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Transportation an
Telecommunication

Czechoslovakia

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NATIONAL INTELLIGENCE SURVEY

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This chapter was prepared for the NIS by the Defense Intelligence Agency and includes a contribution on Merchant Marine from the Department of the Navy. Research was substantially completed by December 1973.

Czechoslovakia

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Transportation and Telecommunications

A. Appraisal (S)

Czechoslovakia has well-developed transportation and telecommunication (telecom) networks, and all the state-operated systems are adequate for current economic needs. The transportation and telecom networks carry large amounts of traffic; there are good rail, highway, airline, and waterway connections to adjacent countries.

The western part of Czechoslovakia is heavily populated and industrialized; Prague and seven surrounding regions (the Czech lands) account for more than two-thirds of the total population. The eastern part is mountainous, sparsely populated, and relatively inaccessible. Reflecting these factors, transportation facilities in western Czechoslovakia are far more extensive than those in the east. Except for the high-capacity heavily trafficked Cierna nad Tisou[1]–Prague rail line, east-west transportation facilities are limited.

Rail is the most significant mode of transportation. Highways serve mainly as a short-haul supplement to the railroads. Statistics for 1972 show that of the three principal means of surface transport, rail accounted for about 80%, highways for some 15%, and waterways for about 5% of the total 51.8 billion ton-miles. In the same year, railroads carried about 24%, highways slightly more than 75%, and waterways less than 1% of the total tonnage moved. The contribution of waterways to the national transport system, although significant, is small, largely because of the sparsity of routes and their lack of interconnection. An extensive system of pipelines for moving oil and gas provides an important complement to the surface transport facilities; of major importance is the CEMA (Friendship) international pipeline.

The rail, highway, and airline systems serve all the important economic centers of the country. Although the railroads have a freight-car shortage that prevents them from meeting peak demands, the lines are rated among the most efficient of those of the Eastern European Communist nations, and the highways, although inferior to those of most Western European countries, compare favorably with those of other European Communist countries. Domestic air-carrier services move only a small portion of the total passenger and cargo traffic, but the government is making every effort to encourage public use of air-transport services.

Direct exchange of rail equipment of the standard-gage (4′8½″) Czechoslovak network is made with all adjacent countries except the Soviet Union, which has a 5′0″ broad-gage system. The most important facilities for transloading freight from Soviet to Czechoslovak rolling stock are located at Cierna nad Tisou, and supplementary facilities are at Vel'ke Kapusany. A significant development in recent years is the 57-mile extension of a Soviet broad-gage line to Kosice. Numerous highway connections are made with East Germany, Poland, the U.S.S.R., Hungary, Austria, and West Germany. International connections via inland waterways provide economical means of transport for cargo moving between Czechoslovakia and ports on the North, Baltic, and Black Seas.

The international air-route network of Czechoslovakia is, among Communist air carriers and in terms of points served and number of flights, second only to the international air-route network of the U.S.S.R. The Czechoslovak air carrier—CSA—links Prague with key cities in Europe, West Africa, the Middle East, South and Southeast Asia, Cuba, and North America (Montreal and New York).

The government owns all transportation modes and telecommunications. Control is vested in the Ministry of Transportation. Railroads are operated by the Czechoslovak State Railways. All highway-transport services are nationalized and are carried out from motor-transport centers in major cities. The Czechoslovak Elbe-Oder Navigation Co. and the Czechoslovak Danube Navigation Co. control all inland-waterway operations. The ministry exercises control of air transport and airwork services through the Civil Aviation Administration.

Telecom facilities are among the best of the Communist countries and include modern telephone, telegraph, telex (teleprinter subscriber exchange), facsimile, radiobroadcast, and TV services.

Czechoslovakia, although landlocked, transports a significant amount of its foreign trade by sea, principally through foreign ports on the Baltic, North,

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

Black, and Adriatic Seas. The government depends heavily on foreign-flag ships to carry the country's foreign trade; in 1972 Czechoslovak ships carried less than 10% of the 4.5 million tons of foreign seaborne trade.

Except for the merchant marine, for which there are no expansion plans, improvement and expansion of the transportation and telecom facilities are in various stages of planning or implementation. As to the railroads, main emphasis is being placed on improvement of the existing lines rather than on construction of new ones; major projects underway include the reconstruction and enlargement of rail junctions in several key centers and electrification of several lines between Prague and several main cities. The highway modernization program aims to eliminate serious bottlenecks, improve existing roads, and establish an expressway system of cross-country routes. A main objective is to have 80% of the national roadnet paved by 1975; long-range plans call for expressways from Prague to the borders of all adjacent countries by 1990. Inland-waterway transport improvements underway or planned include reconstruction of locks and dams, port modernization, new container terminals, and fleet improvement and expansion. Additional pipelines are under construction or planned for the near future. There are no known plans for expansion of the merchant fleet. Some improvement of military airfields is underway, particular emphasis being on construction and improvement of defense installations. Telecom projects seek to eliminate any obsolete intercity systems and establish an automated long-distance telephone service.

B. Strategic mobility (S)

Czechoslovakia's transportation systems would play a strategic role in the event that Warsaw Pact Forces were committed against Western Europe and the NATO central front forces. However, the rail, highway, and inland waterway systems do have shortcomings and vulnerable points. Although adequate for current economic needs, the well-developed rail system would be severely taxed to sustain large-scale military movements. Major military operations in and through the country would be seriously hampered by a lack of alternative east-west routes, too few north-south routes, and the difference in gages between Czechoslovak and Soviet railroads.

The most important rail route is the 593-mile double-track electrified line from the U.S.S.R. border at Cierna nad Tisou to the East German border at Dolni Zleb. It provides the only east-west rail route through Czechoslovakia into East Germany for Soviet military movements. Major interdiction points along the route are the large classification yards at Cierna nad Tisou, Kosice, Ceska Trebova, Prague, and Usti nad Labem. Also vulnerable are the various large steel and concrete bridges crossing the Poprad, Vah, Morava, Elbe, and Vltava rivers. Special clearances on this line permit the use of U.S.S.R. rolling stock after Soviet-gage trucks are exchanged for standard-gage at the border. Should the need arise, Soviets could move more than 68,000 short tons of military supplies over this line in a 24-hour time period without disruption of civilian traffic.

A strategic north-south route runs along the Morava-Oder corridor from Ostrava, at the Polish border, to Bratislava, at the Hungarian border. This 164-mile double-track partly electrified line connects two of the country's major industrial areas and carries the greater share of international traffic from Poland to Czechoslovakia, Hungary, and Yugoslavia. Capacity of this route is over 79,000 short tons per 24 hours. Major interdiction points on the route are: the classification yards at Ostrava, Prerov, and Bratislava; the 670-foot concrete-arch bridge over the Vydrica River at Bratislava; and the 380-foot steel-plate-girder bridge over the Becva River at Prerov.

Another strategically important route is the 55-mile broad-gage line from the U.S.S.R. through Vel'ke Kapusany to Haniska. This line, with a daily capacity of 15,000 short tons, provides the Soviets with a second high-capacity rail route into Czechoslovakia and provides an alternate route for bypassing the highly congested Chop (U.S.S.R.)–Cierna nad Tisou transloading complex. However, because of its lack of bypasses, the route is extremely vulnerable to military action.

The highway network would provide a viable transport alternative for strategic movement during the initial phase of any major military operation. Practically all of the major routes are paved, and bypasses have been constructed around many urban areas. However, prolonged movement by tracked vehicles and heavy trucks would seriously damage most road surfaces. The road pattern throughout the western and central parts of the country provides considerable flexibility for motorized forces, but movement in Slovakia, the eastern part of the country, would be curtailed by the lack of north-south routes and the generally mountainous terrain. Offroad dispersal in that area would be difficult or virtually impossible (Figure 1). Effective interdiction would be

FIGURE 1. Road in mountainous eastern Czechoslovakia. Illustrated are terrain constraints on offroad movement. (U/OU)

difficult to achieve along a wide front because of the numerous alternate routes and bridges throughout most of the country—excepting Slovakia.

Although the two major systems comprising the inland waterways are not interconnected, each system provides significant logistical support routes. Main Elbe-system routes connect the strategically important areas of Kolin, Prague, Melnik, Usti nad Labem, and Decin to the East German waterway system, thence to the East German–West German border. The Danube River provides Komarno and Bratislava access to the Czechoslovakia–Austria border moving west, and to Hungary, Yugoslavia, Bulgaria, Romania, and the U.S.S.R. moving east as well as providing access to the lower Danubian river-maritime ports. The waterways lend themselves to Warsaw Pact logistical support of extended military operations as they are capable of moving large amounts of rations, POL (petroleum, oil, lubricants), ammunition, construction materials, and equipment. Most vulnerable are the lock-and-dam installations on the Elbe system, destruction of which would completely close through traffic by causing flooding and restrictive low water levels. Serious interdiction could also be accomplished by destroying the major ports on the Danube as well as those on the Elbe.

Military support by the Czechoslovak merchant fleet, based primarily at Polish ports, would be limited to logistic support of Warsaw Pact nations only.

Of the 10 oceangoing ships, at least 6 dry-cargo ships have a military lift and supply transport potential of 34,386 cargo deadweight tons for short-haul (48 hours steaming) nearseas operations. The four bulk-cargo ships would have only limited usefulness for logistic support; but, if accessible at the time of emergency, would also be assured for military support. Of the bulk-cargo ships, *Praha*, 32,240 d.w.t., has a heavy-lift capability with its 60-ton booms, and *Vitkovice*, 41,208 d.w.t., is equipped with a long hatch of 51 feet.

The lift capability could be augmented by an indeterminate number of smaller ships assigned to the inland waterway shipping companies.

No formal mobilization plan in regard to CSA and Slov-Air is known to exist. However, because of the status of the civil airlines as state-owned enterprises, civil aviation equipment and personnel could be absorbed into the military with little difficulty. Since most flight personnel are air force reservists, their conversion to the military during a national emergency could be quickly and easily performed. The 45 major transports would be of greatest value for their troop and cargo airlift potential. The light aircraft of Slov-Air could be used for a variety of military-oriented activities including reconnaissance, training, and medical evacuation.

The Czechoslovak military makes considerable use of the civil wire line facilities. Inasmuch as telecom facilities are owned by the government, integration or transfer of part or all of the networks from civil to military would be easy. In wartime, telecom facilities would come under complete control of the military.

C. Railroads (C)

The rail lines are owned and operated by the government and are administered through the Czechoslovak State Railways (CSD), an agency of the government under the jurisdiction of the Ministry of Transportation. The CSD is the principal carrier of domestic long-haul freight and also carries a large amount of international traffic. Because of the thickly forested, rugged mountainous terrain, the pattern of the railroad system has remained basically unchanged since its development under the Austo-Hungarian Empire. Since that time emphasis has been placed primarily upon increased efficiency of the existing lines rather than on new line construction. The main developments have been improvement of east-west routes to provide for increased traffic with the U.S.S.R.

and further improvement of north-south routes. These developments include elimination of unprofitable lines, rebuilding of trackage to increase axleload limits, double tracking and electrification of major routes, and use of automation for greater efficiency. The most recently completed projects include reconstruction and double tracking of the main line extending from Usti nad Labem to Most via Bilina and electrification of the Cheb-Plzen-Ceske Budejovice, Brno-Bratislava-Sturovo, and Novy Zamky-Komarno lines.

The 8,260-route-mile network consists of 8,080 miles of standard-gage (4'8½") lines, 110 miles of 3'3⅜" and 2'6" narrow-gage lines, and 70 miles of broad-gage lines; about 1,010 miles are double or multiple track, and 1,560 miles are electrified. In the 1970 CSD budget the major portion of funds was allocated for reconstruction and maintenance of tracks, yards, junctions, and stations. Other plans include installation of modern signaling; acquisition of new rolling stock, including a substantial number of four-axle cars; and procurement of additional diesel and electric locomotives. Complete conversion to electric and diesel traction was scheduled for 1970, but the modernization program has not progressed as anticipated, and completion is now expected in 1975.

The most important rail route is a 593-mile double-track electrified east-west line from the U.S.S.R. border at Cierna nad Tisou to the East Germany border at Dolni Zleb. This line, which connects many of the major rail terminals, passes through the heart of the country and carries most of the Soviet-Czechoslovak traffic as well as a large amount of domestic freight. Special clearances on the Cierna nad Tisou-Dolni Zleb line permit the use of the U.S.S.R. rolling stock after Soviet-gage trucks are exchanged for standard gage at the border. A strategic north-south route runs along the Morava-Oder corridor from Ostrava, at the Polish border, to Bratislava, at the Hungarian border. This 164-mile double-track partly electrified line connects two of the country's major industrial areas and carries the greater share of international traffic from Poland to Czechoslovakia, Hungary, and Yugoslavia. Another strategically important route is the 55-mile broad-gage line from the U.S.S.R. through Vel'ke Kapusany to the steel mill at Haniska. This line, completed in May 1966, provides an alternate route for bypassing the highly congested Chop, U.S.S.R.–Cierna nad Tisou transloading complex and is the deepest penetration of a Soviet broad-gage line into an Eastern European country.

Czechoslovakia has about 40 rail connections with adjacent Poland, East Germany, West Germany, Austria, Hungary, and the U.S.S.R. Equipment exchange is possible with all the countries except the U.S.S.R. The most important facilities for transloading freight between the broad-gage Soviet system and the standard-gage Czechoslovak system are at Cierna nad Tisou, 12 miles from the U.S.S.R. border; other facilities are at Vel'ke Kapusany.

Details on the principal railroad lines are given in Figure 2.

Major projects underway include reconstruction and enlargement of railroad junctions in Prague, Ceska Trebova, Bratislava, Ostrava, and Novy Zamky and electrification of lines between Prague and the terminals in Usti nad Labem, Most, Plzen, and Ceske Velenice. No new line construction is planned.

Principal lines of the system have axleload limits of 19.8 to 22 short tons per axle, and secondary lines have limits of 11 to 17.6 short tons. In 1972, 65% of the lines had axleloads of 20 or more tons. Bridges and tunnels are well built and adequately maintained. About 75% of the bridges are of steel, and the remainder are of masonry. The longest rail bridge, completed in 1955, is a 3,022-foot reinforced-concrete deck-arch bridge in the southern suburbs of Prague. In the past few years the CSD has been using some prefabricated reinforced and prestressed concrete structures for both new and replacement bridges. Most of the tunnels have masonry linings and portals, are ventilated, and have drainage systems. The longest tunnel (15,413 feet) is about 5 miles east of Horna Stubna on a single-track line that branches east from a junction with the Vrutky-Horna Stubna line.

