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**ECONOMIC INTELLIGENCE REPORT**

**THE ANTIFRICTION BEARINGS INDUSTRY  
IN THE SOVIET BLOC**



**CIA/RR 26  
30 October 1953**

**CENTRAL INTELLIGENCE AGENCY**

**OFFICE OF RESEARCH AND REPORTS**

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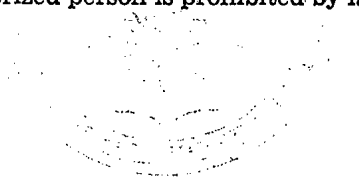
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CIA/RR 26

(ORR Project 43-51)

CENTRAL INTELLIGENCE AGENCY

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S-E-C-R-E-T

S-E-C-R-E-T

CONTENTS

	<u>Page</u>
Summary . . . . .	1
I. Introduction. . . . .	5
A. General Nature and Use of Antifriction Bearings . . . . .	5
B. Importance of Antifriction Bearings to an Industrial Economy . . . . .	6
II. USSR. . . . .	7
A. Development and Organization of the Industry. . . . .	7
1. Development . . . . .	7
2. Organization. . . . .	9
B. Production. . . . .	9
1. Estimated Output. . . . .	9
2. Technology. . . . .	13
3. Material and Equipment. . . . .	16
C. Imports and Exports . . . . .	17
D. Distribution and Requirements . . . . .	21
E. Balance (Surplus or Deficit). . . . .	26
III. East Germany. . . . .	28
A. Development and Organization of the Industry. . . . .	28
1. Development . . . . .	28
2. Organization. . . . .	30
B. Production. . . . .	32
1. Estimated Output. . . . .	32
2. Technology. . . . .	38
3. Material and Equipment. . . . .	39

S-E-C-R-E-T

S-E-C-R-E-T

	<u>Page</u>
C. Imports . . . . .	41
D. Planned Distribution and Requirements . . . . .	42
E. Balance (Surplus or Deficit). . . . .	43
IV. Czechoslovakia. . . . .	45
A. Development and Organization of the Industry. . . . .	45
1. Development . . . . .	45
2. Organization. . . . .	46
B. Production. . . . .	47
1. Estimated Output. . . . .	47
2. Technology. . . . .	50
3. Material and Equipment. . . . .	51
C. Imports . . . . .	52
D. Distribution and Requirements . . . . .	61
E. Balance (Surplus or Deficit). . . . .	62
V. Poland. . . . .	62
A. Development of the Industry . . . . .	62
B. Production. . . . .	63
1. Estimated Output. . . . .	63
2. Types and Sizes of Bearings in Production . . . . .	63
3. Material and Equipment. . . . .	64
C. Imports . . . . .	65
D. Requirements. . . . .	71
E. Balance (Surplus or Deficit). . . . .	71
VI. Rumania . . . . .	72
A. Development of the Industry . . . . .	72
B. Production. . . . .	72
1. Estimated Output. . . . .	72
2. Types and Sizes of Bearings in Production . . . . .	72
3. Material and Equipment. . . . .	73

S-E-C-R-E-T

S-E-C-R-E-T

	<u>Page</u>
C. Imports . . . . .	74
D. Requirements. . . . .	79
E. Balance (Surplus or Deficit). . . . .	79
VII. Hungary . . . . .	80
A. General Information . . . . .	80
B. Imports . . . . .	81
C. Requirements. . . . .	86
D. Balance (Surplus or Deficit). . . . .	86
VIII. Bulgaria. . . . .	87
A. Imports . . . . .	87
B. Requirements. . . . .	87
C. Balance (Surplus or Deficit). . . . .	87
IX. Position of the Soviet Bloc, 1951 . . . . .	87
A. Soviet Bloc . . . . .	87
B. USSR. . . . .	91
C. Satellites. . . . .	93
<div style="border: 1px solid black; height: 20px; width: 100%;"></div>	
<div style="border: 1px solid black; height: 40px; width: 100%;"></div>	
XI. Conclusions . . . . .	98
A. Capabilities. . . . .	98
B. Vulnerabilities . . . . .	104
C. Intentions. . . . .	105

50X1

50X1

S-E-C-R-E-T

S-E-C-R-E-TAppendixes

	<u>Page</u>
Appendix A. Major Industries Consuming Antifriction Bearings . . . . .	107
Appendix B. Plant Facilities for Producing Antifriction Bearings in the Soviet Bloc. . . . .	109
Part I: USSR. . . . .	109
I. No. 1 State Bearings Plant imeni Kaganovich, Moscow . . . . .	109
II. No. 2 State Bearings Plant, Moscow. . . . .	112
III. No. 3 State Bearings Plant, Saratov . . . . .	114
IV. No. 4 State Bearings Plant, Kuybyshev . . . . .	117
V. No. 5 State Bearings Plant, Tomsk . . . . .	119
VI. No. 6 State Bearings Plant, Sverdlovsk. . . . .	121
VII. No. 7 State Bearings Plant, Baku. . . . .	123
VIII. No. 8 State Bearings Plant, Khar'kov. . . . .	125
IX. No. 9 State Bearings Plant, Kuybyshev . . . . .	127
X. Plant under Construction, Minsk . . . . .	129
Part II: East Germany. . . . .	131
I. SAG-Leipziger Kugellagerfabrik, Leipzig . . . . .	131
II. VEB-Thueringer Kugellagerfabrik, Zella-Mehlis . . . . .	135
III. VEB-Walzkoerperfabrik, Schweina-Marienthal. . . . .	136
IV. VEB-Walzlagerfabrik, Fraureuth. . . . .	138
V. VEB-Walzlagerfabrik, Ronneburg. . . . .	140
VI. VEB-Walzlagerfabrik, Berlin (Lichtenberg) . . . . .	142
VII. VEB-Gelenkwellenwerk, Stadtilm. . . . .	144
VIII. VEB-Walzlagerfabrik, Arnshall . . . . .	146
Part III: Czechoslovakia. . . . .	148
I. Zbrojovka Brno Plant No. 04, Lisen. . . . .	148
II. Plant No. 28, Zbrojovka Brno Corporation, Perstejn . . . . .	151
III. Viliama Sirokeho Plant, Kysucke Nove Mesto. . . . .	153
IV. Zbrojovka Brno Plant, Tyniste nad Orlici. . . . .	156

S-E-C-R-E-T

S-E-C-R-E-T

	<u>Page</u>
Part IV: Poland . . . . .	158
Fabryka Wyrowbow Metalowych, Krasnik . . . . .	158
Part V: Rumania... . . . .	160
Steagul Rosu Plant, Orasul Stalin. . . . .	160
Part VI: Other Plants . . . . .	164
I. USSR . . . . .	164
II. East Germany . . . . .	166
III. Czechoslovakia . . . . .	167
Appendix C. Equipment Used in the Antifriction Bearings Industry. . . . .	169
Appendix D. Supporting Statistical Tables for the Antifriction Bearings Industry in the USSR . . . . .	171
Appendix E. Methodology. . . . .	181

50X1

50X1

Tables

1. Announced Annual Increases in Production of Antifriction Bearings in the USSR, 1946-51 . . . . .	11
2. Estimated Production of Antifriction Bearings in the USSR, 1946-55 . . . . .	12
3. Antifriction Bearings in Production in the USSR, 1950. . .	13
4. Output of Antifriction Bearings per Unit of Equipment and per Worker at No. 1 State Bearings Plant in Moscow, 1946-51 . . . . .	16

S-E-C-R-E-T



S-E-C-R-E-T

	<u>Page</u>
5. Estimated Imports of Antifriction Bearings by the USSR from Western Europe through Legal Transactions, 1948-51 . . . . .	18
6. Estimated Distribution of Antifriction Bearings in the USSR, 1951. . . . .	22
7. Requirements for Ball and Roller Bearings in Selected Soviet Equipment, 1951. . . . .	23
8. Estimated Position of the Antifriction Bearings Industry in the USSR, 1951 . . . . .	27
9. Estimated Production of Antifriction Bearings in East Germany, 1949-55. . . . .	33
10. Steel Requirements Position of the Antifriction Bearings Industry in East Germany, 1951. . . . .	40
11. Planned Distribution of Antifriction Bearings in East Germany, 1951 . . . . .	42
12. Estimated Requirements of the Antifriction Bearings Industry in East Germany, 1951. . . . .	44
13. Estimated Position of the Antifriction Bearings Industry in East Germany, 1951 . . . . .	45
14. Estimated Production of Antifriction Bearings in Czechoslovakia, 1948-53 . . . . .	48
15. Estimated Imports of Antifriction Bearings by Czechoslovakia from Western Europe through Legal Transactions, 1948-51 . . . . .	57
16. Estimated Requirements of the Antifriction Bearings Industry in Czechoslovakia, 1951. . . . .	61
17. Estimated Position of the Antifriction Bearings Industry in Czechoslovakia, 1951 . . . . .	62

S-E-C-R-E-T

S-E-C-R-E-T

	<u>Page</u>
18. Estimated Imports of Antifriction Bearings by Poland from Western Europe through Legal Transactions, 1948-51 . . . . .	67
19. Estimated Position of the Antifriction Bearings Industry in Poland, 1951 . . . . .	71
20. Estimated Imports of Antifriction Bearings by Rumania from Western Europe through Legal Transactions, 1949-51 . . . . .	76
21. Estimated Position of the Antifriction Bearings Industry in Rumania, 1951 . . . . .	79
22. Estimated Imports of Antifriction Bearings by Hungary from Western Europe through Legal Transactions, 1948-51 . . . . .	82
23. Estimated Position of the Antifriction Bearings Industry in Hungary, 1951 . . . . .	86
24. Estimated Imports of Antifriction Bearings by Bulgaria from Western Europe through Legal Transactions, 1948-51 . . . . .	88
25. Estimated Position of the Antifriction Bearings Industry in the Soviet Bloc, 1951 . . . . .	92



50X1



50X1

28. Estimated Inputs into the Antifriction Bearings Industry in the Soviet Bloc and the Minimum Quantity of Equipment Required by the Soviet Bloc to Produce the Estimated Output of Bearings, 1951 . . . . .	101
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S-E-C-R-E-T

S-E-C-R-E-T

	<u>Page</u>
29. Estimated Production of Antifriction Bearings at Individual Plants in the USSR, 1932-51 . . . . .	171
30. Average Estimate of Total Production of Antifriction Bearings in the USSR, 1946-51 . . . . .	180

Illustrations

	<u>Following Page</u>
Figure 1. Types of Antifriction Bearings (Photographs) . . .	6
Figure 2. The Antifriction Bearings Industry in the USSR, 1931-55 (Chart) . . . . .	12
Figure 3. Organization and Control of Antifriction Bearings Plants in East Germany, 1952 (Chart) . . . . .	30
Figure 4. Organization of Purchase and Sales of Antifriction Bearings in East Germany, 1952 (Chart) . . . . .	32

Maps

USSR: Antifriction Bearings and Antifriction Bearings Repair Plants, 1951 . . . . .	8
East Germany: Antifriction Bearings Plants, 1951 . . . . .	28
Czechoslovakia: Antifriction Bearings Plants, 1951 . . . . .	46

S-E-C-R-E-T

S-E-C-R-E-T

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THE ANTI-FRICTION BEARINGS INDUSTRY IN THE SOVIET BLOC\*Summary

In the Soviet Bloc, as elsewhere, the antifriction bearings industry is of vital importance, especially to the machine-building industry and industries producing military end items, which are major consumers of antifriction bearings. Antifriction bearings, designed according to a great variety of specifications and in some cases to very close tolerances, are essential in all equipment with moving elements. Since World War II the production of antifriction bearings in the Bloc has expanded rapidly, though not rapidly enough to meet requirements. The USSR produces and consumes by far the greater part of the Bloc output of antifriction bearings. If Soviet output and requirements both continue to develop at the postwar rate, the USSR should be able to supply its own needs in 1953 or 1954, except for replacement in machinery originally procured from the West, which contains types and sizes of bearings outside the production range of the USSR. The European Satellites are in a much less satisfactory position. The bearings industry has developed in the Satellites since World War II from very small beginnings under the handicap of a continual shortage of steel, steel balls, brass, and machinery. Both East Germany and Czechoslovakia have given a high priority to the production of antifriction bearings. Poland and Rumania produce antifriction bearings on a more limited scale. Hungary produces a negligible amount of bearings, and Bulgaria produces none. Collectively, the Satellites are able to meet less than half of their own requirements for bearings. Since they have been able to obtain only small quantities of bearings from the USSR, they have been compelled to seek imports from the West, both openly and through clandestine trade. Imports from the West -- chiefly from Sweden, Italy, and Switzerland -- have been considerable, though far from enough to cover the deficit in Satellite production, which probably will remain much below requirements for some years.

\* This report contains information available as of December 1952. It does not deal with the Far Eastern members of the Soviet Bloc or with the Soviet Zone of Austria, which are special cases. Nor does it deal with Albania, which is of negligible importance in analyzing the Bloc position with reference to antifriction bearings.

S-E-C-R-E-T

S-E-C-R-E-T

The total output of antifriction bearings in the Soviet Bloc in 1951 is estimated at over 115 million bearings, of which approximately 88 percent were produced in the USSR. Net imports into the Bloc in 1951 are estimated at over 8 million bearings, valued at about \$16 million, exclusive of clandestine trade, which probably is considerable but cannot be estimated. Thus total supply (output plus net imports) in 1951 is estimated at about 124 million bearings. Total planned requirements for bearings in the Bloc in 1951 are estimated at between 146 million and 153 million bearings. Accordingly, the Bloc deficit in 1951 is estimated at between 22 million and 29 million bearings, or roughly 15 to 20 percent of estimated total planned requirements.

The USSR, which had a well-established antifriction bearings industry before World War II, was compelled early in the war to dismantle two major plants, located in Moscow, to prevent their capture or destruction. As a result of the dismantling of these two plants, which had accounted for the bulk of prewar production, wartime production suffered severely. There was, however, no permanent loss of capacity, and additional equipment was received during the war through Lend Lease. By 1944 the re-equipped plants in Moscow and the plants that had been constructed with the equipment evacuated from Moscow were producing as many bearings as before the war. Because of the general decline in economic activity after the war, output fell in 1946 to a level lower than the peak prewar level, but production recovered rapidly thereafter, and capacity was expanded with the help of equipment taken from East Germany and Austria. By 1951 the USSR had 9 major plants (7 of them in European USSR) producing antifriction bearings, and a tenth (also in European USSR) was under construction. These plants, together with 12 known bearings repair plants (a special feature of the Soviet industry), are under the control of the Ministry of the Automobile and Tractor Industry. Soviet output of bearings in 1951 was over 100 million units, 2-1/2 times the 1940 output of 40 million units. This amount was still about 10 percent short of meeting the increased requirements in 1951, estimated at 110 million to 115 million bearings, of which about one-third were directly required for military end items.

The USSR produces a fairly wide range of antifriction bearings. A Soviet price catalogue of 1950 listed about 1,240 different types and sizes of antifriction bearings in size ranges which indicated that small precision instrument bearings and special large sizes were in production. Analysis of antifriction bearings made in the USSR has

- 2 -

S-E-C-R-E-T

S-E-C-R-E-T

shown that the Soviet industry is able to produce a standard precision bearing of good quality. In an effort to achieve greater precision and productivity, the bearings industry has worked in close cooperation with research institutes and planning organizations.

The production of antifriction bearings in East Germany, virtually eliminated after World War II by Soviet dismantling, was re-established in 1948. By 1951, in addition to 1 plant still under Soviet control and producing for Soviet account, there were 7 confirmed plants in production in East Germany, under the Ministry of Machine Construction. Three of these plants are classified as key enterprises. Total output in East Germany in 1951 is estimated at about 5.3 million bearings. East German supply was less than this amount, since special orders exported to the USSR were not offset by such imports from the West as East Germany was able to obtain, chiefly through clandestine trade. Requirements, on the other hand, ran to an estimated amount of 11 million bearings. Soviet troop units in East Germany, whose needs account for 40 percent of requirements, probably have top priority, followed in order by Soviet-owned corporations (SAG's), by East German key enterprises, and finally by East German civil consumption and export. The East German deficit in 1951 is estimated at well over 5 million bearings, or roughly one-half of requirements.

The most serious problem of the East German industry has been a shortage of materials, which has been sufficiently acute to lead to experimentation with ceramic bearings and with cages of pressed wood and sintered iron. East German production also has been hampered by inadequate design and lack of prototypes.

The production of antifriction bearings in Czechoslovakia has developed rapidly since World War II, and the industry now consists of 3 major plants and 1 small plant, under the Controller-General of the Precision Machine Industry. Total output in Czechoslovakia in 1951 is estimated at about 6.2 million bearings. Czechoslovakia also has imported large amounts of bearings. It is estimated that in 1951 imports amounted to about 5 million bearings, of which 1 million were imports from the USSR and 2.4 million were legal imports from the West. On this basis, it appears that clandestine trade furnished about 1.6 million bearings in 1951. Requirements in 1951 are estimated at about 14.5 million to 16 million bearings. Priorities in the distribution of bearings are as follows: first, to war industry, mining, and heavy industry; second, to machine tool, motor, and tractor industry; third, to light industry. The deficit of bearings in Czechoslovakia in 1951 is estimated at about 4 million bearings, or roughly one-quarter of requirements.

- 3 -

S-E-C-R-E-T

S-E-C-R-E-T

Czechoslovakia has rather ambitious plans for the antifriction bearings industry. The original Five Year Plan of Czechoslovakia called for the production of about 8 million bearings in 1953, and a government decree of 10 April 1951 revised the original Plan to increase the 1953 quota to 10 million bearings. This goal would appear to be feasible, on the basis of postwar performance. The main cause of delays in the production of bearings to date has been a shortage of steel rods and grinding wheels. The industry's weakness has not been in quantity but in the limited number of types and sizes in production, which has held back the industrial sector of the economy. Analysis of bearings manufactured in Czechoslovakia shows that they are of fair quality.

Since World War II, Poland and Rumania both have begun to produce antifriction bearings, though on a smaller scale than East Germany and Czechoslovakia. In both countries, production fell far short of domestic requirements in 1951, and the deficit was made up only in part by imports. Poland produced an estimated 10 percent and imported an estimated 55 percent of its requirements, which were on the order of 5 million bearings, leaving a deficit of about one-third of requirements. Rumania produced an estimated 35 percent and imported an estimated 33 percent of its requirements, estimated at about 850,000 bearings, leaving a deficit of about one-third of requirements.

Hungary is almost entirely dependent and Bulgaria entirely dependent on imports of antifriction bearings. Although Hungary has initiated the production of bearings at the Matyas Rakosi Combine (formerly the Manfred Weiss Works), output in 1951 was negligible. Moreover, Hungary was able in 1951 to import from the USSR and the West only about 20 percent of its requirements, which were on the order of 5 million bearings, leaving a deficit of about four-fifths of requirements. The shortage of antifriction bearings is probably more critical in Hungary than in any of the other Satellites. Bulgaria, with the smallest requirements of any of the Satellites, is also very short of bearings. In 1951 it succeeded in importing somewhat more than 60,000 bearings, probably less than 25 percent of its requirements, which were on the order of 400,000 bearings, leaving a deficit of over three-quarters of requirements.

As a whole, the Soviet Bloc is evidently vulnerable, under cold war conditions, to economic warfare measures restricting trade in antifriction bearings. Although, as indicated above, Soviet production is due to overtake domestic requirements by 1953 or 1954, except for

S-E-C-R-E-T

S-E-C-R-E-T

replacements in some imported machinery, the continuance of existing trade restrictions will impose a direct strain on the Satellite economies and also will have some indirect effect on the USSR. A complete severance of all East-West trade in bearings would have, of course, a greater effect on the Bloc economies than existing trade restrictions. Estimates of Bloc requirements are by no means firm enough, and information on clandestine trade is too fragmentary to evaluate the seriousness of existing trade restrictions. The results of a complete severance of East-West trade are still more difficult to evaluate.

The antifriction bearings industry of the Soviet Bloc does not appear to be particularly vulnerable under hot war conditions. It is an industry relatively difficult to disorganize because of its rather small transportation and labor requirements and in view of the feasibility of emergency evacuation and relocation of production equipment. Only the actual destruction of vital production equipment would appear sufficient to bring about a great reduction in the production of antifriction bearings over a long period, except as part of a general deterioration in the whole economy.

---

I. Introduction.

A. General Nature and Use of Antifriction Bearings.

An antifriction bearing consists of two concentric metal rings separated by freely moving balls or rollers. Plain, or sleeve, bearings are not classified as antifriction bearings and are not considered in this report. An antifriction bearing is not just a ball or a roller: it is an accurate and intricate self-contained mechanism, and, as the name implies, it is the machine designer's principal way of avoiding friction and its drain on power, speed, and endurance.

