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Economic Intelligence Report

DEPENDENCE OF COMMUNIST CHINA  
ON THE SOVIET BLOC  
FOR INDUSTRIAL DEVELOPMENT



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FOREWORD

The need for an assessment of Communist China's dependence on the Soviet Bloc for industrial development became urgent late in the summer of 1960 when the recall of many Soviet advisers indicated that the Sino-Soviet conflict was beginning to affect economic relations between China and the rest of the Bloc. This report confines itself to a discussion of those industries whose development still depends to a substantial degree on support from the Soviet Bloc. The role of such support in each of these industries is described in Section II, following a brief description in Section I of the history of Soviet Bloc technical and material support for China. Estimates of the prospects for Chinese industrial development through 1965, both with Bloc support and without it, are presented in Section III.

The report does not deal with (1) sectors of the Chinese Communist economy having little dependence on outside sources, such as agriculture, transportation, light industry, and mining; (2) non-Bloc sources of machinery and technical assistance; and (3) international financial relations, including China's problems of financing imports.

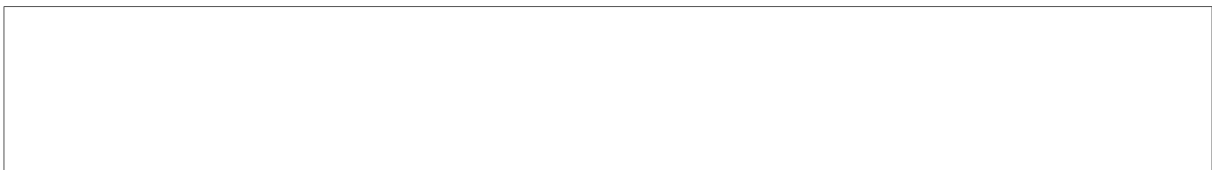
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DEPENDENCE OF COMMUNIST CHINA ON THE SOVIET BLOC  
FOR INDUSTRIAL DEVELOPMENT\*

Summary and Conclusions

The rapid industrialization of Communist China is being accomplished with the substantial help of other Bloc countries, from whom China is importing more than half a billion dollars worth of machinery and equipment each year. The core of the program for industrialization consists of 291 large industrial installations which the USSR is helping build and about 100 smaller installations for which the European Satellites are supplying the key equipment. About half of these plants have been completed. In addition, members of the Bloc during the past decade have sent more than 10,000 technical experts to China, have supplied China with the technical books and blueprints essential to industrialization, and have trained thousands of Chinese students and workers in various scientific and technical fields.

Bloc support enabled Communist China to expand production of heavy industry from 1952 to 1959 at an annual average rate of about 30 percent, compared with an estimate of about 20 percent if China had relied only on its own resources. This outside support also has had a vital effect on the quality of China's industrialization, enabling China to produce such prestige items as jet aircraft, submarines, tractors, trucks, and television sets. The joint Sino-Soviet emphasis during the First Five Year Plan (1953-57) on creating a Chinese machine building industry has meant that, as of late 1960, Chinese industry could satisfy nearly all the equipment needs of small and medium installations in the fields of metallurgy, industrial chemicals, oil refining, and electric power.

The Chinese Communists recently have been pointing to these accomplishments as evidence of their ability to industrialize rapidly by themselves from now on -- if the need should arise. Whether they really believe this or are merely minimizing the value of Soviet aid for political reasons, there are still many branches of Chinese industry\*\* that will continue to depend heavily on the Bloc for development, at least through 1965.

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\* The estimates and conclusions contained in this report represent the best judgment of this Office as of 15 December 1960.

\*\* See II, below.

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Communist China was reminded of this dependence in the summer of 1960, when the USSR withdrew large numbers -- possibly the great majority -- of its technicians from China. Although the full impact of this action cannot yet be evaluated, the Chinese have admitted that it already is having serious consequences. In the event of a sudden complete break in relations between Communist China and the rest of the Bloc, severe dislocations in the Chinese economy would result during the period that alternate sources of supply were being established, and over the long run such a break would confront China with formidable problems in moving ahead to technologically complex industries. If Bloc countries canceled all contracts to export capital equipment, China would have difficulty switching to non-Bloc suppliers, both because even the smoothest of transfers would take a long time and because China probably would be reluctant to establish close economic relations with industrial countries of the non-Communist world.

It follows, therefore, that without Bloc support, the leaders of Communist China would have to moderate their overweening ambition to industrialize at a headlong pace, although growth would still be rapid. Industrial production in 1961-65 would grow at a rate of, say, 10 percent per year instead of the presently projected rate of 16 percent. China would have to cancel or delay many sophisticated development programs now scheduled, including possible programs for producing atomic bombs and the related delivery systems.

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I. Over-All Bloc Programs for Supporting the Industrialization of Communist China

When the Chinese Communist regime was established in October 1949, Chinese industries were in bad shape. The only important heavy industrial base, in Manchuria, had been looted and wrecked by the Soviet Army at the end of World War II. Industries in port cities like Shanghai were oriented toward producing textiles and other consumer goods, not toward the capital goods wanted by a regime determined to repeat the classic Soviet pattern of rapid industrialization.

In spite of their weak base, the Chinese Communists in a single decade built up an impressive industrial complex approaching that of Japan in size but not in quality or variety of output. This feat could not have been achieved without substantial outside support in the form of technology and equipment.\* Effective support was supplied by the USSR, which undertook a comprehensive program, running from 1950 through 1967, to help build 291 large industrial installations in China. These plants are the core of an industrialization effort that is designed to give China by 1967 an industrial establishment exceeding that of Japan or the UK in the production of basic industrial commodities. By 1967 this industrialization effort, if successful, should make China self-sufficient in such basic industries as the coal, electric power, metallurgical, and machine building industries. Construction of the large new factories has had high priority for Soviet machinery and engineering experts. The European Satellites have also made important contributions of machinery and technical experts. During the past decade, Bloc technical advice and factory equipment have been transferred in quantities that often have taxed the ability of Chinese skilled personnel and construction organizations to make full use of them. From the Chinese point of view, it has been a program of maximum, or nearly maximum, scope. In short, China has been engaged in forced-draft industrialization with the USSR supplying much of the draft.

A. Industrial Growth, 1952-59

A hypothetical estimate may be made of the rate at which industrial production would have grown in Communist China during 1952-59 if there had been no Bloc support. In light industry, which the Chinese largely have built up themselves and in which much capacity was idle in 1952, dependence on Bloc equipment and technical aid has

\* Communist China has not needed much support in the form of financial aid. Except in the early years of the Communist regime, China has been able to export enough agricultural products, light industrial and consumer goods, and minerals to pay for imported capital equipment.

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been small. In heavy industry, however, it is estimated from trade and investment data that at least half the increase in total output achieved during 1952-59 was made possible by Bloc machinery and technical aid. On the premise that Bloc support was responsible for none of the progress in light industry and for 50 percent in heavy industry -- conservative estimates -- the actual growth of industry from 1952 to 1959 may be compared with a hypothetical situation of no outside support, as shown in Table 1.\*

As shown in Table 1, the ratio of the value of heavy industrial production to the total rose from 37 percent in 1952 to 61 percent in 1959. Almost certainly heavy industry could not have achieved its 1959 position of preeminence over light industry if it had had to rely for development on Chinese domestic resources or on the technology and machinery that could have been smuggled through the embargo imposed against Communist China during much of that period. An aspect not brought out in the above figures, but to which the Chinese Communists attach great importance, is their attainment with Bloc support of the capability of producing prestige items like jet airplanes, submarines, tractors, trucks, large electric generating equipment, and metalcutting machine tools. Bloc support -- especially Soviet support -- has been, in other words, the means by which China has pushed ahead into the technologically complex fields that must be mastered if a nation is to become a modern industrial power.