Rail is standard T-section type and ranges in weight from 50 to 100 pounds per yard. Increased use of continuous welded rail is planned. All lines have crushed-stone or river-gravel ballast. Most of the ties are of treated wood (oak, beech, or pine), but increasing use is being made of concrete ties. Proper track maintenance is becoming increasingly difficult because of growing traffic, a shortage of qualified personnel, and a lack of domestically produced repair equipment. Centralized Traffic Control was installed on the Cheb–Plzen line in 1967, but further installations are not planned.

Sufficient domestic coal is available for railroad requirements. Most fuel for diesel and oil-fired steam locomotives originates in the U.S.S.R. Water, which is abundant throughout the system, normally requires treatment before use.

In 1972 the CSD carried 284.9 million short tons of freight and produced 41.2 billion ton-miles. Principal commodities carried are coal, building materials, ore, metal products, petroleum, industrial raw materials, wood, grain, and produce. In 1971 the CSD carried

FIGURE 2. Principal railroad lines (C)
(Standard gage-4'8½")

LOCATION AND LENGTH	PHYSICAL CHARACTERISTICS	OPERATIONS	REMARKS
Dolni Zleb–Kolin–Ceska Trebova–Prerov–Zilina–Kosice–Slovenske Nove Mesto–Cierna nad Tisou (593 miles).	Double track, electrified Decin–Cierna nad Tisou (545 miles). Dual gage (4'8½"–5'0") Cierna–Chop, U.S.S.R. (12 miles). Axleload limit, 22 short tons. Known maximum grade (%), direction unknown: Usti nad Labem–Hranice *1.0*, Zilina–Poprad *1.4*, Poprad–Spisska Nova Ves *1.5*, Spisska Nova Ves–Cierna *1.0*.	Only major E.-W. RR. route. Clearances permit use of Soviet rolling stock after exchange of trucks at border. Automatic block operations.	Principal RR. line in Czechoslovakia. Extends across entire country. International connections with East Germany at Dolni Zleb, Hungary at Slovenske Nove Mesto, U.S.S.R. at Cierna. Line carries major portion of Soviet–Czechoslovakia international traffic. 21 major bridges, 235–1,400 ft. long. 8 tunnels, 525–11,188 ft. long.
Petrovice–Prerov–Breclav–Bratislava (178 miles).	Double track, electrified Petrovice–Prerov (66 miles), Breclav–Bratislava (51 miles). Known maximum grade (%), direction unknown: Hranice–Petrovice *1.0;* Prerov–Otrakovice *0.9*, Hodonin–Breclav *1.0*. Axleload limit, 22 short tons.	Ostrava main terminal has vast facilities for handling outbound (coal, coke, manufactured goods), and inbound traffic (ore, limestone, other raw materials). Automatic block operations.	5 major bridges, 328–1,480 ft. long. No major tunnels.
Petrovice–Zilina (58 miles).....	Double track, electrified. Known maximum grade, direction unknown, *0.5*%. Axleload limit, 22 short tons.	Maximum speed limit, 62 m.p.h. Automatic block operations.	4 bridges, 197–390 ft. long. 1 tunnel, 1,969 ft. long.
Bratislava–Novy Zamky–Hungary border (84 miles).	Double track, electrified. Known maximum grade (%), direction unknown: Bratislava–Galanta *0.9*, Novy Zamky–Sturovo *0.7*. Axleload limit, 22 short tons.	Station at border handles major portion of all freight between the 2 countries. Maximum speed limit, 74 m.p.h. Automatic block operations.	5 major bridges, 361–1,450 ft. long.
Novy Zamky–Komarno (19 miles).....	Single track, electrified. Known maximum grade, direction unknown: *0.8*%. Axleload limit, 22 short tons.	Line used by through traffic from Komarno port N. to Novy Zamky and to S. main trunk lines between Bratislava and Sturovo. Also used for international traffic Czechoslovakia–Hungary. Automatic block operations.	2 major bridges, 380 and 735 ft. long. Line to be double tracked by 1980.
Puchov–Bratislava (93 miles).....	Double track. Known maximum grade, direction unknown, *1.1*% for entire line. Maximum axleload (*short tons*): Puchov–Leopoldov 22; Leopoldov–Trnava 20; Trnava–Bratislava 22.	Maximum speed, 62 m.p.h.; braking distance, 2,300 ft. One of most important lines in Slovakia, connecting Bratislava with main E.-W. route.	4 major bridges, 250–870 ft. long.
Kolin Havlickuv Brod–Brno–Breclav (160 miles).	Double track, electrified. Known maximum grades (%): Kutna Hora–Havlickuv Brod *1.9;* Havlickuv Brod–Brno *1.7*. Axleload limit, 22 short tons.	Automatic block operations.....	9 major bridges, 200–900 ft. long. 3 tunnels, 1,740–2,625 ft. long.
Ceska Trebova–Brno (56 miles).....	Double track, electrified Ceska Trebova–Svitavy. New concrete ties, continuous welded rail, new ballast.	Maximum speed, 62 m.p.h. Maximum train length, 60 cars; maximum train density, 96 trains each way. Line equipped with semiautomatic block system; average block distance, 1.8 miles.	13 major bridges, 173–2,155 ft. long. 10 tunnels, 242–1,640 ft. long; 3 tunnels have increased clearances for future electrification.

FIGURE 2. Principal railroad lines (C) *(Continued)*

LOCATION AND LENGTH	PHYSICAL CHARACTERISTICS	OPERATIONS	REMARKS
Hradek nad Nisou-Turnov-Nymburk (73 miles).	Single track. Maximum grade *1.7%*. Axleload limit, 22 short tons.	Steam and diesel locomotives.....	16 bridges, 105–492 ft. long. 2 tunnels, 164 and 2,083 ft. long.
Usti nad Labem–Prague–Kolin (106 miles).	Double track Usti nad Labem–Prague (68 miles), multiple track Prague–Kolin (38 miles). Electrified Prague–Kolin (38 miles). Maximum grade, *1.0%*. Axleload limit, 22 short tons.	Automatic block train operation Prague–Kolin, line equipped with automatic locomotive braking system. Average train speed, 62 m.p.h.	Work underway on electrification Prague–Usti nad Labem, to be completed by 1975. 22 bridges, 66–1,466 ft. long. 2 tunnels, 1,148 and 1,312 ft. long.
Cheb–Most–Usti nad Labem–Decin Dolni Zleb (129 miles).	Double track, electrified Cheb–Sokolov (17 miles); Most–Usti nad Labem (28 miles). Maximum grade, direction unknown, *1.2%*. Axleload limit, 22 short tons.	Automatic block operation Most–Usti nad Labem (28 miles). Special clearances permit use of Soviet rolling stock.	Line runs through industrial area of NW. Bohemia, Cheb–Usti nad Labem, generally paralleling East Germany border. 19 bridges, 33–984 ft. long. 3 tunnels, 196–1,312 ft. long.
Cheb–Plzen (66 miles).....	Portions double track S. of Cheb and W. of Plzen. Entire line electrified. Maximum grade, direction unknown, *1.0%*. Axleload limit, 22 short tons.	Centralized Traffic Control, installed in 1967, controlled by central dispatcher in Plzen. Maximum speed, 56 m.p.h.; braking distance, 2,200 ft.	16 bridges, 26–984 ft. long. 3 tunnels, 328–971 ft. long.
Prague–Plzen (68 miles).....	Double track, electrified Prague–Beroun (25 miles). Maximum grade, direction unknown, *1.0%*. Axleload limit, 22 short tons.	Automatic block operations planned. Maximum speed, 59 m.p.h.	12 bridges, 98–2,650 ft. long. 3 tunnels, 807–3,567 ft. long.
Plzen–Ceske Budejovice–Ceske Velenice (112 miles).	Double track Nepomuk–Horazdovice (15 miles), electrified Plzen–Ceske Budejovice (84 miles). Maximum grade, direction unknown, *1.0%*. Axleload limit, 22 short tons.	Automatic block operations on electrified section only. Trains speeds, 55–62 m.p.h.	9 bridges, 12–104 ft. long.
Prague–Tabor Ceske Velenice (114 miles).	Double track, electrified Prague–Benesov (31 miles). Known minimum radius of curvature, 1,246 ft. Axleload limit, 22 short tons.	Automatic block operations Prague–Benesov.	6 bridges, 65–557 ft. long. 1 tunnel, 3,667 ft. long.
Plzen–Ceska Kubice (42 miles).....	Known maximum grade, direction unknown, *1.1%*. Axleload limit, 22 short tons.	Steam and diesel locomotives.....	3 bridges, 134–197 ft. long.
Haniska–Vel'ke Kapusany (55 miles)...	5'0" broad-gage line U.S.S.R.–iron and steel mill in Haniska. Known maximum grade, direction unknown, *1.7%*. Single track. 1 passing tracks.	Soviet type diesel locomotives used on line. Iron ore only freight traffic permitted.	Line has great military significance. Provides Soviets with second high capacity line into Czechoslovakia.

543 million passengers and produced 11.4 billion passenger-miles.

The CSD equipment pool is not adequate in quantity or quality. Equipment conditions are critical during peak traffic periods in spring and autumn when demands are greatest. Freight-car turnaround time, a measure of operating efficiency, increased from 3.8 days in 1967 to 4.0 days in 1971. Much of the equipment is in poor condition and therefore places great strain on the out-of-date repair facilities. Major car and engine repair shops are at Plzen, Vrutky, Nymburk, Zvolen, Kolin, Ceska Trebova, Chomutov, Ceske Velenice, Ostrava, Louny, Decin, Trnava, Ceska Lipa, Krnov, and Sumperk. Maintenance service is provided at principal yards and junctions.

In 1971 the CSD inventory consisted of 4,806 locomotives—1,800 steam, 2,000 diesel, and 1,006 electric. Replacement of the steam units by diesels and electrics has been slow because the major portion of domestic production of diesel switching locomotives and main line electric locomotives is delivered to the U.S.S.R. In 1971 the freight-car inventory consisted of 150,550 cars, most of which had two axles. Data on the breakdown by type of equipment is not available. Czechoslovakia is the largest producer of main line electric locomotives and one of the larger producers of freight cars in Eastern Europe. Main line diesel locomotives are imported from the U.S.S.R.; passenger and freight cars, from Yugoslavia and Hungary.

The Council for Economic Mutual Assistance (CEMA) freight-car pool, designed to achieve more efficient car utilization among the Eastern European Communist countries, was established on 1 July 1964, with 92,700 cars. Czechoslovakia has contributed over 20,000 cars to the pool, which now totals 236,000 and has provided some relief from the existing car shortage.

In 1972 the CSD had 253,000 employees. The personnel situation of the system continues to be critical because of employee shortages, insufficient training, and lack of discipline. These problems have greatly affected the mechanization and modernization program. Recently the CSD introduced the 5-day workweek, a piece-rate wage, and a new bonus rate in attempts to recruit new employees and to improve operations. Several railroad training schools are situated throughout the country and at higher educational facilities in Prague, Zilina, and Breclav.

D. Highways (S)

Highway transport is used primarily for short-haul movement and local transportation. The highway network has been meeting the minimal requirements of the national economy despite the continuing rise in traffic volume and the marginal condition of many roads. Almost all main highways are paved, but inadequate maintenance limits the effectiveness of the road system as a means of cross-country movement.

The highway network is adequately distributed; the greatest concentrations are in the populous and heavily industrialized western and central areas of the country. The roads form radial patterns around the cities of Prague and Plzen in the west and Brno in central Czechoslovakia. Highway connections between major regions are adequate. In eastern Slovakia, however, there are only two main east-west routes; these converge at Michalovce and continue as a single route to the U.S.S.R. border near Uzhgorod. International border connections are maintained with all adjacent countries. The density of national highways—0.92 mile per square mile—is relatively high and compares favorably with most neighboring counties. The overall quality of the road network is steadily improving and in this respect is comparable to the highway systems of the adjacent countries.

The Czechoslovak highway network comprises an estimated 45,500 miles of national routes and an undetermined mileage of local roads and tracks. The national road network comes under the jurisdiction of the Ministry of Transportation and administratively is classified as follows: primary (5,500 miles), secondary (11,000 miles), and tertiary (29,000 miles). The administrative classification does not signify a particular type of road construction. Primary roads are generally 18 to 30 feet wide and are paved and adequately bridged; most secondary roads are bituminous surfaced, 16 to 20 feet wide, and adequately bridged; and many tertiary roads have been widened and paved recently, but the majority still remain narrow and gravel surfaced with low-capacity bridges.

A typical national route is generally bituminous surfaced (Figure 3) with short sections of cobblestone, stone sett, or concrete. This type of road constitutes 31,850 miles or about 70% of the national network; the remaining portion of the network is crushed-stone or gravel roads. The average thickness of new bituminous surfacing is about 2 to 3 inches. Paved road widths are generally 16 to 30 feet. Bases are crushed stone, gravel, sand, or combinations thereof in varying thickness up to 1½ feet for new concrete highways. Shoulders are grass, earth, or gravel and are mainly up to 6 feet wide, though there are some that measure up to 10 feet.

Details on principal highway routes are given in Figure 6.

The estimated 26,500 highway bridges range from old steel through-truss and masonry deck-arch types to

FIGURE 3. Bituminous surfaced highway. This is the most common type of pavement on primary highways. (U/OU)

modern prestressed concrete-girder, concrete deck-arch (Figure 4), and steel-beam structures. Low-capacity bridges (less than 10 short tons) still exist on some roads, but most modern bridges are the prestressed concrete-deck type and have load capacities of 40 to 66 short tons. Minimum vertical clearance has been set at 17 feet for through-truss bridges and underpasses.

The highway network is virtually free of tunnels, except for a few near Teplice in the mountainous area of the northwest and one under construction near Zilina in northern Slovakia. There are no ferries or fords on national routes.