There are over 30,000 different types, sizes, and modifications of antifriction bearings, of which 5,000 are in common use. There are, however, only a few basic types of antifriction bearings. The most important of these are as follows\*: (1) ball bearing, (2) cylindrical

\* See Figure 1, Types of Antifriction Bearings, following p. 6.



S-E-C-R-E-T

roller bearing, (3) spherical roller bearing, (4) taper roller bearing, (5) self-aligning ball bearing, (6) needle bearing, and (7) thrust bearing.

In general, bearings with balls are used where high speeds are required, and bearings with rollers are used where ability to carry heavy loads is of most importance. Balls can rotate more rapidly than rollers, but the latter, having a greater surface of contact, can take greater pressures without being affected. The needle bearing is a type of roller bearing with long thin rolls used where the space between the moving parts is too small for ordinary bearings. The thrust bearing supports an axial load, whereas the other types of bearings usually support a radial load or a combined radial-axial load.

B. Importance of Antifriction Bearings to an Industrial Economy.\*

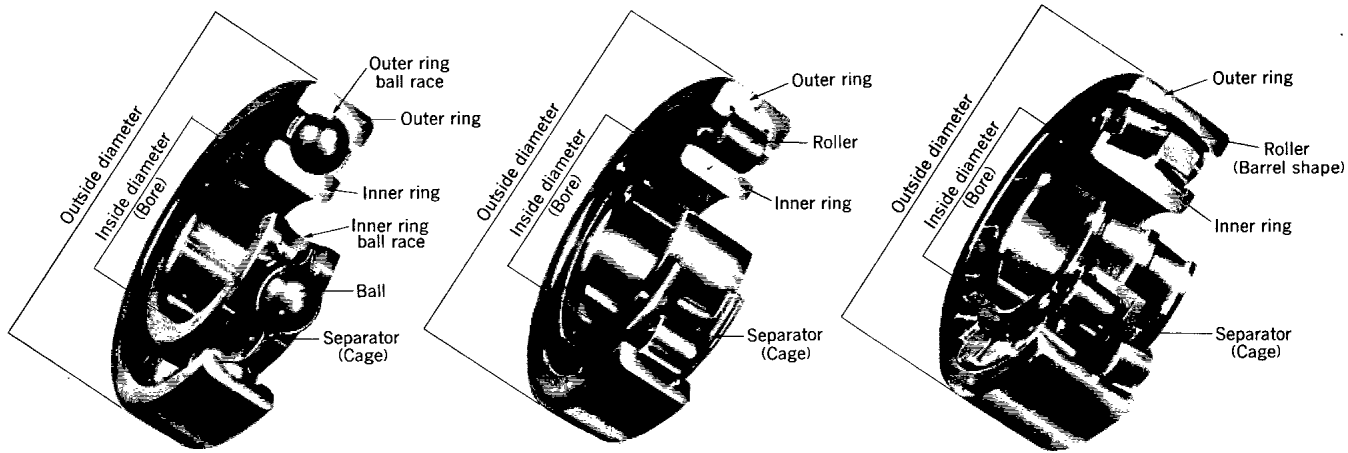
As essential components of practically all mechanical devices with moving parts, antifriction bearings occupy a strategic position in an industrial economy. The importance of a large, uninterrupted, and properly distributed supply of antifriction bearings has been confirmed by the war production experience of all major belligerents during World War II. The importance of the bearings industry cannot be judged from its size or the value of its product. It must be judged, instead, from the many uses for which bearings are required and from the exact specifications that they must meet.

Some of the more important uses of bearings are in precision instruments, machine tools, petroleum equipment, textile machinery, farm machinery, mining machinery, cranes, locomotives, conveyors, trucks, automobiles, motors, tanks, guns, aircraft, torpedoes, ships, radar equipment, and fire-control apparatus. A Soviet MIG-15 jet fighter is estimated to use approximately 300 antifriction bearings in the airframe (excluding accessories) and 16 in the engine 1\*\*; the B-29 bomber, copied by the USSR and known as the TU-4, is reported to use 4,821 bearings (excluding accessories) 2; the Soviet T-34 tank uses 88 bearings 3; the Soviet GAZ-51 truck, a minimum of 49 bearings; the Soviet M-20 Pobeda automobile, a minimum of 32 bearings; the Soviet S-80 tractor, 37 bearings 4; and the Soviet TE-2 excavator, about 42 bearings. 5

\* See Appendix A for a list of the major industries consuming antifriction bearings.



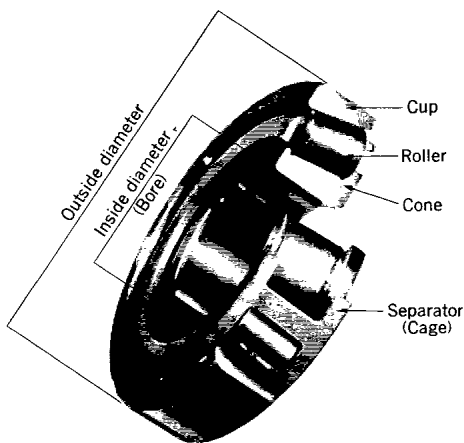
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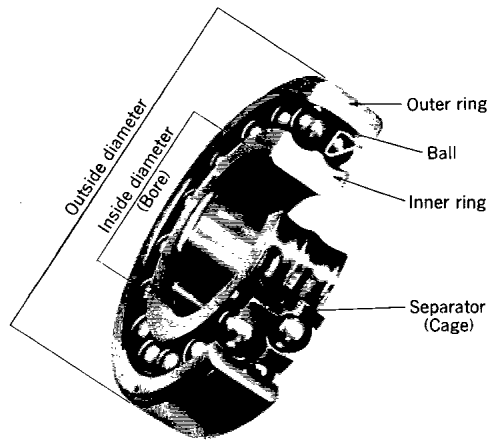
1. BALL BEARING

2. CYLINDRICAL ROLLER BEARING

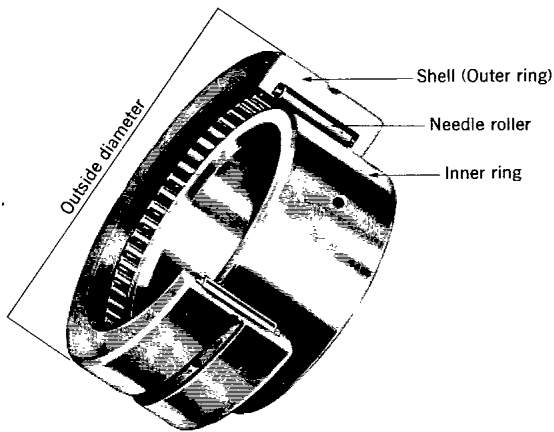
3. SPHERICAL ROLLER BEARING



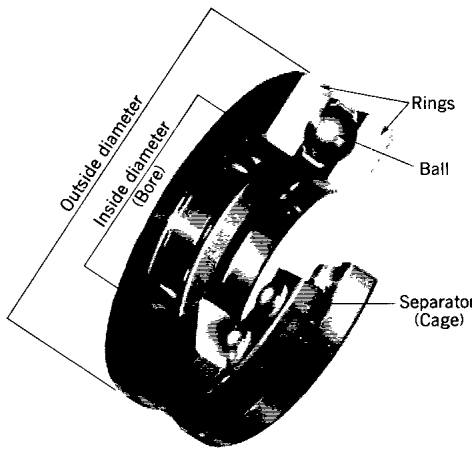
4. TAPER ROLLER BEARING



5. SELF-ALIGNING BALL BEARING



6. NEEDLE BEARING (Heavy Duty)



7. THRUST BEARING

### TYPES OF ANTIFRICTION BEARINGS

The parts common to all standard ball and roller bearings have, for the purpose of this report, been given names as shown above. A number of variations of these types are in use. (Needle bearings have no separator and may be used without an inner ring.)

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S-E-C-R-E-TII. USSR.A. Development and Organization of the Industry.1. Development.

There are 9 major plants\* in the USSR (7 of them in European USSR) producing antifriction bearings, and a tenth plant (also in European USSR) is now under construction. There also are 12 known bearings repair plants, 1 of which was constructed in 1952. There appears to be no planned dispersion of the antifriction bearings industry, although the necessary evacuation of the Moscow plants during World War II caused some dispersion of the plants to the other industrial areas of the USSR.

The first plant for the production of antifriction bearings in the USSR was established in Moscow at the close of World War I by the Swedish firm Svenska Kugellagerfabrik (SKF). The plant was small and continued under SKF administration until it was taken over by the Soviet government during the First Five Year Plan (1928-32). Ultimately, this plant became  State Bearings Plant. 6/ 50X1-HUM

Between 1930 and 1932, No. 1 State Bearings Plant imeni Kaganovich was constructed in Moscow. 7/ This plant also was the product of foreign technical ability. It was constructed under the direction of Italian and US engineers, and no expense or effort was spared to make the plant the major Soviet installation for the production of bearings, a position it still holds today. Practically all the equipment installed at  State Bearings Plant for the production of bearings was imported, including Blanchard surface grinders, Heald gagematics, New Britain chucking machines, and Fiat race grinders.\*\* The equipment was estimated to be capable of producing 15 million units per year of all types and sizes.\*\*\* 50X1-HUM

\* See Appendix B for an analysis of these plants and of other possible production. A map showing the location of antifriction bearings plants and antifriction bearings repair plants in the USSR follows p. 8.

\*\* A gagematic is an internal grinder with a measuring gage; chucking machines refer to turret lathes.

\*\*\* See Appendix C for a list of equipment used in the production of antifriction bearings.

S-E-C-R-E-T

S-E-C-R-E-T

Provision was made for the subsequent expansion of annual capacity to approximately 30 million units. 8/

Construction on [ ] State Bearings Plant at Saratov was begun in 1936, and in 1940 it still had not been completed. Some bearings were turned out in the first part of 1941. The two plants in Moscow and the Saratov plant were the only producers of antifriction bearings for the USSR at the time of the German attack. 9/

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In 1942 the number of bearings plants in the USSR doubled, although the capacity of the industry did not increase. Machinery evacuated from the Moscow plants was used to establish [ ] State Bearings Plant at Kuybyshev, [ ] State Bearings Plant at Tomsk, and [ ] State Bearings Plant at Sverdlovsk. The Saratov plant also received equipment from No. 1 State Bearings Plant. 10/ By the end of 1942 the two Moscow plants were again in production. Plant [ ] was re-equipped primarily with Lend-Lease machinery, and in Plant [ ] some of the evacuated machinery was reinstalled. 11/

50X1-HUM

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Since World War II [ ] State Bearings Plant at Baku, No. 8 State Bearings Plant at Khar'kov, and No. 9 State Bearings Plant at Kuybyshev (Bezmyanka) have been placed in operation. 12/ It has been established that the equipment in the Khar'kov plant consists of machinery obtained through reparations and removals from Germany and Austria. 13/ Finally, there is at present under construction at Minsk a plant which probably is destined to become No. 10 State Bearings Plant. 14/\*

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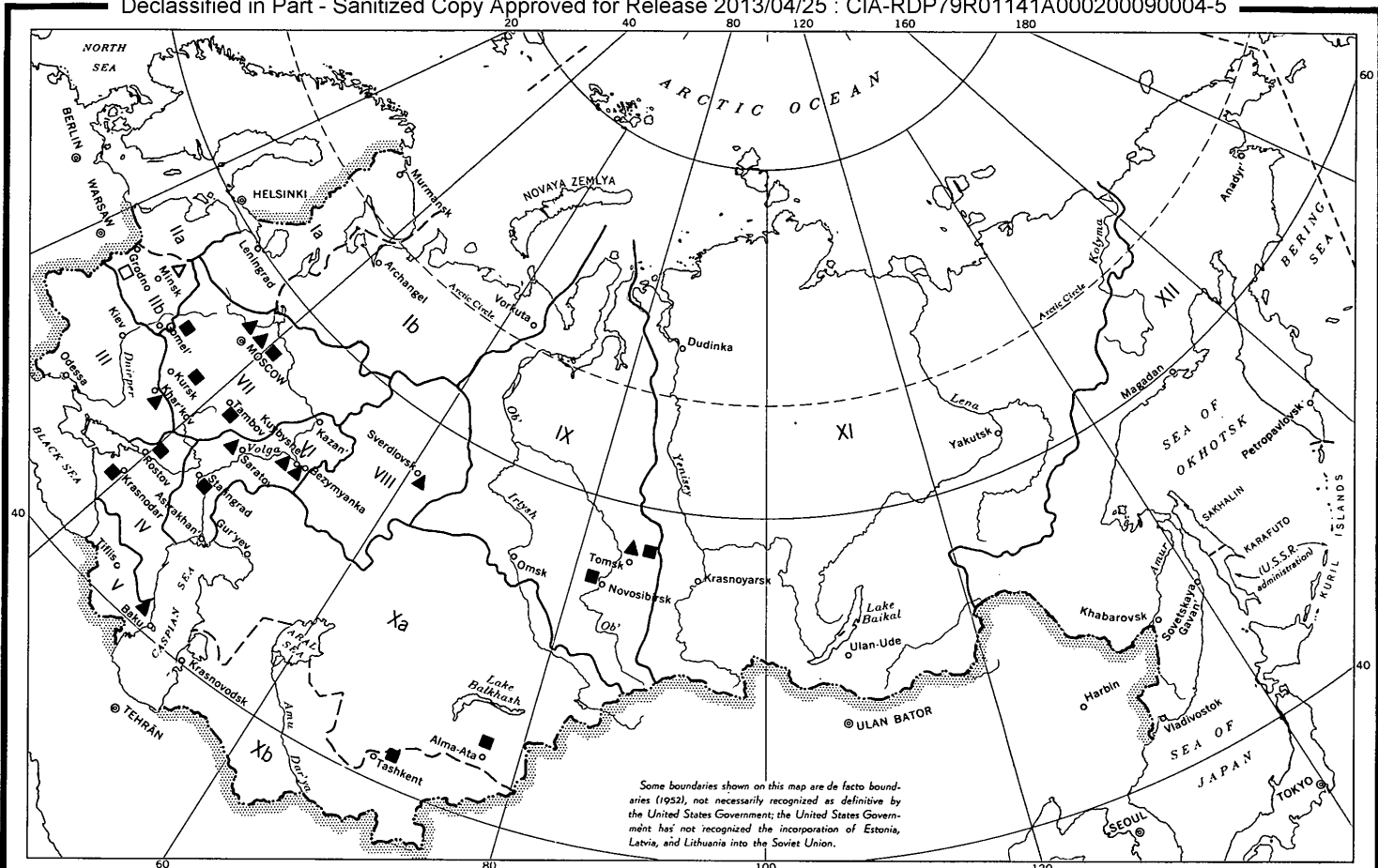
The 12 known bearings repair plants in the USSR are located in the following cities: Alma-Ata, Gomel', Grodno, Krasnodar, Kursk, Moscow, Novosibirsk, Rostov, Stalingrad, Tambov, Tomsk, and Tashkent. (See Appendix B, Part VI.) It is possible that some of these plants, particularly those in Tashkent and Novosibirsk, not only repair but also manufacture bearings, but production would be in limited quantities. The bearings repair plant in Moscow was set up by

\* The production of ball and roller bearings has been reported at other plants throughout the USSR. The production of bearings at these plants would also indicate that the State Bearings Plants are unable to supply the necessary requirements of Soviet industry and that the various industries are attempting to fulfill some of their own requirements, particularly for odd sizes which a major bearings plant does not produce on a production line setup. See Appendix B.

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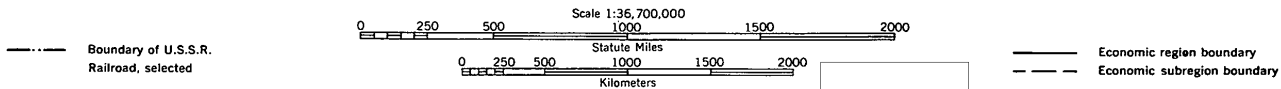
U. S. S. R.

ANTIFRICTION BEARINGS AND ANTIFRICTION BEARINGS REPAIR PLANTS

1951

▲ Antifriction bearings plant  
△ Antifriction bearings plant (Plant under construction)

■ Antifriction bearings repair plant  
□ Antifriction bearings repair plant (Plant under construction)



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S-E-C-R-E-T

the government in 1951, and a confirmed report indicates that the plant in Grodno was constructed in 1952.\*

2. Organization. 15/

The main administrations and organizations which control the antifriction bearings industry in the USSR are under the Ministry of the Automobile and Tractor Industry. They are as follows: the Main Administration of the Bearings Industry (Glavpodshipnik), the Main Administration of Automobile and Tractor Sales (Glavavtotraktorosbyt), the Experimental Scientific Research Institute of the Bearings Industry (ENIIPP), the Central Design Bureau of the Ball Bearings Industry (TsKBPP) [ ] and the All-Union State Trust for the Sale of Bearings (Soyuzpodshipniksbyt).

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B. Production.1. Estimated Output.\*\*

The estimated total output of the Soviet antifriction bearings industry is based on the following information:\*\*\* (a) production data reported on individual plants and on over-all production

\* Except for one known small operation of repairing antifriction bearings on coal mining equipment, the practice of repairing bearings in the US is considered costly and impractical. It is possible to procure a new bearing for the cost of repairing an old one. The number of repair plants and the continued construction of them in the USSR is significant and is a probable indication that the USSR is in short supply of antifriction bearings. It is also a possible indication that the Soviet supply of high-grade steels and specialized machinery for producing bearings is inadequate to fulfill the needs of this expanding industry.

\*\* The production of antifriction bearings by the repair plants has not been included in this summation. Output by the repair plants was planned to be 1 million units in 1941 as compared with an output of 50 million units by primary producers (State Bearings Plants). 17/

\*\*\* The magnitude of Soviet production of antifriction bearings is difficult to estimate, even for prewar years. Very few statistics on total output are available, and the percentage increases of total output from 1947 are dependent on the total output for the year 1946, which was estimated from data on the individual plants. The lack of information on the Soviet antifriction bearings industry, particularly since 1940, has caused intelligence estimates on total output to vary considerably. See Appendix D for supporting statistical tables.

S-E-C-R-E-T

of bearings, (b) percentage increases in production of the individual plants and fulfillment of plans of the individual plants, (c) percentage increases in over-all production of bearings, (d) increases in production resulting from the construction of new plants or extension of existing ones, and (e) increases in production after the introduction of new technical processes. From 1931 to 1939 the production of the Soviet bearings industry is estimated to have been under 150 million units. In the early months of 1941 it reached a peak prewar rate of output estimated at 40 million units per year. 18/

The dismantling of the Moscow plants at the beginning of World War II caused Soviet production of bearings to drop sharply, although no equipment was captured by the Germans and the industry suffered no direct loss of capacity. The low point of production occurred in late 1941, when domestic production of bearings virtually ceased. The year 1942 was the period of minimum output on an annual basis. By 1945 the new plants at Saratov, Kuybyshev, Tomsk, and Sverdlovsk and the re-equipped plants in Moscow were producing almost as many bearings as before the war.

Soviet output of bearings in 1946 began at a lower level than in 1945 and was below the maximum amount produced before the war. Total output in 1946 has been estimated at 27 million bearings. This temporary decline is accounted for largely by two factors -- the general decline in economic activity during the period of reconversion and the use of half the area of  State Bearings Plant imeni Kaganovich in Moscow as a tire plant. 19/ Recovery occurred in 1947, and output for 1950 is estimated at more than double that of 1940.

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The following method has been used to estimate the total production of bearings in the USSR from 1946 to 1951: one series of estimates for total output\* has been compiled for the years 1932-51 by totaling the estimated production of the individual plants. Then, a second series of estimates for total output\*\* has been devised by applying to the 1946 total thus obtained the annual percentage increases announced by the USSR. Since neither series is considered superior to the other, the annual totals have been averaged, and the resulting series\*\* is assumed to be the best estimate of total output. The announced Soviet percentage increases for the period 1946-51 are given in Table 1.\*\*\*

\* See Appendix D, Table 29, p. 171, below.

\*\* See Appendix D, Table 30, p. 180, below.

\*\*\* Table 1 follows on p. 11.

S-E-C-R-E-T

Table 1

Announced Annual Increases in the Production  
of Antifriction Bearings in the USSR  
1946-51

<u>Year</u>	<u>Achieved Percentage Increases over Previous Year <sup>20/</sup></u>	<u>Index (1946=100)</u>
1946	N.A.	100
1947	34	134
1948	28	172
1949	28	220
1950	35	297
1951	30	386

The best estimate of total production is given in Table 2,\* with the figures rounded off to the nearest million and with the production figures for the individual plants readjusted to correspond.