#### B. Bloc Aid Projects

Soviet support for Chinese Communist industrialization is being provided mainly through long-term agreements covering 166 factories, either completed or under construction, as well as through 125 additional projects to be built during the next few years. Four agreements signed between 1950 and 1956 make up the first group, under which the USSR agreed to provide \$2.025 billion\*\* worth of equipment and all necessary technical help for construction of 166 major installations. By the end of 1959, \$1.35 billion worth of Soviet equipment for these installations had been delivered, and 130 projects had been completed. During the early phase of industrialization, the program concentrated on the mining, metallurgical, and electric power industries; recently, the emphasis has been shifting to more complex fields such as machine building, chemicals, and electronics. Under the second group of 125 projects, the USSR promised in August 1958 to give "technical aid" for 47 industrial projects of unstated size and in February 1959 agreed to

\* Table 1 follows on p. 5.

\*\* Unless otherwise specified, all dollar values in this report are in terms of US dollars.

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Table 1

Estimated Growth of Chinese Industry, Actual and Hypothetical  
1952 and 1959

	1952		1959			
	Actual		Actual		Hypothetical <sup>a/</sup>	
	Billion Yuan <sup>b/</sup>	Percent	Billion Yuan <sup>b/</sup>	Percent	Billion Yuan <sup>b/</sup>	Percent
Light industry value added	5.7	63	13.6	39	13.6	53
Heavy industry value added	3.3	37	21.4	61	12.3	47
Total	<u>9.0</u>	<u>100</u>	<u>35.0</u>	<u>100</u>	<u>25.9</u>	<u>100</u>
Average annual increase, 1952-59 <sup>c/</sup>						
All industry				21		16
Heavy industry				31		21

a. Assuming no outside support.

b. 2.5 yuan equal US \$1 in trade with non-Communist countries; 1 yuan has equaled approximately 1 ruble in Sino-Soviet trade. Values in this table are given in terms of 1957 prices.

c. Average annual rates of growth are computed at the compound interest rate between the terminal years (1952 and 1959).

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furnish \$1.25 billion worth of equipment by 1967 for 78 plants which were described as "giant industrial enterprises" in the fields of metallurgy, chemicals, petroleum, machine building, electrical machinery, and others.

The European Satellites have supplemented the Soviet programs by helping to build 68 projects initiated during the First Five Year Plan (of which 44 were completed by the end of 1958) and subsequently signing agreements to help build about 40 more projects. Except for an electronics combine built by East Germany near Peking, Satellite projects have been comparatively small. They include power stations and plants for producing cement, plastics, paper, and sugar.

### C. Bloc Technical Aid and Technicians

Bloc technical aid has been just as important as the supply of equipment to the development of industry in Communist China. Under an agreement with the USSR for scientific and technical research in China, signed January 1958 and extending through 1962, this technical support became more comprehensive. To draw closer to world standards of competence in a significant number of selected scientific fields by 1967 -- the goal of a 12-year Chinese plan initiated in 1956 -- the Chinese would require considerable outside aid. If a slower rate of development were acceptable to Communist China, it could, without outside aid, gradually expand its scientific and technical capabilities by using a small group of able Chinese scientists as a nucleus.

The Bloc has transferred technology to Communist China in the following ways: (1) by supplying a vast quantity of blueprints and technical information without charge; (2) by dispatching advisers and technicians to perform a wide variety of tasks including supervising installation of machinery, troubleshooting, advising Chinese ministries and planning commissions, and teaching in Chinese institutions; and (3) by training Chinese technicians and researchers in Bloc countries.

By October 1959, according to Chou En-lai, about 11,000 Soviet and 1,500 Satellite technical experts had worked in Communist China at one time or another. According to other official reports, China in the past 11 years has sent about 7,000 students (including 1,400 post-graduates) to the USSR for study and 8,000 persons to Soviet industrial establishments for on-the-job training.

The need for Soviet technicians in Communist China declined as the Chinese became increasingly able to do technical work themselves. In the future, China will need fewer experts, but the ones who do come will have to be of very high caliber. Soviet construction teams assigned to China in the past often included foremen, geologists,

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draftsmen, and even welders. What China most needs at the present time are high-level consultants and teachers for research institutes.

The majority of the Soviet experts were withdrawn from Communist China in the summer of 1960. The initiative for the withdrawal came from the USSR, which presumably wanted to remind the Chinese of their continued dependence on Soviet economic assistance. Peking, for its part, has been stressing self-reliance, but the scope of the withdrawal is far greater than Peking bargained for. It remains to be seen whether the withdrawal is permanent or whether new groups of Soviet technicians will be sent to China.

#### D. Self-Reliance and the Declining Soviet Role

As recently as the spring of 1960, Chinese Communist statements often acknowledged that Soviet aid was still important and would be for some time to come. Recently, reflecting the chill that has come over Sino-Soviet political relations, Chinese spokesmen have avoided mentioning the Soviet role specifically, although they still occasionally acknowledge China's backwardness and need for aid from some unspecified source.\* Nevertheless, a main emphasis in the current propaganda line is to "rely on our own efforts to build our country into a great, rich, strong socialist power." Other Chinese Communist statements made in August and September 1960 claimed that China can do virtually all its own designing of new factories and make most of the machinery it needs.

These probably are overstatements for propaganda effect, because it seems unlikely that the Chinese Communist leadership has changed its mind in the space of a few months about the value of Soviet support. Nevertheless, it is true that the Soviet role in the Chinese industrial development program, although still important, has been declining gradually. There are two reasons for this decline: (1) the Chinese Communists have become increasingly able to design and manufacture equipment for new factories and (2) since 1957 Peking has emphasized construction of indigenous small-scale plants to supplement the large-scale plant program based on Soviet aid projects. The small plants with their simple machinery and processes can more readily be built and operated in China than can large, complex factories. Although usually inferior, the products of small plants have been useful in meeting local and rural needs.

\* For example, top economic planner Li Fu-chun, in an article published in Red Flag in mid-August 1960, admitted that "we still have practically nothing to speak of in many fields of science and technology" and that "the greatest possible help from abroad should be obtained in socialist construction."

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According to official Chinese Communist statements, Chinese industry in 1960 was producing about 90 percent of the nation's supply of new machinery and equipment, compared with 60 percent in 1957, although much of the increased production consisted of simple machinery for agriculture and small plants. The Chinese have claimed that they will produce 45 to 50 percent of the machinery needed to equip future Soviet-aid projects; the proportion equipped by China during the First Five Year Plan period reportedly was 30 to 50 percent. The Chinese themselves apparently intend to do most of the design work on future projects. The marked increase in Chinese competence in industrial construction is illustrated by the following Chinese Communist statements (the first, made in 1955, described the nature of Soviet aid during the First Five Year Plan; the second was issued in 1959 in connection with the agreement to build 78 new factories during 1959-67):

On the ... industrial projects which the Soviet Union is helping us to build, she assists us throughout the whole process from start to finish -- from geological survey; selecting construction sites; collecting basic data for designing; designing; supplying equipment; directing the work of construction, installation, and getting into production; and supplying technical information on new types of products; right down to the directing the work of the manufacture of new products. (Li Fu-chun, July 1955)

The Soviet Union will help with research and designing services ..., supply equipment, and send the required number of Soviet experts to the enterprises ... Chinese workers will be received for ... technical practice in various enterprises in the Soviet Union.