The Ministry of Transportation is responsible for implementing the government's highway construction policies and for providing guidance in any construction, modernization, repair, and maintenance work done on the road network. Work is performed by local road construction enterprises. Progress is hampered, though, by a shortage of qualified highway engineers and a general lack of funds. Other problems arise from the rugged terrain in much of the country and the usual seasonal restrictions on road building. Construction in the mountains requires heavy grading and the building of numerous culverts and bridges. Domestic production of bitumen, gravel, portland cement, and steel is adequate.

A highway modernization program underway aims to eliminate serious bottlenecks, improve existing roads, and construct an expressway system of cross-country routes. A major objective is to provide 80% of the national road network with a bituminous or concrete surface by 1975. Other goals include widening all primary routes to 24 to 30 feet,

FIGURE 4. Concrete bridge over Vlatava river. A principal structure on the highway system. (U/OU)

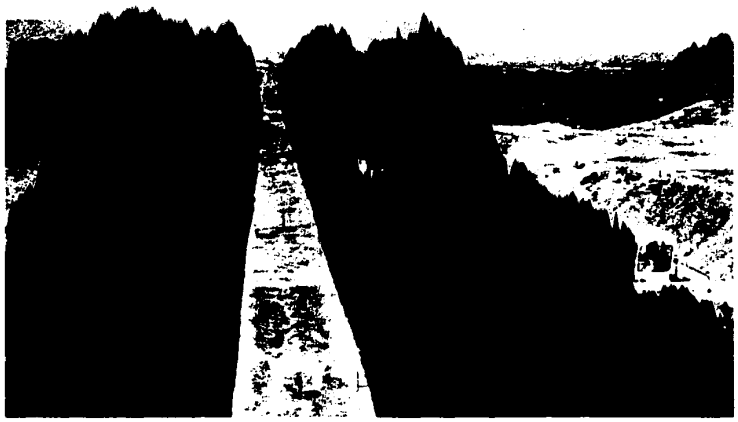


FIGURE 5. Section of expressway (now completed) south of Prague. A system of divided highways such as this has been scheduled for completion by 1990. (U/OU)

constructing urban bypasses, realigning roads that now have severe grades and curves, and upgrading highway construction standards. The most ambitious project is the expressway system; designed to conform to internationl standards, it is to be comprised of 4- to 6-lane divided highways (Figure 5). The initial section, now under construction, is to extend southeast from Prague to Bratislava via Jihlava and Brno. The portion should be completed by 1975. Other expressway routes connecting Prague with the East Germany, West Germany, Poland, and U.S.S.R. borders are scheduled to be finished by 1990.

Despite Czechoslovakia's concerted effort to upgrade the road network, highway operations are still impaired by physical bottlenecks as well as climatic conditions. Travel is hampered quite often by grade crossings; sharp turns and narrow streets slow traffic in many urban areas; and narrow, low-capacity bridges still remain on some roads. Travel through mountainous areas is further aggravated by frequent steep grades and sharp curves. Snow and ice are common winter hazards throughout most of the country between December and March; even on the national routes, particularly along the border areas in Slovakia, winter extremes can snarl traffic for several days. Snow removal is adequate only along major routes; normally little more than cindering is done on most roads. Considerable temporary damage to road surfaces is caused by spring thaws. Subsequent repairs are often rudimentary, and the prolonged effect of this neglect is reflected by the deteriorated condition of many older roads that have not yet undergone major reconstruction.

The Czechoslovak State Auto Transport (CSAD) carries about a third of the total highway tonnage; factory-owned transport is responsible for the remainder. All transport, however, is controlled by the Ministry of Transportation. In recent years the CSAD has encountered some difficulty in meeting its requirements because of the marginal quality of some roads and a chronic shortage of vehicle spare parts. Bus transportation is well developed and serves 90% of the towns and villages through 10 CSAD enterprises. In 1971 the nationalized public-service buses transported 1.7 billion passengers. In 1972 trucks hauled some 901.4 million short tons of freight and produced 8.1 billion short-ton-miles. The average length of haul was just over 11 miles. Among the principal goods shipped by truck are construction materials, machinery, foodstuffs, and light industrial products. Highway traffic volume has been increasing continually, and its composition is fairly evenly distributed among trucks and buses, private cars, and motorcycles. The primary road system bears the burden of most of this traffic.

The Czechoslovak automotive industry is well developed and capable of fulfilling the country's motor-transport equipment needs. A wide variety of vehicles are produced, and many are exported throughout West and East Europe, the Middle East, Asia, and the U.S.S.R. Some foreign passenger cars and light trucks are imported, mainly from other East European countries, Western Europe, and the U.S.S.R. Vehicle production is expected to become more centralized throughout the CEMA as a result of recent discussions. Greater emphasis will be placed on Czechoslovakia's production of heavy trucks as a result of this new program. Extensive plant expansion has already been authorized for the Tatra truck works in Koprivnice. Other major production centers are the Skoda factories in Mlada Boleslav and the Avie plant in Prague. As of January 1972, vehicle registrations totaled 1,165,465 units: 938,203 automobiles, 207,131 trucks and 20,131 buses.

FIGURE 6. Principal highway routes (C)

LOCATION AND LENGTH	PHYSICAL CHARACTERISTICS	OPERATIONS	REMARKS
West Germany border at Cheb–Poland border at Cesky Tesin; 342 miles.	Mostly bituminous surfaced, some stretches of concrete, stone block; 16–35 ft. wide; earth and gravel shoulders, 0–6 ft. wide. 6 major bridges, 310–1,350 ft.; 1 underpass, 1 limited clearance bridge.	Important E.–W. route across populous N. Czechoslovakia. Links Prague with other industrial centers such as Karlovy Vary, Hradec Kralove, Svitavy, Olomouc.	Generally flat to undulating terrain. Road in good condition. E. of Prague, sizable portion of route parallels section of the projected expressway system.
West Germany border W. of Plzen–U.S.S.R. border near Uzhgorod; 570 miles.	Mostly bituminous surfaced, some stretches of concrete stone block; 18–25 ft. wide; earth and gravel shoulders, 0–6 ft. wide. 11 major bridges, 285–1,680 ft. No known bottlenecks.	Route extends over country's length, intersecting most N.–S. routes. Connects most major cities in SW., central, NE. Czechoslovakia, such as Tabor, Jihlava, Brno, Trencin, Zilina, Presov, Kosice.	Flat to undulating terrain on W. half; much of remainder rather hilly. Most of route Jihlava–Brno to be part of projected expressway system. Road condition varies from good to fair in hilly E. section.
Most–West Germany border at Zelezna Ruda; 117 miles.	Bituminous surfaced; 18–24 ft. wide; earth and gravel shoulders, 0–3 ft. wide. 2 important bridges, 360 and 935 ft. Bottlenecks include sharp curves, 5 underpasses.	Important N.–S. route in westernmost Czechoslovakia. Serves industrial center of Plzen.	Generally undulating terrain, some hilly areas. Road in good condition.
East Germany border N. of Teplice–Austria border S. of Ceske Budejovice; 184 miles.	Bituminous surfaced, stretches of stone block and concrete along N. half; 18–23 ft. wide; earth shoulders, 0–6 ft. wide. 4 principal bridges, 265–940 ft.; 1 limited clearance bridge, 3 underpasses.	Primary N.–S. route in W. Czechoslovakia. Links such prominent cities as Teplice, Prague, Tabor, Ceske Budejovice.	Undulating to hilly terrain, flat areas around Prague, Tabor. 21-mile section S. from Prague is 4-lane divided highway, each roadway 25–33 ft. wide with 8-ft. shoulders. Initial 14 miles from Prague part of expressway system. Route in good condition.
Plzen–Poland border NE. of Turnov; 132 miles.	Bituminous surfaced, short stretches of stone block; 18–22 ft. wide; earth and gravel shoulders 0–3 ft. wide. 4 major bridges, 270–560 ft. Bottlenecks include intermittent steep grades, sharp curves along N. third of route.	Important link between W. Czechoslovakia, Poland. Provides connection between Plzen, Prague, Mlada Boleslav.	Flat to undulating terrain until foothills near Poland border. Road in good condition. Section Plzen–Prague will parallel proposed expressway system.
East Germany border NW. of Chomutov–Austria border S. of Znojmo; 209 miles.	Bituminous surfaced, short stretches of concrete; 18–25 ft. wide; earth and gravel shoulders, 0–6 ft. wide. 3 important bridges, 255–660 ft.; 3 underpasses, sharp curves W. of Prague.	Alternate NW.–SE. route through W. Czechoslovakia. Provides internal link between Prague, Havlickuv Brod, Jihlava.	Generally flat terrain, intermittent areas undulating or hilly. Road in good condition.
Poland border at Nachod–Havlickov Brod; 87 miles.	Bituminous surfaced; 18–23 ft. wide; earth and gravel shoulders, 0–3 ft. wide. 1 important bridge, 470 ft.; no bottlenecks.	Alternate route Poland–central Czechoslovakia. Links major industrial centers such as Hradec Kralove, Pardubice, Havlickov Brod.	Generally undulating terrain, some hilly sections at either end. Road in good condition. N. section Poland border–Hradec Kralove will be incorporated into expressway system.
Svitavy–Hungary border S. of Bratislava; 130 miles.	Bituminous surfaced, concrete stretches; 18–25 ft. wide; gravel shoulders, 0–3 ft. wide. 2 major bridges 1,530 and 290 ft.; 2 underpasses, 1 limited clearance bridge.	Primary route connecting central Czechoslovakia with Hungary. Also provides easy access to Austria at Bratislava. Serves important urban areas such as Svitavy, Brno, Brnelav, Bratislava.	N. half traverses undulating to hiliy terrain; remainder crosses generally flat terrain. Much of route S. from Brno is to be included in expressway system. Some sections nearing completion. Road in good condition.

E. Inland waterways (S)

The commercially navigable waterways comprise two major systems, the Elbe and the Danube, in addition to short sections of the Oder and Tisa rivers. Totaling 517 miles, these waterways provide navigability in and bordering the country and act as a supplement to the highways and overburdened railroads. The waterways are greatly underutilized in relation to their potential; nevertheless, they are nationally and internationally important as a suitable means of low-cost short-to-long-haul movement of bulk commodities. The major systems lack interconnection and serve geographically distant portions of the country. However, landlocked Czechoslovakia has dependable river access north through East Germany to West Germany and Polish maritime ports on the North and Baltic Seas and southeast to Romanian and U.S.S.R. Black Sea outlets on the lower Danube.

The major waterways and their facilities are adequate for current shipping demands. The more heavily trafficked routes are well developed and maintained, and others have considerable potential for multipurpose improvement as primary transport arteries.

In 1972 the 9.5 million short tons of waterway freight, including 4.1 million tons of international transit traffic, generated 2.5 billion ton-miles. Passenger traffic averages 300,000 annually. Principal shipments are coal, construction materials, scrap metal, petroleum and petroleum products, and metal products. Important items shipped in lesser quantity include ores, grain and other foodstuffs, general cargo, and a variety of small manufactured goods. The Danube system supports the heavier volume (70%) of traffic due, in part, to the large amounts of transit cargo moved over the Czechoslovak Danube, most of which is moved upstream. On both the Elbe and Danube systems domestic traffic exceeds import-export traffic by a ratio of 2:1. On the Danube, import-export traffic is fairly balanced while on the Elbe exports exceed imports. Exports are largely in long-haul shipments moved either via East German routes to Poland for transshipment at Szczecin, or directly to Hamburg, West Germany, via the Elbe.

The Elbe system has 330 miles, including 126 miles sectionally navigable because of lockless dams on the Elbe between Pardubice and Jaromer and on the Vltava between Slapy dam and Ceske Budejovice. The Danube system provides 159 miles of navigation including 107 on the Danube, 16 on the Maly Dunaj anabranch, and 34 on the Vah upstream to Sered. Sections of the Oder and Tisa have a combined length of 20 miles. The Elbe system is mostly canalized, and a substantial degree of stability is maintained by an extensive system of regulatory dams and locks. Safe drafts generally exceed 5.9 feet, and the controlling channel width is about 165 feet on the major routes. On the Danube the primary form of regulation is a system of groins, dikes, revetments, and other training works; partial regulation of the lower Maly Dunaj and Vah derives from lockless dams on the latter above Sered. Safe draft is 8.2 feet on the Danube, and the controlling channel width is 265 feet.

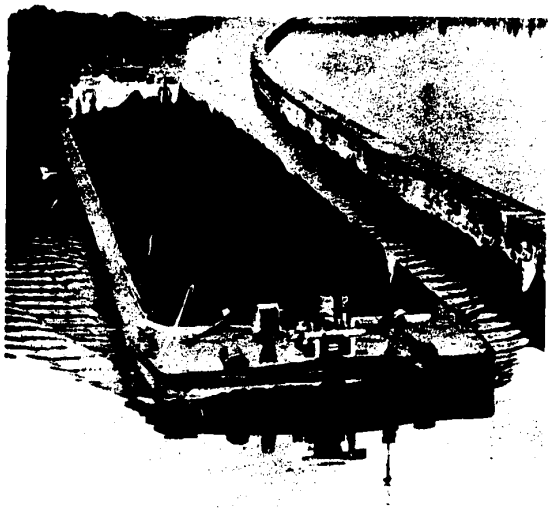
Operations are performed largely by self-propelled vessels and pusher trains, which are replacing the conventional stern-haul dumb-barge tows (Figure 7). On the Elbe 600-ton self-propelled units and 800-ton pusher barges are used most frequently; locks generally limit barge trains to line-ahead formations of two carriers and a towboat. In Danube operations the standard 600-ton self-propelled and dumb-barge units are being replaced by 1,000- to 1,500-ton pusher units and river-seagoing vessels up to 2,500-ton carrying capacity. The latter vessels can now operate out of Bratislava most of the year. The structurally unrestrictive Danube permits flexibility in barge-train composition, especially below Gonyu, Hungary, where wide channels, moderate currents, and greater depths allow formations of conventional tug with two rows of five 600-ton barges fleeted abreast. Pusher tows are generally limited to a towboat and two to four barges. Operations on the major routes are facilitated by floating and shore-based navigational aids, and routes are equipped for night navigation. Radiotelephone and radar facilities have been installed on craft and at shore stations.