As shown in Table 2, the major plants in the USSR\*\* produced an estimated 261 million bearings from 1946 to 1950 (the period of the Fourth Five Year Plan) and in 1951 reached a rate of output estimated at 101 million bearings per year. Information on production for 1952 is still incomplete. Estimates of total production for 1952 and for the years up to and including 1955 have been extrapolated mechanically from the estimates made on the previous years, assuming that cold war conditions of the past years will continue during 1953-55. These estimates also are shown in Table 2. The plant under construction at Minsk has been assumed to begin operations in 1954. <sup>21/</sup> The total production of bearings in the USSR in 1955 has been estimated at 140 million units per year.\*\*\*

\* Table 2 follows on p. 12.

\*\* Not including the bearings repair plants, for whose production see p. 26, note \*.

\*\*\* See Figure 2, The Antifriction Bearings Industry in the USSR, following p. 12, for a graphic projection of estimated bearings production from 1931 to 1955.



S-E-C-R-E-T

Table 2

Estimated Production of Antifriction Bearings in the USSR<sup>a</sup>/  
1946-55

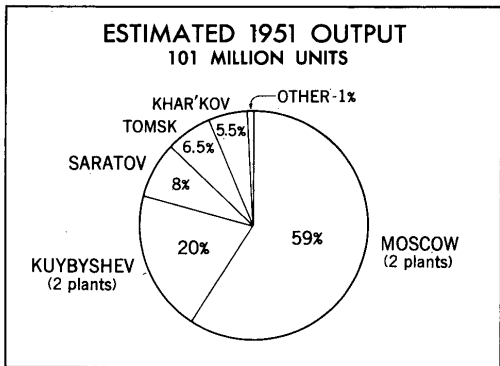
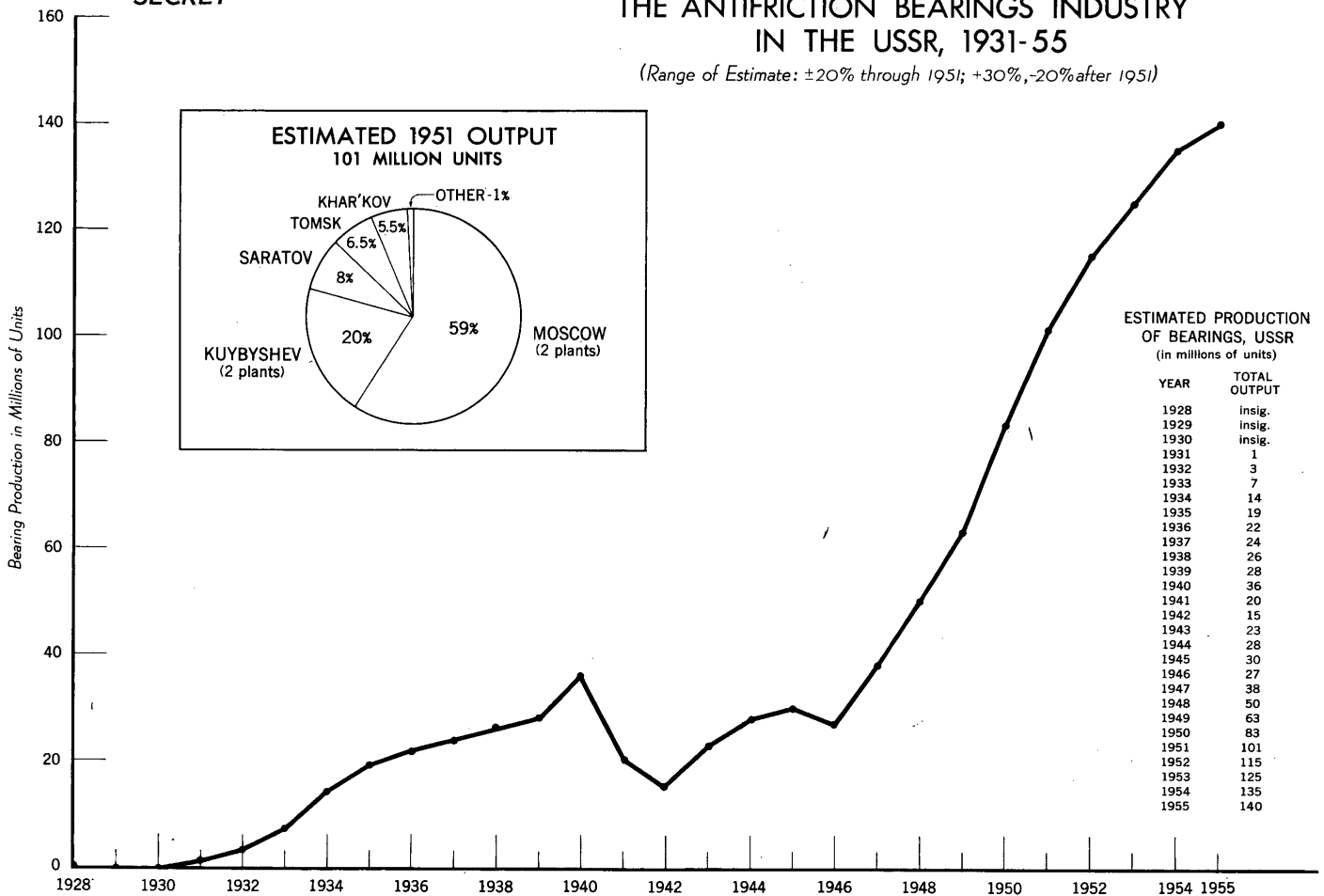
State Bearing Plants	Thousand Units									
	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955
No. 1. Moscow	12,000	18,200	26,000	34,000	46,000	53,000	57,000	59,000	61,000	62,000
No. 2. Moscow	3,500	4,000	4,600	5,000	6,000	7,000	8,000	9,000	10,000	10,000
No. 3. Saratov	1,900	2,100	2,400	3,400	5,000	7,800	9,000	10,000	10,000	10,000
No. 4. Kuybyshev	5,500	8,500	9,500	11,000	13,000	15,000	18,000	21,000	23,000	24,000
No. 5. Tomsk	3,000	3,400	3,800	4,500	5,500	6,500	8,600	9,000	10,000	10,000
No. 6. Sverdlovsk	400	470	650	730	910	1,080	1,250	1,350	1,500	1,600
No. 7. Baku	0	30	50	70	90	120	150	250	300	400
No. 8. Khar'kov	100	300	1,500	2,000	3,200	5,500	7,000	8,000	9,000	10,000
No. 9. Kuybyshev (Bezmyanka)	600	1,000	1,500	2,300	3,300	5,000	6,000	7,400	9,000	10,000
Plant under Construction at Minsk									1,200	2,000
Total	<u>27,000</u>	<u>38,000</u>	<u>50,000</u>	<u>63,000</u>	<u>83,000</u>	<u>101,000</u>	<u>115,000</u>	<u>125,000</u>	<u>135,000</u>	<u>140,000</u>

a. Range of estimate up to and including 1951, plus or minus 20 percent; 1952 and after, plus 30 percent or minus 20 percent.

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Figure 2  
 THE ANTIFRICTION BEARINGS INDUSTRY  
 IN THE USSR, 1931-55

(Range of Estimate: ±20% through 1951; +30%, -20% after 1951)



ESTIMATED PRODUCTION  
 OF BEARINGS, USSR  
 (in millions of units)

YEAR	TOTAL OUTPUT
1928	insig.
1929	insig.
1930	insig.
1931	1
1932	3
1933	7
1934	14
1935	19
1936	22
1937	24
1938	26
1939	28
1940	36
1941	20
1942	15
1943	23
1944	28
1945	30
1946	27
1947	38
1948	50
1949	63
1950	83
1951	101
1952	115
1953	125
1954	135
1955	140

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S-E-C-R-E-T2. Technology.a. Types and Sizes of Antifriction Bearings in Production.

In 1948 the USSR reported that the antifriction bearings industry produced more than 1,500 different types and sizes of bearings. 22/ In 1950 the Ministry of the Automobile and Tractor Industry published a list of wholesale prices for ball and roller bearings which included about 1,240 different types and sizes, as classified in Table 3. 23/

Table 3

Antifriction Bearings in Production in the USSR  
1950

Type	Number of Sizes and Variations	Bore Dimensions (mm)
Ball Bearings		
Single Row Radial	257	3 to 165
Angular Contact	122	3 to 460
Self-Aligning	121	5 to 150
Cylindrical Roller Bearings	210	6 to 890
Needle Bearings (including Spiral-Wound Rollers)	114	6 to 280
Spherical Roller Bearings	55	20 to 280
Taper Roller Bearings	186	17 to 750
Thrust Bearings	175	10 to 1,180
Total	<u>1,240</u>	

S-E-C-R-E-T

The range of sizes indicates that the USSR is producing bearings for small precision instruments and special large-size bearings as well as standard types and sizes.

Analysis of antifriction bearings produced in the USSR indicates that the Russians are capable of producing a standard precision bearing of good quality. The tests performed on eight Soviet-made bearings included dimensional and tolerance examinations, measurement of surface roughness, metallurgical examination, and an over-all examination of the assembly of the bearings. The above examinations had been made in comparison with the equivalent type of bearing made in the US. The workmanship and material put into the bearings compared favorably with US practice. The machining and grinding operations were good, and the final assembly was within US specifications. The steel was of proper hardness, and the metallurgical examination indicated that it was a high-carbon chrome steel. 24/ There is no means of judging the quality of the high-precision bearings which are reported to be manufactured in the USSR, because this type of bearing has not been procured or analyzed.

The above analysis of Soviet-made bearings contradicts  reports which state that the USSR refused to accept equipment from the Satellites in which Soviet bearings had been installed 25/ and that Soviet equipment exported to the Satellites operated improperly until the Soviet bearings had been replaced by bearings manufactured in the West. 26/ One conclusion that can be drawn from this contradiction is that the bearings probably were rejects which had been passed to meet the monthly or yearly goal at the Soviet plants and had then been exported to the Satellites. It also is possible that Soviet machinery exported to the Satellites, as well as the bearings installed in them, may be of inferior quality. 27/

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b. Postwar Innovations.

The postwar development of the antifriction bearings industry in the USSR has been characterized by a continuous attempt to improve the technological processes, to improve the organization of production, and to increase labor productivity. 28/ In an effort to achieve greater precision and productivity of ball and roller bearings, the bearings industry -- in particular No. 1 and No. 2 State Bearings Plants in Moscow -- has been working in close co-operation with the Experimental Scientific Research Institute of the Bearings

S-E-C-R-E-T

Industry and other scientific research institutes and planning organizations. 29/ It should be noted that many of the innovations which the research institutes are attempting to put into operation in the USSR have been used in the US industry for years. The following improvements in mechanization have been stressed 30/: high-speed cutting in the automatic lathe shops, introduction of statistical controls in the automatic lathe shops, organization of conveyor lines in the grinding and automatic lathe shops, mechanization of the loading of parts to be machined, increased mechanization of checking and inspection, and conversion of machinery to individual drives.

As late as 1950, Soviet plants were still using outmoded methods of working their metals. The following innovations had been suggested to save materials: use of tube stock for bearing races instead of bar stock 31/; use of stamped steel retainers instead of nonferrous metal for larger-size bearings 32/; profile rolling of large-size bearings instead of free forgings 33/; and improvement in cold stamping of external rings to eliminate lathe operation. 34/

It is apparent from the suggested improvements that in 1946 the techniques of the Soviet bearings industry were rather obsolete.\* Assuming that many of the suggested innovations were put into practice,

\* The following statement is quoted from a Soviet publication written by S.P. Baykov, Engineer and Senior Scientific Associate of the Experimental Scientific Research Institute of the Bearings Industry in 1948:

"The low productivity of labor in the bearings ball shop of the IGPZ (First State Bearing Plant imeni L.M. Kaganovich) greatly retarded the work of the entire plant in recent years.

"Despite the fact that this shop, in volume of work, is not inferior even to the greatest ball-bearing plants of the US, problems of technology and organization of production needed basic improvement. Such a situation was the result of procuring equipment from different and often casual sources. Furthermore, the technological process used in the shop had become obsolete.

"This situation was largely due to the fact that a high regard for foreign work had been developed and domestic production had been neglected. The technological processes of foreign firms were blindly copied. The fact that foreign firms permitted familiarization only with outdated technologies and did not divulge secret production processes was not considered. Finally, there was insufficient use of the

S-E-C-R-E-T

S-E-C-R-E-T

announced percentage increases in output of bearings per unit of equipment and per worker at [ ] State Bearings Plant in Moscow, shown in Table 4, are not unreasonable. 36/

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Table 4

Output of Antifriction Bearings per Unit of Equipment and per Worker at [ ] State Bearings Plant in Moscow 1946-51

50X1-HUM

	Percent (1946 = 100)					
<u>Output</u>	<u>1946</u>	<u>1947</u>	<u>1948</u>	<u>1949</u>	<u>1950</u>	<u>1951</u>
Per Unit of Equipment	100	158.4	197.0	248.3	351.1	475.1
Per Worker	100	131.8	154.1	168.6	225.0	268.1

3. Material and Equipment.a. Steel.

Steel is the principal material used in making anti-friction bearings. The following plants in the USSR are reported to supply the anti-friction bearings industry with steel: the Moscow Serp i Molot Steel Plant, the Noginsk Steel Plant Elektrostal, the Kuznetsk Metallurgical Combine imeni Stalin in Stalinsk, and the Zlatoust Steel Plant imeni Stalin. The metallurgical examination of Soviet bearings indicates that the high-carbon chrome steel and the hardness of the steel are equivalent to US practice.

b. Machine Tools.\*

As noted in tracing the development of the anti-friction bearings industry in the USSR, the original machinery was all from the

potentialities of socialistic method of production, of the creative ability of our workers and engineer technicians, and of the attainments of our Soviet science. The inadequate state of calculation and planning was also overlooked." 35/

\* Appendix C indicates the types of machine tools required to produce anti-friction bearings.

S-E-C-R-E-T

S-E-C-R-E-T

West. During World War II, additional machinery was shipped to the USSR under the Lend-Lease program, and after the war the USSR dismantled machinery from the bearings plants in East Germany and Austria. Undoubtedly, the Russians are capable of producing machine tools for the bearings industry, but a considerable quantity of the machinery in the bearings plants in the USSR is from the West. A thorough study of the machine tool position in the antifriction bearings industry in the USSR is beyond the scope of this report.

C. Imports and Exports.1. Imports.a. From Western Europe.

With the rapid postwar development of the Soviet antifriction bearings industry, the USSR has become less dependent on Western Europe for bearings. Since World War II the total quantity of legal imports has decreased, but there is no way of estimating the illicit trade, which is not included in the statistical returns of the exporting countries.

Imports from 1948 to 1951 by the USSR from the two important antifriction bearings producing and exporting countries in Western Europe, Italy and Sweden, are shown in Table 5.\* Although Italy did not export bearings to the USSR in 1951, it was to have provided the USSR in 1952 with antifriction bearings valued at \$800,000, 37/ under the Italy-USSR trade agreement protocol of 17 March 1952. The Sweden-USSR trade agreement which was negotiated in January 1952 included a 1952 quota of bearings valued at 6 million kronor, which is approximately \$1 million worth of antifriction bearings. 38/

b. From the Satellites.

The USSR has been receiving antifriction bearings from East Germany. The exact quantity is unknown, but the SAG-Leipziger Kugellagerfabrik, East Germany, produces special orders for the USSR. 39/ The total imports from East Germany in 1951 have been estimated at 1 million bearings.

\* Table 5 follows on p. 18.

S-E-C-R-E-T

Table 5

Estimated Imports of Antifriction Bearings by the USSR  
from Western Europe through Legal Transactions  
1948-51

Country	Year			
	1948	1949	1950	1951
<u>Sweden</u>				
Weight (Metric Tons)	555.5 a/*	440.9 a/	668.1 b/	425.3 c/
Value				
\$ US	1,083,088 a/	941,261 a/	1,232,080 b/	1,019,690 d/
Swedish Kronor	3,896,000	4,878,700		5,282,000
Units e/	815,000 f/	647,000 f/	980,000 f/	624,000 f/
<u>Italy</u>				
Weight (Metric Tons)	142 g/	1,673 g/	317 h/	0
Value				
\$ US	370,434 g/	3,315,200 g/	671,428 h/	0
Italian Lire	213,000,000	2,072,000,000		
Units e/	208,000 f/	2,454,000 f/	465,000 f/	0
Totals				
Weight (Metric Tons)	<u>697.5</u>	<u>2,113.9</u>	<u>985.1</u>	<u>425.3</u>
Value (\$ US)	<u>1,453,522</u>	<u>4,256,461</u>	<u>1,903,508</u>	<u>1,019,690</u>
Units e/	<u>1,023,000</u>	<u>3,101,000</u>	<u>1,445,000</u>	<u>624,000</u>

\* Footnotes for Table 5 follow on p. 19.



S-E-C-R-E-T

Table 5

Estimated Imports of Antifriction Bearings by the USSR  
from Western Europe through Legal Transactions  
1948-51  
(Continued)

- a. Compiled from official figures and converted from Swedish kronor to US dollars in 1948 at 3.6 kronor equaling \$1.00, and from 1949 to 1951 at 5.18 kronor equaling \$1.00. <sup>40/</sup>
- b. In 1950, Sweden exported 656.3 long tons of bearings (converted from long tons to metric tons by multiplying by 1.018), valued at \$1,232,080. <sup>41/</sup>
- c. Sweden increased bearing prices by 30 percent in December 1950. With this price increase and by comparison with the value and metric tons exported in 1950, the quantity exported in 1951 would be equivalent to 425.3 metric tons.

$$\frac{1,019,690}{1.30} \times \frac{668.1}{1,232,080} = 425.3 \text{ metric tons.}$$

- d. Sweden exported bearings valued at 2,641,000 kronor from January through June 1951. This value was doubled to obtain the total value of bearings exported to USSR in 1951, and converted to US dollars at a rate of 5.18 kronor equaling \$1.00. <sup>42/</sup>
- e. All estimates of bearing units have been rounded off to the nearest thousand.
- f. Metric tons were converted to bearing units at a rate of 1.5 pounds per bearing, or 1,467 bearings per metric ton. This average-weight bearing for legal exports to the Soviet Bloc was estimated on the following bases: (1) The average-size bearing exported under quantitative control by COCOM has been assumed to have a 45-mm bore. Although exceptions to the COCOM restrictions have been made, the COCOM countries and Sweden have adhered in general to the sizes under quantitative control in their exports to the Bloc. (2) By tabulating ball and roller bearings with a 45-mm bore as shown below, the average weight per bearing was estimated to be 1.5 pounds.

Type	SKF Bearing No.	Weight (Pounds)
Ball	6209	0.897
Ball	6309	1.840
Spherical Roller	22209	1.320
Spherical Roller	22309	3.090
Taper Roller	30209	1.030
Taper Roller	30309	2.070
Cylindrical Roller	NU209	0.942
Cylindrical Roller	NU309	1.920
Thrust Ball	51209	0.760
Thrust Ball	51309	1.520
		<u>15.335</u>

S-E-C-R-E-T

Table 5

Estimated Imports of Antifriction Bearings by the USSR  
from Western Europe through Legal Transactions  
1948-51  
(Continued)

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g. Compiled from official figures and converted from Italian lire to US dollars in 1948 at 575 lire equaling \$1.00, and from 1949 to 1951 at 625 lire equaling \$1.00. 43/

h. Italy exported bearings valued at \$650,000 and weighing 316 metric tons from 1 January to 14 July 1950. For the full year, however, Italy was reported to have exported bearings only to a value of \$671,428, which would indicate that only \$21,428 worth, or approximately 1 metric ton, of bearings were exported in the second half of 1950. 44/

S-E-C-R-E-T

S-E-C-R-E-T

2. Exports.

Within the Soviet Bloc the USSR has exported some anti-friction bearings to the Satellites, though the exact quantities are unknown. The USSR-Satellite trade agreements during 1949 and 1950, however, have established bearings quotas which give some indication of the values and/or quantities involved.

a. To Poland.

An agreement between Poland and the USSR on the Mutual Exchange of Commodities, 1948-52, included bearings quotas for these years, rising from 300,000 units in 1948 to 800,000 units in 1952 (by annual increases of 100,000 except in 1950, when the increase was to be 200,000 units). 45/

b. To Czechoslovakia.

Under the USSR-Czechoslovakia trade agreement of 1949 the bearings quota from the USSR to Czechoslovakia was 1 million bearings. 46/

c. To Hungary.

The USSR agreed to export to Hungary during the period from 1 October 1948 to 31 December 1949 a ball bearings quota valued at \$350,000. 47/ Converted at a rate of \$2 per bearing, this quota would amount to approximately 175,000 bearings.

d. To Rumania.