China's achievements in developing her national economy, particularly in expanding her machine building industry and training skilled engineering and technical personnel, permit her to rely on herself in manufacturing the major part of the accessory equipment needed for the enterprises named in the agreement and undertaking the work of surveying, prospecting, and designing in connection with certain of these enterprises. (Peking Review, February 1959)

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To state merely that the Bloc role in Communist China's industrial development is declining is misleading. First, the value of Bloc projects under construction and planned for the Second Five Year Plan (1958-62) is actually much larger than during the First Five Year Plan (1953-57), but because over-all Chinese industrial investment has been expanding even more rapidly, the proportion taken up by Bloc projects has declined. The Chinese imported 2.84 billion rubles (\$710 million) worth of machinery to equip Soviet-aid projects during the First Five Year Plan and have already imported 2.26 billion rubles (\$566 million) worth of such equipment in the first 2 years of the Second Five Year Plan. The Chinese in 1958 and 1959 allocated about one-fourth of all their industrial investment funds to Soviet-aid projects in contrast to 44 percent during the First Five Year Plan. In absolute amounts, the Chinese invested 11 billion yuan in Soviet-aid projects during the First Five Year Plan, of which one-fourth (about 2.84 billion yuan\*) went for imported Soviet equipment and three-fourths for domestically produced equipment and for construction costs. Financial data for Satellite projects are less well known than for Soviet-aid projects, but the Soviet-aid program has been by far the larger.

Second, and even more important than the physical level of Bloc deliveries of equipment, is the role of Bloc deliveries in raising the general technological level of the economy of Communist China. The continuous shift in Bloc support to higher levels of technology is described in Section II, below, which assesses the degree of China's dependence on outside help for the development of specific important branches of industry.

## II. Role of Bloc Support in Selected Important Industries

Heavy industry in Communist China has been developing rapidly and now can be expected to satisfy nearly all of planned needs through 1965 for the following items: equipment for smelting and refining of copper and aluminum, machinery for small and medium iron and steel furnaces and steel rolling mills, simple coal mining machinery, oil drills, distillation and thermal cracking equipment for refining petroleum, industrial chemicals, small and medium turbogenerating equipment, rubber tires, medium lathes, medium trucks, tractors, medium merchant vessels, small naval vessels, small transport aircraft, radios, and television sets.

The branches of heavy industry described in Sections A through J, below, are those that still depend heavily on the Soviet Bloc for their development through 1965. These industries, it is estimated, include

\* One yuan has equaled approximately one ruble in valuing imports from the USSR.

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the processing stages of aluminum and steel, large electric power stations, cement, selected chemicals (fertilizer, plastics, and synthetic fibers), heavy and complex machine tools,\* selected electronic equipment, naval shipbuilding, jet aircraft, heavy artillery and tanks, and nuclear energy.

Not all of these industries depend on outside help for both technology and capital equipment; the nature of dependence varies from industry to industry. Communist China has mastered the technology of most basic industries, such as aluminum, steel, and electric power but needs to import capital equipment in order to develop these industries with the rapidity called for in present plans. On the other hand, some industries, such as electronics, seem to have developed an adequate production capability but will continue to require technical assistance from abroad. There remain a few highly complex industries, notably naval shipbuilding, aircraft, missiles, and atomic energy, that depend for their development on both imported knowledge and imported equipment.

A state of strong dependence on the Bloc may be said to exist when Communist China is unable to turn to non-Bloc sources of technology and equipment to replace Bloc sources. By this definition, China is not heavily dependent on the Bloc for petroleum products, heavy machine tools, and antifriction bearings -- although imports of these items from the USSR have been vital to the Chinese economy -- because these products can be readily purchased from non-Bloc countries. Military and atomic energy items, however, presumably will continue under Western embargo to China. Moreover, the generally hostile attitude of China toward non-Bloc industrial countries and its desire to preserve economic secrets will keep it from taking full advantage of opportunities that do exist to acquire technology and equipment outside the Bloc. It would be difficult for China to transfer contracts for complete factories to non-Bloc manufacturers, especially those contracts requiring the services of foreign technicians. It is assumed in this report that most such contracts left unfulfilled by the Bloc would be passed to domestic Chinese factories to fulfill as best they could.

#### A. Aluminum Processing

Of the basic nonferrous metals important to modern industrial economies -- aluminum, copper, lead, zinc, and tin -- aluminum probably is the most difficult to process. Whereas the Chinese Communist

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\* Heavy and complex machine tools are not treated in a separate subsection but are part of the discussion of other subsections, such as those that discuss steel and aluminum.

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machinery industry should prove during the next 5 years to be able to make the dies for drawing copper wire and most of the other machinery needed to cast and shape copper, lead, zinc, and tin, China will have to import most of the rolling mills, extrusion presses, and other fabricating equipment needed to process aluminum metal.

Communist China, which planned to produce about 84,000 tons\* of aluminum metal in 1960 and to import small quantities, is believed to have plants capable of fabricating about 100,000 tons of metal. The principal aluminum mill in China is one at Harbin that was built in the mid-1950's with modern Soviet equipment. A small rolling mill of pre-World War II vintage is still in operation at Shanghai.

Chinese Communist plans for expanding production of aluminum metal are shown in the following tabulation:

<u>Year</u>	<u>Thousand Metric Tons</u>
1952	0
1960	84
1962	100 to 120 (Official target)
1965	250 (Estimate)

Producing the metal poses no problem to Communist China, which has large deposits of aluminous shale and is planning to build and equip aluminum refineries entirely by itself. China cannot, however, make the rolling mill equipment and extrusion presses needed for aluminum mills and has been planning to import such equipment from Bloc countries. China will need to add about 150,000 tons of fabricating capacity to its aluminum industry to match anticipated expansion of refinery capacity through 1965.

#### B. Steel

Communist China holds the classic Communist view that an iron and steel industry should be at the core of any program for rapid industrialization and consequently gives extremely high priority to this

\* Tonnages are given in metric tons throughout this report.



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industry. China has greatly expanded the large iron and steel combine at An-shan and has been building two new combines at Wu-han and Pao-t'ou, all with Soviet aid. Construction has also been proceeding on five somewhat smaller iron and steel plants, which are being partially equipped with Soviet and Satellite machinery, as shown in Table 2.\* Although the Chinese inherited some capacity from the Japanese and have built some small plants on their own, most of the industry consists of the Bloc-equipped plants, which are large, modern mills capable of producing steel of standard quality and of rolling a large part of the rails, pipes, beams, bars, and other shapes needed for the Chinese construction and machinery industry. The ability to produce a wide variety of alloy and special steels, however, is still lacking. In 1959 the Chinese imported 825,000 tons of finished steel, or nearly 10 percent of their steel product supply, principally in the forms of silicon steel sheets for electrical purposes, carbon steel sheets, alloy steels, and steel plates and tubes.

Since 1957, large numbers of domestically equipped small plants have been built to supplement production from the large plants. After a false start in 1958 with native backyard furnaces, the Chinese Communists switched to small plants of relatively modern design. These small, semimodern plants produced 3 million tons in 1959, their first full year of operation, and their capacity may have been increased to about 7 million tons by the end of 1960. Such aggregate figures are impressive, but the product of small plants has been of low quality and has been of little value in meeting the demand for steel products by machinery factories and in the industrial construction program. The small plants have been useful in meeting the non-exacting standards of local construction, agricultural, and handicraft industries. Because of the limitations of small plants, it is probable that the Chinese intend, after 1960, to push ahead primarily on the basis of the large-plant program that at present relies on importing technology and equipment.