The principal traffic interruption factors are ice, floods and prolonged high-water periods, and excessive silting. Ice conditions can interrupt navigation for 50 days between mid-December and early April on the Elbe system and for 35 days between mid-December and mid-February on the Danube system and is the only principal interruption factor on the major routes. Navigation may be suspended for a week or more because of flooding, most frequently following the spring thaw but also during midsummer on the Danube system. Low-water conditions rarely halt shipping, but inadequate depths in late summer and early winter can necessitate partial loading of the larger Danube craft. Through navigation on parts of the Elbe system is suspended during yearly maintenance operations.

Structures on the waterways include locks, dams and weirs, bridges, and a safety gate. The controlling dimensions of the 35 locks on the major routes are as follows: length, 240 feet; width, 36 feet; and depth over sill, 8.2 feet. The locking cycles average 45

Road junction E. of Brno–Poland border NE. of Opava; 103 miles.	Bituminous surfaced; 18–25 ft. wide; earth shoulders, 0–3 ft. wide. No major bridges; 1 underpass.	Principal internal connection between major industrial centers of central Czechoslovakia, Opava, Olomouc, Brno.	Generally hilly terrain. Road in good condition.
Poland border at Cesky Tesin–Zilina; 44 miles.	Bituminous surfaced; 20–25 ft. wide; gravel and earth shoulders, 0–3 ft. wide. 1 bridge, 400 ft.; no bottlenecks.	Convenient access from Poland into W. part of Slovakia. Intersects main E.-W. route through Slovakia at Zilina.	Generally flat terrain; some hilly portions along central section. Road in good condition.
Trencin–Austria border W. of Bratislava; 95 miles.	Bituminous surfaced, stretches of concrete; 20–25 ft. wide; gravel shoulders, 0–3 ft. wide. 1 major bridge, 1,530 ft.; no bottlenecks.	Main connection between Slovakia, Austria. Provides internal link between Trencin, Bratislava.	Generally flat terrain. Route scheduled to be incorporated into expressway system.
Poland border N. of Ruzomberok–Hungary border at Sahy; 136 miles.	N. half mostly bituminous surfaced, stretches of gravel; 15–20 ft. wide; earth shoulders, 0–6 ft. wide. S. half bituminous surfaced; 20–30 ft. wide; gravel shoulders, 0–6 ft. wide. No major bridges or bottlenecks.	Most direct through route Poland–Budapest. Intersects both major E.-W. routes in Slovakia. Serves industrial centers of Ruzomberok, Zvolen.	Generally hilly terrain, particularly in N. portion. Road conditions fair to good.
Trencin–Kosice; 221 miles.....	Mostly bituminous surfaced, intermittent sections of concrete, stone block, gravel; 15–20 ft. wide; earth and gravel shoulders, 0–3 ft. wide. Road widens to 40–50 ft. for 5 miles approaching Kosice. 2 major bridges, 340 and 920 ft. No bottlenecks.	Important internal E.-W. link along SE. Czechoslovakia. Intersects other main E.-W. route through Slovakia at Trencin, Kosice.	Generally hilly terrain; some areas of relative flatness. Road condition fair to good.
Poland border–Presov; 52 miles.....	Mostly bituminous surfaced, stretches of gravel; 15–20 ft. wide; earth shoulders, 0–3 ft. wide. No major bridges or bottlenecks.	N.-S. connection between Polish area near Krosno and NE. Slovakia.	Generally hilly terrain. Road in fair condition.
Kosice–Hungary border; 16 miles.....	Bituminous surfaced; 18–30 ft. wide; gravel shoulders, 0–6 ft. wide. No important bridges, bottlenecks.	Alternate access S. into Hungary; a link to main E.-W. routes that converge at Kosice.	Generally flat terrain. Road in good condition.

Conventional tow: 2,195-h.p. tug pulling two 600-ton barges



Modern pusher tow: 2,135-h.p. towboat pushing a 800-ton dumb barge

FIGURE 7. Elbe river tows (U/OU)

minutes and the variation in lift is from 5.0 to 26 feet. On the Vltava and Lateralni Kanal most locks are parallel and double chambered; there are no locks on the Danube. Of the estimated 100 bridge crossings, all are fixed-span structures. Most bridges are of steel construction, and none impose restrictive underbridge horizontal or vertical clearances for craft normally operating. A safety gate on the Lateralni Kanal facilitates draining the route for yearly maintenance and winter protection; it imposes no horizontal or depth restrictions. The waterways have six major ports and about 65 smaller ports and landings. The major ports are as follows: Decin, Usti nad Labem, and Melnik on the Elbe, handling mostly coal and other bulk materials; Prague on the Vltava, primarily a general-cargo port, and Komarno and Bratislava on the Danube, both handling large amounts of construction materials, scrap, petroleum and petroleum products, and manufactured items. The major ports have extensive riverside and basin wharfage adequately served by fixed and mobile cargo-transfer equipment, ample open- and covered-storage facilities, and good rail and road clearances. The combined turnovers at the two Danubian ports account for nearly 55% of the total turnover at the six major ports: Komarno and Bratislava each handle approximately 2.8 million short tons annually. On the other hand, the three major and four smaller installations on the Elbe account for over 60% of the total berthage available at the significant Czechoslovak inland ports.

The cargo fleet comprises an estimated 319 dumb barges having a capacity of 285,000 short tons and about 83 self-propelled barges having a capacity of 55,300 short tons and an aggregate horsepower of 39,700. An estimated 80 tugs provide a total of about 49,300 horsepower. In addition, there are two river-seagoing vessels, each 1,274 d.w.t., that are inventoried by the Czechoslovak Danube Navigation Co. (CSPD). One of these vessels, the *Lednice*, lies in the blocked-off Suez Canal as a result of the Arab-Israeli war in 1967; the second vessel, the *Bojnice*, is operating out of Bratislava. The total number of units and total horsepower are fairly evenly distributed between the two nationalized shipping companies, but about 55% of the barge capacity is inventoried by the CSPD due to the introduction of 1,500-ton pusher units. The majority of dumb barges are 600- to 1,000-ton carriers, the most common carrier of the CSPD being the 1,000-ton unit while the 800-ton unit is the most common inventoried by the Elbe-Oder Navigation Co. (CSPLO).

Self-propelled vessels in both fleets tend to be of the same carrying capacity as the dumb barges, i.e. the most common unit in the CSPD is the 1,000-ton vessel, while most common in the CSPLO is the 800-ton craft. Modern hydrofoils are employed in regular international service on the Danube and in local tourist service between Decin and Usti-nad-Labem on the Elbe. The passenger fleet has a total seating capacity of about 2,500, fairly evenly distributed between the Danube and the Elbe fleets. Czechoslovak shipyards are collectively a very prominent builder of waterway craft (Figure 8) and special equipment among the Eastern European countries, but most of their production is exported.

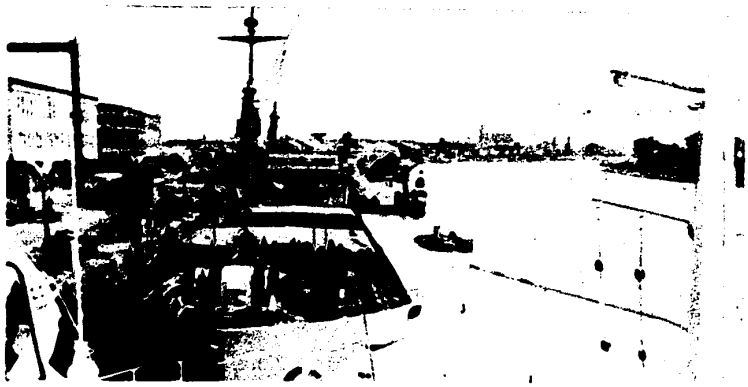


FIGURE 8. Fitting-out quay at the Slavak Shipyard at Komarno (U/OU)

Commercial waterway transportation is controlled by the Ministry of Transportation through its Main Administration of Navigation, which administers and directs the activities of the two nationalized shipping companies. Within their respective operating areas each company maintains its own fleet, administers port activity, and is responsible for equipment and personnel. Waterway construction and maintenance are the responsibility of several regional national committees and the Central Administration of Water Economy. International navigation on the Danube is regulated by the U.S.S.R.-sponsored Danube Commission. All riparian states except West Germany are full members.

Development of waterway transportation has been slow. Current projects underway include reconstruction of lock-and-dam installations on the Elbe and Vltava and large-scale port expansion and modernization at Usti-nad-Labem, Decin, and Bratislava; container terminals are being constructed at Decin and Bratislava. Fleet development is still being directed toward the acquisition of new units, particularly higher capacity self-propelled barges and pusher trains. Specifications for the long-discussed CEMA project to interconnect the Danube, Oder, and Elbe rivers by a combination of land-cut canals and canalized tributaries were approved in June 1973. Major construction work is now programmed to begin in 1974. Extensions of the Danube, Oder, and Elbe would project north, southwest, and southeast, respectively, to form a three-way junction near Prerov in central Czechoslovakia. Preliminary work such as dredging and bank reinforcement is underway on another CEMA project, the large-scale hydroelectric and navigation scheme on the Danube near Gabcikovo. The scheme will include two large dams, two hydroelectric plants, two sets of double-chambered locks, and a 26-kilometer shipping canal extending to Nagynaros, Hungary.

Selected principal inland waterway routes, providing 251 route miles of primary navigation, are described in detail in Figure 9. Representing slightly more than 50% of the total navigability, the selected waterways account for over 90% of the yearly waterway tonnage. They include all of the important high-capacity through routes between major production and/or strategic areas and are routes that make links to routes with significant international connections.

F. Pipelines

Czechoslovakia has extensive pipeline systems for handling crude oil, refined petroleum products, and natural gas. More than 3,000 miles of trunk pipeline are in operation, and more pipelines are under construction or planned for the near future.

The most important crude oil pipelines are part of the CEMA pipeline system, which extends westward from Soviet oilfields near the Ural Mountains to refineries in the western U.S.S.R., Poland East Germany, Czechoslovakia, and Hungary. In Czechoslovakia the CEMA system consists of parallel 21- and 28-inch lines with a combined capacity of approximately 400,000 barrels per day. These two lines extend from Uzhgorod, U.S.S.R., to Tupa, Czechoslovakia, near Sahy. From Tupa a 21-inch line with a capacity of 115,000 barrels a day extends to the Slovnaft refinery near Bratislava, and a 12-inch, 40,000 barrels-per-day line extends to the Szazhalombatta refinery near Budapest, Hungary. From Tupa the two main CEMA lines extend through Kolin to the refinery at Zaluzi. By 1975, Czechoslovakia, Hungary, and Yugoslavia plan to build the "Adria Pipeline," which will transport Middle East crude oil from the port of Bakar, Yugoslavia to refineries in the three countries. The estimated capacity of this line is 240,000 barrels per day.

FIGURE 9. Selected inland waterway routes (S)

LOCATION AND LENGTH	PHYSICAL CHARACTERISTICS	OPERATIONS	REMARKS
Czechoslovakia/East Germany border–Melnik; 71.5 route miles via Elbe.	Partially regulated stream; channel width, 165–200 ft.; safe draft, 5.9 ft.; current velocity slight to moderate; 7 bridges; 6 locks with controlling dimensions of: 469-ft. length, 72-ft. width, 8.2-ft. depth over sill. High water 1 Mar.–1 Apr. Low water mid-Aug.–mid-Sept.; total water level differential, 17 ft.	Navigation season early Apr.–mid-Dec. Ice mid-Dec.–late Mar. Up to 50 days interruption. Icebreakers/tugs attempt to keep channel open. Spring flooding and summer low water can create delays but rarely halt traffic. Morning and evening fog in spring and fall may curtail operating day. Normal operating day 24 hours with 2-way channel operations. Most common carriers: 600-ton self-propelled barge and pusher trains of 1,200 h.p. towboat and two 800-ton barges. Largest craft that can be accommodated, 1,000-ton self-propelled barge. Traffic medium to heavy. Principal cargos coal, ore, small manufactures.	Strategic E.-W. artery for movement to East/West German border. Carries heavy bulk supplies to Czech industry and Czech manufacturers for export. Principal ports: Decin, Usti-nad-Labem, Melnik. Small amounts of containerized cargo currently being handled at temporary container terminal at Decin.
Melnik–Kolin; 53.5 route miles via Elbe.	Partially regulated stream; channel width, 165–200 ft.; safe draft, 5.9 ft.; current velocity slight to moderate; 9 bridges; 15 locks with controlling dimensions of: 240-ft. length, 36.5-ft. width, 8.2-ft. depth over sill. High water, 1 Mar.–1 Apr.; low water mid-Aug. and mid-Sept.; total water level differential, 17 ft.	Navigation seasons, early Apr.–mid-Dec. Ice mid-Dec.–late Mar. with up to 50 days interruption. Spring flooding, summer low water can create delays but rarely halt traffic. Morning and evening fog in spring and fall may curtail operating day. Normal operating day 24 hours with 2-way channel operations. Most common carriers: 600-ton self-propelled barge, pusher trains of 1,200 h.p. towboat with two 800-ton barges. Largest craft that can be accommodated, 1,000-ton self-propelled barge. Traffic medium to heavy. Principal cargos coal, ore.	Strategic E.-W. artery for movement to East/West Germany border. Carries bulk supplies to Czech industry. Principal port is Kolin.
Melnik–Prague; 29.5 route miles via Laternalni Kanal and Vltava river.	Partially regulated stream; channel width, 165–200 ft.; safe draft, 5.9 ft.; current velocity slight to moderate; 2 bridges; 14 locks with controlling dimensions of: 440-ft. length, 36-ft. width, 8.2-ft. depth over sill; high water 1 Mar.–1 Apr.; low water mid-Aug.–mid-Sept.; total water level differential, 17 ft.	Navigation season early Apr.–mid-Dec. Ice mid-Dec.–late Mar. with up to 50 days interruption. Spring flooding and summer low water can create delays but rarely halt traffic. Morning and evening fog in spring and fall may curtail operating day. Normal operating day 24 hours with 2-way channel operations. Most common carriers: 600-ton self-propelled barge, pusher trains of 1,200-h.p. towboat with two 800-ton barges. Largest craft that can be accommodated, 1,000-ton self-propelled barge. Traffic medium to heavy. Principal cargo coal, ore, manufactures.	Route strategically important; 1st link in route Prague–East/West Germany border. Carries heavy, bulk supplies to Czech industry and Czech manufacturers for export. Principal port, Prague

FIGURE 9. Selected inland waterway routes (S) *(Continued)*

LOCATION AND LENGTH	PHYSICAL CHARACTERISTICS	OPERATIONS	REMARKS
Czechoslovakia/Hungary border–Czechoslovakia/Austrian border; 106.5 route miles via Danube.	Partially regulated stream; channel width, 265 ft.; safe draft, 8.2 ft.; current velocity slight to moderate; 3 bridges; high water 1 May–1 June; low water mid-July–mid-Aug.; total water level differential, 15 ft. No locks.	Navigation season 1 Feb.–early Jan. Ice mid-Dec.–mid-Feb. can interrupt traffic for 35 days. Icebreakers/tugs attempt to keep channels open. Low water July, Aug. may require light loading and can create delays; morning and evening fog in spring and fall may curtail operating day. Normal operating day, 24 hours; 2-way channel operations, separate upstream and downstream channels around large islands. Common carriers: 800-ton–1,500-ton self-propelled barges and pusher trains of 2,000-h.p. towboat with two 1,500-ton barges. River-seagoing vessels up to 2,500 d.w.t. can be accommodated. Principal cargos: coal, ore, petroleum, petroleum products, manufactures.	Strategically important for E.-W. movement of Warsaw Pact forces. Supplies bulk materials and semi-finished products to Czech industries and carries heavy manufactures to lower Danube river-maritime ports for export. Principal ports: Komarno, Bratislava.

