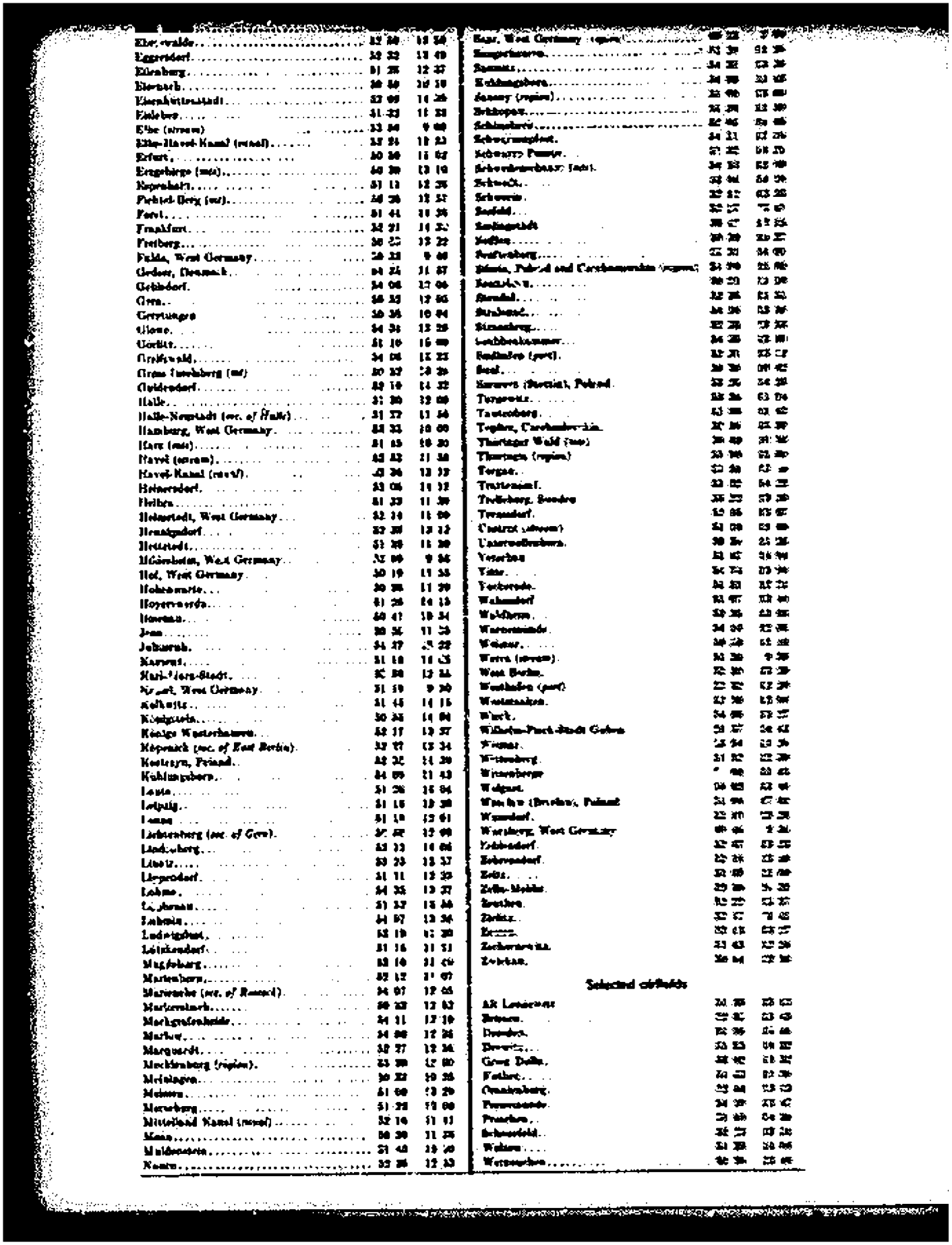
Glossary (u/ou)

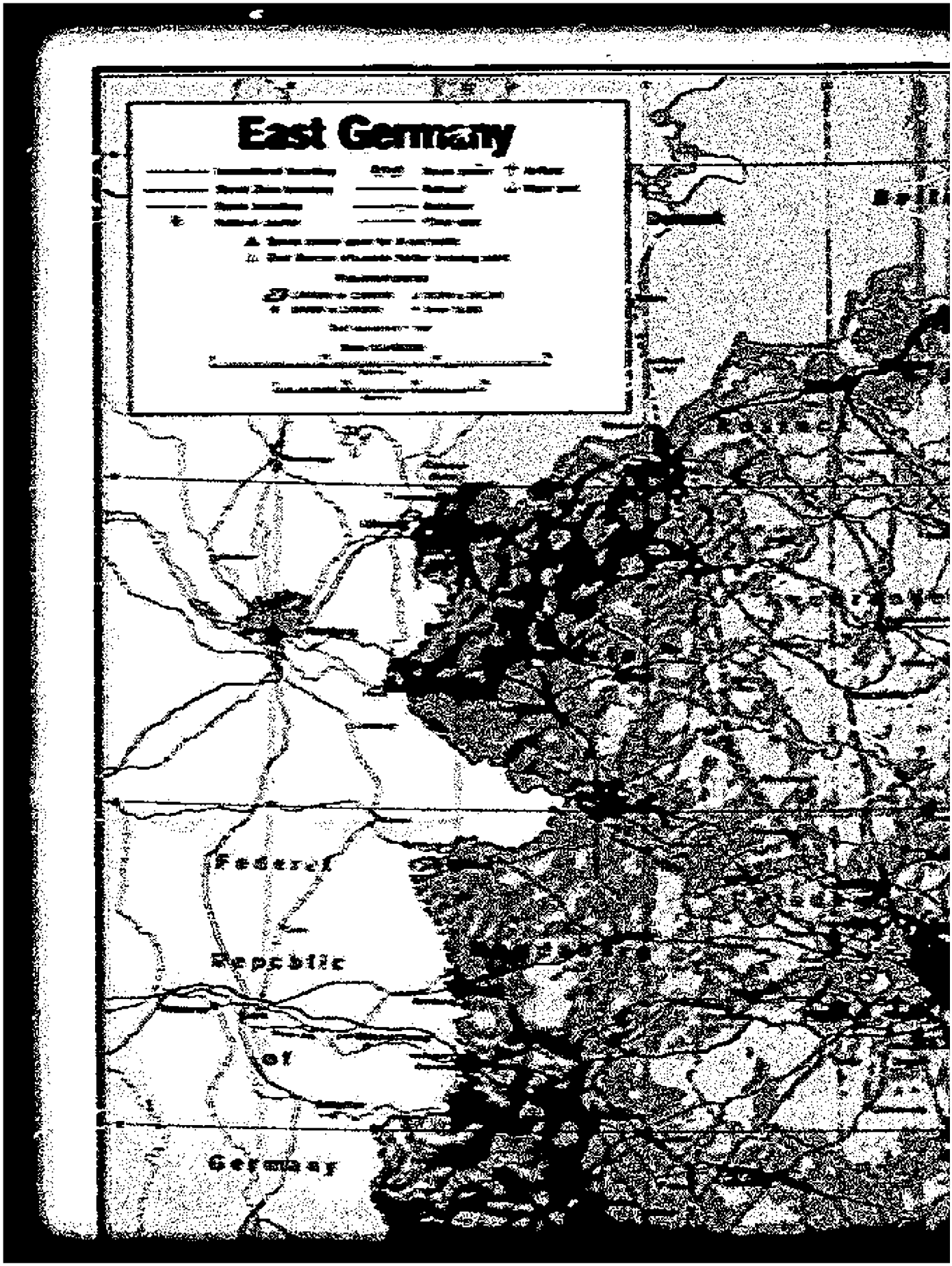
Abbreviation	Foreign	English
BBS	*Berufsbeförderungsschule*	Vocational Trade School
DSR	*Deutsche Binnenreederei*	German Inland Waterways Shipping Company
DR	*Deutsche Reichsbahn*	German State Railways
DSR	*VEB Deutsche Seereederei*	East German Sea Shipping Company
FDGB	*Freie Deutsche Gewerkschaftsbund*	Free German Trade Union Federation
GST	*Gesellschaft für Sport und Technik*	Society for Sport and Technology
HVZL	*Hauptverwaltung der Zivilen Luftfahrt*	Main Administration for Civil Aviation
INTERFLUG	*Gesellschaft für Internationale Flugverkehr mbH*	German International Airline
OSShD	*Organizatsiya Sotrudnichestva Zheleznykh Dorog* (Russian)	Organization for the Cooperation of Socialist Railroads
UIC	*Union Internationale des Chemins de Fer* (French)	International Union of Railroads
...	*Seefahrtschule*	Merchant Marine Academy
...	*Ingenieurschule für Schiffbautechnik*	Engineer School for Ship Engineering
...	*Ingenieurschule für Schiffsführung und Schiffstechnik*	Maritime School for Navigation and Ship Engineering