Under the large-plant program, if all goes well, Communist China will have built up by 1965 a well-balanced, modern iron and steel industry capable of producing an estimated 28 million tons of standard grade steel, not counting production from small plants. To carry out this program, China will have to rely heavily on the Bloc. During the next 2 years the Bloc is to supply key equipment for nearly all new open hearths and rolling mills. The USSR is also helping China build and bring into full operation three metallurgical machinery factories at T'ai-yuan, Mukden, and Fu-la-erh-chi (near Tsitsihar in Manchuria). These factories are already in trial production, producing

\* Table 2 follows on p. 13.

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Table 2

Estimated Production (1959) and Capacity (1965) of the Steel Industry  
in Communist China a/

	Million Metric Tons	
	<u>1959 Production</u>	<u>1965 Capacity</u>
Major Soviet aid projects		
An-shan	5.6	6.0
Wu-han	0.5	3.0
Pao-t'ou	0	3.0
Tsitsihar (special steel plant)	0.4	0.5
Total	<u>6.5</u>	<u>12.5</u>
Plants partly equipped with Soviet Bloc machinery		
Ta-yeh	0.5	1.3
T'ai-yuan	0.4	2.0
Chungking	0.9	1.5
Shih-ching Shan	0.7	1.3
Hsiang-t'an	0	1.2
Total	<u>2.5</u>	<u>7.3</u>
Special steel plants equipped with Japanese, Chinese, and Bloc machinery		
Small Chinese-built plants	1.1	1.2
Large plants mostly equipped with Chinese machinery	3.0 <u>b/</u>	7.0
Grand total	<u>13.4 <u>b/</u></u>	<u>35.5</u>

a. The steel plants tabulated above are measured in terms of their production of, or capacity to produce, crude steel. Finished steel capacity for most plants may be rated at 75 percent of crude steel capacity.

b. In 1959, few small Chinese plants had completed their rolling mill components. Therefore, total rolling mill production was about 65 percent of crude steel production, or 8.5 million tons.

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prototypes of large rolling mill equipment. It takes a long time to achieve proficiency in this field, but, with Soviet advisory help, these plants should be able after 1962 to manufacture most of the basic equipment needed for new steel mills. China still will have to import some special rolling mills and control instruments. China also will have to import equipment (especially associated electrical equipment and control devices) for electrical furnaces, which make the alloys used in modern machine tools, chemical machinery, and jet and rocket engines. A large increase in capacity and technological level of furnaces producing alloys is needed to support the rapidly expanding machine building industry.

A complete breakoff in economic relations with the Soviet Bloc would compel Communist China to reduce its plans for developing the quantity and quality of steel production, but such a breakoff should not greatly affect current operations. China should be able eventually to complete all Bloc aid projects because some of the machinery probably has been delivered and China is rapidly acquiring the know-how and factory capacity to produce the undelivered equipment. If thrown on its own resources, China might be able by 1965 to complete all known Bloc projects and some domestic projects, totaling about half the 16 million tons of crude steel capacity to be added under the present program for 1961-65. It also could further expand small plants, especially if it wanted to maximize production to prove to the world that China could not be effectively isolated. As noted above, however, there is only limited need for additional quantities of the inferior product of small plants.

C. Electric Power

The Chinese Communists realized from the start the importance to their economic program of an adequate supply of electric power. With substantial Soviet aid, they have steadily expanded the industry, most of the time staying one jump ahead of industrial demand for electric power. Installed capacity of Chinese electric powerplants increased from 2 million kilowatts (kw) in 1952 to 13.6 million kw in 1960, when the industry generated about 58 billion kilowatt-hours (kwh) of electricity. These 1960 levels of capacity and output were not exceeded by the USSR until 1948. Of the 13.6 million kw of capacity now in place, 6.5 million kw are in plants imported from the Bloc.

Unwilling to rely indefinitely on imports of electrical equipment, the Chinese Communists gave high priority during the First Five Year Plan (1953-57) to the construction of factories capable of producing electrical equipment. By 1960 these Chinese factories were capable of supplying about two-thirds of the machinery needed to expand electric power capacity. Assisted by the USSR, the Chinese have

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built turbogenerator factories at Shanghai and Harbin and factories producing transformers, motors, and accessory equipment at Mukden and Shanghai. A fourth important center of the electrical equipment industry is being built in Sian with Soviet and East German aid, and a fifth is going up at Chungking, also presumably with outside aid. Production standards in the industry, although improving, are below Bloc or world standards, primarily because management has been inexperienced and under strong pressure to meet quantity goals. There have been reports of large generators which operated far below rated capacity upon installation.

The following tabulation, which shows in million kw the estimated installation of turbogenerators in Communist China, illustrates the growth of domestic ability to produce turbogenerators, the main product of the electrical equipment industry:

<u>Origin of Turbogenerators</u>	<u>1957</u>	<u>1958</u>	<u>1959</u>	<u>1960</u>	<u>1965</u>	<u>1961-65</u>
	<u>Million Kilowatts</u>					
Imported	0.6	1.0	1.6	1.7	2.0	10.8
Domestic	0.2	0.7	1.5	2.5	5.1	21.4
Total	<u>0.8</u>	<u>1.7</u>	<u>3.1</u>	<u>4.2</u>	<u>7.1</u>	<u>32.2</u>
	<u>Percent</u>					
Imports as percent of total	75	59	52	40	28	34

Even after 1965, Communist China will need Soviet help to carry out plans for huge hydroelectric stations on the upper reaches of the Yangtze and Yellow Rivers. China cannot produce the turbo-generators of 200,000 kw or more that are desirable for such projects and is reported to have already placed orders with the Leningrad turbogenerator factory to design and manufacture 50 turbogenerators of 500,000 kw to be installed in the Yangtze River Gorge, probably in the decade after 1970.

During 1961-65, Communist China apparently plans to increase electric generating capacity from 13.6 million kw in 1960 to about 46 million kw in 1965. Of the capacity to be added, almost 11 million kw are to be imported and about 21 million are to be produced domestically, as shown in the above tabulation. If cut off from Soviet Bloc support, China would be deprived of scheduled imports,

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which, because they consist primarily of large units, would be difficult to replace from domestic production. The transfer of manufacturing contracts for large projects to non-Bloc suppliers would involve long delays. In addition, China would be reluctant to sign contracts requiring the services of non-Bloc technicians.

Because the electrical equipment industry is already well developed, even if poorly managed, Communist China's ability to maintain projected levels of production of turbogenerators probably would be affected only slightly by a withdrawal of Soviet support. The comparatively small, standardized units that make up the bulk of domestic production are types readily obtainable from non-Bloc manufacturers, so that any failure in domestic production could be made up with non-Bloc imports.

The above data suggest that by relying solely on domestic production and on imports of minor equipment from non-Bloc sources, Communist China could expand its electric power industry to a capacity of 35 million kw in 1965, some 25 percent below the presently anticipated total of 46 million kw. In terms of power generated, the industry could produce 150 billion kwh instead of the 195 billion kwh presently projected. Even so, China would rank with such major industrial countries as Japan and West Germany, which generated 82 billion and 95 billion kwh, respectively, in 1958.