Under the 1950 USSR-Rumania trade agreement the bearings quota from the USSR to Rumania was 120,000 bearings. 48/

D. Distribution and Requirements.

1. Distribution.

The estimated distribution of antifriction bearings to Soviet industries in percentage of total supply as shown in Table 6\* is based on Soviet and US wartime distribution patterns 49/ and the estimated requirements of Soviet equipment shown in Table 7.\*\*

\* Table 6 follows on p. 22.

\*\* Table 7 follows on p. 23.

S-E-C-R-E-T

Table 6

Estimated Distribution of Antifriction Bearings in the USSR  
1951

<u>Consumer</u>	<u>Percent of Total Requirements</u>
Aircraft	22
Tanks and Assault Guns	3
Ships	3
Guns and Fire-Control Apparatus	5
Automotive Vehicles and Parts	24
Industrial Machinery and Equipment	30
Generators, Transformers, Electric Motors	4
Tractors	5
Agricultural Machinery	2
Railroad Equipment	2
Total	<u>100</u>

2. Requirements.a. Estimated World War II Requirements.

In 1941 the Soviet planned output of antifriction bearings was 50 million, 50/ and, in 1943, German and Soviet technicians in Germany estimated Soviet requirements for ball bearings to be approximately 60 million. 51/

b. Estimated Postwar Requirements.

There is no direct information on the postwar requirements for antifriction bearings of the USSR. Table 7\* gives limited information on the volume of antifriction bearings used in various types of Soviet equipment but does not indicate the total requirements for bearings of the USSR. There are insufficient data available to make a complete study of requirements of bearings in the USSR by this approach.

\* P. 23, below.

S-E-C-R-E-T

Table 7

Requirements for Ball and Roller Bearings  
in Selected Soviet Equipment a/\*  
1951

<u>Consumer</u>	<u>Estimated Production <u>b</u>/</u>	<u>Average Bearings per Unit</u>	<u>Bearings Required <u>c</u>/ (Units)</u>
Aircraft			
Jet Fighter	N.A. <u>d</u> /	316 <u>e</u> /	N.A.
Bomber	N.A. <u>d</u> /	4,821 <u>f</u> /	N.A.
Tanks and Assault Guns	10,930	88 <u>g</u> /	963,600
Motor Vehicles			
Trucks	395,000	50 <u>h</u> /	19,750,000
Passenger Cars	36,000	38 <u>i</u> /	1,368,000
Tractors	118,000	38 <u>j</u> /	4,484,000
Machine Tools	78,000	23 <u>k</u> /	1,794,000
Coal Mining Equipment			
Coal Cutters and Combines	1,440		36,000 <u>l</u> /
Coal Loaders	750		38,000 <u>l</u> /
Locomotives (4-Wheel)	1,700		16,000 <u>l</u> /
Chain Conveyors	3,000	13 <u>l</u> /	39,000
Belt Conveyors	1,500	973 <u>l</u> /	1,459,000
Railroad Locomotives (Main Line, Steam)	2,170	118 <u>m</u> /	256,000
Electric Motors	633,000 <u>n</u> /	2 <u>o</u> /	1,266,000
Total			<u>31,469,600</u>

\* Footnotes for Table 7 follow on p. 24.

S-E-C-R-E-T

Table 7

Requirements for Ball and Roller Bearings  
in Selected Soviet Equipment a/  
1951  
(Continued)

- a. Estimates do not include spares or replacement parts, nor do they include the large quantity of bearings used in instruments and accessories.
- b. ORR estimates unless otherwise stated.
- c. Total number of bearings required have been rounded off to the nearest thousand.

[Redacted]

e. Estimate of the MIG-15 includes 16 bearings in the engine and approximately 300 in the airframe. The estimate does not include the cockpit, nose gear, instruments, and accessories. The estimate of bearings in the airframe is subject to revision. 52/

50X1-HUM

- f. Estimate is based on prototype of the TU-4. 53/
- g. Requirements of the T-34 Tank. 54/
- h. Average requirements for bearings of ZIS-150 and GAZ-51 trucks. 55/
- i. Requirements of the M-20 Pobeda automobile.
- j. Requirements for bearings of the S-80 tractor.

[Redacted]

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- k. 56/
- m. Requirements of bearings of a US freight steam locomotive, which includes 4 bearings on the leading truck and 24 on the tender trucks that could conceivably be left off Soviet models.
- n. Planned output of electric motors for 1950. 57/
- o. ORR estimates of requirements based on US practice.

S-E-C-R-E-T

The antifriction bearings requirements of the USSR have, therefore, been estimated in the following section by relating the prewar output and requirements for antifriction bearings with the planned expansion of the USSR machine building industries after World War II.

According to the Fourth Five Year Plan (1946-50), the machine building industry\* was to double its output as compared with 1940. 58/ The machine building industry, during the rehabilitation program of the Five Year Plan, would consume approximately 60 percent of the total supply of bearings,\*\* and it could reasonably be assumed that the over-all requirements for antifriction bearings would also double to fulfill the demands of the machine building industry and other users of bearings.

The planned output of antifriction bearings in 1941 was 50 million. Assuming that the 1941 planned output of bearings was approximately 20 percent over the planned output of 1940, which is not unreasonable, since the value of total industrial production for 1941 was planned to increase 17 percent over 1940, 59/ the 1940 planned requirements (which have been taken to be equal to planned output) would be over 41 million bearings. Actual output in 1940 has been estimated at only 36 million bearings. The USSR, however, has always imported antifriction bearings from the West, and these imports were particularly important in the prewar period. Assuming that in 1940 the difference between actual output and planned requirements was made up by imports, the total supply of antifriction bearings available to the USSR in 1940 is estimated to have been 41 million.

If the above reasoning be accepted, the planned requirements for antifriction bearings in 1950 would be 82 million (doubling the actual supply of antifriction bearings available in 1940).

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\* The machine building industry includes the manufacture of equipment for the iron and steel, power, coal, and oil industries, the manufacture of electrical machines, railway rolling stock, motor vehicles, tractors, agricultural machinery, equipment for the building industry, machine tools, foundry equipment, and equipment for the chemical industry.

\*\* See Table 6, p. 22, above.

S-E-C-R-E-T

The antifriction bearings industry under the Fourth Five Year Plan, however, was "to develop at a greater rate than the other types of engineering." 60/ This greater rate of development has been assumed to be between 5 to 10 percent of the requirements for antifriction bearings in 1950. Consequently, requirements for ball and roller bearings by Soviet industry in 1950 have been estimated to be 85 million to 90 million bearings. If the reported achieved output of bearings of 130 percent in 1951 over 1950 can be assumed to be the approximate increased requirements of Soviet industry for bearings, the requirements for antifriction bearings in 1951 would then be approximately 110 million to 115 million bearings.

E. Balance (Surplus or Deficit).

In 1951 the USSR was capable of supplying approximately 90 percent of its requirements for antifriction bearings through the production of the State Bearings Plants. If it is assumed that the bearings repair plants and plants other than the State Bearings Plants that are reported to be producing antifriction bearings are capable of producing 2 million bearings per year,\* the Soviet antifriction bearings industry was capable of fulfilling approximately 92 percent of its domestic requirements.

The estimated exports to the Satellites reduce the quantity of bearings available to the USSR, but the estimated imports from Western Europe and East Germany partially balance off these exports. The deficit in 1951 has been estimated to be between 7 million and 12 million bearings, as shown in Table 8.\*\*

\* In 1941 the planned output of bearings by the repair plants was to be 1 million as compared with 50 million for primary producers (State Bearings Plants). Since total output of the primary producers is estimated to be 101 million, it appears reasonable to assume that the output of the repair plants would have increased by the same proportion.

\*\* Table 8 follows on p. 27.



S-E-C-R-E-T

Table 8

Estimated Position of the Antifriction Bearings Industry in the USSR  
1951

	<u>Thousand Units</u>	
Requirements	110,000 to 115,000	
Production		
State Bearings Plants	101,000	
Bearings Repair Plants and Other Soviet Plants Producing Bearings	2,000	
Imports		
Western Europe a/	600	
East Germany	1,000	
Production plus Imports	<u>104,600</u>	
Exports	-2,000	
Total Supply Available b/	<u>102,600</u>	102,600
Balance (Deficit)		<u>-7,400 to -12,400</u>

a. Excluding illicit transactions.

b. Carry-over stocks appear to be negligible.

Since the range of error of the production estimate is plus or minus 20 percent for 1951 and that of requirements is at least as great, the significance of the deficit computed in Table 8 is somewhat indefinite. Applying a range of plus or minus 20 percent to both estimates, the Soviet bearings position in 1951 can be anywhere between a surplus of 35 million units, about 36 percent of estimated output, to a deficit of 49 million units, about 47 percent of estimated output. Therefore, taking into account also the fact that there may well be some unbalance between production and requirements for particular types and sizes of bearings, the best that can be said is that the supply of bearings in

S-E-C-R-E-T

the USSR probably is somewhat tight and that there may be some actual shortages.

III. East Germany.

A. Development and Organization of the Industry.

1. Development.

a. Before the Partition of Germany. 61/

In the middle of 1943 the main producers of the German antifriction bearings industry were concentrated in four places: Schweinfurt; Bad Cannstatt; Berlin; and Steyr, Austria. The most important center was Schweinfurt in West Germany. Of these main centers, Berlin is the only one located in what is now called East Germany.\*

The bulk of the production of German antifriction bearings was in the hands of two firms -- the Vereinigte Kugellagerfabrik\*\* (VKF), a subsidiary in Schweinfurt of the international Svenska Kugellagerfabrik (SKF), and the Kugelfischer Company in Schweinfurt, an independent German enterprise. The 2 firms controlled 78 percent of production in Germany. The balance of German production was divided among relatively small independent producers.

Germany's peak annual production during World War II was 90 million to 95 million bearings. Of this total production, the plants now located in East Germany produced 14 million bearings, or approximately 15 percent of the total. Of the estimated 30,000 workers in the German antifriction bearings industry at the peak production period, the East German plants employed 4,200 workers, or 14 percent of the total.

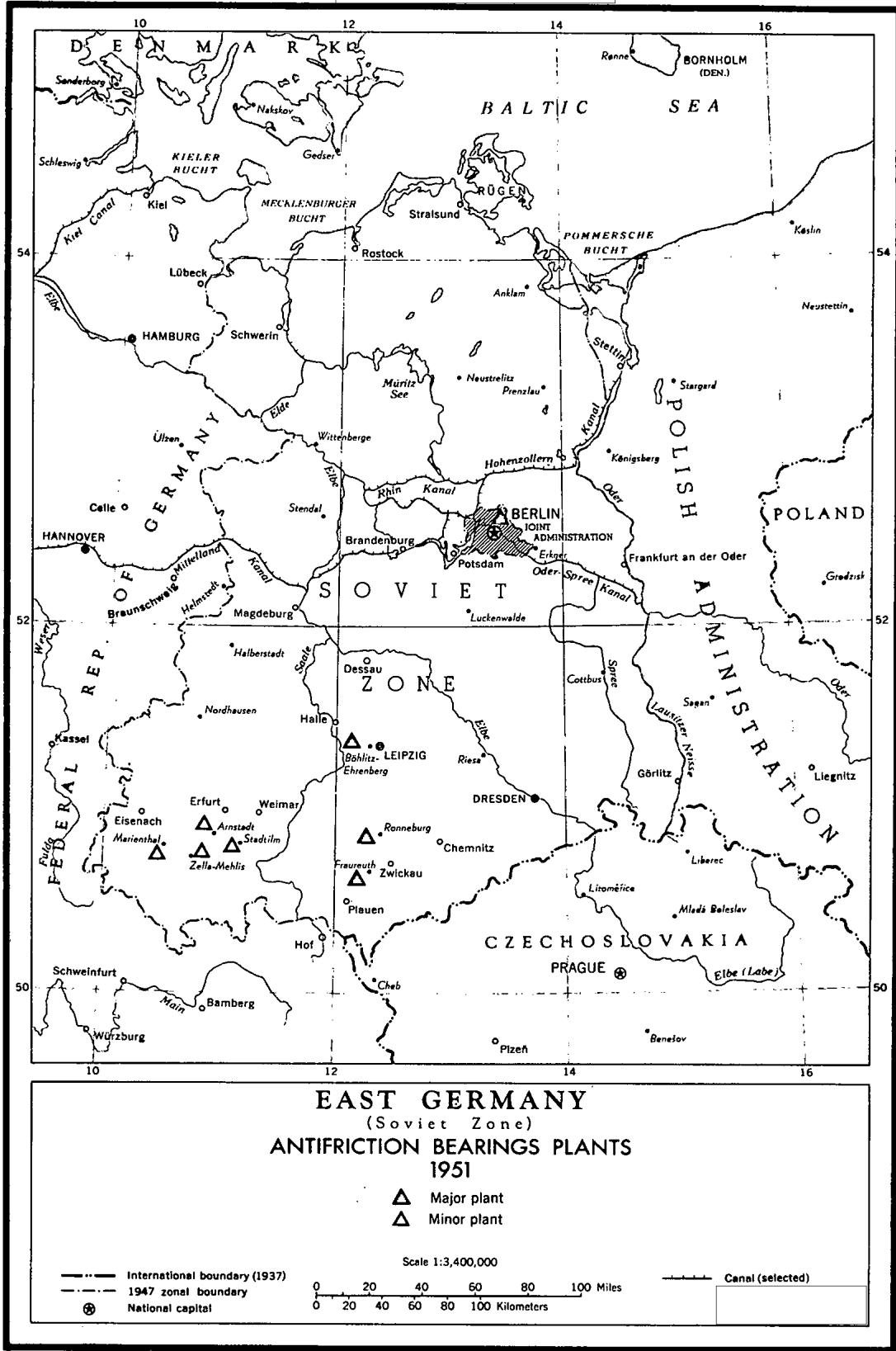
The plants in East Germany, a minor element in Germany's World War II antifriction bearings industry, consisted of four known producers.

\* A map showing the location of antifriction bearings plants in East Germany follows p. 28.

\*\* Kugellagerfabrik or Kugellagerwerke (ball bearing factory) -- it is common practice to use the term ball bearing to cover all types of antifriction bearings.

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S-E-C-R-E-T

The first, the VKF subsidiary at Erkner near Berlin, produced ball and roller bearings, using balls obtained from the VKF plant in Schweinfurt. Total employment was 1,826 workers, and output represented 7 percent by value of the total German output of anti-friction bearings.

The second, the Norddeutsche Kugellagerfabrik at Berlin, was a subsidiary of the Kugelfischer Company. About half the production in 1943 consisted of needle bearings. Balls were obtained from the Kugelfischer plant in Schweinfurt. The employment was 560, and output represented 1.5 percent by value of the total German output of antifriction bearings.

The third, Deutsche Kugellagerfabrik (DKF), was an independent small producer with two plants in different sections of Leipzig. This plant bought its balls from other producers and produced ball and roller bearings. Employment of this firm was 1,777, and output amounted to 6 percent by value of the total German output of the antifriction bearings.

The fourth, Gebrueder Heller at Schweina-Marienthal,\* was an independent producer manufacturing balls for antifriction bearings.

The principal conclusion to be derived from the discussion of these producers is that they were relatively unimportant to the German war machine and that they depended on the plants in Schweinfurt for materials, particularly for steel balls.

b. After the Partition of Germany.

Although Allied bombing did only minor damage to the plants located in East Germany, the dismantling of these plants by the Russians immediately after partition practically eliminated the ability of East Germany to produce antifriction bearings. Soviet authorities, however, did place 2 antifriction bearings plants and 1 plant producing balls for antifriction bearings\*\* under the ownership of the SAG-Awtowelo

\* These are two small towns a short distance apart. This area will be referred to as Schweina-Marienthal in the text and as Marienthal on the accompanying map.

\*\* See Appendix B for an analysis of these plants and of other possible production.

S-E-C-R-E-T

(Staatliche Aktiengesellschaften-Awtowelo -- the Soviet Corporation for Motor Vehicle Construction). They were SAG-Leipziger Kugellagerfabrik (formerly the Deutsche Kugellagerfabrik) at Leipzig, SAG-Thueringer Kugellagerfabrik (formerly the Karl Reich Ball Bearing Plant) at Zella-Mehlis, and SAG-Kugelfabrik\* (formerly the Gebrueder Heller Plant at Schweina-Marienthal).

In 1948 the USSR abandoned its destructive economic policy and permitted the reconstruction of the antifriction bearings industry in East Germany. In addition to the 3 SAG plants listed above, 5 other plants in East Germany were producing antifriction bearings between 1948 and 1952: VEB\*\*-Walzlagerfabrik\*\*\* at Fraureuth, VEB-Walzlagerfabrik at Ronneburg, VEB-Walzlagerfabrik at Berlin (Lichtenberg), VEB-Gelenkwellenwerk\*\*\*\* at Stadtilm, and Maschinenfabrik Fritz Scholz, at Arnshall near Arnstadt.

In the latter part of 1952 the antifriction bearings industry in East Germany was reorganized. No additional plants were put into operation but two SAG plants were transferred to VEB's. The plants are now known by the following names: SAG-Leipziger Kugellagerfabrik, Leipzig; VEB-Thueringer Kugellagerfabrik, Zella-Mehlis; VEB-Walzlagerfabrik, Fraureuth; VEB-Walzlagerfabrik, Ronneburg; VEB-Walzlagerfabrik, Berlin (Lichtenberg); VEB-Gelenkwellenwerk, Stadtilm; VEB-Walzlagerfabrik, Arnshall (in 1953 this plant is scheduled to become Plant II of VEB-Thueringer Kugellagerfabrik); and VEB-Walzkoerperfabrik,\*\*\*\*\* Schweina-Marienthal.

## 2. Organization.

Figure 3\*\*\*\*\* shows the organization and administrative control of antifriction bearings plants in East Germany. One plant, the

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\* Kugelfabrik (ball factory) -- only steel balls were produced at this plant.

\*\* VEB, Volkseigener Betriebe (People-Owned Enterprise).

\*\*\* Walzlagerfabrik (antifriction bearings factory).

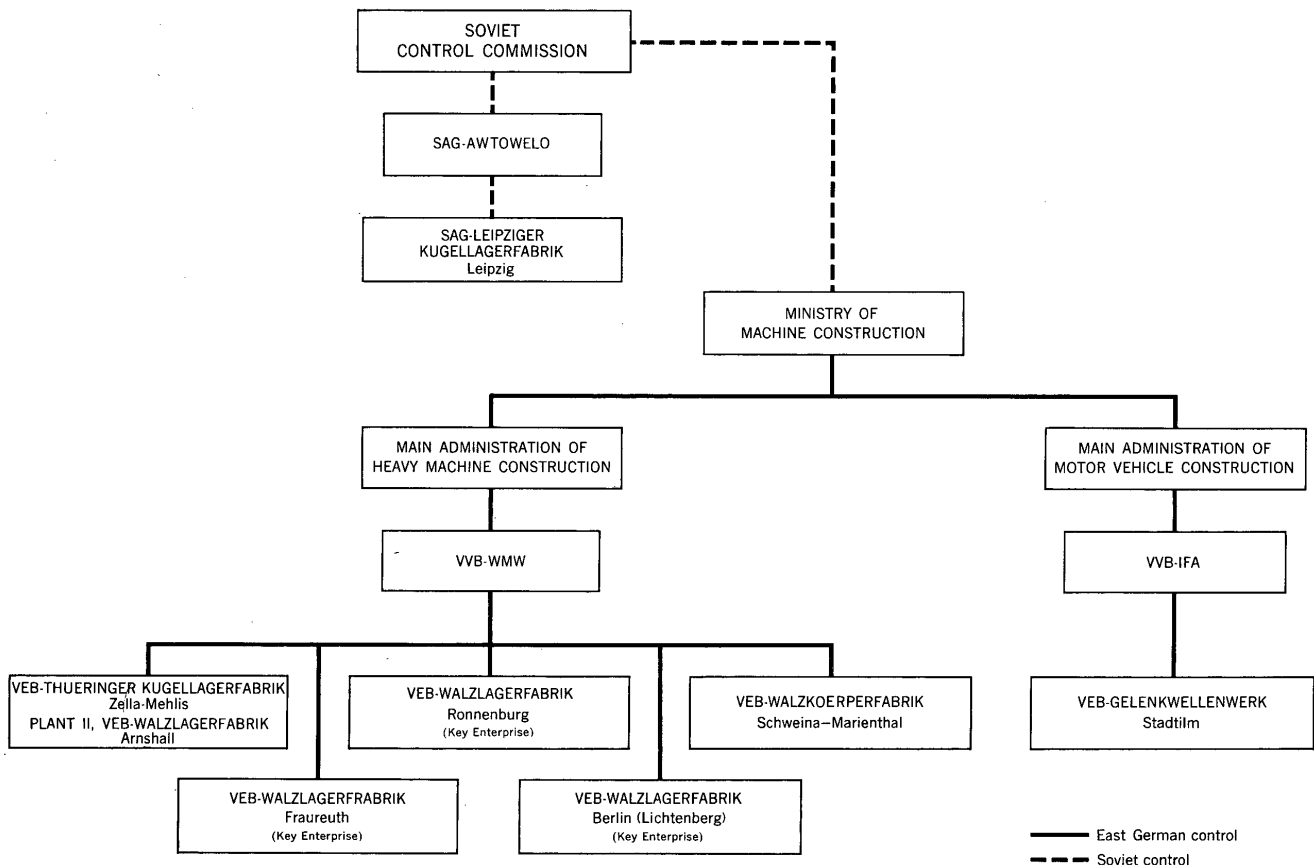
\*\*\*\* Gelenkwellenwerk (drive-shaft factory) -- also produces anti-friction bearings.

