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YUGOSLAVIA'S INDUSTRIAL POTENTIAL

## I. GENERAL

The availability in Yugoslavia of raw materials, the exploitation of which is being intensified, the assistance offered by Russia, which sent materials and above all technicians, the rebuilding and expansion of old installations destroyed or damaged during the war, the construction of new industrial plants, and the orientation of the Five-Year Plan toward the industrialization of the country suggest that before long Yugoslavia will have at its disposal such industrial resources as to permit it to meet all national industrial requirements.

Certain particular provisions accreted during the execution of the Five-Year Plan, together with the building of underground factories, clearly show how the development of industry is largely subject to military directives for an everincreasing offensive and defensive military potential.

According to a recent estimate, Yugoslav industry is well provided with such ordinary machinery as milling cutters, lathes, perforators, presses, etc. Precision instruments, however, are lacking. Electrical equipment and ball bearings are in particularly short supply.

Of the 14,000 machines Yugoslavia received from Germany as reparations, 12,000 were assigned to military industries and 2,000 left for civilian industry. The equipment of 200 factories is still scheduled to be sent to Yugoslavia as reparations from Germany, but the British authorities stubbornly oppose this.

# II. STATE CONTROL OF INDUSTRY

All Yugoslav industrial activities are under the control of the Ministry of Industry, the headquarters of which are in Belgrade.

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The various Generalne Direkcije (General Administrations) are subordinate to the Ministry of Industry, which delegates the control of the factories of national significance to them.

Besides, each of the six republics has its own Ministry of Industry, the administrations of which control local industry of regional importance.

The following General Administrations of the Ministry of Industry in Belgrade are known: Mechanical Industry, Metallurgical Industry, Motor Industry, Agricultural Machinery Industry, Electrical Equipment Industry, Chemical Industry, Textile Industry, Tobacco Industry, Cement Industry, Mining Industry, Leather and Rubber Industry, and Electrical Industry.

## III. FIVE-YEAR PLAN FOR INDUSTRY

The first Five-Year Plan for industry covers the period from 1946 to the end of 1951.

The Ministry of Industry called upon the following six Yugoslav engineers, specialists in industrial problems, to draw up the plan: Doctor of Engineering Hercegoni, and Engineers Stefanovic, Vuco, Prica, Lazarevic, and Hanzecovic.

The directives of the then Minister of Industry Kidric called for the creation of new factories and the modernization of those in existence, so as to assure the complete independence of the country from abroad in the industrial sector by the end of the second Five-Year Plan, which was to follow immediately after the first.

The factories of fundamental importance were to be set up in such a way that any one could be transformed into a war industry within a maximum of 6 months.

The new factories were to be so located as to permit an easy defense of the installations and to assure the protection and continuity of operation in any contingency. In particular the buildings of each factory were to be separated from one another by a distance of at least 200 meters and were not to be placed in the same direction. The buildings were to have the appearance of hospitals, museums, or apartment houses rather than of factories.

These last requirements were presented by the Army General Staff to Minister Kidric, who ordered the planners and builders to adapt the General Staff directives to industrial needs.

The time allowed to the engineers for presenting their respective plans was very short. Thus each of them presented his own project without details and without coordination with the others. All the plans presented were approved by the Council of Ministers and translated into laws, after which each plan was elaborated in detail and its relative cost estimated. The total sum for the realization of the various plans turned out to be beyond the financial capacity of the country (Engineer Hanzecovic's plan would have cost  $\theta_2^1$  billion dinars, while the others varied from 6 to 8 billion). Thus each planner was obliged to cut down on the installations and machinery of each factory planned, while leaving the number of actual factories unchanged. For exemple, the Zeleznik factory would, according to the initial project, have been twice as extensive as it was when actually completed.

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However much the original plans were reduced, the Ministry of Finances still did not succeed in meeting the expenses. Thus it was necessary to resort to a tremendous increase in taxation, which resulted in indescribable discontent among the people. The government, although aware of this discontent, kept its determination to meet the costs of the Five-Year Plan in whatever manner might be necessary. This included the necessity of exporting such products of prime necessity as grain and fats to acquire machinery, to such an extent as to deprive the people of them almost totally.

In 1946 Yugoslavia was very short of such products as cement, bricks, and iron, after sending more of these items to the USSR then Yugoslavia was capable of exporting. This was responsible for the failure of the plan for the first year of the Five-Year Plan. The government, thinking that the failure of the plan at its beginning would cause general discontent and would discredit it before the people, stopped sending the above materials to Russia and tried during the second year to make up for lost time; but it failed again because of a shortage of manpover, skilled and unskilled. (According to many observers, this failure to deliver materials to Russia was probably one of the causes of the Tito-Cominform break.)

To carry out the plan at any cost and to reduce expenditures, the government in 1947 invented the institution of "extraordinary compulsory labor without compensation." If the government succeeds in keeping this system in force, it will attain the goals fixed by the plan in 1949; however, it will meet vigorous opposition from the workers concerned.

The Five-Year Plan includes a plan for the expansion of the city of Belgrade as far as the station and airfield in Zemun. The airfield will be moved to the vicinity of Batajnica, about 15 kilometers west of Zemun. The new Government Building is now being built according to this plan on the left bank of the Sava, opposite the Zemun railroad station.

The expansion of the city of Belgrade will prove very expensive and will proceed slowly, as the subsoil is sandy. At present about 2,000 youth are working as volunteers leveling the ground. Details on the plan for expanding Belgrade are not available, although details on the expansion of Zagreb, also provided for by the Five-Year Plan, are at hand.

Military industry also has its five-year plan, the details of which are known, however, only to persons of proved political fidelity who are directly interested in the subject. All that is known is that of the  $1^{\rm h},000$  machines received from Germany as reparations, at least 12,000 have been assigned to military industry, which has priority over civilian heavy industry.

IV. INDUSTRIES OF PARTICULAR MILITARY AND AERONAUTICAL INTEREST

#### Belgrade Area

1. "Rogozarski" Aeronautical Workshop

This workshop, located in Belgrade at Ul. Knez Danila 29, was in existence before the war and during 1941 produced 100 aircraft. Present production, the details of which are not known, consists of fighter aircraft of modern type and of spare parts.