D. Cement

Cement production facilities in Communist China consist of three types: (1) plants of various sizes established before 1949 and renovated and expanded with Bloc help; (2) large plants (annual capacities of 300,000 to 1 million tons) built since 1949, entirely with Bloc equipment; and (3) small plants (capacities of less than 100,000 tons) built since 1957 with equipment supplied by Chinese machinery factories. Production of cement by these categories was as follows in 1959:

<u>Type of Plant</u>	<u>Production (Million Tons)</u>	<u>Percent</u>
Pre-1949 plants	7.4	60
Post-1949 large plants	3.2	26
Small plants*	1.7	14
Total	<u>12.3</u>	<u>100</u>

\* Excluding native kilns, which were established in large numbers in 1958 but mostly replaced with small plants of relatively modern design in 1959.

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Communist China does not produce the large gears and rotary kilns used in large cement plants, nor is it presently planning to begin quantity production during the next 5 years. Although China can make the equipment, it seems to have made an economic or strategic decision to import cement plants rather than to divert the capacity of heavy machine building and boiler factories -- now geared up to produce metallurgical and electric power equipment -- to the production of cement-making machinery. Under this policy China has signed long-term contracts, running from 1961 through 1965, with East Germany, other Bloc countries, and Denmark, for the importation of complete sets of equipment for large cement plants with a total annual capacity of about 8 million tons. The Danish contract is unusual in that it is the only complete factory of any type that China is known to have ordered from a non-Bloc country. Although forced to tell its Danish supplier the altitude and atmospheric pressure under which the plant would operate, China has refused to divulge the location of the plant.

Communist China cannot readily make equipment for large cement plants without interfering with higher priority work, even though the light machinery plants in China can produce large quantities of machinery for small cement plants. The regime has been vigorously pushing local construction of small plants, which show promise of being economical and of producing a good-quality product.

Information on negotiated imports and plans for expanding production in small plants suggests that by 1965 Communist China hopes to produce cement in the following quantities:

<u>Type of Plant</u>	<u>Production (Million Tons)</u>	<u>Percent</u>
Pre-1949 plants	8	27
Post-1949 large plants	12*	40
Small plants	10	33
Total	<u>30</u>	<u>100</u>

If cut off from Bloc sources of machinery, Communist China would have difficulty continuing the program for building large plants. It could not quickly turn to non-Bloc suppliers, because equipment negotiated for at this late date could not be manufactured, installed, and brought into full operation much before 1965. The operation of existing cement plants would also be affected if the Bloc cut off the

\* Eight million tons from plants established during 1961-65.

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flow of spare parts to the industry. Because the manufacturing process in cement plants is highly abrasive, equipment is subject to rapid physical deterioration and must be replaced frequently.

If the Bloc suddenly stopped supplying equipment, Communist China undoubtedly would try to accelerate the small-plants program to cushion the blow. The seriousness of the loss would depend on how rapidly China could build small plants in large numbers and get them running smoothly and economically.

E. Chemicals

The chemical industry of Communist China has been heavily dependent on Bloc equipment and technical assistance. Bloc assistance (primarily Soviet, East German, and Czechoslovak) has extended from technical assistance, in some instances only the supplying of blueprints, to the construction and equipping of complete plants. Plants producing synthetic ammonia and nitric acid, nitrogen fertilizer, pharmaceuticals, dyestuffs, synthetic fibers, plastics, and synthetic rubber have been the major beneficiaries of Bloc assistance. The Chinese have needed only minor assistance in the production of most basic industrial chemicals, including sulfuric acid, soda ash, and caustic soda.

The USSR began to help develop Communist China's chemical industry as early as 1950 when it started remodeling and expanding the Dairen chemical center, originally built by Japan. Subsequently, the USSR has completely equipped plants producing nitrogen fertilizer (Kirin, T'ai-yuan, and Lan-chou), dyestuffs (Kirin and T'ai-yuan), calcium carbide (Kirin), synthetic rubber (Lan-chou), pharmaceuticals (T'ai-yuan and Shih-chia-chuang), and starch (Shih-chia-chuang). Czechoslovakia has equipped a fertilizer plant at Chin-t'ang, and East Germany has supplied equipment and technical assistance to synthetic fiber plants at Pao-t'ing and Peking. Although all these plants are completed, most are still operating below their original designed capacity. Soviet technical assistance has been given also to the new plants at Nanking and T'ai-yuan that produce phosphorus fertilizer and to the recently expanded nitrogen fertilizer plant in Nanking.

The scope of Communist China's ambitions for its chemical industry is shown in the following tabulation of estimated production of selected chemicals:

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Chemical	Metric Tons	
	1960	1965
Sulfuric acid	1,400,000	3,600,000
Caustic soda	420,000	940,000
Nitric acid	430,000	800,000
Nitrogen fertilizer (in terms of 20 percent N)	1,900,000	5,500,000
Plastics	17,000 (1958)	200,000 (1962 Plan)
Synthetic fibers	Negl.	100,000 (1962 Plan)

Communist China probably can expand production of most basic industrial chemicals, including sulfuric acid and caustic soda, by itself. Technical problems are few, and equipment to produce these items can be made by the chemical equipment industry, which manufactures a growing range of chemical equipment, including acid-resistant pumps and air and refrigeration compressors, as well as more complex items such as oxygen-making equipment.

Chinese Communist ingenuity has not solved the problem of how to make nitrogen fertilizer in large quantities by indigenous means. The bottleneck is the high-pressure equipment needed to make synthetic ammonia, a vital input for quantity production of nitrogen fertilizer. Although Czechoslovakia is believed to be supplying a plant to produce layered high-pressure vessels, with which China will then be able to equip its own synthetic ammonia factories, this Czechoslovak plant probably will not reach significant levels of production for several years. China will also have to develop a capability for making high-pressure compressors for this industry.

Meanwhile, Communist China has been forced to purchase a large amount of equipment from Bloc countries to build up the fertilizer industry. It reportedly has contracted with East Germany, Poland, and Czechoslovakia to supply 3 or 4 nitrogen fertilizer plants each by 1962 and has planned to expand the Soviet-built plants at Kirin, T'ai-yuan, and Lan-chou with more Soviet equipment. Because nitrogen is the principal nutrient deficiency in Chinese agriculture, these planned imports are a key element of the Chinese program for expanding agricultural production in the next few years. It is estimated that without Bloc equipment, production in 1965 of synthetic nitrogen fertilizer would be only about 60 percent of the production presently projected -- that is, 3.3 million instead of 5.5 million tons. If Bloc aid ceased, the Chinese might increase their imports of nitrogen fertilizers and try to obtain plant equipment and technical aid from



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non-Bloc countries, although any transfer of contracts from Bloc to non-Bloc suppliers for building complete plants would entail long delays.

The Chinese Communists have little competence or experience in designing, constructing, and equipping plants to produce synthetic organic chemicals and synthetic materials, such as fibers, plastics, and rubber. These sectors of the chemical industry would be very adversely affected by a withdrawal of Bloc support. The loss of Bloc sources of supply of spare parts and technical assistance might even reduce the level of production and the quality of those chemicals goods now being produced as the result of previous aid, especially in plants equipped with machinery that is not yet manufactured in China. In this event, however, China probably could turn to Japan and Western Europe for equipment and technical assistance needed to maintain production at existing facilities.