\*\*\*\*\* Walzkoerperfabrik -- antifriction material factory.

\*\*\*\*\* Following p. 30.

Figure 3  
ORGANIZATION AND CONTROL  
OF ANTI-FRICTION BEARINGS PLANTS IN EAST GERMANY  
1952

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S-E-C-R-E-T

SAG-Leipziger Kugellagerfabrik, is still owned by the SAG-Awtowelo.\* The other plants have been incorporated into the East German economy as VEB's under the Ministry for Machine Construction (Ministerium fuer Maschinenbau).

a. SAG's.

The main administrations of the individual industrial sectors of the SAG's are subordinate to the Soviet Control Commission in the Soviet Zone of Occupation, which replaced the Military Government in East Germany in January 1950. 63/ The holding corporation for the SAG's is located in Moscow. The East German branch office is located at Weimar, and the administration office of the SAG's is located at Berlin (Weissensee). 64/ The Soviet general director of the SAG-Awtowelo is Nikolayev, 65/ and the German representative at Berlin (Weissensee) is reported to be a person named Radtke. 66/

b. Ministry for Machine Construction.

In the Five Year Plan extending to 1955 the industrial production plan of East Germany is based on the output of certain industries known as key industries (schwerpunkt Industrien). The antifriction bearings industry is one of these industries. Within these key industries, certain plants are selected as key enterprises. Three of the VEB antifriction bearings plants controlled by the Main Administration for Heavy Machine Construction (Hauptverwaltung Schwermaschinenbau) under the Ministry for Machine Construction have been selected as key enterprises. These enterprises receive the top priorities. 67/

The East German Ministry for Machine Construction consists of 6 main administrations (Hauptverwaltungen), of which 2 have control over antifriction bearings plants. The Main Administration for Motor Vehicle Construction is in control of the VVB-IFA (Vereinigung Volkseigner Betriebe - Industrie Vereinigung Fahrzeugzubehoerwerke -- Federation of People-Owned Enterprises - Industrial Federation for Vehicle Construction), which is in charge of one VEB plant producing antifriction bearings. The Main Administration for Heavy Machine Construction is

\*  this plant may now be controlled by the SAG-Transmasch. 62/

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S-E-C-R-E-T

in control of the VVB-WMW (Werkzeugmaschinen und Werkzeuge -- Machine Tools and Tools), which in turn is in charge of 6 antifriction bearings plants, including the 3 key enterprises. 68/

c. Purchase and Sales.

The procurement of materials and components (that is, brass, steel tubing, and balls) and the distribution of antifriction bearings are carried out by the EVA (Einkaufs und Verkaufs Abteilung -- Purchase and Sales Department) for ball bearings under the DHZ-MF (Deutsche Handelszentrale Maschinen und Fahrzeugbau -- German Trade Center for Machines and Motor Vehicles), which also controls the EVA's for iron goods, farm machinery, tools, and motor vehicles. The six branch offices of the EVA for ball bearings, the managers of the offices, and the administrative area served by each of these offices are shown in Figure 4.\* 69/

B. Production.1. Estimated Output.

The estimated total output of the East German antifriction bearings industry shown in Table 9\*\* is based on actual and planned production data for the individual plants.

In 1948 the 2 SAG antifriction bearings plants were the only major producers in East Germany, and the total output is estimated to have been about 2 million bearings. 70/ It was in this year that the USSR allowed the East Germans to rebuild the antifriction bearings industry. By 1949 the 3 VEB's with top priority as key enterprises were in partial operation, and total output is estimated at 2.5 million bearings. In 1951 the industry was still rebuilding its facilities, and total output is estimated at approximately 5.3 million bearings. In 1952, all of the bearings plants except the SAG-Leipziger Kugellagerfabrik were turned over to the VEB's. No new plants were put into operation, and the output is estimated to have been about 6.8 million bearings. The estimated output of 8.7 million bearings for 1953 is based on a report of 19 September 1952 from the ball bearing section of the German Trade Center for Machines and Motor Vehicles to the State

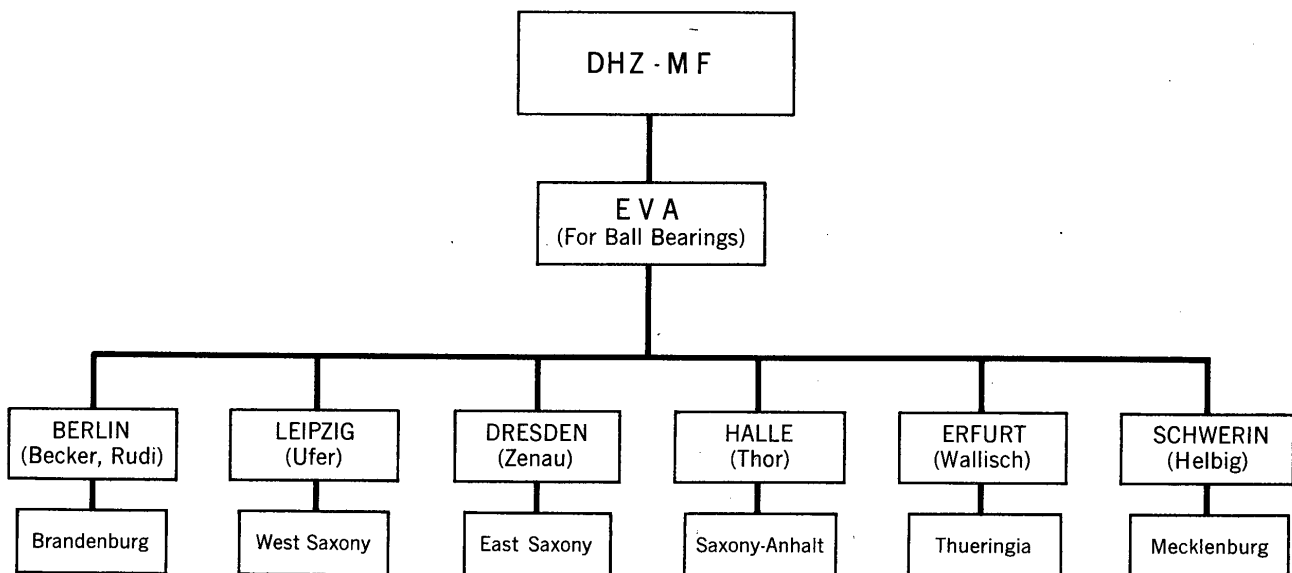
\* Following p. 32.

\*\* Table 9 follows on p. 33.



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Figure 4  
ORGANIZATION OF PURCHASE AND SALES  
OF ANTIFRICTION BEARINGS IN EAST GERMANY  
1952



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S-E-C-R-E-T

Table 9

Estimated Production of Antifriction Bearings in East Germany a/  
1949-55

Plants	Thousand Units						
	1949	1950	1951	1952	1953	1954	1955
SAG-Leipziger Kugellagerfabrik, Leipzig b/	1,100 c/	1,680 d/	1,840 e/	1,900 f/	2,000 g/	2,100 g/	2,200 g/
VEB-Thueringer Kugellagerfabrik, Zella-Mehlis h/	900 h/	1,400 i/	1,900 h/	2,700 i/	3,600 i/	3,900 i/	4,100 i/
VEB-Walzlagerfabrik, Fraureuth	330 j/	390 k/	730 l/	900 m/	1,100 n/	1,400 m/	1,750 m/
VEB-Walzlagerfabrik, Ronneburg o/	3 p/	15 q/	20 r/	30 s/	40 t/	50 s/	60 s/
VEB-Walzlagerfabrik, Berlin (Lichtenberg) u/	120 v/	250 w/	600 x/	1,000 y/	1,600 z/	2,100 y/	2,500 y/
VEB-Gelenkwellenwerk, Stadttilm aa/	100 bb/	180 cc/	200 dd/	200 dd/	200 dd/	200 dd/	200 dd/
VEB-Walzlagerfabrik, Arnshall	N.A.	N.A.	55 ee/	100 ff/	125 ff/	250 ff/	375 ff/
Total	2,553	3,915	5,345	6,830	8,665	10,000	11,185

a. Range of estimate, plus or minus 20 percent.

b. In 1947, production of bearings at the Leipziger Kugellagerfabrik was estimated to be 900,000 at an average price of 8 DM.\*  
This estimate is based on reported production for 2 months as follows 71/:

1947	Output (Units)	Value (DM)
March	73,772	608,786
April	74,431	597,363
Total	148,203	1,206,149

\* Unless otherwise noted, East German currency will be noted as DM throughout this report.

S-E-C-R-E-T

Table 9

Estimated Production of Antifriction Bearings in East Germany  
1949-55  
(Continued)

- c. In 1949, production of bearings valued at 22 million DM <sup>72/</sup> was converted at a rate of 20 DM per bearing. The average price per bearing was raised because the Leipziger Kugellagerfabrik discontinued the production of bearings below a 35-mm bore but still continued to mass-produce medium-size bearings. The production of bearings in sizes below a 35-mm bore was transferred to the VEB-Thuringer Kugellagerfabrik at Zella-Mehlis.
- d. In 1950, production of bearings valued at 33.6 million DM <sup>73/</sup> was converted at a rate of 20 DM per bearing (see footnote c). The estimated output of 1.7 million bearings is not unreasonable, because, although the plant discontinued the production of bearings below the 35-mm bore, the plant is reported to have fulfilled an order of 1.5 million needle bearings for the USSR in 1950. (See Appendix B.) Needle bearings can be produced more rapidly than ball or roller bearings.
- e. In 1951, production of bearings was estimated to be 1,840,000. This estimate is based on reliable reports of the production schedule of this plant for 8 months as follows:

<u>1951</u>	<u>Output (Units)</u>
January-May	658,586 <sup>74/</sup>
July	298,960 <sup>75/</sup>
August	120,636 <sup>76/</sup>
September	146,708 <sup>77/</sup>
Total (8 Months)	<u>1,224,890</u>
Average	1,840,000

- The plant is reported to have completed a part of an order for 2 million needle bearings in 1951 for the USSR. (See Appendix B.)
- f. Schedule production of bearings for January, April, and May of 1952 was as follows:

<u>1952</u>	<u>Output (Units)</u>
January	131,716 <sup>78/</sup>
April	181,000 <sup>79/</sup>
May	163,000 <sup>80/</sup>

This would be a monthly average of 158,572. Assuming that production remained at this level throughout 1952, output in 1952 is estimated to be 1.9 million bearings.

- g. There have been no reports on this plant which would indicate an expansion of the production facilities in 1953 or 1954. Improvements in production techniques, better use of machinery, and increased skill of labor, however, would cause the output of the plant to increase during these and ensuing years.

S-E-C-R-E-T

S-E-C-R-E-T

Table 9

Estimated Production of Antifriction Bearings in East Germany  
1949-55  
(Continued)

h. Prewar capacity of the plant was 100,000 bearings per month. In September 1948 the production of bearings amounted to 50,000, which corresponds to an annual output of 600,000. 81/ In the first 5 months of 1951 a production report of the SAG's reported an output of 800,305, 82/ which corresponds to an annual output of 1.9 million.

i. The ball bearings section of the German Trade Center for Machines and Motor Vehicles reported to the State Planning Commission on 18 September 1952 that, on the basis of the current machine park, 3.6 million bearings can be produced at VEB-Thueringer Kugellagerfabrik. Total capacity of plant is also reported to be 4.1 million bearings. 83/ A smooth curve was drawn through the estimated output in 1948, 1951, 1953, and the reported capacity of the plant to obtain the estimates for the other years.

j. In 1949, actual production of bearings valued at 8,168,000 DM was converted at a rate of 25 DM per bearing. 84/ A rate of 25 DM per bearing was used because Walzlagerfabrik, Fraureuth, produced bearings in the medium-size ranges from 80-mm to 200-mm outside diameter.

k. In 1950, actual production of bearings valued at 9,708,000 DM was converted at a rate of 25 DM per bearing. 85/ (See footnote j.)

l. Planned production of bearings in 1951 was valued at 28.9 million DM. In the first quarter of 1951, actual production was valued at 4,539,000 DM. 86/ Assuming production at same level for the year, annual output would be 18,156,000 DM, which is approximately 10 million DM under the planned output (converted from value at a rate of 25 DM per bearing). (See footnote j.)

m. Planned increase in production of bearings was reported to be 910 percent in 1955 as compared with 1950. 87/ Although the plant has high priority and is expanding, this increase is unlikely. The planned increase has been reported to have been worked out in the Ministry of Planning without any contact with the technical personnel in the field and without any planning for the procurement of materials and skilled personnel to fulfill the planned expansion. 88/ An increase of approximately 350 percent has been assumed for 1955 as compared with 1950. Employment was planned to increase approximately fivefold by 1955 over 1950. (See Appendix B.) Assuming a lower labor productivity by the new personnel, the estimated percentage increase appears reasonable. The output for 1952, 1954, and 1955 was interpolated along a smooth curve from 1950 passing through the 1951 and 1953 estimates.

n. The ball bearings section of the German Trade Center for Machines and Motor Vehicles reported to the State Planning Commission on 18 September 1952 that, on the basis of the current machine park, about 1.1 million bearings can be produced. 89/

o. In 1948, Walzlagerfabrik, Ronneburg, produced 150 roller bearings per month and repaired 150 ball bearings per month in size ranges between 150-mm and 350-mm outside diameter. 90/

p. In the first quarter of 1949, planned production of bearings was 750, which corresponds to an annual output of 3,000 units in large sizes up to 400-mm outside diameter. 91/

q. In 1950, actual production of bearings was reported to be valued at 3,217,000 DM. 92/ Ronneburg's production is in large-size bearings over 100-mm bore. The actual output was converted at a rate of 200 DM per bearing. (The estimated quantity was rounded off to 15,000.)

r. In 1951, planned production of bearings was reported to be 4 million DM 93/ (converted from value at a rate of 200 DM per bearing). (See footnote m.)

s. Planned increase in production of bearings was reported to be 772 percent in 1955 as compared with 1950. 94/ Although the plant is being expanded, this increase is unlikely. The planned increase has been reported to have been worked out in the Ministry of Planning without any contact with the technical personnel in the field and without any planning for the procurement of materials and skilled personnel to fulfill the planned expansion. 95/ An increase of approximately 300 percent has been assumed for 1955 as compared with 1950. The output for 1952, 1954, and 1955 was interpolated along a smooth curve from 1950 passing through the 1951 and 1953 estimates.

S-E-C-R-E-T

Table 9

Estimated Production of Antifriction Bearings in East Germany  
1949-55  
(Continued)

t. The ball bearings section of the German Trade Center for Machines and Motor Vehicles reported to the State Planning Commission on 18 September 1952 that, on the basis of the current machine park, 33,000 ball and roller bearings can be produced. 96/

u. In 1948, Walzlagfabrik, Berlin (Lichtenberg) produced 5,000 ball bearings per month in size ranges up to 62-mm outside diameter. 97/

v. In the first quarter 1949, planned production of bearings was 30,000, which corresponds to an annual output of 120,000 in small sizes up to 62-mm outside diameter. 98/

w. In 1950, actual production of bearings was reported to be valued at 1,491,000 DM 99/ (converted from value at a rate of 6 DM per bearing, since the production of this plant is in small-size bearings).

x. In 1951, planned production of bearings was valued at 3.6 million DM. In the first quarter of 1951, actual production was valued at 822,000 DM. 100/ Output probably would be at a higher rate for the balance of the year, and the planned production has been assumed to have been fulfilled (converted from value at a rate of 6 DM per bearing). (See footnote w.)

y. Planned increase in production of bearings was reported to be 1,734 percent in 1955 as compared with 1950. 101/ Although the plant is being expanded, this increase is unlikely. The planned increase has been reported to have been worked out in the Ministry of Planning without any contact with the technical personnel in the field and without any planning for the procurement of materials and skilled personnel to fulfill the planned expansion. 102/ An increase of approximately 900 percent has been assumed for 1955 as compared with 1950. Employment was planned to increase approximately fivefold by 1955 over 1951. Assuming lower productivity by the new personnel, the estimated percentage increase appears reasonable. The output for 1952, 1954, and 1955 was interpolated along a smooth curve from 1950 passing through the 1952 and 1953 estimates.

z. The ball bearings section of the German Trade Center for Machines and Motor Vehicles reported to the State Planning Commission on 18 September 1952 that, on the basis of the current machine park, 1.6 million bearings can be produced. 103/

aa. In 1948, Gelenkwellenwerk, Stadtilm, produced 8,000 taper roller bearings per month, which corresponds to an annual output of 96,000. 104/

bb. In the first quarter of 1949, planned production of bearings was 27,000 taper roller bearings up to 100-mm outside diameter. 105/ Monthly production was reported to be 7,000 to 10,000 taper roller bearings, which corresponds to an annual output of 84,000 to 120,000 bearings. 106/

cc. In 1950, monthly production of bearings was reported to be 12,000 to 15,000 taper roller bearings, which corresponds to an annual output of 144,000 to 180,000 bearings. 107/

dd. The ball bearings section of the German Trade Center for Machines and Motor Vehicles reported to the State Planning Commission on 18 September 1952 that this plant has the necessary machine park to produce 200,000 taper roller bearings in 1953 and that the additional orders for universal drive shafts, which this plant also produces, will prevent any increases in ball bearings production. 108/ The output of the plant is therefore estimated to remain at 200,000 bearings.

ee. In 1948 this plant was repairing ball bearings. Information on output is not available. In the first quarter of 1951 the plant required 27 metric tons of bearings steel, which corresponds to annual steel requirements of 108 metric tons. 109/ Experience in US industry shows that a minimum of 65 percent of the steel is scrapped in the production of antifriction bearings. On this basis, annual output in 1951 would be 38 metric tons.

This plant has also been reported to produce bearings for replacement on trucks. 110/ The average-size bearing has been assumed to have a 45-mm bore. Metric tons were converted to bearings units at a rate of 1.5 pounds per bearing, or 1,467 bearings per metric ton. (See Table 5, footnote f, p. 19, above, for methodology.)

S-E-C-R-E-T

S-E-C-R-E-T

Table 9

Estimated Production of Antifriction Bearings in East Germany  
1949-55  
(Continued)

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ff. The ball bearings section of the German Trade Center for Machines and Motor Vehicles reported to the State Planning Commission on 18 September 1952 that, on the basis of the current machine park, 100,000 antifriction bearings can be produced in 1952 and that a capacity of 125,000 bearings can be reached in 1953 as a result of improvements in production methods. 111/ The ball bearings section also reported that, because of additional orders for 250,000 units of taper roller bearings, considerable expansion will be required at the plant. 112/ Assuming that the expansion is completed by 1955, output in 1955 has been estimated to be 375,000 antifriction bearings.

S-E-C-R-E-T

Planning Commission. The estimates up to 1955 are based on adjusted percentage increases and the reported capacities of these plants.

2. Technology.a. Types and Sizes of Bearings in Production.

The East German plants are producing a number of different types of antifriction bearings. During the first 9 months of 1951, 2,446 different types in 3,239 different designs were ordered by users of bearings through the ball bearing section of the German Trade Center for Machines and Motor Vehicles. The types and size ranges produced at each plant are noted to the extent available in the plant studies in Appendix B. The bearings industry is constantly attempting to increase the variety of types and sizes in order to meet the requirements of East German industries but have been hampered by inadequate design and lack of prototypes.

b. Postwar Innovations.

In East Germany the antifriction bearings industry has been principally rebuilding and equipping the plants. 113/ However, the shortages of critical materials (steel and brass principally) have caused experiments with substitutions.