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# 2. "Zmaj" Aircraft Factory

The "Zmaj" Factory, located in a suburb southeast of the town of Zemun, not far from Belgrade, is now engaged in the construction of light aircraft, of which 10 to 12 are produced per year, with a labor force of about 300 workers. This factory also existed before the war and in 1941 had attained an annual production of 150 aircraft.

# 3. "Ikarus" Aircraft Factory

The "Tkarus" Aircraft Factory is located south of Zemun, less than 100 meters from the Belgrade-Zagreb railroad line. Its production has never been of a well defined character and has never been done serially. At present it consists of the construction of duralumin airframes for military aircraft, at a rate of three per day for fighter types and two per day for bomber types.

The "Ikarus" Factory has been assigned the special task of carrying out research on foreign aircraft and eventually copying them. With this in view, all aircraft shot down during the war have been taken there. As a result, the factory has built an unknown number of Spitfire-type aircraft. In July 1947, two aircraft prototypes, named "XX Oktobar," were under construction at "Ikarus." They were low-wing two-seaters, of mixed construction, with 100-horsepower Gipsy engines, capable of a speed of 200 kilometers per hour.

The factory is under rigid military control and is strictly guarded. It is not modern, and the workshops are small. The labor force varies from 1,200 to 1,500 workers.

## 4. Ball-Bearing Factory

There is a building in Ul. Knez Mihajlo in Belgrade -- it does not look much like an industrial establishment -- in which a ball-bearing factory is supposed to be set up. The machinery has not yet arrived from abroad.

### 5. "Teleoptik" Workshops

The "Teleoptik" Workshops are about 2 kilometers from Zemun on the Zemun-Jagreb Highway, next to the local cavalry barracks. These workshops produce precision optical instruments, telemeters, and sights for bomber and fighter aircraft. About 100 instruments are produced there per month.

"Teleoptik" employs about 300 specialized workers, almost all Germans, as are the managers. They work by contract. The few Yugoslav workers are all militarized.

The workshops are old, but have been substantially enlarged.

# 6 Aeronautical Workshop in Zemun

This workshop, near the Zemun Airfield, is equipped for small and medium repairs on aircraft and engines. It employs 700 German specialists, including 200 mechanics who were prisoners of war.

Besides the above enterprises, the following establishments are located in the Belgrade area, but details on them are not known: the "Pancevo" Factory; a cannon and artillery projectile factory; workshops for the production of aeronautical equipment, spare parts for engines, and aircraft accessories; the aeronautical workshop at the Pancevo Airfield for testing the aircraft of the field itself; and the glass factory in Pancevo.

#### Belsinac Area

Exact data on the aeronautical enterprises in this area are not known.

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#### Borovo Area

"Bata" Shoe Factory

This is the largest shoe factory in Yugoslavia and in the Balkans. It produces leather and rubber footwear and tires of all sizes. Its present production is scarcely sufficient to meet one-fifth of the national needs, but it could be increased sufficiently to fill half the needs of the Yugoslav civil population if its machinery could be modernized and spare parts acquired. Before the Tito-Cominform break, spare parts were imported from the "Bata" factory at Zlin in Czechoslovakia.

At present the "Bata" Factory in Borovo is engaged chiefly in producing footwear and tires for military use. If the entire production were diverted to military needs, it would satisfy all the requirements of the Armed Forces.

About 3,000 workers are employed.

## Bosanski Brod Area

Factories producing war materiel, including aircraft bombs and artillery agranition, are located just to the north of the railroad station.

#### Brdolje Area (near Skofja Loka)

The plywood factory in this area is also engaged in aircraft production.

#### Breza Area

Details on the aircraft enterprises in this area are not known.

## Kotor-Crokov.c Area

There is a small factory in this area which makes ammunition for light weapons.

## Celje Area

"Western" Factory

This factory is located 500 meters north of the railroad station of the Maribor-Celje line, and occupies a rectangle 1,000 by 500 meters. Its production consists of manufactured copper, zinc, and iron products and of red lead and rust-proofing paints. It is the only zinc-manufacturing plant in Yugoslavia. Its zinc production, consisting of plate, is sufficient to satisfy Yugoslav needs. It produces about 3,000 to 4,000 toms per year of copper products for railroads and for locomotive boilers. Its iron production consists of 10,000 toms per year of kitchen utensils, enough to meet Yugoslav needs. The factory also produces radiators and boilers for thermosiphons.

The "Western" Factory obtains its raw materials primarily from the Bor mines. It employs 3,000 persons working on three shifts. The factory is antiquated, and no expansion or modernization is plauned. However, it has one modern section, a special polishing section. The machinery is unsuitable for producing war material, as it is not adapted to precision work.

A workshop which has been observed in the Celje area is probably intended for testing aircraft.  ${\mathfrak v}$ 

#### Rijeka Area

1. Refinery of the General Administration for Petroleum and Gas

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This refinery formerly belonged to the Italian firm ROMSA. The installations and machinery, except for slight modifications, are the same as before, and are in poor condition because of a shortage of spare parts. The equipment of the "Edelanu" section is incomplete, while that of the "Contatto" (Contact) section, though satisfactory, is now out of service because of the lack of specialist personnel resulting from the departure of the Italian technicians

The petroleum formerly was obtained from Albania, but deliveries from this source appear to have been cut off completely as a result of the Tito-Cominform break. At present, the petroleum is obtained from Iran, and is of the best quality. Every 20 - 25 days the tanker Jajce (sold to Yugoslavia by England) puts in at Rijeka Harbor to unload about 9,000 tons of crude petroleum.

The daily production of the refinery amounts to about 150 - 200 tons of gasoline, 100 tons of kerosene, 40 - 50 tons of heavy oil, and 200 tons altogether of paraffin, asphalt, and other secondary products. These products are shipped every day to Belgrade, Zagreb, and Sarajevo in railroad tank cars with a capacity of about 15 tons.

About 800 blue- and white-collar workers are employed at the factory. They are carefully controlled by UDB / secret police / personnel who mingle among them secretly. The manager of the enterprise is Engineer Cernoschi, the assistant manager a certain Biagini Nello, both of Italian origin.

# 2. "A. Fankovic" Torpedo Factory

and workers who took advantage of the right option.

The "A. Rankovic" Torpede Factory in Rijeka was established by Italy. It was largely destroyed during the war, and completely restored and equipped with a new pavilion of reinforced concrete. However, for lack of machinery, only 16 of the 32 sections making up the prewar torpedo factory appear to be in operation now.