...	*VEB Bagger, Eugier und Bergungsbetrieb*	People-owned Enterprise for Dredging, Towing, and Salvage Operations
...	*VEB Deutfracht—Internationale Befrachtung und Reederei*	People-owned Enterprise, International Chartering and Shipping Company
...	*VEB Schiffswerft*	People-owned Enterprise, Ship Builders
...	*VEB Rostocker*	People-owned Enterprise, Seaports
...	*Weiße Flotte*	White Fleet

NOTE—VEB translates literally as People-owned Enterprise but is usually used in connection with State-owned Enterprise.

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

	Coordinates °′N.	°′E.		Coordinates °′N.	°′E.
Adlershof (sec. of East Berlin)	52 27	13 32	Naumburg	51 09	11 48
Altenburg	50 59	12 27	Neisse (stream)	52 01	14 46
Aue	50 34	12 42	Neubrandenburg	53 34	13 16
Babelsberg	52 24	13 06	Neustrelitz	53 22	13 05
Bad Elster	50 17	12 14	Niederfinow	52 50	13 56
Bad Hersfeld, West Germany	50 52	9 42	Niemegk	52 04	12 42
Bad Schandau	50 55	14 09	Oberhof	50 42	10 44
Barnim	52 58	14 08	Oder (stream)	53 33	14 36
Harbeit	51 26	13 02	Oder-Havel-Kanal (canal)	52 53	14 07
Baruth	51 27	13 46	Oder-Spree-Kanal (canal)	52 23	13 41