The Hescho plant in Kahla, Thuringia, East Germany, which was experimenting with ceramic roller bearings fabricated from ceramic materials during World War II, has continued its research. The ceramic roller bearing would be useful where bearings are used with corrosive materials or under conditions which would adversely affect the characteristics of metallic roller bearings. 114/

The shortage of brass and sheet steel has caused the use for medium-size roller bearings of pressed wood cages made from beechwood veneer. 115/ This cage was a development of the former Thuringia Pressed Wood Company, now the VEB-Walzlagerfabrik, Fraureuth.

The shortage of brass and steel has caused experimentation in and possibly the manufacture of sintered iron cages for large-size roller bearings. 116/ Sintering is a process of pressing powdered metal to produce a dense homogeneous form.

S-E-C-R-E-T

S-E-C-R-E-T3. Material and Equipment.a. Procurement.

Materials for the antifriction bearings plants in East Germany are ordered through the EVA Branch Office for anti-friction bearings in Berlin. The required material is then requested from the producing plants or DIA (Deutscher Innen- und Aussenhandel -- Intra-German and Foreign Trade Agency). Most deliveries of materials to the antifriction bearings plants are made through the EVA offices in Berlin or Leipzig. The balls for anti-friction bearings are delivered through the EVA branch office in Erfurt. 117/

b. Material Suppliers.

Steel is the principal material used. The following plants in East Germany supply the antifriction bearings industry with steel: Maxhuette Unterwellenborn, Hennigsdorf Steel Mill, Riesa Steel Works, and the Thale Iron Works. 118/ Unknown but limited quantities of steel are reported to be delivered from the USSR and Czechoslovakia. 119/

Steel balls and rollers are partially supplied by the SAG-Kugelfabrik (VEB-Walzkoerperfabrik) at Schweina-Marienthal. 120/

c. Shortages of Materials.

The East German antifriction bearings industry is in short supply on almost all materials. The principal bottlenecks have been steel tubing and bar steel for bearing rings, sheet steel for cages, steel wire for balls, steel balls, abrasives, and grinding wheels. 121/ Table 10\* indicates the steel requirements of the anti-friction bearings industry in 1951 and the inability of the East German industry to fulfill these requirements.

\* Table 10 follows on p. 40.



S-E-C-R-E-T

Table 10

Steel Requirements Position of the Antifriction Bearings Industry  
in East Germany 122/  
1951

<u>Material</u>	<u>Planned Requirements (Metric Tons)</u>	<u>Capacity to Fulfill (Metric Tons)</u>	<u>Shortage to be Fulfilled by Imports (Metric Tons)</u>
Steel Tube	7,500	4,500	3,000
Bar Steel	5,100	2,100	3,000
Sheet Steel	840	N.A.	N.A.
Steel Wire for Balls	1,130	420	710

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d. Machine Tools.\*

The Soviet dismantling of East German plants immediately after World War II removed a considerable amount of machine tools from the East German antifriction bearings plants. In late 1948, when the VEB-Walzlagerfabrik, Fraureuth, established the plan for an improved East German antifriction bearings supply, it was noted that a supply of about 500 different types of machine tools would be required, of which

\* Appendix C indicates the types of machine tools required to produce antifriction bearings.

S-E-C-R-E-T

70 machine tools were scheduled to be delivered from West Germany, 23 from Czechoslovakia, and more than 400 from East German production. 126/ East Germany is capable of manufacturing the standard types of machine tools required for the bearings industry but at this time would probably have difficulty in manufacturing the special tools. A thorough study of the machine-tool position in the antifriction bearings industry in East Germany is beyond the scope of this report.

C. Imports.

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In 1949, East Germany was reported to have a planned import quota of 150,000 units. 127/ In 1950, East Germany was reported to have established a planned import quota of antifriction bearings valued at \$3 million and by 30 September 1950 had actually imported \$3,082,000, 128/ which would correspond to an annual rate of approximately \$4 million. Value was converted to bearings units at a rate of \$10 per bearing.\* Although this is approximately 5 times the average price per bearing, it has been used because the known shipments to East Germany with reported values and quantities during 1950 average \$10 per bearing. The calculated imports of 400,000 are therefore considered as a minimum estimate. It is reasonable to assume that the imports in 1951 have not decreased. For the purposes of this report, the estimated imports in 1951 have been assumed to be similar to the estimated imports in 1950.

\* Conversion from value to bearings was based on the following shipment made in 1950 (official exchange rate \$1 = 4.2 DM):

<u>Export Company</u>	<u>Quantity of Bearings</u>	<u>Value (DM West)</u>	<u>Value (\$ US)</u>
VKF, Schweinfurt <u>129/</u>	2,279	70,994	
Cornelius and Richter, Minden <u>130/</u>	327	30,432	
Kugelfischer, Schweinfurt <u>131/</u>	1,601	80,515	
Total	<u>4,207</u>	<u>189,941</u>	<u>45,224</u>

On the basis of these shipments, which were principally large sizes, the average cost per bearing was over \$10.00.

- 41 -

S-E-C-R-E-T

S-E-C-R-E-TD. Planned Distribution and Requirements.1. Planned Distribution.

In 1951 the planned distribution of antifriction bearings in East Germany in percent of total supply was reported as shown in Table 11. 132/

Table 11

Planned Distribution of Antifriction Bearings in East Germany  
1951

<u>Consumer</u>	<u>Percent of Total Supply</u>
Soviet Troop Units in East Germany	40.0
East German Machine Construction, Electrotechnic Construction, and Vehicle Construction	47.5
Other Industry (including Exports)	12.5
Total	<u>100.0</u>

Since World War II the demand for antifriction bearings has been in excess of the total available supply in East Germany. For this reason, the distribution of the output would probably conform to the following priorities: first, to the Soviet troop units in East Germany; second, to the SAG; third, to East German key enterprises; and fourth, in limited amounts, to other German civil consumption and exports. 133/

2. Requirements.

In 1949 the requirements for antifriction bearings in East Germany were reported by the VEB-Walzlagerfabrik, Fraureuth, at 8,006,000 ball and roller bearings. 134/ In 1951 the State Secretariat for Material of the State Planning Commission in East Germany prepared

S-E-C-R-E-T

an allotment plan of antifriction bearings which totaled 6,754,915 bearings, including an export of 1 million.\* 136/ The 1951 allotment plan was less by 1,251,085 bearings than the 1949 requirements, which did not include exports. It may be assumed that the 1951 allotment covered only the requirements of the industries reported under this plan, and thus did not indicate the requirements of the Soviet troop units in East Germany. The estimated requirements for 1951 of over 11 million bearings as shown in Table 12,\*\* were obtained by adjusting the reported 6,754,915 figure to include the 40-percent requirement of the Soviet troop units in East Germany.

E. Balance (Surplus or Deficit).

In 1951, East Germany was capable of supplying about 52 percent of its requirements for antifriction bearings through domestic production. Although East Germany only exported 8 percent of its export quota of 1 million bearings in 1951, the special orders for the USSR from the SAG-Leipziger Kugellagerfabrik increased the total exports to an estimate of 1 million bearings. The imports, however, have been estimated to have been approximately 400,000 units. Consequently, the total supply available to East Germany is only 46 percent of the requirements of the East German industry and the Soviet troop units in East Germany. The deficit in 1951 has been estimated to have been over 5.5 million bearings as is shown in Table 13.\*\*\*

\*  the planned amount of exports in 1951 was equal to 26,560,000 rubles, which would correspond to a price of about 25 rubles per bearing.  only 8 percent of the planned export, or approximately 80,000 bearings, had actually been exported in 1951. 135/

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It appears that the special order of needle bearings produced for the USSR by the SAG-Leipziger Kugellagerfabrik is not included in the allotment plan of East Germany. It has been assumed that in 1951 approximately 1 million bearings of the 2 million order were completed. The total exports in 1951 from East Germany are therefore estimated to be approximately 1 million bearings.

\*\* Table 12 follows on p. 44.

\*\*\* Table 13 follows on p. 45.

S-E-C-R-E-T

S-E-C-R-E-T

Table 12

Estimated Requirements of the Antifriction Bearings Industry  
in East Germany a/  
1951

Consumer	Percent Total Requirements <u>b/</u>	Bearings Required (Units)
Soviet Troop Units in East Germany	40.0	4,503,275
East German Machine Construction, Electrotechnic Construction, and Vehicle Construction	47.5	
SAG		1,900,000
Ministry for Machine Construction and Electrical Engineering		2,409,159
Ministry for Light Industry		40,000
Magistrate for Greater Berlin		75,000
Thuringia		140,000
Saxony-Anhalt		80,000
Mecklenburg		45,000
Brandenburg		40,000
Saxony		683,500
Other Industries and Exports	12.5	1,342,256
Total	<u>100.0</u>	<u>11,258,190</u>

a. Requirements of East German Machine Construction, Electrotechnic Construction, and Vehicle Construction and Other Industries and Exports are reported requirements totaling 6,754,915 bearings, 137/ which is believed to be 60 percent of total requirements. Total requirements have then been estimated to be 11,258,190 ( $6,754,915 \div 0.60$ ). The requirements of the Soviet troop units in East Germany would then be 4,503,275 bearings.

b. Percentage of total requirements was assumed to have the same breakdown as the percentage distribution pattern as shown in Table 11, p. 42, above.

S-E-C-R-E-T

S-E-C-R-E-T

Table 13

Estimated Position of the Antifriction Bearings Industry  
in East Germany  
1951

		Thousand Units
Requirements <u>a/</u>		10,300
Production	5,300	
Imports	400	
Production plus Imports	<u>5,700</u>	
Exports	-1,000	
Total Supply Available <u>b/</u>	<u>4,700</u>	4,700
Balance (Deficit)		<u>-5,600</u>

a. Including industry and Soviet troop units in East Germany and not including planned exports in 1951.

b. Carry-over stocks assumed to be negligible.

IV. Czechoslovakia.A. Development and Organization of the Industry.1. Development.

Before World War II, Czechoslovakia depended almost completely on imports of antifriction bearings, principally from Sweden and, to a lesser degree, from Germany, Italy, and the US. The only plant in Czechoslovakia assembling antifriction bearings was a plant at Perstejn owned by the Swedish firm SKF. The plant was dependent on Swedish and German sources for supplies of balls and outer and inner rings. 138/

S-E-C-R-E-T

During the war, SKF continued its ownership of the plants. After the bombing of the German antifriction bearings industry, however, machinery from the Schweinfurt plants in Germany was sent to Perstejn. In July 1943, output of this plant was just under 60,000 bearings. 139/ In 1945, when industry in Czechoslovakia was nationalized, the Perstejn plant was confiscated. 140/ In 1947, it became Plant No. 28 of the Zbrojovka Brno Corporation.

Since the war, Czechoslovakia has been attempting to build up an antifriction bearings industry capable of fulfilling most of its requirements. 141/ Up to 1949, new machinery purchased from Sweden was being installed in the Perstejn plant. 142/ During the Two Year Plan (1947-48) and under the Five Year Plan (1949-53), two other major antifriction bearings plants have been established, the Zbrojovka Brno Plant at Lisen and the Viliama Sirokeho Plant at Kysucke Nove Mesto. 143/ A small branch plant of the Zbrojovka Brno Corporation with an insignificant production is also in production at Tyniste nad Orlici.\*

## 2. Organization.

### a. Antifriction Bearings Plants.

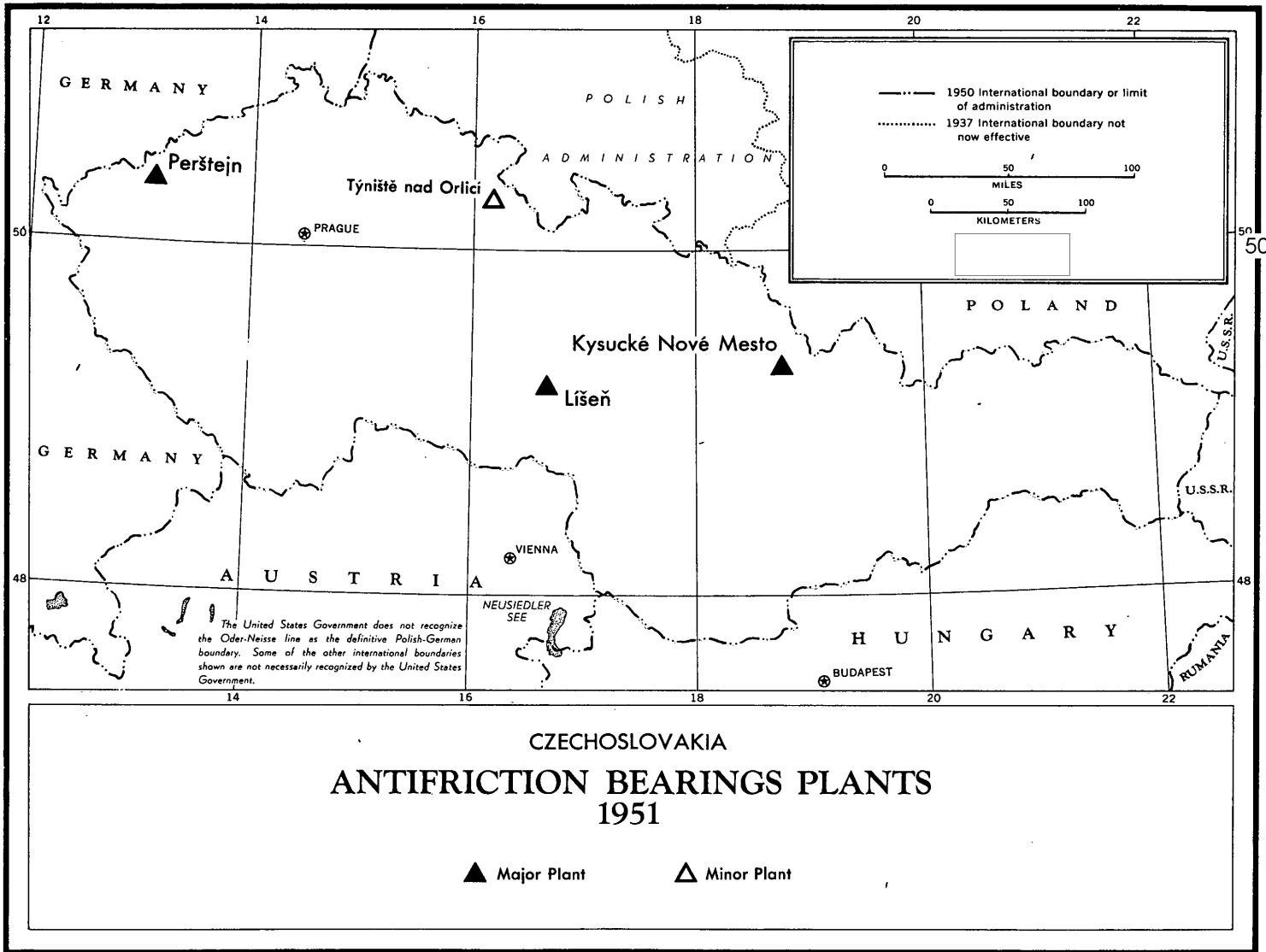
The antifriction bearings plants of Czechoslovakia are subordinate to the Controller-General of the Precision Machine Industry (Generalni Reditelstvi Presneho Strojirenstvi) at Prague. Engineer Eimuth, formerly employed in the industry, was reported to be chief of the bearings department in 1951. 144/

The Zbrojovka Brno Corporation, which was nationalized after the war, has been nominally in charge of the operation of the antifriction bearings plants. The corporation also was in charge of the construction of the new plant at Kysucke Nove Mesto. The central office of the corporation was located at Prague (Dejvice), Velflikova Street, in 1949. 145/

### b. Procurement and Distribution.

The Central Control Office for Bearings and Tools (Stredisko LN) is reported to control both the procurement and distribution of antifriction bearings. This office is reported to

\* See Appendix B for an analysis of these plants and of other possible production. A map showing the location of antifriction bearings plants in Czechoslovakia follows p. 46.



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S-E-C-R-E-T

receive statements of planned and special requirements for antifriction bearings in Czechoslovakia and, after checking these statements against domestic production, to determine import requirements. Orders for bearings are then forwarded to the state foreign trade organization KOVO a.s. and to the foreign representatives in Prague of the firms SKF of Sweden, RIV of Italy, and SRO (Kugellagerwerke J. Schmid-Roost, AG) of Switzerland. 146/

B. Production.1. Estimated Output.

The estimate of total output of antifriction bearings in Czechoslovakia shown in Table 14\* is based on the estimated output of the individual plants, on the planned capacity of the individual plants, and on the planned output of the industry under the Five Year Plan (1949-53).

Immediately after World War II, production of bearings in Czechoslovakia was insignificant. Production was begun in 1947, with an output of approximately 800,000 bearings. In 1948 the output was increased to 1.4 million units. According to reports, the available productive capacity was fully utilized at that time, and the production corresponded approximately to the scheduled quota. 147/ The capacity of the Lisen and the Perstejn plants was then being increased, and the total output in 1949 is estimated to have risen to 2.7 million bearings.

The expansion of the Lisen plant has continued under the Five Year Plan, and the new plant at Kysucke Nove Mesto has been in limited operations since 28 October 1950. Total output is estimated at 4.6 million bearings in 1950 and 6.2 million bearings in 1951.

The original Five Year Plan called for a production of about 8 million bearings in 1953. 148/ A government decree of 10 April 1951, which revised the original Five Year Plan, increased the antifriction bearings quota by 23 percent over the original plan. The 1953 production of antifriction bearings is now scheduled to be about 10 million units, which would correspond to an increase of more than 600 percent over 1948. 149/

\* Table 14 follows on p. 48.

S-E-C-R-E-T  
Table 14

Estimated Production of Antifriction Bearings in Czechoslovakia a/  
1948-53

Plants	Thousand Units					
	1948	1949	1950	1951	1952	1953
Zbrojovka Brno Plant No. 04, Lisen	800 <u>b/</u>	1,800 <u>c/</u>	2,500 <u>d/</u>	3,500 <u>e/</u>	4,500 <u>e/</u>	5,000 <u>e/</u>
Plant No. 28, Zbrojovka Brno Corporation, Perstejn	600 <u>f/</u>	900 <u>g/</u>	2,000 <u>h/</u>	2,300 <u>h/</u>	2,700 <u>i/</u>	3,000 <u>i/</u>
Viliana Sirokeho Plant, Kysucke Nove Mesto	0	0	Negligible	300 <u>j/</u>	1,000 <u>k/</u>	2,000 <u>k/</u>
Zbrojovka Brno Plant, Tyniste nad Orlici	0	Negligible	100 <u>l/</u>	100 <u>l/</u>	100 <u>l/</u>	100 <u>l/</u>
Total	<u>1,400</u>	<u>2,700</u>	<u>4,600</u>	<u>6,200</u>	<u>8,300</u>	<u>10,100</u>

a. Range of estimate, plus or minus 20 percent.

b. Production of bearings was planned to be at a rate of 150,000 units per month. The shortage of raw materials and the lack of skilled workers, however, prevented the fulfillment of this plan. The output at the end of 1948 was reported to be approximately 60,000 to 80,000 units per month. 150/ Assuming that the monthly average for the year falls somewhere between these reported figures, total output of bearings in 1948 was estimated to be 800,000 units.

c. The quota was reported to be 350,000 bearings for the first quarter of 1949 and 500,000 for the second quarter. In mid-1949, output was reported to have reached a monthly average of 150,000 units, 151/ which would correspond to an annual output of 1.8 million.

d. In 1950, total production was reported to be 2.5 million bearings. 152/

e. Plant capacity was reported originally to be 4 million bearings. 153/ It is believed that this capacity production would be reached and probably surpassed by 1952. In 1951 the capacity of the plant was reported to be eventually 20,000 ball bearings per day, 154/ which would correspond to an annual capacity of over 6 million bearings. On 10 April 1951 a government decree which revised the original Five Year Plan increased the 1953 antifriction bearings quota by 23 percent over the original plan. The 1953 production of antifriction bearings is now scheduled to increase about 600 percent as compared with the 1948 output. 155/ Assuming that this plant

S-E-C-R-E-T

Table 14

Estimated Production of Antifriction Bearings in Czechoslovakia  
1948-53  
(Continued)

will increase output between 500 and 600 percent over 1948, total output in 1953 is estimated to be 5 million units, and capacity production of 6 million units would probably be reached in 1954.

f. Total production of the Czechoslovak antifriction bearings industry in 1948 was reported to be 1.4 million. 156/ Output of the Lisen plant is estimated to be 800,000, which would leave a balance of 600,000 to be produced at the Perstejn plant. This figure equals about 85 percent of the maximum-production rate achieved during World War II. g. Daily production of bearings was reported to be 3,000 per day in 1949, which would correspond to an annual output of 900,000. 157/ [redacted]

h. In December 1950, annual production of bearings was reported to be 2.3 million. 159/ This output for late 1950 and for the year 1951 [redacted] was 7,000 per day, 160/ which would correspond to an annual output in 1951 of approximately 2.1 million to 2.3 million. The total output in 1950 would be less than in 1951, and an output of 2 million has been estimated for 1950.

i. No information on future expansion of this plant is available. Capacity of this plant without further expansion is assumed to be about 3 million bearings, which has been estimated to be the output in 1953.

j. This plant is reported to have produced 140,000 ball bearings from late October 1950 to June 1951, 161/ which corresponds to an average of 20,000 units per month. The operation of this plant was reported to have been delayed because of the lack of skilled personnel, 162/ and the fact that the Soviet machinery installed in the plant proved unsuitable for the quality of production intended. 163/ On the basis of these reports, total output in 1951 has been estimated to be approximately 300,000 bearings.

k. Capacity of this plant is reported to be eventually 6 million to 8 million bearings. 164/ Estimates have been made for 1952 and 1953 on the assumption that the capacity of 6 million will be reached in 1955.

l. In late 1949, annual production of bearings at this plant was reported to be 2 percent of the total output of the industry. 165/ Applying this 2-percent output to the estimated production in 1950, the output of this plant is estimated to be approximately 100,000 bearings. There is no report of expansion at this plant, and production has been assumed to remain unchanged.