New models of torpedoes are not being produced at present, but intensive efforts are being made to perfect those invented by Italian engineers, using modifications suggested by torpedoes found recently. There is a stockpile of 200 to 250 torpedoes near the torpedo factory at present.

Qmite recently, work was being carried on by advanced specialists, including some Germans, toward adapting Stuka aircraft engines to Yugoslav Navy submarine chasers. The tests appear to have given gratifying results.

The torpedo factory is considered to be a minitary enterprise, and is under the jurisdiction of the local command of the Yugoslav Navy.

# Ilidza Area

The beginning of construction of a large factory scheduled to produce aluminum goods, insulating materials, plumbing fixtures, etc., has been observed in this area.

#### Indija Area

There is a parachute and flight clothing factory in this area.

#### Jesenice Area

## 1. "Jesenice" Factory

This factory is engaged almost exclusively in the construction of passenger railroad cars. Its production capacity will be one car per day when its entire machine inventory has been put into operation. At present its capacity is 18 - 20 cars per month. It produces serially, using a Ford-type production line.

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The factory is not scheduled to be transformed into a war industry, but in case of necessity it could produce tank parts, tractor tracks, and pressed metal parts with its present machinery.

The "Jesenice" Factory is now being expanded. At present an iron shed 126 by 90 meters in area is being set up. It was brought from the Krupp Works in Essen. An administration building and a building to be used as a school for apprentices are also under construction.

The enterprise now has about 600 machines at its disposal, including four or five special hydraulic presses from Czechoslovakia. Another 300 machines, including stamping machines, planero, and milling cutters are on order from the Eve-Export Company in Stockholm. Each of these machines will cost from 3 to 5 million dinars.

The wheels and axles for the railroad car, are supplied by the factory at Osovich, near Zenica, in Bosnia. The electrical equipment is furnished by the British Western House factory in Southampton, which sends 20 sets per month, or about one for each car. Negotiations are now under way for a contract for springs from the largest Polish manufacturer of railroad equipment.

The factory has no foundry, but it has a power plant scheduled to have a capacity of 3,000 kilowatts as soon as the Diesel engines ordered from Germany are in organism. The raw materials come primarily from the three Yugoslav ironworks, and also, to some extent, from Germany and Czechoslovakia. The latter supplies iron plate. Before the Tito-Cominform split, materials were also received from Russia, but they proved to be of increasingly poor quality.

The entire production of the "Jesenice" Factory is absorbed by internal trade, but is not sufficient to meet the demand. The quality of the products is falling off. Serious railroad accidents occur frequently in Yugoslavia as a result of the poor quality of the rolling stock and because of inadequate maintenance of the lines. These accidents are not reported to the public.

The cars produced by the factory are marked with the letters CHH. About 3,000 workers are employed. This number will be increased to 5,000 when the current expansion and modernization of the factory are completed.

There is a small independent establishment for the production of automobile and truck bodies annexed to the "Jesenice" Factory. It has a production capacity of five bodies per month. They are fitted with engines from the factories at Rakovica and Tezno.

#### 2. Jesenice Ironworks

This plant is located in the city of Jesenice, in a degression near the railroad station. It has only one blast furnace in operation. Another will be built during 1949; however, production will not increase proportionally because the present machinery will not permit it. The inventory of machinery consists at present of about 90 machines, including four large laminating machines and pneumatic and hydraulic hammers. Some of these machines came from the Krupp Works in Essen and were repaired in the Zeleznik works. These machines include stamping machines that can cut 80 pieces per minute, and research is in progress on others that can cut 200 per minute, regardless of thickness. It is planned to use tools of "Vidia" material on all the machines. There are rather few tools of this material at the plant at present.

Besides the blast furnace the Jesenice Ironworks has a Martin furnace for the production of special steel and three electric furnaces for making ingots. Each furnace has a capacity of three to four 3-ton charges per day. The blast furnace and the Martin furnace burn coke. There are also a few small gas furnaces for special operations. The machinery is run by electricity supplied by one of the four power plants on the Drays.

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The raw materials come from the Bor mine. The Jesenice Ironworks also melts up scrap iron. In 1946-47 it also received iron from Sweden and Austria, but since then Yugoslavia has had to do without this source of supply for lack of foreign currency.

The Jesenice Ironworks produces iron and steel bars of better quality than those of any other Yugoslav ironworks, but they are definitely inferior to those produced abroad. Expansion and modernization of the machinery, planned for 1951, will permit a definite imprevement in the quality of production.

The blast furnace is operated by 1,500 workers, the Martin furnace by 2,000, and the other sections by about 8,000. Most of the workers are unskilled.

#### Kakanj Ares

An aeronautical enterprise has been noted in this area, but details are not available.

#### Kragujevac Area

Arms and Munitions Factory

This factory, the largest of its kind in Yugoslavia, is cituated in the suburbs east of the city, between the Kragujevac-Belgrade railroad and the Jeponica River. It consists of shout 25 buildings within an area of 1,500 by 1,000 meters. It is regarded as a military establishment and is directly under the jurisdiction of the Ministry of Defense.

At present the factory produces light arms and small-caliber ammunition, but it is being equipped for the production of entiaircraft machine guns and antitank gun. Its arms production consists at present of the following models (the daily output for each model, in the absence of direct knowledge, is computed from the capacity of the machinery, of the labor force, and of the raw materials used): 75- and 80-millimeter antiaircraft guns, two per day; 34- and 37-millimeter antiaircraft guns, 30 per day; 20-millimeter single-barrelled antiaircraft machine guns, with a horizontal magazine containing 50 cartridges divided among five clips of ten cartridges each, 20 per day; and Russian-type submachine guns with vertical cartridges, about 2,500 per day. The entire Yugoslav Army is scheduled to be equipped with this last type of gun.

Besides these weapons, hand grenades and various types of ammunition are being produced. Data is not available on their quantity and quality. The present production is superior to the prevar and to that of the war period. The factory also repairs and remodels old-type weapons.

The factory buildings are now being modernized, but they are not scheduled to be enlarged, although they are insufficient for production needs. The machinery inventory consists of about 5,500 machines, and has been largely renovated with machinery sent from Germany as reparations. Many other machines are available but cannot be installed for lack of space. Each machine operates independently of the others as it has its own electric motor. The current is supplied by the thermal power plant in Belgrade and by a hydroelectric power plant in Bosnia.