FIGURE 10. Selected pipelines (C)

TERMINALS						
From	To	LENGTH	DIAMETER	PRODUCT TRANSPORTED	CAPACITY*	REMARKS
		Miles	*Inches*			
U.S.S.R. border	Tupa (Sahy area)	168	21	Crude	**180,000	CEMA I pipeline, completed early 1960's. Known pumping stations: Budkovce, Budulov, Tomasova, Tupa.
Tupa (Sahy area)	Bratislava	82	21	....do	**115,000	Branch of CEMA I line.
Do	Zaluzi (via Most)	286	16	....do	**65,000	Branch of CEMA I line. Known pumping stations: Tupa, Klobouky, Velka Bites, Havlickuv Brod, Caslav.
Do	Czechoslovakia–Hungary border	15	12	....do	**40,000	Branch of CEMA I line. Pumping station: Tupa.
U.S.S.R. border	Tupa (Sahy area)	168	28	....do	**240,000	CEMA II pipeline, completed 1970. Route and pumping stations same as CEMA I.
Bratislava	Klobouky area	**63	**24	....do	*na*	Branch of CEMA system, connecting with CEMA I line near Klobouky. Reported pumping stations: Bratislava, Kuty.
Kolin	Pardubice	26	12	....do	*na*	Unconfirmed.
Malacky	Bratislava	21	**20	....do	*na*	Constructed early 1950's. Present status not known.
Bakar, Yugoslavia	....do	**320	*na*	....do	240,000	Planned completion 1975.
Zaluzi	Hnevice	35	8	Refined	**8,220	Carries gasoline Zaluzi refinery–underground storage depot at Hnevice.
Do	....do	35	8	....do	**8,220	Carries diesel fuel Zaluzi refinery–underground storage depot at Hnevice. Parallel to preceding line.
Do	....do	35	11	....do	*na*	Parallel to preceding lines.
Hnevice	Prague	25	*na*	....do	*na*	Probable branch of preceding line.
Do	Brno	**155	*na*	....do	*na*	Brandys nad Labem–Brno section unconfirmed.
Bratislava	Prague area	**200	*na*	....do	**7,500	Unconfirmed line, reported completed 1967. May be same as preceding line in parts.
Plzen	Klatovy	25	**11	....do	*na*	Unconfirmed.
Kolin	Pardubice	25	12	....do	*na*	*Do.*
U.S.S.R. border	Zlate Moravce	159	27.55	Natural gas	6,000,000	Bratstvo 1 line, operational 1967. Delivered average of 4,577,250 cu. m./day in 1969. Route via Ruska, Hradistska Molva, Trebisov, Slanec, Haniska, Cecejovce, Moldava nad Bodvou, Silica, Coltovo, Safarikovo, Rimavska Sobota, Lucenec, Vel'ke Zlievce, Sahy, Le ice, Tlmace.
Haniska	Strbske Pleso	82	19.68	....do	*na*	Route via Kosice, Presov, Poprad, Vysoke Tatry. Presov–Strbske Pleso section 11.81-in. pipe.

FIGURE 10. Selected pipelines (C) *(Continued)*

TERMINALS						
From	To	LENGTH	DIAMETER	PRODUCT TRANSPORTED	CAPACITY*	REMARKS
		Miles	*Inches*			
Zlate Moravce	Bratislava	61	19.68	Natural gas	*na*	Route via Sal'a, Sladkovicovo, Senec.
Senec	Martin	118	11.81	*do*	*na*	Route via Cifer, Trnava, Piestany, Nove Mesto nad Vahom, Horne Srnie, Puchov, Povazska Bystrica, Zilina, Brutky.
Sladkovicovo	*do*	101	11.81	*do*	*na*	Route via Sered, Nitra, Topol'cany, Prievidza.
Zilina	Doly area	**40	7.87	*do*	*na*	Route via Cadca, Trinec, Cesky Tesin.
Bratislava	Brno	83	19.68	*do*	*na*	Route via Zohor, Breclav, Zidlochovice.
Do	*do*	83	11.81	*do*	*na*	Parallels preceding line.
Brno	Doly area	106	19.68	*do*	*na*	Route via Prostejov, Prerov, Lipnik nad Becou, Hranice, Starojicka Lhota, Novy Jicin, Pribor, Mstetice.
U.S.S.R. border	Jablonica	199	48	*do*	**27,000,000	Bratstvo II parallel to Bratstvo I.
Jablonica	Vysoka pri Morave	**30	36	*do*	**16,000,000	To Austria, Italy.
Do	Zlonice	**195	36	*do*	*na*	
Zlonice	Litvinov	**45	36	*do*	*na*	To East Germany.
Do	Rozvadov	**90	36	*do*	*na*	To West Germany, compressor station at Trpisty.

na Data not available.
*Barrels per day for crude oil and refined products; cubic meters per day for natural gas.
**Estimated.

Two 8-inch pipelines and one 11-inch pipeline carry refined products eastward from the Zaluzi refinery 35 miles to an underground storage facility in Hnevice, near Roudnice nad Labem. A pipeline from the Hnevice storage facility serves the Prague area. An 8-inch pipeline from Hnevice to Brno has been reported under construction, and a line of unknown diameter has been built from Bratislava to the Prague area. Although reported as separate construction projects, the latter two lines may have a common section between Brno and Prague and together constitute a single line. The total length of the refined product pipelines is about 500 miles.

The most significant natural gas pipeline system consists of two trunklines, the Bratstvo (Brotherhood) I and II, which bring gas from the U.S.S.R. The 28-inch Bratstvo I extends from the U.S.S.R. border to Bratislava. The Bratstvo II line has recently been completed. The first segment, with a 48-inch diameter, parallels the Bratstvo I to Zlate Moravce and then continues to Jablonica. At Jablonica the pipeline divides into two 36-inch lines. One branch goes to Austria via Vysoka pri Morave and will eventually be extended to Italy; the other branch goes to Zlonice. From Zlonice a 36-inch branch runs to West Germany via Rozvadov; another 36-inch branch extends from Zlonice to East Germany via Litvinov. Figure 10 gives details on selected pipelines.

G. Merchant marine (C)

The small merchant fleet of landlocked Czechoslovakia uses maritime port facilities in Poland, East Germany, West Germany, Yugoslavia, and Romania. The merchant marine was established in 1952 because of political pressures and a desire to reduce hard-currency expenditures through utilization of Czechoslovak ships for seaborne trade.

As of 31 August 1973 the merchant fleet consisted of 12 (all cargo types) ships over 1,000 gross register tons (g.r.t.)—totaling 107,223 g.r.t. and 156,912 deadweight tons (d.w.t.). Although the number of ships remained the same, the fleet realized a 10% g.r.t. and 13% d.w.t. increase since 31 January 1971. The 1973 inventory includes the dry-cargo river-seagoing ship *Lednice*, which has been blocked in the Suez Canal since June 1967. More than 81% (127,428 d.w.t.) of the fleet's deadweight tonnage is represented by five ships, each of which is over 13,000 d.w.t.; the seven other ships are in the 1,200-6,000 d.w.t. range. The fleet is relatively new, no unit being over 10 years old. All ships are diesel powered, and nine have speeds which range from 15 to 18 knots; the others have speeds of 12 to 13 knots. All 12 ships were built in foreign shipyards: 6 in Poland, 2 in Hungary, and 1 each in Bulgaria, East Germany, Japan, and the United Kingdom. There are no known plans for expansion of the fleet; details on the fleet are given in Figure 11.

The government-owned merchant fleet is controlled administratively by three ministries: the Ministry of Transportation, which is responsible for the operation of the Czechoslovak Danube Navigation Co. (CSPD), in Bratislava, and also the technical operation and logistic support of the Czechoslovak Ocean Shipping Co. (COSCO), in Prague; the Ministry of Foreign Trade, which administers COSCO in matters other than those assigned the Ministry of Transportation; and the Ministry of Interior, which directs political and personnel matters related to inland-waterway and maritime shipping.

In addition to its membership in the Council of Mutual Economic Assistance (CEMA) with main offices in Moscow, and the International Shipowners Association (INSA) with its secretariat in Gdynia; Czechoslovakia is a member of the Inter-Governmental Maritime Consultative Organization (IMCO), a specialized agency of the United Nations in London. The Czechoslovaks also hold a broker membership in the Baltic and International Maritime Conference (BIMCO), whose headquarters is in Copenhagen.

Operational control of the merchant fleet is exercised by two shipping companies: COSCO, which operates 10 (154,364 d.w.t.) of the fleet's vessels; and CSPD, which controls the remaining two vessels (2,548 d.w.t.), both river-seagoing craft.

The fleet is used primarily in tramp operations, being employed in international shipping to Cuba, Canada, the United States, South America, northern Europe, Africa, and the Mediterranean and Indian Ocean areas.

Czechoslovakia is a party to two joint-service shipping lines. One, the Cuban-Baltic Shipping Co. (CUBALCO), was established jointly by Czechoslovakia, East Germany, Poland, and Cuba in November 1962. The second line, the Czechofracht-Arab-Black Sea Joint Service Line, was established around March of 1967; additional details on its organization and operations are not available.

In 1972, Czechoslovak ships carried less than 10% of the 4.5 million tons total foreign seaborne trade. Of this total, almost 50% was shipped through Poland—Gdynia, Gdansk and Stettin; 25% through Hamburg, West Germany; the remainder through Rostock, East Germany; Constanta, Romania; and Rijeka, Yugoslavia. An estimated 10% of this trade moved via inland waterways to the maritime ports for further shipment. Having insufficient tonnage under its own

FIGURE 11. Ships of the Merchant Marine (C)
(All units diesel powered)

SHIP	TYPE	G.R.T./ D.W.T.	SPEED	COUNTRY/YEAR BUILT	CALL SIGN
BLANIK	Dry cargo	5,517 6,005	15.2	Poland 1967	OLGD
BOJNICE*	....do	1,403 1,274	12.0	Hungary 1966	OLMA
BRNO	Bulk cargo	10,842 14,067	15.2	Poland 1965	OLGM
JISKRA	Dry cargo	1,702 3,047	13.0	Bulgaria 1963	OLGK
KOSICE	Bulk cargo	16,760 25,913	16.1	Japan 1963	OLGL
KRIVAN	Dry cargo	5,313 5,923	16.3	Poland 1970	OLGE
LEDNICE*	....do	1,412 1,274	12.0	Hungary 1967	*na*
MIR	....do	9,651 14,000	18.0	East Germany 1973	*na*
PRAHA	Bulk cargo	19,677 32,240	15.0	Poland 1972	OLGN
RADHOST	Dry cargo	5,310 5,961	15.2	Poland 1970	OLGC
SITNO	....do	5,310 6,000	15.2	Poland 1970	OLGF
VITKOVICE	Bulk cargo	24,326 41,208	16.2	United Kingdom 1966	OLGB

na Data not available.
*River-seagoing craft. The *Lednice* has been blocked in Suez since 1967 Arab-Israeli war.

registry, Czechoslovakia continues to depend heavily on foreign-flag merchant ships to assure the movement of its seaborne commerce; at least 10 Yugoslav-flag and 42 western-flag ships were chartered in the first 8 months of 1973. These charter agreements were made with foreign merchant ships under the flags of Yugoslavia, Greece, Liberia, Cyprus, Panama, India, Italy, Somalia, and Lebanon. All ships were chartered on a voyage basis.

Most of the more than 400 officers and ratings serving in the merchant marine are Czechoslovak nationals. A few Russians, Poles, and Bulgarians, usually of officer rank, have been listed as crew members aboard Czechoslovak ships. About 200 additional persons are employed in the land-based operations of COSCO. Historically not a maritime nation, and having no navy from which to recruit qualified seagoing personnel, the Czechoslovak merchant marine suffers from a lack of senior personnel, particularly ship-masters. This condition has been somewhat alleviated in recent years by Soviet and Polish assistance in training personnel for the maritime fleet. Seamen receive shipboard training for 3 to 4 weeks and then must pass an examination given by the Ministry of Transportation in Prague. Membership in the Communist Party and the Central Revolutionary Union, which is the maritime labor union, is mandatory for all seamen except medical officers.

H. Civil air (S)

Civil Aviation is fully government owned and controlled. Air transportation and general aviation services are provided by two state aviation enterprises, Czechoslovak Airlines (*Ceskoslovenske Aerolinie*—CSA) and Slov-Air. There is no private aviation. Responsibility for the administration, regulation, and control of civil aviation is vested in the Civil Aviation Division of the Federal Ministry of Transportation. Civil aviation is viewed by the government both as a means to further its economic and political aims and as a service to the public.