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S-E-C-R-E-T2. Technology.a. Types and Sizes of Bearings in Production.

In late 1950 the plants in Czechoslovakia were producing only ball, tapered roller, and thrust bearings ranging in bore sizes from 12 to 75 mm. 166/ The types of antifriction bearings which are required for heavy industry and for the construction of machine tools -- in particular, cylindrical roller bearings, self-aligning ball bearings, and spherical roller bearings -- have not been produced in Czechoslovakia and must be imported. The shortage of these types of antifriction bearings is one of Czechoslovakia's principal bottlenecks in its drive to make the industrial sector of the economy independent of the West. 167/ Because of this shortage, the operation of the new rolling mills of the Iron Works at Vitkovice in 1951 had been delayed. Attempts to procure the heavy antifriction bearings from England; SKF, Sweden; and RIV, Italy were unsuccessful. Czechoslovakia is reported to have decided in the summer of 1951 to produce the needed bearings in Lisen piece by piece. The same type of bearing reportedly is needed for a new rolling mill which is being installed in a big steel combine in Slovakia. 168/

The antifriction bearings manufactured in Czechoslovakia are apparently of fair to good quality. Tests performed on two Czechoslovak bearings have shown that the steel was a high-grade steel and that the surface finish was good but that the bearings ran rough because of poor manufacture of the rolls and the cage. A large number of tests of this type would have to be performed before definite conclusions could be drawn of the quality of the bearings manufactured in Czechoslovakia. Soviet engineers apparently consider the Czechoslovak bearings of inferior quality; it has been reported that the USSR insists on the installation of ball bearings of Swedish or Swiss origin in the electromotors which Czechoslovakia exports to the USSR. 169/

b. Postwar Innovations.

In Czechoslovakia the antifriction bearings industry has devoted its major effort to building and equipping its plants.

S-E-C-R-E-T

One development caused by the shortage of certain types and sizes of antifriction bearings has been the formation of an industry-wide designing office (Konstruktionsbuero) and a development division, which are located in the Zbrojovka Brno Plant [ ] at Lisen. Since <sup>50X1-HUM</sup> according to the Five Year Plan, Czechoslovakia is to become self-sufficient in the production of antifriction bearings, these divisions are required to establish the theoretical and practical means of producing those types of bearings required by Czechoslovak industry which are not now produced domestically. 170/

3. Material and Equipment.a. Steel.

The high-grade steel required in the manufacture of antifriction bearings has been supplied by the following steel plants: Vitkovice Iron and Steel Works near the Polish border, Poldi Steel Works at Kladno, and the Poldi Steel Works at Chomutov in North Bohemia. 171/ In late 1949, steel deliveries were reported to be irregular and the alloy content inconsistent. 172/ A shortage of steel rods for the bearing rings is reported to have been most acute. These steel rods reportedly were delivered to the bearings plants bent and twisted. 173/ The Swedish firm SKF had supplied the Perstejn plant with steel. The last shipment of Swedish steel to this plant is reported to have been made in August 1949. 174/

b. Steel Balls.

The Lisen plant is reported to have started the manufacture of steel balls in 1951. All other steel ball requirements have been fulfilled by imports. The Swedish firm SKF has supplied the Perstejn plant with steel balls. Most of the other requirements for steel balls are reported to be fulfilled by imports through Kellenberg and Company, the Swiss representative of Steyr, Austria. 175/

c. Grinding Wheels.

Grinding wheels are reported to be manufactured at Benatky nad Jizerou near Mlada Boleslav. These wheels are reported to be copies of the Norton wheels previously imported from the UK and the

S-E-C-R-E-T

US. The Czechoslovak grinding wheels are reported to be of variable quality and inferior to the previously imported products. There is a reported shortage of the silicon carbide which is required for the manufacture of the wheels. 176/

d. Machine Tools.\*

Czechoslovakia, which is considerably industrialized, would be capable of manufacturing the standard types of machine tools required for the antifriction bearings industry but probably would have considerable problems in designing and manufacturing the special tools. A study of the machine tool position in the antifriction bearings industry in Czechoslovakia is beyond the scope of this report.

C. Imports.1. Import Quota. 177/

The planned budget for the import of antifriction bearings in 1951 is reported to be 1 billion Czechoslovak crowns (koruny -- Kcs) which, at a rate of exchange of US \$1.00 = 150 Kcs, is estimated to be about \$6.7 million.\*\* The average price per antifriction bearing

\* Appendix C indicates the types of machine tools required to produce antifriction bearings.

\*\* The transactions of SKF, Prague, in 1950 have been used to estimate the rate of exchange between Kcs and US dollars. The import of antifriction bearings through SKF, Prague, is regulated by a trade treaty in which 6.2 million Swedish kronor worth of bearings were imported in 1950. This quantity of bearings is reported to be the equivalent of 180 million Kcs. 178/ The official exchange rate of US dollars to Swedish kronor is \$1.00 = 5.18 kronor. The estimated rate of exchange used in this report to convert Kcs to US dollars has been calculated as follows:

US \$1.00 = 5.18 kronor  
6,200,000 kronor = 180,000,000 Kcs  
1 kronor = 29.0 Kcs  
therefore, US \$1.00 = 150 Kcs

S-E-C-R-E-T

imported by Czechoslovakia has been estimated to be 175 Kcs.\* Consequently, the 1951 import quota valued at 1 billion Kcs is estimated to be about 5.5 million bearings.

The import of antifriction bearings is handled through the state foreign trade organization KOVO a.s. and through the Prague offices of the foreign firms, SKF of Sweden, RIV of Italy, and SRO of Switzerland. The location of these firms in Czechoslovakia is as follows: KOVO a.s., Prague II, Soupkupovo nam 3; SKF a.s., Prague VII, U. Mestanskenho Pivovaru 7; RIV, Prague 11, Opletalova ul.; and SRO, Prague II, Nekazanka.

\* The average price per bearing imported by Czechoslovakia has been estimated as follows:

(1) In 1951, KOVO a.s. had an import quota of antifriction bearings valued at about 500 million Kcs, of which 30 percent was reportedly to be obtained from the USSR. 179/ Under the USSR-Czechoslovakia trade agreement of 1949, the USSR agreed to export 1 million bearings to Czechoslovakia. 180/ Assuming that this trade agreement is still in effect, the price per bearing imported from the USSR has been estimated to be 150 Kcs:

$$\frac{0.30 \times 500}{1,000,000} = 150 \text{ Kcs}$$

(2) In 1950, SKF, Prague, is reported to have imported 6.2 million Swedish kronor, or 180 million Kcs, worth of antifriction bearings into Czechoslovakia. 181/ In 1950, Sweden, however, is reported to have exported a total of \$1,650,720 (8,550,730 Swedish kronor) worth of bearings and bearing components to Czechoslovakia, which was converted to a quantity of 1,260,000 bearings. (See Table 15, p. 57, below, and footnotes b and f of this table.)

Therefore, the quantity of bearings imported by SKF, Prague, has been estimated to be about 900,000 bearings:

$$\frac{6,200,000 \times 1,260,000}{8,550,730} = 913,500 \text{ (900,000) bearings}$$

The average price per bearing imported by Czechoslovakia through SKF, Prague, has been estimated to be 200 Kcs:

$$\frac{180,000,000 \text{ Kcs}}{900,000} = 200 \text{ Kcs per bearing}$$

(3) In this report, to convert Kcs to quantity of antifriction bearings imported by Czechoslovakia, the average price per bearing is assumed to be between the prices estimated by the two methods above, or a price of about 175 Kcs.

S-E-C-R-E-T2. KOVO a.s.

In 1951 the state foreign trade organization KOVO a.s. is reported to have had an import quota of about 500 million Kcs (\$3.3 million), which would correspond to about 2.7 million anti-friction bearings. In the first quarter of 1951, KOVO a.s. is reported to have imported about 100 million Kcs of antifriction bearings. It is believed that KOVO a.s. did not attain the import quota planned for 1951 because of the shortage of hard currency required to pay for the imports. It has been assumed that KOVO's 1951 imports were at the same rate in the last 9 months of 1951 as in the first 3 months. Thus the total imports of KOVO in 1951 are estimated to be 400 million Kcs (\$2.7 million), which would correspond to about 2.2 million bearings, a drop of about 0.5 million bearings from the import quota. KOVO a.s. is reported to obtain its bearings from the USSR, Austria, Switzerland, Italy, France, the UK, and Germany.

a. USSR.

Under the USSR-Czechoslovakia trade agreement of 1949, the USSR agreed to export to Czechoslovakia 1 million antifriction bearings per year. 182/ It has been assumed that this trade agreement is still in effect. The deliveries of bearings from the USSR are reported to constitute about 30 percent of KOVO's import quota. Since there are no apparent currency difficulties in this transaction, it is reasonable to assume that 1 million bearings were imported in 1951 from the USSR.

b. Austria.

On the basis of an Austro-Czechoslovakian trade agreement, Austria was to export to Czechoslovakia \$1 million worth of antifriction bearings during the period of October 1950-October 1951. 183/ The bearings are obtained from the Steyer-Daimler-Puch Werke, Styria.

c. Switzerland.

The embargo on antifriction bearings is reported to have caused the traffic through the various intermediaries in Switzerland to decline. The following suppliers are still active: RIV Waelzlager, Zurich (roller bearings); Keller and Kellenberg, Zurich (balls); KFA (Kugellagerfabrik Arbon), Arbon (ball and roller bearings); and General Transport AG, Basel (ball and roller bearings). 184/



S-E-C-R-E-T

d. Italy.

The most important Italian supplier of antifriction bearings is RIV, Turin, whose affairs are handled by the RIV representative at Prague. Besides RIV, there are a number of intermediaries, of whom the most important is reported to be Jacob M. Loewy in Rome. He is reported to have concluded two transactions with KOVO in 1950 for 20 million Kcs and 10 million Kcs. 185/

e. France.

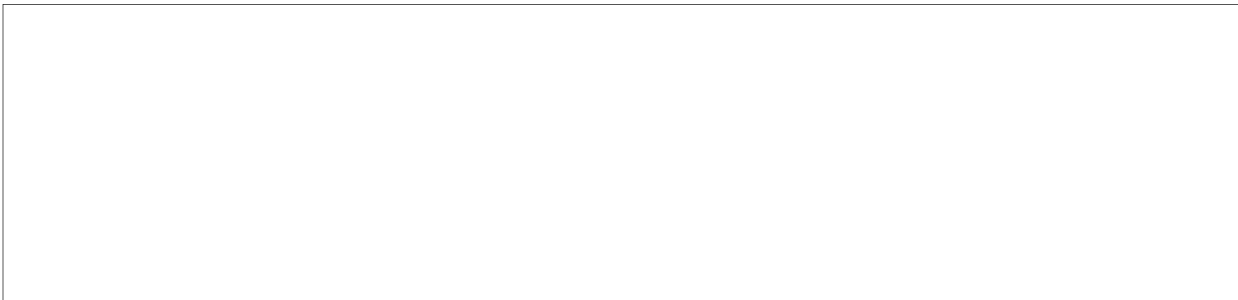
The biggest French supplier of antifriction bearings is reported to be the firm Nadella, Rouen. Other suppliers are reported to be Prometall, Landi Frères, Paris, and Rossi Frères, Paris.

f. UK.

The firm Pollard, Birmingham, is reported to deliver special antifriction bearings to the steel works at Vitkovice, because of an old contract. Deliveries are made through Poland.



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3. SKF a.s., Prague.

The SKF a.s., Prague, is a corporation controlled by the Swedish firm, SKF. The imports by SKF, Prague, are regulated by a trade treaty which contemplates the import of about 6.2 million Swedish kronor worth of antifriction bearings per year. Besides this, KOVO a.s. imports about 2 million Swedish kronor worth of partially fabricated items, such as bearing rings and steel balls from Sweden for the factory at Perstejn. The activities of SKF, Prague, have been reduced by the Czechoslovak government. The turnover was reported to be 180 million Kcs (\$1.2 million) in 1950 and is reported to have decreased to 120 million Kcs (\$800,000) in 1951.

S-E-C-R-E-T4. RIV, Prague.

The RIV branch office is controlled by the Italian firm RIV, Turin. All transactions between Czechoslovakia and Italy are made on a barter basis. Imports of antifriction bearings through RIV, Prague, are reported to have been about 200 million Kcs (\$1.3 million) in 1950.

5. SRO, Prague.

The operations of the Swiss corporation SRO in Prague are reported to be relatively small and are estimated to be about 20 million Kcs (\$130,000) worth of antifriction bearings per year.

6. Estimated Imports through Legal Transactions.

Table 15\* shows the estimated weight, value, and quantity of antifriction bearings exported legally to Czechoslovakia by Western European countries from 1948 through 1951. The most important exporters have been Sweden, Italy, and Austria. Other suppliers have been France and Switzerland. In 1948 the total value was about \$5,340,000, representing an estimated 2,772,000 bearings. The effects of the trade embargo appear to have been disappointing, since in 1951 the total value was about 4.5 million, representing an estimated 2,385,000 bearings.

7. Estimate of Total Imports, 1951.

The planned import of antifriction bearings in 1951 has been estimated to be 5.5 million. KOVO's import quota, however, is believed to have been reduced by approximately 0.5 million bearings because of hard currency difficulties. Consequently, the total imports in 1951 have been estimated to be approximately 5 million units, of which 1 million are estimated to have been obtained from the USSR and approximately 2.4 million (see Table 15) have been shipped legally from Western Europe. The balance of approximately 1.6 million bearings is believed to have been obtained through clandestine transactions.

\* Table 15 follows on p. 57.

S-E-C-R-E-T

Table 15

Estimated Imports of Antifriction Bearings by Czechoslovakia  
from Western Europe through Legal Transactions  
1948-51

Country	Year			
	1948	1949	1950	1951
<u>Sweden</u>				
Weight (Metric Tons)	808.7 <u>a</u> /*	468.7 <u>a</u> /	859.3 <u>b</u> /	481.6 <u>c</u> /
Value				
\$ US	1,885,035 <u>a</u> /	961,623 <u>a</u> /	1,650,720 <u>b</u> /	1,202,702 <u>d</u> /
Swedish Kronor	6,780,700	4,982,500	8,550,730	
Units <u>e</u> /	1,186,000 <u>f</u> /	688,000 <u>f</u> /	1,260,000 <u>f</u> /	707,000 <u>f</u> /
<u>Italy</u>				
Weight (Metric Tons)	323 <u>g</u> /	565 <u>g</u> /	337 <u>g</u> /	478 <u>h</u> /
Value				
\$ US	1,119,916 <u>g</u> /	2,241,600 <u>g</u> /	1,608,000 <u>g</u> /	1,529,000 <u>h</u> /
Italian Lire	644,000,000	1,401,000,000	1,005,000,000	
Units <u>e</u> /	474,000 <u>f</u> /	829,000 <u>f</u> /	494,000 <u>f</u> /	701,000 <u>f</u> /
<u>Austria</u>				
Weight (Metric Tons)	416 <u>i</u> /	385.6 <u>j</u> /	N.A.	N.A.
Value				
\$ US	1,656,480 <u>i</u> /	1,257,309 <u>j</u> /	1,110,038 <u>k</u> /	978,676 <u>l</u> /
Units <u>e</u> /	870,000 <u>m</u> /	808,000 <u>m</u> /	642,000 <u>n</u> /	568,000 <u>n</u> /

\* Footnotes for Table 15 follow on p. 59.

S-E-C-R-E-T

S-E-C-R-E-T

Table 15

Estimated Imports of Antifriction Bearings by Czechoslovakia  
from Western Europe through Legal Transactions  
1948-51  
(Continued)

Country	Year			
	1948	1949	1950	1951
<u>France</u>				
Weight (Metric Tons)	N.A.	19 o/	N.A.	70 plus p/
Value				
\$ US	15,339 o/	173,857 o/	321,814 g/	419,175 p/
Units e/	5,000 r/	51,000 r/	95,000 r/	123,000 r/
<u>Switzerland</u>				
Weight (Metric Tons)	92.7 s/	81.6 s/	159.0 s/	111.7 s/
Value				
\$ US	663,136 s/	469,910 s/	680,690 s/	380,190 s/
Units e/	237,000 t/	209,000 t/	407,000 t/	286,000 t/
Totals				
Weight (Metric Tons)		1,519.9		
Value (\$ US)	5,339,906	5,104,299	5,371,262	4,509,743
Units e/	2,772,000	2,585,000	2,898,000	2,385,000

S-E-C-R-E-T

S-E-C-R-E-T

Table 15

Estimated Imports of Antifriction Bearings by Czechoslovakia  
from Western Europe through Legal Transactions  
1948-51  
(Continued)

- a. Compiled from official figures 186/ and converted from Swedish kronor to US dollars in 1948 at 3.6 kronor = \$1.00, and from 1949 to 1951 at 5.18 kronor = \$1.00.  
b. In 1950, Sweden exported 844.2 long tons of bearings valued at \$1,650,720 187/ (converted from long tons to metric tons by multiplying by 1.018).  
c. Sweden increased bearing prices by 30 percent in December 1950. With this price increase and by comparison with the value and metric tons exported in 1950, the quantity exported in 1951 would be equivalent to 481.6 metric tons.

$$\frac{1,202,702}{1.30} \times \frac{859.3}{1,650,720} = 481.6 \text{ metric tons}$$

- d. Sweden exported 3,115,000 kronor from January to June 1951. 188/ This value was doubled to obtain the total value of bearings exported to Czechoslovakia in 1951 (converted to US dollars at a rate of 5.18 kronor = \$1.00).  
e. Estimates of units have been rounded off to the nearest thousand.  
f. Metric tons were converted to bearing units at a rate of 1.5 pounds per bearing, or 1,467 bearings per metric ton. (See Table 5, footnote f, p. 19, above, for methodology.)  
g. Compiled from official figures 189/ and converted from Italian lire to US dollars in 1948 at 575 lire = \$1.00, and from 1949 to 1951 at 625 lire = \$1.00.  
h. US official statistics. 190/  
i. In 1948, Austria exported a total of 668 metric tons of bearings valued at 27 million Austrian schillings of which Czechoslovakia received 416 metric tons valued at 16.8 million schillings. 191/ Official exchange rate in 1948 was 10.14 Austrian schillings = \$1.00.  
j. In 1949, Austria exported 385.6 metric tons 192/ valued at 12.9 million Austrian schillings to Czechoslovakia. 193/ Exchange rate in 1949 was 10.14 Austrian schillings = \$1.00.  
k. In 1950, Austria was reported to have exported \$1,110,038 worth of bearings to Czechoslovakia. 194/  
l. Compiled from official figures. 195/  
m. Official statistics. 196/  
n. Converted at a rate of \$1.73 per bearing, which is the average price for the 1948 and 1949 shipments of bearings to Czechoslovakia.  
o. Compiled from official figures. 197/  
p. US official statistics. 198/  
q. In 1950, France was reported to have exported \$321,814 worth of bearings to Czechoslovakia. 199/

S-E-C-R-E-T

Table 15

Estimated Imports of Antifriction Bearings by Czechoslovakia  
 from Western Europe through Legal Transactions  
 1948-51  
 (Continued)

r. Converted at a rate of \$0.30 per bearing. (See Table 18, Polish imports, footnote t, p. 70, below, for methodology.)

s. Swiss official statistics. 200/

t. Swiss exports of bearings were converted from metric tons to bearings at a rate of 0.86 pound per bearing, or 2,558 bearings per metric ton. Swiss bearings manufacturers produce a wide variety of bearings. They do specialize, however, in small-size bearings and are not restricted by the COCOM size ranges in their shipments to the Soviet Bloc. Therefore, the average-size bearing has been estimated to have a 35-mm bore. By tabulating ball and roller bearings with a 35-mm bore, as shown below, the average weight bearing was estimated to be 0.86 pound.