Ordinary raw materials are supplied by the foundries at Jesenice and at Zenice. Special raw materials came from Czechoslovakia until recently. In 1946 a small amount of materials from Russia were also used, but their quality was poor.

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The management personnel of the factory is entirely military. The technicians include some German ballistics experts. About 30,000 workers are employed on three 8-hour shifts. The whole city of Kragujevac may be said to earn its living from the factory.

The only obstacle to production at the factory results from the lack of raw materials, as there is sufficient manpower.

A large underground workshop for assembling aircraft and an engine factory with a large depot attached have also been noted in the Kragujevac area.

#### Kraljevo Area

Railroad Car Factory

This factory is situated one kilometer north of the city of Kraljevo and a like distance from the Belgrade-Kraljevo railroad line, to which it is connected by a siding. At present it consists of several buildings, all made of wood, but in 1949 and 1950 they will be replaced by masonry buildings.

At present the factory produces one railroad car and ten Decauville cars per day, as well as 2,500 tons of building machinery per year. When the factory is modernized as planned, its production will be limited to railroad cars, about ten per day. The Decauville cars will be produced by the "14 Oktobar" Factory in Krusevac and by the factory in Slavonski / Slav ski Brod? /, which are already equipped to make them. The machinery for building the Decauville cars will be transferred to the factory under construction at Smederevo, which will use it for the production of tractors.

Plans have been made for modernizing the factory's machinery and the installation of many new machines that are to be taken from a total of 2,000 machines received as reparations from Germany, now stored in the village of Batainica, 100 meters from the Zemun-Zagreb railroad line.

The current to operate the machinery is supplied by the hydroelectric power plant near Dubrovnik and the thermal power plant in Belgrade. Production is often hampered by shortages of raw materials.

The labor force varies from 2,000 to 3,000 workers. The number will remain the same after the factory is modernized, as operations will be better mechanized. The technical director of the factory is Engineer Hilutinovic.

The following enterprises have also been noted in the Kraljevo area:

An aircraft accessory factory, located about one kilometer northeast of the city near the Kraljevo-Krusevac railroad line. In 1941 this factory was the most important Yugoslav factory producing aircraft. It employed about 1,000 workers and produced one aircraft per day on a single-shift schedule;

Workshops for overhauling aircraft; and

Workshops with modern equipment for the production of Soviet-type aeronautical equipment.

## Kranj Area

"Kranj" Rubber Products Factory

This factory produces waterproof garments, sanitary articles, and inner tubes. Its machinery is not modern but is satisfactory. Shortages of raw materials interfere with production.

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The factory is of modest proportions. It employs about 1,200 workers.

As neither the "Bata" nor the "Kranj" Factory produces synthetic rubber, there is no synthetic rubber factory in Yugoslavia.

#### Krusevac Area

"14 Oktobar" Factory

This factory is about 500 meters from the Krusevac railroad station, to which it is connected by a siding. Its annual production consists of 2,400 Decauville cars and 1,500 tons of machinery for making cement. Production is somewhat hampered by a shortege of manpower, but is 50 percent greater than before the war and is expected to double during 1951.

The factory is not supposed to be converted into a war industry, as it is an old establishment without precision machinery.

It employs 2,000 workers, who work on three shifts. Some of the technicians are Germans.

#### Lesce Area

"Verig" Factory

This factory is in the city of Lesce. It was modernized and enlarged recently. It produces iron chains and screws, the latter being its specialty.

The machinery for making screws which ic now at the General Iron Construction Factory in Maribor, scheduled to be demolished, will be given to the "Verig" Factory. This machinery has a production capacity of 300 tons per year, but at present it produces only 120 because of a shortage of raw materials.

## Ljubljana Area

"Litostroj" Factory

This is the largest factory in Slovenia. It is very well constructed architecturally, but has technical defects. Its construction was begun in 1947. The factory has already begun production, although its construction has not yet been completed.

The factory was designed for the construction of centrifugal pumps and turbines. It is supposed to produce five 50,000-horsepower turbines per year. The first ones will be used for the modernization of the electric power plants at Mariborski Otok, Dravograd, and the old Fala power plant on the Drava.

The factory is located in the outskirts of 'ubljana, near the Ljubljana-Sv Vid railroad line, to which it is connected by a siding. About one kilometer away, on the Ljubljana-Sv Vid highway, there is a workers' village consisting of eight large blocks of housing. A school for apprentices is planned.

The personnel includes German technicians and a Swiss technician from the "Escher Vies" Factory, who is employed on a 2-year contract. The technical director of the factory is Engineer Zoricic, the political director Franz Pecar, a former worker.

The "Letov" Glider Factory is also in the Ljubljana area.

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### Maribor Area

#### 1. Railroad Workshops

These workshops, near the Studenci railroad station, form the largest industrial installation of the kind in Yugoslavia. Although designed for the production of locomotives, at present they merely repair locomotives damaged during the war and carry on research and experiments on railroad equipment. The machinery is rather antiquated but the personnel for the most part is good.

There is another railroad workshy at Nis, but it also does only repair work.

#### 2. "Hutter" Textile Factory

The "Hutter Factory is located in the eastern part of Maribor near the Drava. At present it employs about 3,000 workers.

This is the largest textile factory in Yugoslavia, the only one capable of satisfying the textile requirements of the country to any considerable extent. During 1945 and 1946 the factory produced cloth for military clothing and also made the garments. It is not known whether it still does so.

The production of the factory has been greatly increased. Its products are exported to all the Balkan countries and to Austria. Before the Tito-Cominform break they were also sent to Russia, and at first raw materials were obtained from Russia. They now come from the West.

## 3. "Ruse" Factory

This factory is 10 kilometers from Maribor, on the Drava. It produces acetylene and other gases for autogenous welding.

## Maribor-Tezno Industrial Area

This area is about 8 kilometers southeast of the center of Maribor, ear the Tezno railroad station. It is regarded as one of the most important industrial areas in Yugoslavia, if not in the entire Danube basin.

### 1. "V.D.M." Engine and Motor Vehicle Factory

The construction of this factory was begun in 1942 by the Germans. According to their plan, it was to build 2,700 aircraft engine parts per month. The necessary machinery was removed during the war from Italian, French, and Czechoslovak factories, but at the end of the war they had to be returned and replaced by others sent as reparations from Germany. At present the factory is fully equipped with machinery.