Bautzen	51 11	14 26	Oranienburg	52 45	13 14
Bergen	51 25	13 26	Osnabrück, West Germany	52 16	8 03
Berlin	52 31	13 24	Osthafen (port)	52 27	13 25
Biesenthal	52 46	13 36	Ostseebad Wustrow	54 21	12 24
Bitterfeld	51 37	12 19	Paderborn, West Germany	51 43	8 40
Blankenhain	51 31	11 25	Pankow (sec. of East Berlin)	52 34	13 24
Böhlen	51 12	12 23	Parow	54 21	13 05
Boizenburg	53 23	10 43	Pätz	52 14	13 39
Bonn, West Germany	50 44	7 06	Peenemünde	54 08	13 47
Boxberg	51 24	14 34	Peitz	51 59	14 21
Brandenburg	52 25	12 33	Piesteritz	51 52	12 36
Brandenburg (region)	52 00	14 00	Plauen	50 30	12 08
Braunschweig, West Germany	52 16	10 32	Pomerania (region)	53 40	15 00
Bierge	54 27	13 31	Potsdam	52 24	13 04
Belesen	52 03	13 43	Prague, Czechoslovakia	50 05	14 25
Brocken (peak)	51 48	10 37	Radeberg	51 07	13 55
Buch (sec. of East Berlin)	52 38	13 30	Rheinsberg	53 06	12 53
Bug	54 37	13 13	Riems (island)	54 10	13 22
Calvörde	52 24	11 18	Riesa	51 18	13 16
Cölpin	53 31	13 26	Rosendorf	51 03	15 44
Cottbus	51 46	14 30	Roßlau	51 53	12 15
Crossen	50 46	12 29	Rostock	54 05	12 08
Dänholm (island)	54 18	13 07	Rothensee	52 11	11 40