CSA operates an extensive international route network; among the Communist air carriers, only the U.S.S.R.'s Aeroflot has service to more cities. Scheduled flights originating in Prague and Bratislava serve 49 cities in 40 countries. CSA routes reach into

Western Europe, the Middle East, North and West Africa, the Western Hemisphere, and South and Southeast Asia, as well as the U.S.S.R. and all the Communist Eastern European countries except Albania. Some of these services, notably the flights to Montreal and New York, are operated more for prestige purposes than economic gain. Other international services, including those to Africa and Southeast Asia, are designed to establish and strengthen economic ties with developing areas and new nations. In recent years, however, air traffic potential and profitability have become the criteria for establishing new routes, thus causing some low-volume routes to be cancelled. Although CSA's international services are used primarily by government, diplomatic, and technical personnel traveling to foreign countries, tourist travel is claiming an increasingly greater proportion of the passenger traffic. Increased summer services to Kiev, Leningrad, and resort areas in Yugoslavia and Romania have become very profitable in recent years. In addition to these regularly scheduled services, CSA charter flights annually transport thousands of tourists to Yugoslavia and the Black Sea resorts.

Domestic air services are highly developed; about 175 flights depart weekly from Prague to 10 other points throughout the country. Bratislava and Brno receive much of this traffic, being served each week by about 50 and 25 flights, respectively. Cargo and officials traveling on government business comprise most of the weekday traffic, but passenger loads increase considerably on weekends. Summer passenger traffic is much heavier than winter, reflecting internal tourist travel to the various recreation areas of the country.

The CSA fleet is estimated to include 45 major transport aircraft: 22 CRATE (Avia-14), 7 COOT (Il-18), 4 CAMEL (Tu-104), 2 COOKPOT (Tu-124), 6 CRUSTY (Tu-134), and 4 CLASSIC (Il-62) aircraft (Figure 12). In the future, CSA is considering the purchase of CARELESS (Tu-154) aircraft to replace its aging CAMEL and COOT units. CSA's twin-engine piston CRATE aircraft are employed exclusively on domestic routes. Turboprop COOT units are now used only on domestic routes and as back-up aircraft for short-range international flights. COOKPOT twinjets are no longer used on scheduled routes and may soon be retired from service. The four-engine CLASSIC jetliners see service primarily on long-range international flights to Southeast Asia and the Western Hemisphere, and twinjet CAMEL and CRUSTY aircraft are the workhorses of CSA's short- and medium-range international routes. All of CSA's major transport aircraft are of Soviet manufacture, except for the CRATE, which is the Czech-built version of the Soviet Il-14.

CSA's scheduled domestic services are supplemented by air-taxi transportation and charter services provided by the Bratislava-based enterprise, Slov-Air. A fleet of 6 L-410 and about 30 L-200 (Morava) aircraft are used for this purpose. The 17-passenger L-410 aircraft have also performed scheduled services to Bratislava and other points in Slovakia. It is, however, the aim of the government to reserve all scheduled services for CSA and employ Slov-Air aircraft only on charter, airtaxi, and general aviation missions. The Czech-built four-passenger L-200's provide airtaxi service to over 70 airfields in all areas of the country. In addition to transporting passengers to the country's smaller airfields, they are also used for emergency medical missions, the transport of mail, and for sightseeing excursions.

Agricultural services are also performed by Slov-Air, using a fleet of approximately 125 light aircraft and helicopters. The Czech-Z-37 (Cmelak), a versatile single-engine plane specifically designed for agricultural work, is the primary aircraft of the fleet. Also included are a few Soviet COLT (An-2) biplanes and Soviet HARE (Mi-1) helicopters. Throughout the country Slov-Air has about 65 stations, from which planes are contracted out to local and central

FIGURE 12. CSA's newest transport, the Soviet IL-62 (U/OU)

government agencies and collective farms for the performance of a variety of tasks. Although these aircraft are primarily used for agricultural purposes—spraying, dusting, fertilizing, and seeding—they are also employed in other general aviation services such as aerial advertising, construction, geological survey, aerial photography, surveillance of powerline systems, provisioning of remote mountain settlements, and emergency rescue work.

CSA's principal aircraft repair and maintenance installation is at the Prague/Ruzyne airfield, and there are subordinate installations at a few other fields. With the exception of the CLASSIC and possibly the CRUSTY, CSA repairs and maintains its own fleet. It also performs inspection and overhaul on airframes and on all turboprop and piston engines. Routine maintenance on the CLASSIC is performed by Aeroflot personnel under contract to CSA. This may also apply to CSA's newest aircraft, the CRUSTY. Jet engines (CAMEL, COOKPOT, CRUSTY, and CLASSIC) are returned to the Soviet Union for overhaul.

CSA relies heavily on the Soviet Union for spare parts for its major transport aircraft, since all are of Soviet manufacture or design. Extra engines and an adequate supply of spare parts are kept in reserve at Ruzyne. Although there are no indications that CSA has ever encountered any difficulty in obtaining such equipment, its near-complete dependence on the U.S.S.R. in this regard certainly gives the Soviets important economic influence.

It is estimated that CSA has about 4,300 employees, including a maximum strength of about 150 transport pilots. Transport aircrews are recruited from among trained air force reservists and are given transition and on-the-job training in commercial aircraft by the CSA operating staff. As new Soviet transport aircraft are added to the fleet, crews are sent to the U.S.S.R. for familiarization training. Upon completion of their training, they return to Czechoslovakia and give instruction to prospective crews of the new planes. Technical personnel, most of whom are recruited from aeroclubs, military workshops, and industry, receive a 3-year program of on-the-job training in the CSA workshops.

About 120 pilots are assigned to Slov-Air on a regular basis. Personnel from CSA's transport flight crews frequently receive specialized training in agricultural aviation and are assigned to Slov-Air.

Training for technical civil aviation positions with CSA is accomplished within that organization. Other aviation training may be obtained at the Civil Air Control School at Tatry, which trains ground aviation technicians, and the Transport School of Higher Learning at Zilina, which offers a 5-year residence course in air transportation studies.

Most basic flight training is provided by the local units of the Aeroclub of the Czechoslovak Republic (ARCS). ARCS is apparently divided into separate Czech and Slovak national organizations. Each national organization has its own flight training school; the Czech school is located at Vrchlabi and the Slovak at Nitra. The aeroclubs have an estimated 1,000 light aircraft, helicopters, and gliders stationed at about 90 airfields in all sections of the country.

Since World War II Czechoslovakia has actively participated in the development and regulation of international civil aviation. It is a member of the International Civil Aviation Organization (ICAO) and a contracting party to the major multilateral conventions and agreements regulating the conduct of international aviation. CSA holds membership in the International Air Transport Association (IATA). Czechoslovakia is also signtory to the multilateral arrangement of 8 June 1957 with Bulgaria, East Germany, Hungary, Poland, and Romania providing for cooperation among the airlines of those nations. This arrangement is commonly referred to as the Six-Pool Agreement.

Czechoslovakia has entered into formal bilateral air transport agreement with 49 countries, including the parties to the Six-Pool Agreement, the U.S.S.R., Cuba, and Yugoslavia. There apparently is no formal bilateral agreement between Czechoslovakia and Albania, although CSA at one time provided scheduled services to Tirane. No air transport agreements have been made with the Asian Communist countries.

A total of 41 non-Communist countries have entered into bilateral agreements with Czechoslovakia, 18 in Western Europe, 8 in the Middle East, and North Africa, 8 in Asia, 5 in West Africa, and 2 in North America. CSA services to Kuwait, Libya, and Iran are apparently conducted under special arrangements with those governments; no formal agreements are known to exist.

Under the terms of these agreements and arrangements, CSA operates its international services and in turn Czechoslovakia is served by 23 foreign carriers. Among these are eight Communist airlines: Aeroflot (U.S.S.R.), Cubana (Cuba), Interflug (East Germany), LOT (Poland), Balkan (Bulgaria), JAT (Yugoslavia), MALEV (Hungary), and TAROM (Romania). Fifteen airlines from non-Communist areas also conduct regularly scheduled services to Prague: KLM—Royal Dutch Airlines, Scandinavian Airlines System, BEA British Airways, Air France, Finnair, SABENA—Belgian World Airlines, Lufthansa German Airlines, Swissair, Austrian Airlines, Air Algerie, Pan American World Airways, Air Canada, Iraqi Airways, Syrian Arab Airlines, and Egyptair. The

only city other than Prague to receive service from a foreign airline is Bratislava, into which Aeroflot and Interflug fly.

I. Airfields[2] (S)

The air-facilities system consists of 135 operational airfields: 36 military, 13 joint civil and military, and 86 that normally are used only by civil aircraft. About 50% of all Czechoslovak airfields are small sod-surfaced fields used by aeroclub, airtaxi, agricultural, and ambulance aircraft. Runways that are 6,000 feet or more in length are found at 56 airfields: of this group, 32 fields have hard-surfaced runways and 24 natural-surfaced landing areas.

Airfield distribution follows the population and industry pattern; the greater number is situated in or west of the Morava-Oder Corridor. Of the airfields supporting tactical aircraft, only Soviet-occupied Sliac lies east of the corridor.

The air-facilities system is adequate for normal civil requirements. During the 1960's the principal civil airfields were greatly improved. Runways were extended at Prague/Ruzyne and Bratislava/Ivanka, and new terminal buildings were added at these two and at Brno/Turany. A concrete runway was added at Poprad/Tatry in 1969 and extended to 8,500 feet in 1971.

Czechoslovakia has two multirunway airfields: Prague/Ruzyne, which has four runways—the longest 10,700 feet; and Bratislava/Ivanka, which has two runways—the longer measuring 9,500 feet. The longest runway in the entire air-facilities system—11,500 feet—is at the Mosnov field, which probably was built to meet Soviet specification for sustained heavy bomber usage in accordance with a Warsaw Pact agreement. The Mosnov runway is in a class with the one at Gross Dolln, East Germany, and that of the Powidz field in Poland. Figure 13 gives details on selected airfields.

[2]Detailed information on Czechoslovak airfields is contained in Volume 14, *Airfields and Seaplane Stations of the World*, published by the Defense Intelligence Agency.

FIGURE 13. Selected airfields (S)

NAME AND LOCATION	LONGEST RUNWAY: SURFACE DIMENSIONS; ELEVATION ABOVE SEA LEVEL.	LARGEST AIRCRAFT NORMALLY SUPPORTED	REMARKS
Bechyne 49°16′N., 14°30′E.	Concrete 6,600 1,440	BEAGLE	Military. CAF fighter base. POL capacity 450,000 gal.
Bratislava/Ivanka 48°10′N., 17°13′E.	Concrete 9,500 430	CAMEL	Civil. International airport. POL capacity 300,000 gal. minimum.
Caslav/Chotusice 49°56′N., 15°23′E.	Concrete 7,900 760	BEAGLE	Military. CAF fighter base. POL capacity 1,450,000 gal.
Ceske Budejovice 48°57′N., 14°26′E.	Concrete 8,200 1,310	*do*	Military. CAF fighter base. POL available; quantity *na*.
Dobrany 49°40′N., 13°16′E.	Concrete 6,400 1,160	*do*	Military. CAF fighter base. POL capacity 300,000 gal.
Hradec Kralove 50°15′N., 15°51′E.	Concrete 7,900 780	*do*	Military. CAF fighter base. Military aeronautical academy. POL capacity 250,000 gal.
Klecany/Vodochody 50°13′N., 14°24′E.	Concrete 8,200 910	FISHBED	Civil. Field for Praha aircraft plant "Vodochody Letov." POL available; quantity *na*.
Milovice 50°14′N., 14°55′E.	Concrete 8,200 640	BEAGLE	Military. Soviet fighter base. POL capacity 655,000 gal.
Mimon 50°37′N., 14°55′E.	Concrete 8,000 900	FISHBED	Military. Soviet fighter base. POL capacity 280,000 gal. minimum.
Mosnov 49°42′N., 18°07′E.	Concrete 11 500 820	BADGER	Military. CAF fighter base. Longest runway in Czechoslovakia. POL capacity 2,145,000 gal.

FIGURE 13. Selected airfields (S) (*Continued*)

NAME AND LOCATION	LONGEST RUNWAY: SURFACE DIMENSIONS; ELEVATION ABOVE SEA LEVEL	LARGEST AIRCRAFT NORMALLY SUPPORTED	REMARKS
Namest nad Oslavou 49°10′N., 16°07′E.	Concrete 7,900 1,510	FISHBED	Military. CAF fighter base. POL capacity 250,000 gal.
Pardubice 50°01′N., 15°44′E.	Concrete 8,200 730	BEAGLE	Military. CAF fighter base. POL capacity 3,900,000 gal.
Poprad/Tatry 49°04′N., 20°14′E.	Concrete 8,500 2,320	COOKPOT	Civil. POL available; quantity *na*.
Prague/Ruzyne 50°06′N., 14°16′E.	Concrete 10,700 1,200	CAMEL	Civil. International airport. 4 runways. POL capacity 5,300,000 gal.
Prerov 49°26′N., 17°24′E.	Concrete 8,200 660	BEAGLE	Joint. CAF fighter base. CSA scheduled service. POL capacity 320,000 gal.
Sliac 48°38′N., 19°08′E.	Concrete 6,600 1,020	FISHBED	Joint. Soviet fighter base. CSA scheduled service. POL capacity 1,419,000 gal.
Zatec 50°22′N., 13°35′E.	Concrete 8,200 890	*do*	Military. CAF fighter base. POL available; quantity *na*.

na Data not available.

J. Telecommunications (U)

The relatively modern telecommunication (telecom) system in Czechoslovakia excels those of most other Eastern European Communist countries. They are used chiefly to support the diversified operations of the government and industry; secondary consideration is given to the needs of the general public.

The main industrial and large populated areas are served by a network of hardened underground cables. Open-wire and cable lines generally extend parallel to main highways and railroads. An extensive radio-relay network, providing channels for both domestic and international service, supplements the landlines.

More than 4,800 telephone exchanges are distributed throughout Czechoslovakia. Most have capacities of 200 to 2,000 lines; those in large cities have up to 10,000 lines. Most automatic exchanges use Strowger step-by-step or rotary switches. However, the latest equipment uses crossbar switches. Some 2.2 million telephones are in use, or about 15.4 per 100 population; about 95% are automatic. The domestic telecom system is oriented toward a regional administrative structure. The principal centers are the regional capitals of Banska Bystrica, Bratislava, Brno, Ceske Budejovice, Hradec Kralove, Kosice, Ostrava, Plzen, Prague, and Usti nad Labem. The principal cables extend from the East Germany border in the northwest through Prague, the hub of the network, to the borders of the U.S.S.R. and Hungary in the east and southeast and the Poland border in the northeast. The network is dense in the central and northern parts of the Czech Socialist Republic. The wire facilities are used mainly for telephone, telegraph, telex (teleprinter exchange service), and radiobroadcast distribution service. Radio-relay links are used principally for TV program distribution.