Production for Yugoslavia was begun in 1946, when the factory was equipped to produce ten Praga-type 2½-ton trucks. Goosenecks, connecting rods, and steering assemblies were to have been imported from the "Praga" Factory in Czechoslovakia; but they never arrived because of Russian influence, and therefore only one truck a week could be produced. To eliminate this difficulty and to raise production to the planned level, a workshop is being built at the factory to produce the parts that were to have been imported. However, even when this workshop is ready to operate, production will be seriously hampered by the shortage of skilled labor.

At present the factory employs 2,500 persons working in two shifts, and it will be able to employ 5,000 when the above-mentioned workshop is completed. The internal organization of the factory is defective, and exaggerated police control is in force. A large housing community for the workers at "V.D.M." and at

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the General Iron Construction Factory is well under way. The technical director of the factory is Engineer Hercegoni; the political director is Golop.

Although the factory now produces only Praga-type trucks, the plan calls for its adaptation to the production of aircraft and motor vehicle parts. However, it will not produce aircraft engines, for which the factory was originally designed. The factory has been divided into two sections for future production, one for aircraft and the other for motor vehicles.

The factory builds all the parts and accessories for the Praga trucks it roduces, with the exception of magnetos and electrical equipment, which are imported. The gears are now built by a factory in Rakovica, which also tempers engine parts. However, "V.D.M." is fully equipped both for making gears and for tempering.

#### 2. General Iron Construction Factory

This factory is situated opposite the Tezno railroad station. It is primarily equipped for making major iron construction materials. In 1948 it produced 10,000 tons of such material. The same year a large section was added to the factory. This year / presumably 1948 or 1949 / it will produce 24,000 tons. This section is located in a large loft. It is already completely equipped with machinery and has begun to operate. Two other sections for assembling railroad bridges, cranes, and windlasses, to be built very soon, should increase production to 40,000 tons per year.

Thus far the factory has built two large bridges for the Samac-Sarajevo railroad, several smaller bridges, three large cranes, one of which has been sent to the "Litostroj" Factory in Ljubljana and one to the factory in Zeleznik, and six 100-cubic meter gasoline tanks, which have been sent to Titograd.

A worksh of or making screws and bolts is annexed to the factory. This workshop will be destroyed and the machinery transferred to the "Verig" Factory in Lesce. The other sections called for by the plan for the expansion of the factory will be built on its site.

The factory employs about 2,400 persons working on two shifts. Plans call for a possible increase in the labor force of 3,000 more workers. In case the factory is converted into a war industry, it will be able to produce tank parts.

### 3. "Motor Oil" Refinery

This small refinery is opposite the Tezno railroad station and is carefully camouflaged. Until 1946 its production consisted of 15 to 20 tons of gasoline of various types and 5,000 kilograms of oil per day. The crude petroleum comes from the wells at Lendava.

Its present products are renovated machine oil and greases for industrial use. About 40 tons of regenerated oil are produced per week, while the production of grease varies according to the amount of residue left after the renovating process. The refinery has six underground tanks, four large and two small, with a total capacity of one million liters. In the future "Motor 0il" will continue this kind of production, while refining petroleum will remain a monopoly of the refinery in Rijeka.

## Nis Area

There are workshops for overhauling aircraft in the outskirts of Nis, not far from the airfield.

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#### Novi Sad Area

"Jugo Alat" (Yugoslav Tool) Factory

This factory is being built in the outskirts of Novi Sad east of the city, on Futog Ul, near the Novi Sad-Sombor railroad station, to which it is connected by a siding. It is expected to produce 350 tons of drill points, 600 tons of cutting tools, and 300 tons of assorted measuring instruments per year for use in industry.

The section for making drill points will begin operation this year.

The installation c. this factory has precedence over all others, as it will produce materials essential to all Yugoslav industry. It will cost a total of 604 million dinars.

The factory will have about 900 machines, most of them imported. The following deliveries are now expected: 30 special machines from the S.I.P. Factory in Ceneva; 19 pressure threaders from the "Rishaner" Factory in Zurich; 40 machines for making calipers and for rectifying gears, from the Swiss "Gerlikon" Factory; 10 - 12 rectifiers from the Swiss "Kelemberg" Factory; a complete electric furnace section and equipment for tempering tools, from the "Sivert" Factory in Stockholm; several thousand precision measuring instruments from the Swedish "Johannson" Factory in Eskilstuna; 4 small precision machine tools from the Swiss "Studer" Factory; 10 - 12 small "Centerlex" machines from Sweden; various polishers, mill cutters, and hydraulic presses from the "Zbrojovka" Factory in Brno, Czechoslavakia (to be imported through Sweden); milling machines and mechanical saws from "Skoda" in Czechoslovakia; 32 precision cutters and 40 Pitlertype cutters, the latter patented by a German firm in Brandenburg, from the "Liberta" Factory in Prague; and 3 electric furnaces for tempering, from the "Foliman" Factory in Prague; and 3 electric furnaces for tempering, from the "Foliman" Factory in Prague.

Parts for the above machines, especially for those from Czechoslovakia, have already arrived.

The Jesenice Ironworks will furnish "Jugo Alat" with special profiled materials. What enterprises will supply the other necessary raw materials is not known. The electricity will come from the thermal power plant in Belgrade.

The factory will employ about 1,300 workers. Its total production is expected to be three times the national requirements, so extensive export to all the Balkan countries is planned.

Details are not known concerning the "Vojvodjanska Livnica" (Vojvodina Foundry) and the "Jedinstvo" Factory in the Novi Sad area.

Petrovac Area (about 15 kilometers east of Skoplje)

There is a small foundry for the production of duralumin in this area.

Rakovica Area (about 9 kilometers south of Belgrade)

1. Heavy Motor Vehicle Engine Factory

This factory is equipped with machinery acquired as war booty. It produces four-cylinder 45-horsepower gasoline engines for tractors at a rate of 12 to 15 per day. In the past it made aircraft engines for the "V.D.M." Factory in Tezno.

The Five-Year Plan provides that the factory should be able to produce about 12 to 15 tank engines per day. It is also equipped with the necessary tools for making aircraft engines in cooperation with other enterprises.