#### F. Electronics

Since 1955, Communist China has acquired an impressive electronics manufacturing industry. Most of the capital equipment for the new plants was supplied by the USSR and East Germany. Among the major centers of production are Peking, Ch'eng-tu, Nanking, and Shanghai. Chinese capability to manufacture most types of standard receiving tubes, circuit components, and simple finished items like radios and television sets approaches that of the USSR. The quality of Chinese-made components in radio samples tested in the US has been excellent. Large-scale production of tubes began in 1959 when 43 million were produced. By comparison, 1959 production was 17 million in East Germany and 119 million in the USSR. China by 1959 or earlier had also begun production of radio and television receivers (production in 1959 was about 1.6 million and 10,000, respectively), navigational aids and radar, and communications equipment like teleprinters, facsimile, and broadcasting and TV transmitters. Relying on substantial Soviet material and technical aid as well as on Western technology, Chinese laboratories have produced high-speed electronic computers, some types of semiconductor devices including transistors, and a fairly wide range of more advanced communications equipment, such as medium-capacity microwave sets.

Assistance from Bloc countries has been the basic reason that an industrially backward country like Communist China has advanced so far in the highly complex field of electronics. China has been able to draw on Bloc countries for designs of finished items and technology and equipment for producing component parts. The Chinese also have adapted or copied Western prototypes of a few items, such as test equipment. The electronics industries in the US and the USSR employ

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many scientists to carry out theoretical research and product development, activities the Chinese largely leave to their more advanced partners. Beyond the research and development stage, the electronics industry is inherently labor intensive and well suited to China. To overcome their technological backwardness, the Chinese Communists have established several electronics institutes and given high priority to electronics in their long-range scientific program. Such efforts are already beginning to pay off, but it will be many years before they give China an independent capability for designing all new electronics products.

By and large, the new electronic manufacturing facilities already are fairly well developed, and little further plant expansion is expected in the near future. From now on, development of the industry will depend mainly on Bloc supply of design information and on the learning of production techniques by Chinese Communist engineers. The Chinese also will continue to exploit available Western prototypes and technical information.

With outside help, by 1963 or 1964 Communist China probably will be able to produce much of the military and civilian electronic equipment it needs, including scatter communications, radio direction-finding equipment, shipborne anticollision radar, radars for early warning and directing fighter aircraft in combat, and gunlaying radar. One exception will be microwave equipment, needed in large quantities for a high-capacity, secure radio network that is currently being installed to handle communications for the armed forces, high echelons of the government, and important branches of industry. Because of special technical problems and because of inability to produce in quantity special tubes and components used in this equipment, China plans to import microwave equipment at least through 1965.

If deprived of Bloc advisers, technical information, and specialized components, the electronics industry in Communist China probably would postpone some plans for producing complex modern equipment. The industry probably would wish to concentrate its available engineering skills on continuing production of present product lines and on providing spare parts for existing equipment. For a while, it might prove difficult to maintain even present levels of production, because production of electron tubes, now apparently dependent on tungsten wire from the USSR, probably would drop off unless sources of supply were found in the non-Bloc world. For years the world's largest producer of tungsten ore, China only recently completed facilities to make tungsten metal and shape or draw it into filament wire; production in adequate varieties and quantities probably is still a year or two off. China has been able to turn to non-Bloc countries for civilian equipment, such as specialized test equipment.

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Its primary interest, however, is in electronics equipment for military applications (it is estimated that 75 percent of Chinese tube production is for military use). A break with the Bloc would effectively slow down present plans to make progress in military electronics.

G. Naval Shipbuilding

Communist China first produced large naval vessels in 1955, under a program closely supervised by large numbers of Soviet technicians and dependent on the USSR for designs and many component parts. By the end of 1960, 21 W-class submarines, 4 Riga destroyer escorts (DE's), 18 Kronstadt subchasers, 10 minesweepers, and about 150 torpedo boats (PT/PGM classes) had been built. In addition to these vessels, initial construction is believed to have started on a Kotlin-type destroyer and one or more new types of conventionally powered submarines.

The Chinese Communist shipbuilders now carry out their own fabrication and assembly of naval-vessel hull structures, using domestically produced steels, even the special steel used for submarine hulls. The main shipbuilding deficiency at this time lies in the production of marine components. Many of these components are now in production domestically, but the more complex items, such as propulsion machinery, electronic equipment, armament, and possibly navigational equipment, are still imported from the USSR. China has acquired considerable experience in producing large marine diesel engines, including types used to propel submarines as well as merchant vessels. It has not, however, begun to produce large steam turbine engines of the types used in destroyers and destroyer escorts. The Chinese have designed and produced a fast patrol boat but in general have a limited design capability and must rely on the USSR for designs of most naval vessels.

Termination of Soviet aid would force cancellation of the new program of building Kotlin-class destroyers and the new class of submarines. It is unlikely that construction of W-class submarines could continue, although further construction probably could be resumed in 2 or 3 years depending on how fast China learned to produce W-class components.

Even if unable to build major combat vessels, Communist China still could continue to build a variety of torpedo boats and other small surface vessels up to and including subchasers. Because such vessels would be highly valuable for patrolling and defending the long Chinese coastline, their construction would have high priority but could take place initially only at the expense of merchant ship construction, which might lag behind desired rates for a year or two.

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Another problem would be the difficulty in making spare parts to maintain operating naval units. The Chinese Communists might have to resort to cannibalization of some classes of vessels, such as the four Soviet-supplied Gorkyy-class destroyers. Most of the submarines probably could be kept in operation at lowered levels of effectiveness. China should be able to solve most repair and maintenance problems by 1965.

#### H. Aircraft and Missiles

Shortly after the end of the Korean War, Communist China decided to develop an aircraft industry to produce Soviet-type aircraft. Relying on technical assistance received from the USSR, China was able within a short period of time to establish factories capable of producing in series the following aircraft: MIG-17 (Fresco) and MIG-19 (Farmer) jet fighters, MI-4 (Hound) helicopters, and a single-engine biplane used for light transport duties and dusting crops. The MIG-19 is capable of reaching only low supersonic speeds, but when the Chinese decided to begin producing the MIG-19 in 1957 or 1958, it was the most advanced fighter of proven design and in mass production in the USSR. The Chinese are now making about 2 MIG-19's per month at a complex of factories in Mukden. The airframes are fabricated in China, largely from domestically produced components. China also has a factory at Mukden that can make VK-1 and AM-9 jet engines for fighters, but it must import some high-grade alloys for the engines. The rapidly developing metallurgical industry in China can make low-alloy steels and some grades of stainless steel but has not yet mastered the difficult technology of making high-temperature alloys and shaping them into components needed for jet engines, rockets, and missiles. Nickel and chrome, main ingredients of most of these alloys, are mined in insignificant quantities in China, if at all. Besides alloys for engines, the Chinese aircraft industry depends on the USSR for original designs, ordnance, some electronic gear, instruments, and spare parts.

Assuming continued Soviet aid, the Chinese Communists probably will expand production of MIG-19's while phasing out production of MIG-17's. They might also soon begin producing a larger jet aircraft at a complex of factories that has been built up at Sian since 1956. These factories probably are now tooling up for production of an aircraft like the Tu-16 (Badger) bomber or the Tu-104 (Camel) transport. The Chinese are working hard under Soviet guidance to overcome their deficiencies in the metallurgical field and may soon be able to produce all component parts of jet engines, if nickel and chrome ores can be procured.