The Committee for Posts and Telecommunications (FVPT), a collective body of 10 members, formulates the state policy for postal and telecom services and supervises the respective telecom ministries in the Czech and Slovak Socialist Republics. Cooperation among the FVPT and the ministries of the two Socialist Republics has resulted in steady expansion of the entire system of postal services and telecom throughout the country. Czechoslovakia participates in international telecom activities through membership in the International Telecommunications Union (ITU), the Organization for Communication Cooperation (*Organizatsiya Sotrudvichestva Syvazi*—OSS), and the International Radiobroadcasting and Television Organization (OIRT).

The independent government organizations, Czechoslovak Radio and Czechoslovak Television, are responsible for programming and studio operations for radiobroadcast and television. Radiobroadcast service

is provided by 23 AM and 16 FM stations, and the TV network comprises 10 major regional stations supplemented by 300 low-powered rebroadcast transmitters. Czechoslovakia has the best developed and most extensive TV system in Eastern Europe, offering a national program to more than 90% of the population. At the end of 1972, there were 3.2 million TV receivers and 3.8 million registered radio receivers in the country. TV programs are exchanged with the Intervision and Eurvision networks. A high-powered TV transmitter capable of color transmissions in both the PAL (West German) and SECAM (French) systems has been completed at Krizava Hill, near Prague; transmission commenced on 9 May 1973.

Wired broadcasting is still used extensively, and in recent years the network has developed into a significant countrywide facility. Programs are transmitted to loudspeakers in schools and other public places.

International telecom facilities which include landlines, radio-relay links, and radio communication stations are interconnected with the domestic public intercity networks. These facilities provide telecom circuits to all neighboring countries and to many principal cities of the world. Direct automatic exchange equipment are in use. The army telecom system consists of military-owned wire lines, leased circuits, and radio facilities. The system provides telegraph service between the main telecom center in Prague and other centers at Brno, Ceske Budejovice, Hradec Kralove, Karlovy Vary, Kbely, Kosice, Mlada Boleslav, Olomouc, Plzen, Tabor, and Trencin. An extensive radio-relay system operated by the Ministry of Defense provides communications down to the division level for member countries of the Warsaw Pact. More recently the links have been extended to SAM sites and radar stations. The headquarters is located at Petrin Hill, and the control and operations center is at Ruzyne.

The Communist Party has a private telegraph service operating between headquarters in Prague and 10 group centers throughout the country. Circuits are leased from the FVPT, and teleprinters are used throughout the system.

In 1968 the Soviet Forces (Central Group of Forces—CGF) established a permanent telecom link to the Soviet Union and the Group of Soviet Forces Germany (GSFG). Headquarters for the CGF is located in Milovice, Czechoslovakia. A troposcatter station at Jirice maintains a link between the Milovice CGF headquarters, the Northern Group Forces (NGF), at Legnica, Poland, the GSFG Headquarters at Zossen, East Germany, and the Ministry of Defense, Moscow.

Czechoslovakia ranks among the most important producers of telecom equipment in Eastern Europe. Currently, the industry consists of 11 major equipment producers plus numerous facilities which make components and subassemblies. Types of wire equipment produced include telephone handsets, semiautomatic and manual switchboards, carrier equipment, teleprinters, and cathode-ray picture tubes. Radio and TV receivers, and transmitters including transistorized units, are produced in substantial quantities. Czechoslovakia is largely self-sufficient in meeting its requirements for most telecom equipment; however, special items such as high-speed data transmission systems suitable for use by new agencies, VHF communication equipment, microwave relay equipment, and telecom components including oscilloscopes and certain types of transistors, are imported.

During winter months, high humidity and low temperatures occasionally cause ice accumulation on open-wire lines and antennas, and heavy snows are a problem particularly in the higher elevations. These climate conditions have also hampered the construction of the transmitter network for the second television program and radio-relay communications.

Telecom systems are reasonably secure from disruption by sabotage. The basic intercity cables are buried, and numerous alternate routes are available between important areas. The heaviest concentration of intercity telecom circuits is in the Prague area, where the main terminal and switching centers are located. Destruction of these facilities would disrupt telecom service in most of the western half of the country. Other important junction points where telecom traffic could be disrupted are Bratislava, Brno, Olomouc, Ostrava, Trencin, and Zilina.

A shortage of electronics engineers and technicians exists, but sufficient personnel are available to operate and maintain telecom facilities. Universities in Prague and Bratislava have special schools for electronics training.

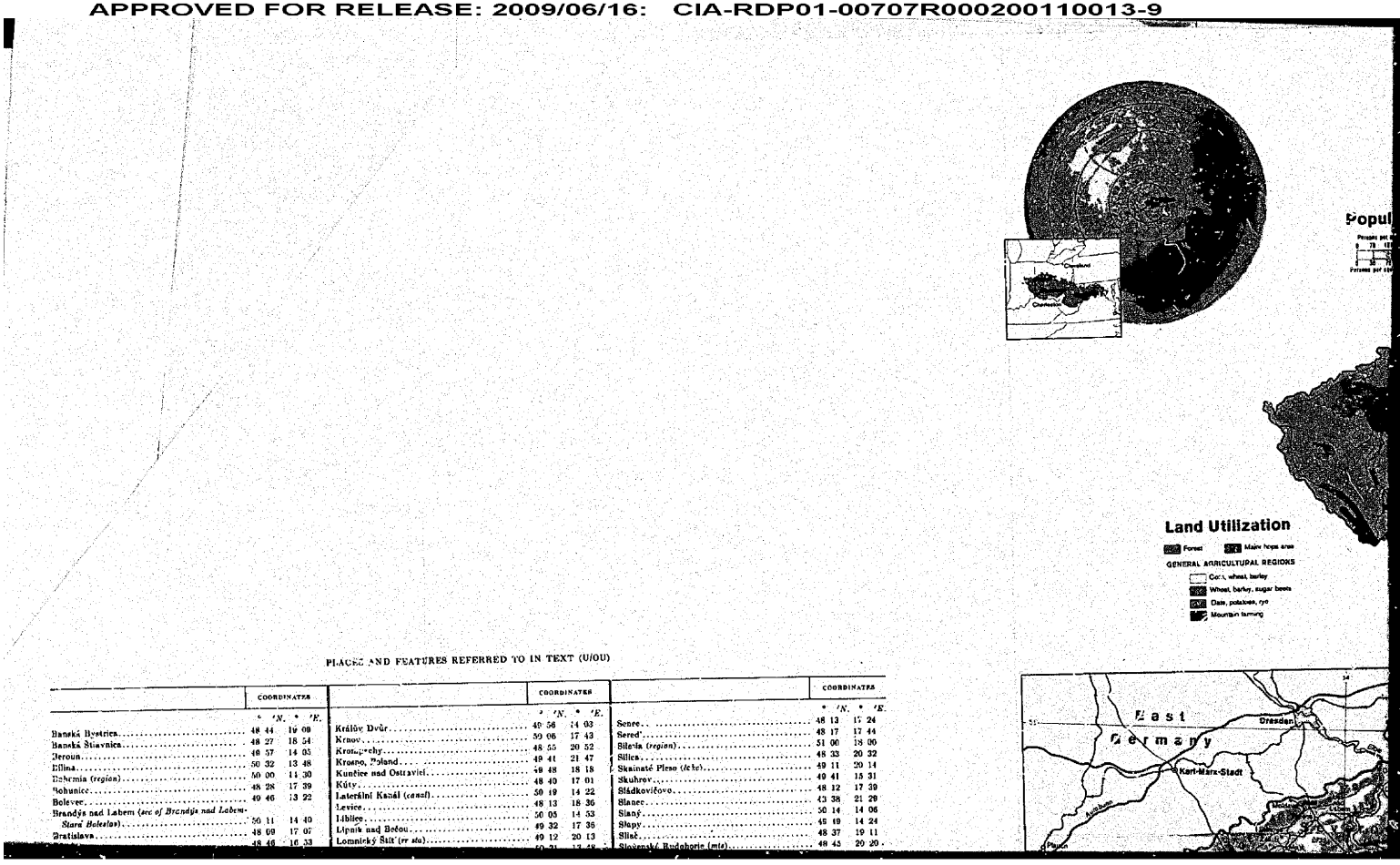
The main task of the present Five Year Plan (1971-75) is the elimination of obsolescence of inter-city networks. High priority has been placed on the automation of long-distance telephone service. New coaxial trunk lines will be installed, mainly from

Prague to the East. In the near future, satellite communications will play an increasingly importart role.

Their integration within the Czechoslovak communications network will probably occur in the next Five Year Plan, initially in relaying international television broadcasts and later in telephone communications. A Telecom Center currently under construction in Prague will serve as headquarters for the intercity and interstate dial telephone systems, for the telegraph service, and the telex system. It will rank Czechoslovakia's communications system as the best in Europe and will integrate the country into the main European trunk line network.

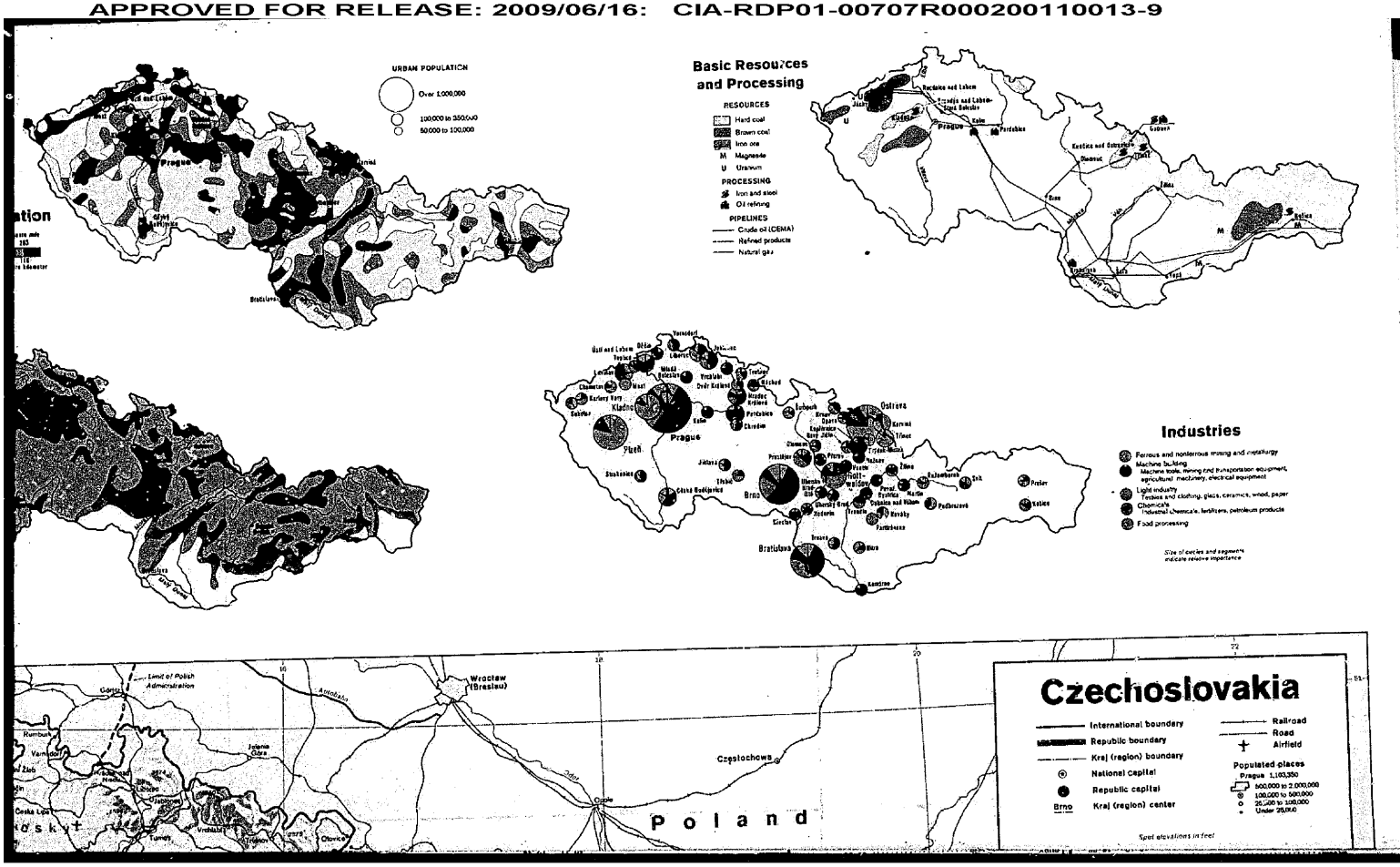
Glossary (s)

ABBREVIATION	CZECHOSLOVAK	ENGLISH
CSA	*Ceskoslovenske Aerolinie*	Czechoslovak Airlines
CSAD	*Ceskoslovenska Automobilove Doprava*	Czechoslovak State Auto Transport
CSD	*Ceskoslovenske Statni Draphy*	Czechoslovak State Railways
CSPD	*Ceskoslovenska Plavba Dunajska*	Czechoslovak Danube Navigation Co.
CSPLO	*Ceskoslovenska Plavba Labsko-Oderska*	Czechoslovak Elbe-Oder Navigation Co.
OSS	*Organizatsiye Sotrudvichestva Svyazi*	Organization for Communications Co-operation



PLACES AND FEATURES REFERRED TO IN TEXT (U/OU)