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This factory has no foundry, but it is equipped to do the best oil-tempering work in all Yugoslav industry. It also does this kind of work for the "V.D.M." Factory in Tezno.

Three thousand workers are employed on the two shifts. The political director of the factory is a certain Andrijevic, formerly director of the "Zmaj" Factory in Zemun. He was sent to Rakovica as a reward.

### 2. Aircraft Engine Factory

This factory can be identified with the Vlaicovic Company installations in the suburbs south of Belgrade near Topcider Park. In 1941 they were equipped with all the most modern tools and produced 100 aircraft engines per year, with a labor force of 600. Present production is unknown.

#### 3. Aeronautical Works

These works are equipped to construct, assemble, and overhaul YAK aircraft engines. Until recently the materials were obtained from Russia. Here repairs were made on Allied aircraft shot down or burned on Yugoslav territory during the war, and machine guns and aircraft guns were assembled.

Recently a special military aircraft section was established at the works. Until 2 months ago the installation of the technical equipment and machinery, a 5-month job, was carried out under the direction of Soviet technicians, and since then by Yugoslav engineers assisted by experts and technicians who were formerly prisoners of war and now are employed on contracts at premium pay. The section has recently begun a produce aircraft engines for the Yugoslav Air Force. As the installations and equipment came from Russia and were installed according to Soviet methods, the engines produced may be expected to be similar to, if not identical with, Russian engines, especially the AM-42, designed by the Russian engineer, A. A. Mikulin.

The works employ 1,700 workers, including 400 German specialists, on two shifts. The management personnel includes four German engineers who have probably worked on V-1 and V-2 weapons.

## Sarajevo Area

"Kombinat" (Combine)

This factory was designed for various types of machine construction, primarily for civilian and secondarily for war industry. It is assigned to make machinery and spare parts for the "Beta" Shoe Factory in Borovo, as well as woodworking machinery and small precision instruments for working metals. Its military production will consist of precision light arms, telemeters, telescopes, and artillery instruments.

The combine is now under construction 5 kilometers south of Sarajevo, near the mountain where the sources of the Bosna River rise. It was designed by three German engineers, Engineer Ribensan, who planned the foundry, Engineer Pauner, who planned the machinery, and Engineer Halase, who planned the buildings. These engineers are now in the British zone of Berlin.

The factory was to have been put into operation at the end of 1948, but the plans for the machinery are not yet complete, and the machines themselves, which were to have been imported from Switzerland, have not yet arrived. However, the foundry section is near completion. It consists of fully modern electrical equipment for melting special metals in small quantities. Each of the electrical furnaces will cost from 30 to 40 million dinars. They are products of the Manfred Weiss Company in Budapest. A coke blast furnace for ordinary metals, with a capacity of 12,000 tons a year, is being built. Of this tonnage, 6,000 will be used in the factory and the other 6,000 tons furnished to other enterprises.

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The combine will be a model of technical perfection in its field. Near the factory a housing development of 70 to 80 houses is being built for the workers. Four of them are already finished,

The political director of the factory is one Luzner.

#### Sisak Area

Works for overhauling aircraft engines have been noted in this area.

# šlavenski Brod Area

Steam Boiler and Iron Bridge Factory

This factory is near the Slavonski Brcd railroad station. It is antiquated and its pevilions are rather far apart. Its production consists of steam boilers, small industrial locomotives, gasoline tanks, and iron bridges. Until recently Decauville cars also were produced. The factory's present production is 25,000 tons per year. By the end of 1951 it is scheduled to produce 40,000 tons.

The factory is fully equipped with machinery, recently renovated. It case of need it will be able to produce tanks without modifying its equipment.

The labor force consists of 6,000 persons working on three shifts.

#### Smederevo Area

Enterprise for Machine Construction in Smederevska Palanka

This enterprise produces motor vehicles, motorcycles, and aluminum spare parts for aircraft.

Two new factories to built very soon in the Smederevo area are a factory for building farm tractors and tank tracks and a factory that will make agricultural implements. Construction of the former is well advanced.

# Split Area

The existence of an enterprise for the production of liquid hydrogen in this area has been noted but not confirmed.

# Stara Pazova Area

Large works for assembling aircraft have been established in this area. These works use the Zemun Airfield for test flights.

# Store Area

#### Ironworks

The Ironworks is about 300 meters from the Store railroad station, to which it is connected by a siding. It is located between two hills beyond the Voglajna River, and consequently cannot expand. There is a kiln for refractory brick near the Ironworks.

The Ironworks processes scrap iron only. It has no blast furnaces, but only special furances for melting scrap and a Bessemer furnace with which it produces steel by an antiquated process. Its maximum annual production is 100,000 tons of iron and ordinary steel.

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Its labor force consists of 9,500 persons working on three shifts.

The Ironworks has 300 machines, operated by current from the Fala power plant on the Drava. The Ironworks and its products are not slated for military use.

#### Strnisce Area

Aluminum Factory

This factory is in a woods 5 kilometers southwest of Ptuj. It occupies an area of 8 square kilometers.

Construction was begun in 1942 by the Germans, who planned a production capacity of 100,000 tons per year. At the time of the German withdrawal about half of the factory had been completed. It is now being finished according to plans calling for somewhat smaller proportions then the German plan. The factory will be finished this year. Some of the machinery left by the Germans will be used, other machinery required for the last stage of the chemical production process, will be furnished by Brown-Boveri in Zurich. The lack of powerful electric motors and high-capacity conductors is delaying the completion of the factory.

The chemical process for producing aluminum, invented by a German professor, has been laboriously reconstructed by Yugoslav chemists. Although it cannot be called the best method, it is suita'le for Yugoslavia as it requires very little electricity.

Twenty 150-cubic meter tanks. covered with a cement roof, are now under construction. They will be used for mixing the bauxite with water. By means of an electrochemical process, the aluminum product can be converted into duralumin.

Production will begin in 1950 and will amount to 50,000 tons per year of sheet metal and hars with various cross sections. The raw material will come from the bauxite mines in Bosnia. Electric power will be supplied by the new power plant on Mariborski Otok, which was built on the Drava expressly for the needs of this factory.

A labor force of about 1,000 workers will be employed.

#### Topusko Area

There are aeronautical enterprises in this area, but no details are known.

#### Tuzla Area

There are aeronautical enterprises in this area, but no details are known.