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If the USSR discontinued technical aid and deliveries of components, the Chinese Communist aircraft industry probably would be forced to (1) suspend production of jet fighters in order to concentrate on repair and maintenance of the operating jet air force (even so, some cannibalization might be necessary); (2) abandon the program underway at Sian to produce a larger jet aircraft; and (3) redirect research and development into more elementary fields. Deprived of the capability to produce a turbojet transport or bomber, the Chinese might attempt to produce a piston transport of the DC-3 size, probably the most sophisticated model that the industry could design and produce locally during the next 5 years. Production of the helicopter and biplane models probably would continue.

In order to modernize the Chinese Communist air defense system, which now relies on MIG-17 and MIG-19 fighters, China will have to acquire air-to-air missiles (AAM's) to mount on the MIG-19 or develop an effective surface-to-air missile (SAM) system. Judging from past Chinese practices in meeting military needs, it is presumed that China is planning with Soviet aid to achieve the industrial capacity to produce most types of missiles and eventually to establish an independent capability for missile research, development, and production. The Chinese are believed to be in the very early stages of a research and development program. They might be able to produce simple short-range surface-to-surface missiles on their own during the next 5 years, but they probably would be unable to produce longer range surface-to-surface missiles, SAM's, or AAM's in this period without substantial Soviet aid.

### I. Ground Force Weapons

Since the Korean War, Communist China has advanced beyond the stage of producing light equipment and into the production of medium field artillery pieces, antitank guns, antiaircraft guns, and the T-54 tank. Bases for producing this equipment are the Japanese-built arsenal complex in Mukden, now reequipped with Soviet machinery, and large new factories in Tsitsihar and Pao-t'ou for which the USSR has provided the necessary technology and equipment. China can produce about eight major items of equipment. Estimates of current production as well as the total Chinese inventory of major items of equipment are shown in Table 3.\* China can also produce ammunition for all its ground force weapons, even those not made in China.

The most important item in production is the T-54 tank, a modern medium tank needed to replace the obsolete T-34 tanks with which the Chinese Communists are now mainly equipped. At present

\* Table 3 follows on p. 25.

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Table 3

Major Items of Equipment of the Chinese Communist Ground Forces  
1960

Item	Quantity in Inventory <sup>a/</sup>	Estimated Annual Production	Units
Artillery			
100-mm field/attack gun	70	Fewer than 50	
122-mm howitzer	1,800	100	
122-mm gun	800	None	
152-mm howitzer	400	20	
152-mm gun/howitzer	400	None	
130-mm gun	75	None	
Antiaircraft			
37-mm AA gun	1,450	Ceased	
57-mm AA gun	250	30	
85-mm AA gun	1,350	None	
100-mm AA gun	250	None	
Rocket launcher			
102-mm rocket launcher	N.A.	100	
132-mm rocket launcher	150	Negl.	
140-mm rocket launcher	35	None	
Armor			
Medium tank (T-34/85)	2,600	None	
Medium tank (T-54)	100	500	
Heavy tank (JS-2)	60	None	
Assault gun (SU-76/100)	800	None	
Assault gun (JSU-122)	100	None	
Assault gun (JSU-152)	100	None	

a. Mostly of Soviet origin.

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production rates, the T-34's could be replaced in 5 years, but inventories would still be relatively small. China now has fewer than 3,000 tanks, enough to equip 3 armored divisions and 70 armored regiments attached to infantry divisions. The Soviet army, by comparison, has 25 times as many tanks.

The ability of Chinese Communist arsenals to produce artillery is especially weak. They are unable to produce artillery pieces of sufficient range to fire from the mainland to the main island of the Matsu group or the resupply beaches of Kinmen. They do not produce antiaircraft weapons of large enough caliber to be effective against modern aircraft. The few types of light and medium artillery they can produce are not manufactured in large enough quantities to build up inventories, which are small compared with the needs of a large, modern army.

By modern standards, the Chinese Communist armed forces are deficient in the firepower needed to support the foot soldier. They have been correcting this deficiency steadily but not rapidly. Heretofore, the regime has concentrated on building up a heavy industrial base that will permit modernization of the army at some future date. By following this policy, Communist China has built up its metallurgical and heavy machine building industries and is now in a position where it could plan on expanding its arsenals and on increasing greatly the production of a wider variety of major items of military equipment during the next 5 years. The Chinese need not only the items in their present inventory (see Table 3) but also larger, more mobile weapons and more advanced rockets than they now have. China has nothing comparable to the self-propelled 203-mm howitzers and Honest John rockets, standard items of modern equipment which the US has supplied to Nationalist China and South Korea. Such weapons are designed not only to deliver high-explosive shells accurately over a long range but also to fire tactical atomic shells. China cannot produce any weapon suitable for delivering atomic shells.

In the absence of further Soviet technical assistance and additional Soviet shipments of machine tools, it is believed that Communist China can initiate trial production within 1 or 2 years of all Soviet weapons currently used by the Chinese army. At least two Chinese plants, the T'ai-yuan Heavy Machinery Plant and the Dairen Steel Works, are now producing special steels for small-arms barrels and artillery tubes, and there are no other technological factors that would prevent Chinese plants from manufacturing recoil brakes and recuperators, traverse mechanisms, and other artillery components.

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How soon Communist China could hope to begin producing more complicated, larger, and more mobile types of equipment than it now possesses would depend on the state of plans to expand Chinese arsenals, a subject on which little information is at hand. If the USSR has already helped China tool up for production of new items, then there should be few problems. If China has to equip its own arsenals and do its own design work, then it might not be able to produce new items in quantity during the period of this estimate. Even if a program for expanding arsenals is well advanced, Communist China has so far to go that it probably will not be able to modernize its forces solely with items of its own production during the next 5 years. Even in a nonnuclear war, therefore, the Chinese Communists would not be able to sustain major military operations against a modern armed force without substantial additional quantities of Soviet weapons and equipment.

#### J. Nuclear Energy

Information on the nuclear program in Communist China and on the Soviet contribution to this program is fragmentary. In the present state of Chinese competence the carrying out of programs to produce fissionable materials requires substantial Soviet assistance in the form of technicians, designs, and equipment. Recent evidence strongly suggests that the USSR has given China more technical assistance toward the eventual production of nuclear weapons than previous information had indicated.

The USSR has provided Communist China with a nuclear research reactor and is training Chinese nuclear scientists in the Joint Institute for Nuclear Research at Dubna in the USSR. The exploitation of native uranium resources has been underway, with Soviet assistance, since 1950. At least 10 deposits are now being worked, and ore with a uranium metal equivalent of several hundred tons probably is being mined annually and retained in China. The Chinese Communists probably have initiated the processing of uranium ores into metals, probably are building a plutonium production reactor, and may also be building a U-235 gaseous diffusion plant.

The fragmentary evidence available points to 1963 as the most likely target date for detonation by Communist China of its first nuclear device, assuming no marked decline in Soviet aid. If such a decline occurred, Chinese Communist progress in the nuclear field would be retarded by a substantial but indeterminable amount.