	COORDINATES				COORDINATES				COORDINATES	
	° 'N.	° 'E.			° 'N.	° 'E.			° 'N.	° 'E.
Banská Bystrica	48 44	19 08		Králův Dvůr	49 56	14 03		Senec	48 13	17 24
Banská Štiavnica	48 27	18 54		Krnov	50 06	17 43		Sered'	48 17	17 44
Beroun	49 57	14 05		Kroměříž	49 18	17 24		Silesia (*region*)	51 00	18 00
Bílina	50 32	13 48		Krosno, Poland	49 41	21 47		Silica	48 33	20 32
Bohemia (*region*)	50 00	14 30		Kunčice nad Ostravicí	49 48	18 18		Skalnaté Pleso (*lake*)	49 11	20 14
Bohunice	48 28	17 39		Kúty	48 49	17 01		Skuhrov	49 41	15 31
Bolevec	49 46	13 22		Laterální Kanál (*canal*)	50 19	14 22		Sládkovičovo	48 12	17 39
Brandýs nad Labem (*see of Brandýs nad Labem-Stará Boleslav*)	50 11	14 40		Levice	48 13	18 36		Slaneč	43 38	21 29
Bratislava	48 09	17 07		Libišce	50 05	14 53		Slaný	50 14	14 06
	48 46	17 33		Lipník nad Bečou	49 32	17 36		Slapy	45 49	14 24
				Lomnický Štít (*pr sta*)	49 12	20 13		Sliač	48 37	19 11
								Slovenský Rudohorie (*mts*)	48 45	20 20



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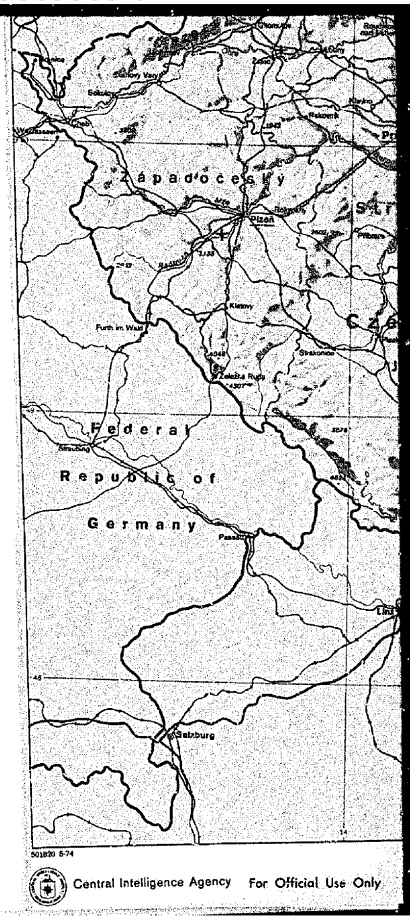
Brno	49 12	16 38
Budapest, Hungary	47 30	19 05
Bučkov	48 04	14 00
Budkovce	48 38	21 56
Budulov	48 35	21 00
Bystřice nad Pernštejnem	49 31	16 16
Čadca	49 26	18 47
Čáslav	49 55	15 24
Češejovce	48 36	21 04
Černá v Pošumaví	48 44	14 07
Česká Lípa	50 41	14 33
Česká Třebová	49 54	16 27
České Budějovice	48 50	14 28
České Velenice	48 46	14 38
Český Krumlov	48 49	14 19
Český Těšín	49 45	18 37
Cheb	50 04	12 22
Chomutov	50 27	13 25
Chop, U.S.S.R.	48 26	22 12
Chudeřice	50 34	13 47
Cierna nad Tisou	48 26	22 06
Cieszyn, Poland	49 43	18 38
Cifer	48 19	17 30
Coltovo	48 30	20 23
Constanta, Romania	44 11	28 39
Danube (*strm*)	45 29	29 40
Děčín	50 47	14 13
Dolní Žleb	50 50	14 13
Dresden, East Germany	51 03	13 45
Dukla Pass (*pass*)	49 25	21 42
Dukovany	49 05	16 12
Elbe (*strm*)	53 50	9 00
Freistadt, Austria	48 30	14 30
Frýdek-Místek (*commune*)	49 40	18 20
Furth im Wald, West Germany	49 18	12 51
Gdynia, Poland	54 30	18 33
Gönyü, Hungary	47 44	17 50
Gottwaldov	49 13	17 40
Habry	49 45	15 29
Hamburg, West Germany	53 33	10 00
Hanska	48 37	21 15
Havlíčkův Brod	49 37	15 35
Hlohovec	48 47	16 48
Hněvice	50 27	14 22
Horná Štubňa	48 49	18 53
Horné Srnie	48 49	18 06
Hradec Králové	50 13	15 50
Hradištská Mo'va	48 36	21 49
Hranice	49 33	17 44
Hurbanovo	47 52	18 12
Ipel' (*strm*)	47 49	18 51
Istebné	49 13	19 13
Jablonica	48 36	17 25
Jáchymov	50 22	12 55
Jaroměř	50 22	15 55
Jelšava	48 38	20 14
Jelšovce	48 24	18 04
Jihlava	49 24	15 35
Karlovy Vary	50 13	12 54
Karviná	49 52	18 33
Katowice, Poland	50 10	19 01
Kladno	50 09	14 08
Kletovy	49 24	15 16
Klobouky	48 59	16 52
Kłodsko, Poland	50 26	16 39
Kolín	50 02	15 12
Komárno	47 46	18 08
Kopřivnice	49 36	18 09
Košice	48 42	21 15
Kralupy nad Vltavou	50 14	14 19

Loučky	48 26	19 38
Levinabaňa	48 40	20 12
Lubeník	48 20	19 40
Lučenec	48 20	19 40
Malacky	48 26	17 01
Malín	49 58	15 18
Malý Dunaj (*strm*)	47 45	18 09
Marktredwitz, West Germany	50 00	12 05
Martin	49 04	18 56
Medvedov	47 48	17 40
Mělník	50 21	14 29
Michalovce	48 45	21 56
Miskolc, Hungary	48 06	20 47
Mladá Boleslav	50 25	14 54
Mníšek pod Brdy	49 52	14 16
Moldava nad Bodvou	48 37	21 00
Morava (*strm*)	48 10	16 59
Moravia (*region*)	49 30	17 00
Moravian Gate (*pass*)	49 35	17 50
Mosonmagyaróvár, Hungary	47 52	17 17
Most	50 32	13 39
Mstětice	50 09	14 42
Nemětíany	48 18	18 28
Netolice	49 03	14 12
Nitra	48 19	18 05
Nové Město nad Váhom	48 45	17 50
Nové Zámky	47 59	18 10
Nový Jičín	49 36	18 01
Nymburk	50 11	15 03
Oder (*strm*)	53 32	14 38
Ohře (*strm*)	50 32	14 08
Olomouc	49 35	17 15
Onšejov	49 54	14 48
Opatínek	50 02	15 39
Ostrava	49 50	18 17
Ostravsko-Karvinská Pánev (*region*)	49 50	18 30
Panská Ves	50 32	14 33
Panšubice	50 02	15 47
Pešťin (*hill*)	50 05	14 24
Piest'any	48 38	17 50
Plavecký Štvrtok	48 22	17 00
Plzeň	49 45	13 22
Podbrezová	48 49	19 22
Poděbrady	50 09	15 08
Podunajské Biskupice	48 08	17 13
Poprad	49 03	20 18
Považská Bystrica	49 07	18 27
Povrly	50 40	14 10
Prachatice	50 05	17 15
Prague	50 05	14 28
Přerov	49 27	17 27
Přešov	49 00	21 15
Příbor	49 39	18 09
Příbram	49 42	14 01
Prievidza	48 45	18 38
Prostějov	49 28	17 07
Průhonice	50 00	14 34
Púchov	49 08	18 20
Rež	50 10	14 21
Rijeka, Yugoslavia	45 21	14 24
Rimavská Sobota	48 23	20 02
Rostock, East Germany	54 05	12 08
Roudnice nad Labem	50 25	14 15
Rudňany	48 53	20 41
Ruská	48 32	22 09
Šafárikovo	48 25	20 20
Šahy	48 04	18 58
Šal'a	48 09	17 53
Satalice	50 07	14 35
Sázava (*strm*)	49 10	20 03

Sokolov	50 11	12 38
Staroljeká Lhota	49 24	17 55
Starý Bohumín	49 55	18 20
Stettin, Poland	53 25	14 35
Strmé Pleso	49 07	20 03
Štúrovo	47 48	18 44
Šumperk	49 58	16 58
Tábor	49 25	14 40
Tatry	48 45	14 12
Tehov	49 58	14 42
Teplice	50 38	13 50
Tillyschanz, West Germany	49 35	12 35
Tirană, Albania	41 20	19 50
Tisa (*strm*)	45 15	20 17
Tlmače	48 17	18 32
Tomášová	48 22	20 01
Topoľčany	48 34	18 11
Třebíč	49 13	15 53
Trebišov	48 38	21 43
Trenčín	48 54	18 02
Třinec	49 41	18 39
Trnava	48 22	17 36
Tupá	48 07	18 54
Týn nad Vltavou	49 14	14 25
Ústí nad Labem	50 40	14 02
Uzhgorod, U.S.S.R.	48 47	22 18
Váh (*strm*)	47 55	18 01
Vajková	48 49	19 31
Velká-Bíteš	49 18	16 13
Veľké Kapušany	48 33	22 05
Veľké Zlievce	48 12	19 27
Vienna, Austria	48 12	16 22
Višňovice (*see of Ostrava*)	49 49	18 16
Vltava (*strm*)	50 20	14 29
Vochov	49 46	13 17
Vrchlabí	50 38	15 36
Vrútky	49 07	18 55
Vysoká pri Morave	48 20	16 55
Vysoké Tatry (*mts*)	49 10	20 00
Vysoké Tatry	49 08	20 13
Waidhaus, West Germany	49 39	12 30
Zaluži	50 34	13 36
Zdiměř (*see of Prague*)	50 01	14 28
Zhenalov	50 02	13 09
Žiar nad Hronom	48 35	18 52
Židlochovice	49 02	16 37
Žilina	49 13	18 44
Zlaté Moravce	48 23	18 24
Znojmo	48 51	16 03
Zohor	48 19	16 59
Zvolen	48 35	19 08

SELECTED AIRFIELDS

Bechyne	49 16	14 30
Bratislava/Ivanka	48 10	17 13
Caslav/Chotusice	49 56	15 23
Ceske Budejovice	48 57	14 26
Dobrany	49 40	13 16
Hradec Kralove	50 .5	15 51
Klecany/Vodochody	50 13	14 24
Milovice	50 14	14 55
Mimon	50 37	14 55
Mosnov	49 42	18 07
Namest nad Oslavou	49 10	16 07
Pardubice	50 01	15 44
Prague/Ruzyne	50 06	14 16
Prerov	49 26	17 24
Slicc	48 38	19 08
Zatec	50 22	13 35



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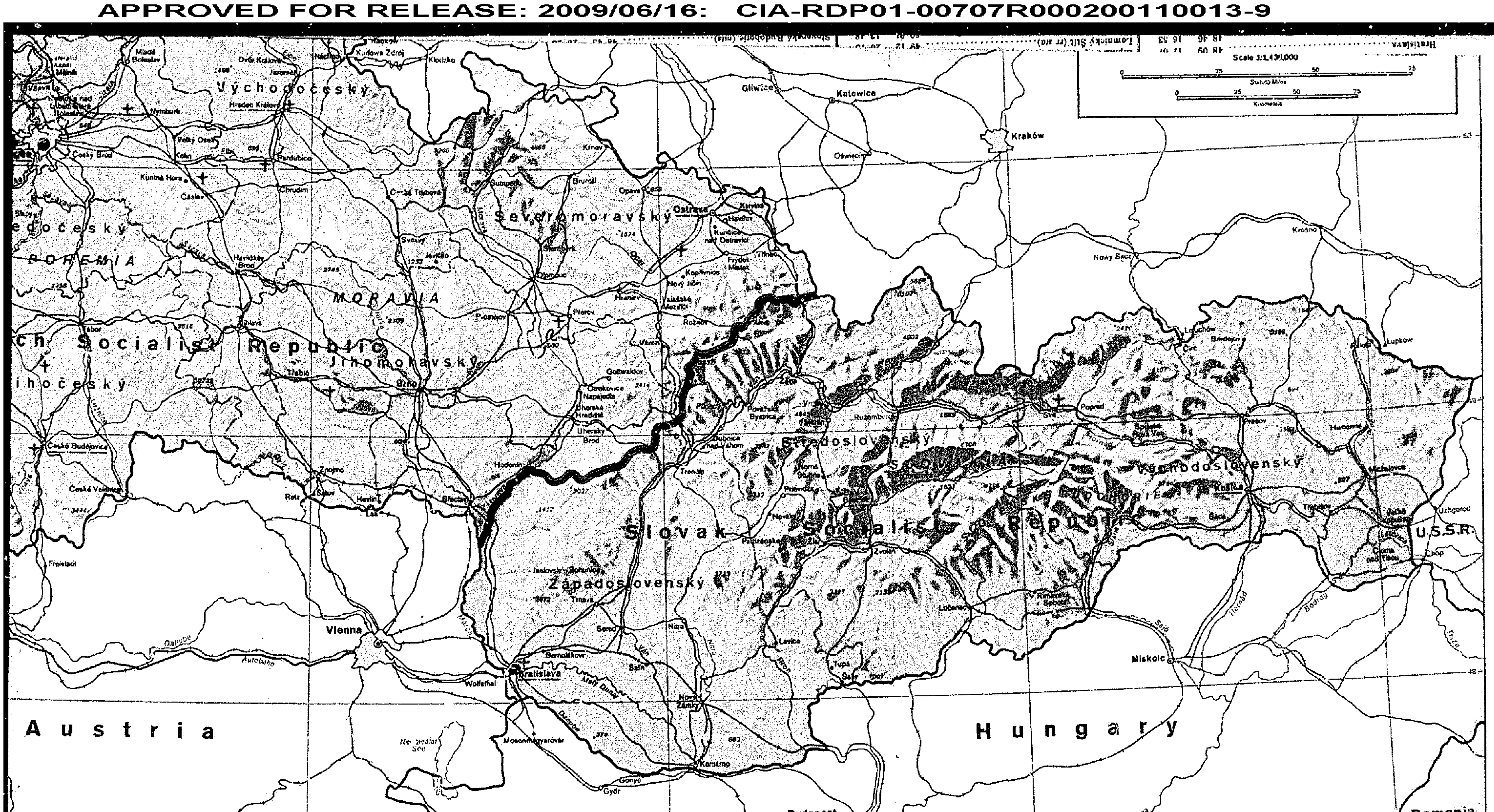

Terrain and Transportation Figure 14

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