#### Visegrad Area

The first Five-Year Plan calls for the construction of an agricultural machinery and tool factory in this area. In 1947 a site 500 meters southwest of the city of Visegrad was selected and levelled.

An annual production of 5,000 tons of plows, sowers, and other agricultural implements is scheduled. The machinery has already been ordered abroad.

The factory will employ 600 workers. It can be converted into a war industry.

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### Zagreb Area

## 1. "Rade Koncar" Factory

This factory is in the suburbs southwest of Zagreb. Its products consist of 10-horsepower electric motors, transformers of up to 100,000 volts, telephones, and electrical equipment. In 1946 it also built army field telephones. The factory is scheduled to extend its activity over the whole and of electrical equipment so as to compete with the Siemens plant. At present, however, it can produce only about 1,000 motors and 100 transformers per year, because of a shortage of manpower and materials, especially ball bearings. Most of the transformers are for the hydroelectric power plants being built on the Drava. "Rade Koncar" furnishes electric motors for the machinery produced by the "1 Maj" Factory in Zagreb.

"Rade Koncar" obtains its raw materials from the "Vojvedina" Factory in Novi Sad, which also furnishes it with stators for its motors. It obtains other materials from abroad and electric cables from an enterprise in Zagreb.

The labor force now consists of 3,000 workers, but the number is slated to reach 9,000 when the factory is able to operate at full capacity. The machinery inventory is complete, and consists chiefly of new machines of the best quality.

The political director is Boro Petrov.

### 2. "1 Maj" Factory

This enterprise is near Zitnjak, about 5 kilometers east of Zagreb, and adjoins the Steam Boiler Factory. The two factories give the appearance of a single establishment.

The factory is assigned to serial production of industrial tools and precision machines of up to 6 tons for working metals. It will also serially produce a machine tool of the Centerlex type, invented by Engineer Walter in the corresponding factory in Zeleznik. The factory is now under construction. Its production capacity will be 25,000 to 30,000 tons of machinery and spare parts per year. The factory will be finished in 1951. It will have its own completely independent foundry, and will employ about 2,000 workers.

The new "1 Maj" Factory will replace an old enterprise of the same name now in existence in Zagreb, which is slated to be absorbed by the new establishment. The old enterprise now produces about 1,500 tons of machine tools per year and employs about 200 workers, who will form the nucleus of the skilled labor force in the new factory.

## 3. Steam Boiler Factory

This factory, only one section of which is now under construction, is slated to be built near the "l Maj" Factory. It will produce enough steam boilers for industry, for heating, and for road rollers to meet all Yugoslav needs. It will not need massive machinery, but only pneumatic hammers and equipment for electric welding.

The factory will employ a maximum of 600 workers. It is not expected to meet any problems that would hinder production.

## 4. Electrical Conductor Factory

This factory is in the city of Zagreb, but its exact location is not known. It produces electrical conductors for railroads and for hydroelectric power plants on a small scale. It obtains its raw materials from the "Western Factory in Celje.

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The following enterprises are also in the Zagreb area: an aircraft factory built by the Germans, the current activity of which is not known; a small tire factory; an antitank and antiaircraft gun factory, details for which are not known; and an underground factory begun by the Germans for the construction of aircraft and engines. The last-named factory appears to have been completed and equipped for the production of parts for aircraft engines.

#### Zeleznik Area

### 1. Youth Factory

This factory, built in 1947 by Yugoslav youth, produces aircraft engines, automatic arms, and heavy tools. It is now in process of reorganization, and no data is known concerning its production, but it will be one of the largest factories in the Balkans. German machine guns and small cannon, to be mounted in aircraft, arrived at the factory recently.

### 2. "Ivo Lola Ribar" Factory

This factory was named for a fallen Partisan. It is the only enterprise not designated by a name in the Yugoslav Ministry of Industry, where it is referred to as 13A and 13B.

The factory is about 2 kilometers southwest of the city of Zeleznik, between two hills, and it is connected with the narrow-gauge Zeleznik-Belgrade railroad line by a siding. It is divided into two plants, 13A and 13B. It has a technical management, a section for research or models, and warehouses.

There is a school for apprentices at the factory, where 120 apprentices per year are enrolled in the 3-year course. Political supervision of the workers is rather strict and is carried on by members of the UDB who mingle with the workers. Each worker has a political card kept by the political director, Buda. The technical director of the enterprise is Engineer Nesic the director of production is Engineer Oberschmidt, formerly director of the railroad works in Slavonski Brod.

#### a. Section 13A

The construction of this section was begun on 1 June 1947, and shortly afterward the installation of machinery was begun. On 1 January 1948 the section, finally completed, was formally opened by Marshal Tito and began production.

According to the Five-Year Plan, 13A is to produce 15,000 tons of machinery annually, but because of shortages of materials and skilled manpower, its production will be limited to 12,000 tons. Thus far 25 power hammers weighing 300 kilograms, six machines for pulverizing paper, and a certain number of cogwheels of a maximum diameter of 5 meters have been built. The production does not follow a well defined plan, but varies with the requirements of Yugoslav industry.

The "Ivo Lola Ribar" Factory was so designed by Engineer Hanzekovic, according to instructions from the Ministry of Industry, that it could be converted in 3 months to a war industry producing 50-ton tanks, with a maximum output of five tanks per lay. In such a case 13A would build the heavy parts and 13B would make accessories.

Section 13A occupies an area of 134 by 90 meters. It now employs 1,400 persons working on two shifts, but could employ up to 2,700. Most of the personnel are Yugoslavs, but there are about 200 Germans, including a few very capable engineers, and about 15 Istrians. The machinery consists of about 120 heavy machines, each of which works independently of the others because it has its own electric motor.

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Section 13A has a foundry with two coke blast furnaces for smelting iron. Each blast furnace can accommodate five or  $\sin 2\frac{1}{2}$ -ton charges per day. Two Herold-type electric foundries for steel and a small electric foundry for special metals are also planned. The former will have a smelting capacity of 250 to 500 kilograms. The machinery for these foundries has already been ordered from the Manfred Weiss Factory in Budapest, but has not yet arrived.