Danube (stream)	45 20	29 40	Rudenitz	50 25	12 01
Darsser Ort (cape)	54 29	12 31	Rügen (island)	54 25	13 21
Dequede	52 50	11 41	Rummelsburg	52 30	13 31
Dessau	51 50	12 15	Saale (stream)	51 57	11 55
Dresden	51 03	13 45	Saalfeld	50 39	11 22
East Berlin	52 30	13 25	Saalow	53 12	13 53
Eberswalde	52 50	13 50	Saar, West Germany (region)	49 15	7 00
Eggersdorf	52 32	13 49	Sangerhausen	51 28	11 18
Eilenburg	51 28	12 37	Sassnitz	54 31	13 39
Eisenach	50 59	10 19	[illegible]	51 09	10 43
Eisenhüttenstadt	52 09	14 39	Saxony (region)	51 00	13 00
Eisleben	51 33	11 33	Schkopau	51 24	11 50
Elbe (stream)	53 50	9 00	Schönebeck	53 01	14 42
Elbe-Havel-Kanal (canal)	52 24	12 22	Schwarzenpfost	54 11	13 16
Erfurt	50 59	11 02	Schwarze Pumpe	51 32	14 21
Erzgebirge (mts)	50 30	13 10	[illegible] (mts)	50 33	13 09
Espenhain	51 11	12 25	Schwedt	53 01	14 16
Fichtel-Berg (mt)	50 26	12 57	Schwerin	52 17	13 54
Forst	51 44	14 38	Seefeld	52 37	13 41
Frankfurt	52 21	14 32	Seelingstädt	50 47	12 14
Freiberg	50 55	13 22	Seiffen	50 39	13 27
Fulda, West Germany	50 33	9 40	Senftenberg	51 31	14 01