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### III. Effects on the Chinese Economy of a Withdrawal of Bloc Assistance

#### A. Short-Run Impact

A sudden withdrawal of Bloc material and technical assistance would cause severe short-run dislocations in the Chinese Communist economy during an initial period when Peking would be forced to revise basic economic policies and seek alternate sources of supply. Eventually, non-Bloc sources or domestically produced substitutes probably could be found for much of the petroleum products, metals, and machinery and equipment that China now imports from Bloc countries, but until readjustment was made to the new situation, many economic activities in China would have to go on short rations. Transportation would be affected by a severe shortage of diesel and fuel oil for ships and of motor and aviation gasoline, until a large flow of oil products from non-Bloc sources began arriving. Chinese machine building industries are unprepared to begin producing spare parts for much of the vast quantity of Bloc machinery received in recent years, especially for types of machinery not yet made in China. During an interim period it is expected that the lack of spare parts would prolong the period of breakdown of some equipment, such as large rolling mills, forges, presses, lathes, turbogenerators, cement plant and chemical equipment, airplanes, and ships. The departure of Bloc technicians has already put additional strains on the thin domestic supply of technicians, the situation being most severe in those industries at the frontier of Chinese technology.

The leadership in Peking, being occupied with political as well as economic aspects of the Sino-Soviet dispute, might be slow in determining new economic goals, policies, and priorities and in giving guidance to administrators trying to allocate effectively scarce inputs of petroleum products, transportation, electric power, repair parts, and skilled manpower.

#### B. Impact Through 1965

After initial adjustments were made, Communist China would still be faced with long-run problems of building up production in industry and expanding into new industrial fields. These problems would force the leaders to moderate their overweening ambitions to industrialize at a headlong pace. Growth rates of industrial production and capital construction would decline markedly. The regime would have to reduce or cancel many sophisticated development programs now scheduled, including those for producing atomic bombs and the related delivery systems.

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In terms of the highly ambitious scope of Chinese Communist hopes, the setback would be considerable. For an underdeveloped agrarian country, however, China would still have an impressive ability to build up industries and expand industrial production. Communist China's achievements in expanding industrial production rest not only on assistance from the Bloc but also on the high proportion of gross national product devoted to investment and on the energy and ruthlessness of the leadership. If Bloc assistance were withdrawn, the other two factors would remain and the expansion of production would continue, although in a distinctly different pattern.

### 1. On Industrial Production

Chinese Communist industries will vary widely in their need for Bloc support over the next 5 years. Some, such as the nitrogen-fertilizer industry and most military industries, could not achieve more than a fraction of planned targets without the continuation of Bloc technical and material assistance. At the other end of the scale of dependency are industries that are producing coal, basic industrial chemicals, tractors, and trucks -- industries that have largely outgrown the need for outside help. In the middle of the scale are industries like steel, electric power, and electronics, which are fairly well developed and which China can expand by itself, but more slowly than if Bloc help were forthcoming. Over-all growth in industrial production, which probably will be closely related to the growth of steel and electric power, may be estimated from trends in these two industries as described in II, B, and II, C, above, where it is estimated that a cessation of Bloc support would lower the outlook in 1965 for generating electric power from 195 billion kwh to 150 billion kwh and for producing steel in large, modern steel combines from 28 million tons to 20 million tons. These data suggest that over-all industrial production in 1965 might fall 25 percent below presently projected levels, if China were deprived of economic support of the Bloc. Estimated data for steel, electric power, and aggregate industrial production are shown in Table 4.\*

### 2. On Industrial Investment

Communist China has been counting on Bloc countries to supply the necessary equipment and technology to help build up to 200 large, modern industrial plants that will be the heart of the Chinese investment program from 1961 to 1965. These facilities include metallurgical, electric power, chemical, and machine building plants. Recent trends in trade and investment suggest that plants for which

\* Table 4 follows on p. 30.

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Table 4

Estimated Industrial Production in Communist China  
1960 and 1965

Industrial Category	Unit	1960	1965	
			With Bloc Help	No Bloc Help
Steel a/	Million metric tons	12	28	20
Electric power	Billion kwh	58	195	150
Over-all industrial production b/	Billion yuan	43	91	68
Average annual increase in industrial production c/	Percent		16	10

a. Production of large, modern steel mills.

b. Value added by industry, in 1957 prices.

c. Between the terminal years (1960 and 1965).

the key equipment will be of Soviet and Satellite origin will make up about 20 to 25 percent\* of the over-all Chinese industrial investment program from 1961 through 1965. The comparable proportion during the First Five Year Plan (1953-57) was 44 percent (see I, D, above).

If Bloc countries canceled all contracts to export capital equipment, Communist China would have difficulty transferring them to non-Bloc suppliers, both because any transfer would take a long time and because China probably would be reluctant to have close relations with industrial countries of the non-Communist world. A mass cancellation of Bloc contracts, therefore, would force China to cut back the industrialization program and would revise the program's fundamental character for a few years at least. Because most of the Bloc-equipped plants are designed to produce heavy capital equipment and

\* Total industrial investment for the 5-year period 1961-65 is projected at 175 billion to 200 billion yuan, on the assumption that it probably will average 15 to 17 percent of gross national product. Investment in Bloc-equipped plants may total 42 billion yuan, assuming that imported capital equipment -- estimated to be 8.5 billion yuan -- will take up 20 percent of total construction costs in these plants. This figure of 42 billion yuan is approximately 20 to 25 percent of the projected total industrial investment of 175 billion to 200 billion yuan.

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industrial materials, a Chinese investment program from which Bloc-equipped plants were deleted would necessarily give less emphasis to heavy industry than to light industry and less to industry than to agriculture.

That the Chinese Communists would not accept such a setback without a struggle was made clear by Chou En-lai while speaking on 30 September 1960 to an international audience gathered in Peking for the National Day celebrations. Referring to "our road of development," Chou said that "no difficulty, coming from whatever quarter, can cow the long-suffering Chinese people ... ; it will only arouse us to make even greater efforts to overcome difficulties and advance bravely."

Chou En-lai did not spell out what form these greater efforts might take. If he was thinking of increasing the emphasis on small plants that can be built and run by the Chinese Communists themselves, he might compound Chinese economic difficulties, because, in general, China does not need more of the low-quality, high-cost product produced by these plants. The leaders in Peking in late 1960, moreover, were stressing goals of quality, efficiency, and low costs, and they may reject a solution that relies on further expansion of small plants. Rather than order an increase in possibly abortive construction efforts, the leaders, at least privately, might come to accept the fact that worthwhile opportunities for investment would shrink without Bloc equipment. In this case they might allow investment to decline as a proportion of gross national product while concentrating their energies on trying to run the economy smoothly and on expanding facilities for technical education.

### 3. On Technological Development

The Chinese Communists have been trying to master modern technology in many fields under Soviet tutelage. With this help, China should by 1965 have acquired adequate technological competence in most basic industries and have trained a small corps of scientists able to offer research and development support of high standard to a selected number of high-priority projects. Without further Soviet aid, however, China would have to curtail many of the more advanced elements of its industrial research and development program. The withdrawal of Soviet Bloc technical aid would mean (a) the cessation of delivery of vast quantities of technical information, including information on atomic energy, missiles, and many chemical processes; (b) the withdrawal of remaining Bloc experts from China; and (c) the return home of Chinese technicians and researchers being trained in the USSR.

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In this contingency, Communist China probably would try to learn more from the West than it now does, but such efforts would be inhibited by Western reluctance to share information in military fields or to sell China industrial secrets and by limited Chinese contacts with non-Communist industrial countries. For example, China probably would be unwilling to send students to non-Communist countries or to hire non-Communist industrial experts and scientific teachers -- two of the most important means of acquiring modern technology.

Communist China would have difficulty breaking technological ties established during a decade of heavy reliance on Soviet technology. China now looks to the USSR for spare parts and replacement equipment, and younger Chinese engineers and high-level technicians have been learning Russian and not Western languages.

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