Walter, a German engineer at "Ivo Lola Ribar," has invented a Center-lex machine tool which is more productive than others of its kind and works more rapidly and economically. Section 13A has the only three prototypes of this machine. It is scheduled to be serially produced for export by the "1 Maj" Factory in Zagreb. The Yugoslav Ministry of Industry rewarded Engineer Walter for this invention by a cash payment equal to 20 months' pay. He also invented a new device for Jeparating molten metals from the slag; but as the Ministry of Industry refused to give him a reward, he refused to build the machine and surrender the plan. However, negotiations for a settlement are in progress.

#### b. Section 13B

This section occupies an area of 126 by 80 meters. It is to be completed and ready to begin production toward the end of this year.

Section 13B is assigned to produce machines weighing not more than 10 tons, at a rate of 13,000 tons per year. Its production will consist of boring and turning lathes for cutting metal plate, shapers for planing, spindle-type perforators which perforate up to 80 millimeters, German Stoss-type machine tools, heavy vertical milling cutters copied from the German Birnaski-type model 500, and machines for working cogwheels of large diameter, up to 2 meters.

Most of the machinery for 13B will come from Germany as reparations. The raw materials will be supplied by the ironworks at Jesenice, Zenice, and Store. A workshop for making spare parts and maintenance materials for the section itself will be built next to the section.

The labor force will consist of 2,800 to 3,000 persons working in three shifts. When the section is operating at full capacity, it will have 5,500 workers. A village being built for the workers will have a capacity of 30,000 persons. It consists of 250 large buildings and will also house femilies.

## Zenica Area

#### ironworks

The Zenica Ironworks is in the suburbs to the east and west of the city. It is about 10 kilometers from the Bor mines, from which iron, copper, and silver are obtained.

The annual production of the Zenica Ironworks consists of 1,200,000 to 1,500,000 tons of bars, mostly of iron and steel. However, this total plus the production of the two other ironworks, at Jesenice and Store, is not sufficient to meet the demands of Yugoslav industry. The products of the Zenica Ironworks are inferior in quality to those of Jesenice, but superior in quantity, as it produces about a million tons of ordinary steel.

At present there are only two blast furnaces in operation. A third will be built this year and a fourth in 1951. When the fourth blast furnace begins to operate, the Zenica Ironworks will produce about 3 million tons per year. All the blast furnaces burn coke, about 350 tons a day. The coal is imported from Czechoslovakia. It is loaded aboard ship at Bratislava, carried down the river to Belgrade, and transshipped to Zenica by rail. Thus far, coal deliveries have not been interrupted, but in case this should happen, a chemical section has been formed in the Ministry of Industry to study the possibility of deriving industrial

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coke from Yugoslav coal. However, even if Czechoslovakia continues to deliver coal, it is doubtful whether the Zenica Ironworks could produce the scheduled 3 million tons per year because, on the one hand, deliveries of Czech coal are hampered by the shortage of transport facilities, and, on the other, the lack of adequate tools at the Bor mines seriously interferes with one production. At present production is sometimes slowed down by the irregular delivery of ore, especially iron.

The machinery consists of about 1,000 machines, largely modernized. The machinery needed for the expansion of the Zenica Ironworks will be supplied by the factory in Zeleznik.

Because of the great expansion expected at the Zenica Ironworks -- its production has increased 100 percent since the war -- a plan has been submitted for the expansion of the city, and modernization of the equipment at the Bor mines has been planned.

At precent about 15,000 persons work at the Zenica Ironworks, on three shifts. Electricity is furnished by a power plant near Dubrovnik. The products of the Zenica Ironworks are shipped by rail, and except for a few defects, transportation may be considered satisfactory.

Aircraft enterprises have been noted in the Zenica area, but no details are available.

#### V. COMMERCIAL EXCHANGES WITH FOREIGN COUNTRIES

Since the Tito-Cominform break, Yugoslavia has stopped carrying out the huge-scale commercial exchanges it had maintained with the USSR and its satellites. However, commercial exchanges are continuing with some of the satellites on a reduced scale, exactly how much is not known.

# USSR, Rumania, Bulgaria, Albania, Poland

No commercial exchanges are now taking place with these countries.

#### Hungary

A commercial agreement concluded before the Tito-Cominform break is still in force between Hungary and Yugoslavia. It calls for exports of wood worth 600 million dinars to Hungary, in exchange for electrical machinery from the Manfred Weiss Factory in Budapest. Much of the wood has already been sent and the rest is still being delivered, as is the case with the electrical machinery, some of which was ordered for the factory in Zeleznik.

## Czechoslovakia

Before the Tivo-Cominform break, commercial exchanges with Czechoslovakia were very active, as Yugoslavia had decided to buy most of the machinery needed for its industrialization program in Czechoslovakia. At present these exchanges are reduced to practically nothing, except for deliveries of Czech coal to the ironworks at Jesenice and Zenica.

#### Sweden

Yugoslavia now has a credit of 55 million Swedish crowns for deliveries of corn and a debit of about 30 million crowns solely for the acquisition of machinery and special metals. The credit balance in Yugoslavia's favor will certainly be used up in the purchase of other machinery.

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Exchanges between the two countries are always extremely active. In December 1948 they were regulated by a commercial agreement to last for one year. Through Sweden, and specifically through Swe Export in Stockholm, Yugoslavia also obtains Czech machinery. Swe Export ships Czech machinery as though it were its own, at a markup of 2 or 3 percent above the purchase price.

#### Switzerland

It cannot be determined exactly how much the commercial exchange between Yugoslavia and Switzerland amount to at present, but there is known to be a commercial agreement between the two countries. There is considerable export-import activity, consisting of shipments of fats from Yugoslavia and precision machinery from Switzerland.

## Great Britain

There is no real of formal commercial treaty between Great Britain and Yugoslavia, but individual agreements for imports and exports are made from time to time. Yugoslavia sends poultry to Great Britain, and thus far has received 32 special machines for making ball bearings and perforators in exchange, via Sweden. Also the British factory Western House in Southampton has sent and is still sending Yugoslavia electrical equipment for lighting railroad cars and other electrical materials which cost more from Switzerland and Sweden.

#### Italy and France

Very small exchanges are made between these commutries and Yugoslavia.

#### United States

The United States sends Yugoslavia gasoline, special oils, and radio equipment. They are unloaded at Sibenik. Particulars are lacking.

Yugoslavia is known to be very eager to cultivate commercial relations with all the Western countries, but is seriously hampered by the scarcity of worthwhile currency.

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