Gedser, Denmark	54 35	11 57	Silesia, Poland and Czechoslovakia (region)	51 00	16 00
Gehlsdorf	54 06	12 08	Sonneberg	50 21	11 10
Gera	50 52	12 05	Stendal	52 36	11 51
Gerstungen	50 55	10 01	Stralsund	54 18	13 06
Glowe	54 34	13 28	Strausberg	52 35	13 53
Görlitz	51 10	15 00	Stubbenkammer	54 35	13 40
Greifswald	54 06	13 23	Südhafen (port)	52 31	13 12
Gross Inselsberg (mt)	50 52	10 28	Suhl	50 36	10 42
Guldendorf	52 19	14 18	Szczecin (Stettin), Poland	53 25	14 35
Halle	51 30	12 00	Teterow	53 35	11 14
Halle-Neustadt (sec. of Halle)	51 29	11 50	Tautenburg	51 00	11 43
Hamburg, West Germany	53 33	10 00	Teplice, Czechoslovakia	50 38	13 50
Harz (mts)	51 45	10 30	Thüringer Wald (mts)	50 40	10 50
Havel (stream)	52 53	11 58	Thuringia (region)	51 00	11 00
Havel-Kanal (canal)	52 34	13 19	Torgau	51 34	13 00
Heinersdorf	52 09	14 17	Trattendorf	51 37	14 33
Helbra	51 33	11 30	Trelleborg, Sweden	55 22	13 10
Helmstedt, West Germany	52 14	11 00	Tremsdorf	52 10	13 07





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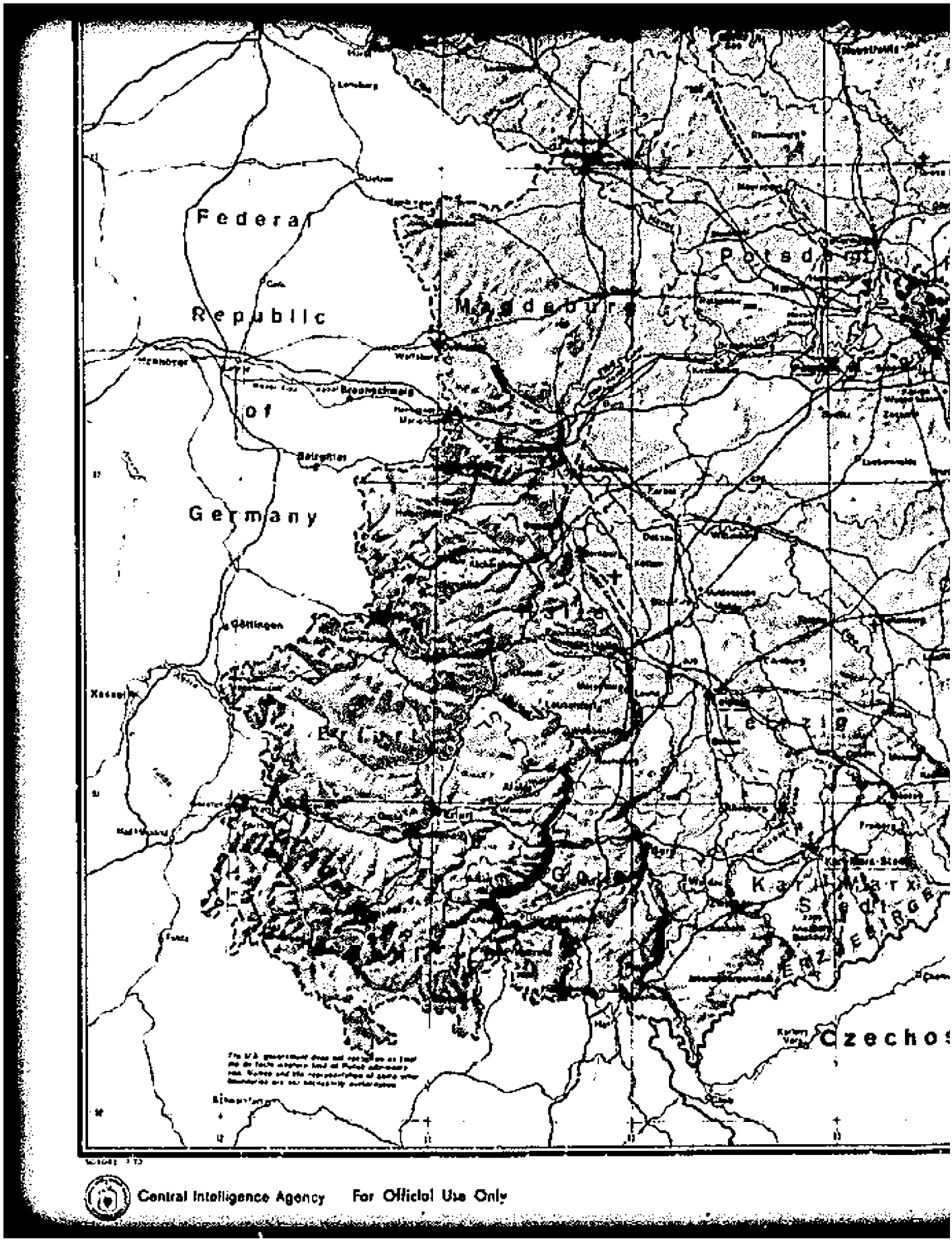

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Terrain and Transportation Figure 13