<u>Type</u>	<u>Bearing No. (SKF)</u>	<u>Weight (Pounds)</u>
Ball	6207	0.635
Ball	6307	1.010
Spherical Roller	22207	0.946
Spherical Roller	21307	1.120
Taper Roller	30207	0.701
Taper Roller	30307	1.120
Cylindrical Roller	NU207	0.646
Cylindrical Roller	NU307	1.050
Thrust	51207	0.485
Thrust	51307	0.860
Total		<u>8.573</u>
Average		0.86

S-E-C-R-E-TD. Distribution and Requirements.1. Distribution.

Since World War II the demand for antifriction bearings has been in excess of the total supply available in Czechoslovakia. This condition has led to an order of priority in the distribution of bearings to industry which has been reported as follows 201/: first, to war industry, mining, and heavy industry; second, to machine tool, motor, and tractor industry; and third, to light industry.

2. Requirements.

The annual requirements of Czechoslovakia have been reported at about 14.5 million to 16 million antifriction bearings. 202/ Since this information was reported in December 1950, it appears reasonable to assume that these requirements, and, in particular, the reported maximum of 16 million bearings would also apply to the annual requirements in 1951. An estimate of the percent of total requirements and of the quantity required by the various industries is shown in Table 16.

Table 16

Estimated Requirements of the Antifriction Bearings Industry  
in Czechoslovakia  
1951

<u>Consumer</u>	<u>Percent of Total Requirements</u>	<u>Bearings Required (Thousand Units)</u>
Tractors, Aircraft, Vehicles	43	6,000- 7,000
Railroads	7	1,000
Machine Tool Industry	26	4,000
Light Industry, Precision Industry	13	2,000
Mining and Heavy Industry	11	1,500- 2,000
Total	<u>100</u>	<u>14,500-16,000</u>

- 61 -

S-E-C-R-E-T

S-E-C-R-E-TE. Balance (Surplus or Deficit).

In 1951, Czechoslovakia was capable of supplying about 40 per cent of its requirements for antifriction bearings through domestic production. It is evident that Czechoslovakia is dependent on imports to supplement domestic production. The import of bearings in 1951 has been estimated at 5 million, which is still short of the total required. The total supply available to Czechoslovakia, domestic production plus imports, fulfills about 74 percent of the requirements of industry in Czechoslovakia. The deficit in 1951 has been estimated at about 4 million bearings, on the basis indicated in Table 17.

Table 17

Estimated Position of the Antifriction Bearings Industry  
in Czechoslovakia  
1951

	Thousand Units	
Requirements	14,500 to 16,000	
Production	6,200	
Imports	5,000	
Production plus Imports	<u>11,200</u>	
Total Supply Available a/	<u>11,200</u>	<u>11,200</u>
Balance (Deficit)	<u>-3,330 to -4,800</u>	

a. Carry-over stocks assumed be negligible.

V. Poland.A. Development of the Industry.

Before 1949, Poland had been completely dependent on imports of antifriction bearings to fulfill its requirements. Under the Three Year Plan (1947-49), 94 million zlotys\* were to be invested in the

\* Based on exchange rate of US \$1.00 = 400 zlotys (taken from



S-E-C-R-E-T

construction of an antifriction bearings plant. 203/ In March 1948 the precision and optical instruments branch of the metal manufacturing industry was reported to have begun work on the problem of producing antifriction bearings in Poland. 204/ In the latter half of 1949, machinery reportedly was installed in the newly erected shops of a plant at Krasnik, known as the Fabryka Wyrobow Metalowych (Metal Products Plant). Production of antifriction bearings began in 1950. 205/

The plant at Krasnik is the only confirmed antifriction bearings plant in Poland, although there is a report that a steel plant at Stalowa Wola near Nisko is manufacturing antifriction bearings. 206/

B. Production.1. Estimated Output.

The total confirmed output of antifriction bearings in Poland consists of the production of the plant at Krasnik. Estimates of output have been developed based on the reported planned production of this plant.\*

Series production actually began in 1950, but a negligible quantity of bearings may have been turned out in the latter part of 1949. The output of the plant, which was estimated to be 200,000 bearings in 1950, increased to an estimated 500,000 in 1951. There is no information available on the output in 1952 or on the planned output in Poland for later years. At the rate at which the industry expanded in 1951, it is reasonable to assume that output in 1952 may have been up to 800,000 bearings.

2. Types and Sizes of Bearings in Production.

The plant at Krasnik reportedly has produced ball and roller bearings in the medium-size range and of types which require a low degree of technical skill. 207/ The smaller- and the larger-size antifriction bearings had not been produced in Poland up to the middle of 1951, 208/ nor is there any evidence that they have been produced to date.

International Financial Statistics, May 1951, published by the International Monetary Fund), the 94 million zlotys would be equivalent to \$2,350,000.

\* See Appendix B.

S-E-C-R-E-T

The shortage of antifriction bearings and the limited number of types and sizes in production are sensitive points in the industrial development of Poland. The shortage of bearings led to an order issued by the Minister of Foreign Trade on 3 April 1950 in which CEBILOZ (Centralne Biuro Lozysk Tocznych -- the Central Office of Antifriction Bearings) was to supervise the use of antifriction bearings in all enterprises in Poland. The object was to assure the most efficient exploitation of antifriction bearings, with special attention to the application, maintenance, assembly, and warehousing of antifriction bearings and parts. 209/ The supervision by CEBILOZ apparently did little to alleviate the shortage of antifriction bearings in Poland. In September 1950 the lack of antifriction bearings at the J. Stalin Works (formerly the Cegielski Plant) at Posen and at various industrial installations in Rzeszow was reported to be extremely critical. 210/

### 3. Material and Equipment.

Under the trade agreement between Poland and the USSR signed in June 1950, the USSR was to export to Poland more than 30 key industrial installations, including a ball bearings plant. In addition to supplying complete equipment for the plant, the USSR was to supply technical literature, technical plans, records of Soviet experience, and Soviet licenses and patents. The USSR was also to assist in the design and construction of the plant and in the installation of the equipment. Polish engineers, technicians, and workers were to receive practical training in Soviet industrial plants. 211/

Although this trade agreement was signed in June 1950, it is reasonable to assume that the ball bearings plant mentioned in the agreement referred to the plant at Krasnik. Apparently, the USSR has not been fulfilling certain parts of this agreement. The 1951 development plan for the Krasnik plant is reported to have included delivery of machinery from the USSR. This assistance has not materialized, and production at the plant has been hampered by the lack of suitable machinery.\* 212/

There is no information available on supplies of bearings steel and steel balls in Poland.

\* Appendix C indicates the types of machine tools required to produce antifriction bearings.

S-E-C-R-E-TC. Imports.1. Method of Procurement.

Imports of antifriction bearings are procured principally through CEBILOZ and through a state-owned organization called POLIMEX (Polskie Towarzystwo Eksport-Importowe Maszyn i Narzedzi -- Polish Enterprises for the Imports and Exports of Tools and Machines). Both CEBILOZ and POLIMEX are under the Ministry of Trade. 213/ The imports are obtained from the USSR and, legally and illegally, from Western European countries.

50X1  
50X12. Estimated Imports.a. USSR.

As stated above,\* the agreement between Poland and the USSR on the Mutual Exchange of Commodities, 1948-52, included quotas for antifriction bearings for these years rising from 300,000 units in 1948 to 800,000 units in 1952 (by annual increases of 100,000 except in 1950, when the increase was to be 200,000 units).

b. Western Europe.

Table 18\*\* shows the estimated weight, value, and quantity of antifriction bearings exported legally to Poland by Western European countries from 1948 through 1951. The most important exporters have been Sweden, Italy, and Austria. One reason for the large exports of antifriction bearings from these countries is the need for Polish coal, a need which has given Poland leverage to obtain bearings from them in return. The exports of Sweden and Italy decreased in 1951 compared with 1950, but those of Austria increased for the same period. In 1952 the trade agreements of Sweden, Austria, and Italy with Poland followed almost the same pattern as in previous years. Other suppliers have been France and Switzerland. In 1948 the total value was about \$3.3 million, estimated to be 1,411,000 bearings. By 1950 the total value had increased to about \$5.3 million estimated to be 2,306,000 bearings. Evidently, the export control program has had some effect, for in 1951 the total value was about \$4.3 million, estimated to be

\* P. 21.

\*\* Table 18 follows on p. 67.

S-E-C-R-E-T

2,076,000 bearings, a decrease of \$1 million and of 230,000 units. However, exports of bearings to Poland were still considerably higher in 1951 than in 1948.

(1) Sweden.

Under the terms of the Sweden-Poland trade agreement, signed on 3 December 1951, Sweden agreed to an antifriction bearings commitment valued at 10 million Swedish kronor (\$1.9 million). This commitment represents a large increase over bearings commitments in 1951, valued at 6 million kronor, but Sweden insists that because of price increases Poland will receive in real terms, the same amount of bearings in 1952 as in 1951. 214/

(2) Austria.

The quota under the Poland-Austria trade agreement for 1952 is for \$800,000 worth of antifriction bearings, 215/ which is similar to the quota of previous years.

(3) Italy.

Under the terms of the Italy-Poland trade agreement in force in 1952, Italy granted to Poland quota for antifriction bearings of \$2 million, 216/ which is comparable to the quota granted in previous years.

c. Estimated Imports in 1951.

The total known imports by Poland in 1951 have been estimated at 2,776,000 antifriction bearings, an amount made up of imports from the USSR under the agreed bearings quota and the legal imports from Western Europe shown in Table 18.\*

\* P. 67, below.

S-E-C-R-E-T

Table 18

Estimated Imports of Antifriction Bearings by Poland  
from Western Europe through Legal Transactions  
1948-51

Country	Year			
	1948	1949	1950	1951
<u>Sweden</u>				
Weight (Metric Tons)	516.8 a/*	549.3 a/	522.2 b/	422.6 c/
Value				
\$ US	1,226,592 a/	1,075,010 a/	1,073,880 b/	1,129,728 d/
Swedish Kronor	4,412,200	5,570,000		
Units e/	758,000 f/	806,000 f/	766,000 f/	617,000 f/
<u>Italy</u>				
Weight (Metric Tons)	276 g/	383 g/	676 g/	410 h/
Value				
\$ US	1,398,156 g/	1,804,800 g/	3,043,200 g/	1,434,000 h/
Italian Lire	804,000,000	1,128,000,000	1,902,000,000	
Units e/	405,000 f/	562,000 f/	992,000 f/	601,000 f/
<u>Austria</u>				
Weight (Metric Tons)	69.3 i/	225 j/	117.9 k/	260.9 k/
Value				
\$ US	276,080 l/	956,420 j/	500,965 l/	1,105,949 m/
Units e/	129,000 n/	637,000 n/	275,000 o/	608,000 o/

\* Footnotes for Table 18 follow on p. 69.

S-E-C-R-E-T

S-E-C-R-E-T

Table 18

Estimated Imports of Antifriction Bearings by Poland  
from Western Europe through Legal Transactions  
1948-51  
(Continued)

Country	Year			
	1948	1949	1950	1951
<u>France</u>				
Weight (Metric Tons)	73 <u>p</u> /	239 <u>p</u> /	81.5 <u>q</u> /	80.2 <u>q</u> /
Value				
\$ US	387,152 <u>p</u> /	1,435,240 <u>p</u> /	489,188 <u>r</u> /	480,999 <u>s</u> /
Units <u>e</u> /	114,000 <u>t</u> /	422,000 <u>t</u> /	144,000 <u>t</u> /	141,000 <u>t</u> /
<u>Switzerland</u>				
Weight (Metric Tons)	2 <u>u</u> /	92.7 <u>u</u> /	50.5 <u>u</u> /	42.8 <u>u</u> /
Value				
\$ US	10,919 <u>u</u> /	663,136 <u>u</u> /	167,860 <u>u</u> /	153,915 <u>u</u> /
Units <u>e</u> /	5,000 <u>v</u> /	237,000 <u>v</u> /	129,000 <u>v</u> /	109,000 <u>v</u> /
Totals				
Weight (Metric Tons)	<u>937.1</u>	<u>1,489.0</u>	<u>1,448.1</u>	<u>1,216.5</u>
Value (\$ US)	<u>3,298,899</u>	<u>5,934,606</u>	<u>5,275,093</u>	<u>4,304,591</u>
Units <u>e</u> /	<u>1,411,000</u>	<u>2,664,000</u>	<u>2,306,000</u>	<u>2,076,000</u>

S-E-C-R-E-T

Table 18

Estimated Imports of Antifriction Bearings by Poland  
from Western Europe through Legal Transactions  
1948-51  
(Continued)

- a. Compiled from official figures 217/ and converted from Swedish kronor to US dollars in 1948 at 3.6 kronor = \$1.00, and from 1949 to 1951 at 5.18 kronor = \$1.00.
- b. In 1950, Sweden exported 513 long tons of bearings valued at \$1,073,880 218/ (converted from long tons to metric tons by multiplying by 1.018).
- c. Sweden increased prices of bearings by 30 percent in December 1950. With this price increase and by comparison with the value and metric tons exported in 1950, the quantity exported in 1951 would be equivalent to 422.6 metric tons.

$$\frac{1,129,728}{1.30} \times \frac{522.2}{1,073,880} = 422.6 \text{ metric tons}$$

- d. Sweden exported bearings valued at 2,926,000 kronor from January to June 1951. 219/ This value was doubled to obtain the total value of bearings exported to Poland in 1951 (converted to US dollars at a rate of 5.18 kronor = \$1.00).
- e. Estimates of units have been rounded off to the nearest thousand.
- f. Metric tons were converted to units at a rate of 1.5 pounds per bearing, or 1,467 bearings per metric tons. (See Table 5, footnote f, p. 19, above, for methodology.)
- g. Compiled from official figures 220/ and converted from Italian lire to US dollars in 1948 at 575 lire = \$1.00, and from 1949 to 1951 at 625 lire = \$1.00.
- h. US official statistics. 221/
- i. In 1948, Austria exported 69.3 metric tons of bearings valued at 2.8 million schillings to Poland 222/ (converted at an exchange rate of 10.14 schillings = \$1.00).
- j. In 1949, Austria exported 225 metric tons of bearings 223/ valued at 9.7 million schillings to Poland 224/ (converted at an exchange rate of 10.14 schillings = \$1.00).
- k. Converted at a rate of \$4,250 per metric ton, which is the price Austria charged Poland per metric ton in 1949.
- l. In 1950, Austria was reported to have exported bearings valued at \$500,965 to Poland. 225/
- m. Compiled from official figures. 226/
- n. Official statistics. 227/
- o. Converted at a rate of \$1.82, which is the average price of a bearing on the 1948 and 1949 shipments to Poland.
- p. Compiled from official figures. 228/
- q. Converted at a rate of \$6,000 per metric ton, which is the price France charged Poland per metric ton in 1949.

S-E-C-R-E-T

S-E-C-R-E-T

Table 18

Estimated Imports of Antifriction Bearings by Poland  
from Western Europe through Legal Transactions  
1948-51  
(Continued)

- 
- r. In 1950, France was reported to have exported bearings valued at \$489,188 to Poland. 229/
- s. US official statistics. 230/
- t. Converted at a rate of \$3.40 per bearing. This estimated price is based on the French-Polish bearings list for 1951 in which France was to export 189,759 bearings valued at \$646,060 (converted at an exchange rate of 350 French francs = \$1.00). 231/ Although the total quantity was not exported, it does give an indication of the average price per bearing to Poland, which has also been assumed to be the average price per bearing to the Soviet Bloc from France.
- u. Swiss official statistics. 232/
- v. Swiss exports of bearings were converted from metric tons to units at a rate of 0.86 pounds per bearing, or 2,558 bearings per metric ton. (See Table 15, footnote t, p. 60, above, for methodology.)

S-E-C-R-E-T



S-E-C-R-E-TD. Requirements.

There is no direct information available on Poland's requirements for antifriction bearings. [redacted]

[redacted] in 1951 the Polish antifriction bearings industry was capable of furnishing not more than 10 percent of Poland's requirements. <sup>233/</sup> The output of the Krasnik plant in 1951 has been estimated at approximately 500,000 bearings. Poland's requirements for antifriction bearings may thus be computed at about 5 million. This estimate has been considered acceptable in view of the industrial development of Poland relative to that of Czechoslovakia or East Germany.

50X1  
50X1E. Balance (Surplus or Deficit).

In 1951, Poland was capable of supplying about 10 percent of its requirements for antifriction bearings through domestic production. It is evident that Poland is dependent on imports to supplement domestic production. The import of bearings in 1951 has been estimated to be 2,776,000 bearings, aside from illegal transactions. The total supply available to Poland, domestic production plus imports, fulfills about 65 percent of the requirements of the industry in Poland. The deficit in 1951 has been estimated to be over 1.5 million bearings, on the basis indicated in Table 19.

Table 19

Estimated Position of the Antifriction Bearings Industry  
in Poland  
1951

		Thousand Units
Requirements		5,000
Imports	2,776	
Production	500	
Production plus Imports	<u>3,276</u>	
Total Supply Available <u>a/</u>	<u>3,276</u>	3,276
Balance (Deficit)		<u>-1,724</u>

a. Carry-over stocks appear to be negligible.

S-E-C-R-E-TVI. Rumania.A. Development of the Industry.

Before 1949, Rumania had been completely dependent on imports of antifriction bearings to fulfill its requirements. As a result of constant shortages of antifriction bearings, there were serious delays in the output of tractors and other industrial equipment. Under the 1949 Economic Plan, therefore, Rumania established an antifriction bearings section in the Steagul Rosu Plant (formerly Astra Vagoane) at Orasul Stalin (formerly Brasov). 234/

The Steagul Rosu Plant is the only confirmed antifriction bearings plant in Rumania. There is a report, however, that a plant has been under construction since March 1951, 2 miles north of the Barlad railway station, which will be either a ball bearings plant or a war materiel plant. 235/ In 1952 the Vasile Rosita metallurgical plant in Bucharest reportedly began producing roller bearings. 236/

B. Production.1. Estimated Output.

The total output of antifriction bearings in Rumania consists of the production of the bearings section in the Steagul Rosu Plant. The estimates of output have been developed in the plant study of Steagul Rosu (see Appendix B). They are based on the reported actual and planned production of this plant.

Output, which was estimated to be about 7,000 bearings during the last 7 months of 1949, increased to an estimated 200,000 in 1950. On the basis of this growth in output, production has been estimated to be about 300,000 bearings in 1951. There is no information available on total output in 1952 or on the planned output in Rumania for later years. At the rate the industry has expanded in 1950, it is reasonable to assume that output of bearings in 1952 may have increased to 400,000.

2. Types and Sizes of Bearings in Production.

Steagul Rosu has produced a small number of types and sizes of roller bearings. Actual production up to April 1950 consisted of taper roller, spherical roller, and cylindrical roller bearings in

S-E-C-R-E-T

bore sizes of 50 mm, 60 mm, and 110 mm. According to the planned production in 1950, this plant has been planning to produce over 40 different sizes in various types of ball and roller bearings. 237/ In 1951 the plant reportedly succeeded in manufacturing a ball bearings with a 50-mm bore. 238/

The limited number of types and sizes in production is a sensitive point in the industrial development of Rumania. 239/ It would appear that the industry itself suffers from a lack of skilled labor, since the bearings turned out by the plant are reported to be rejected frequently because of improper tolerances. 240/

### 3. Material and Equipment.

#### a. Steel.

The high-grade chrome steel required for antifriction bearings has been produced in Rumania at the following mills: Industria Sarmei (Wire Industry) in Campia-Turzii, 241/ the steel combine at Hunedoara, 242/ and the Sovrometal Steel Plant at Recita. 243/ A person by the name of Ionescu is reported to be responsible for the procurement of the bearings steel, 244/ the quality of which is reported to be good. 245/

#### b. Steel Balls.

In early 1950, steel balls were reported to have been supplied by the USSR and by RIV, Italy. 246/ Steagul Rosu produced only roller bearings in 1950, and the production of ball bearings was not accomplished until 1951.

#### c. Machine Tools.\*

Machinery for the bearings section of Steagul Rosu was imported from the USSR under the USSR-Rumania trade agreement of 1949, and other machinery is reported to have transferred from the IAR (Industria Aeronomica Romana) factory in Orasul Stalin. 247/ Only roller bearings had been manufactured up to 1951, because Rumania did not have the special machinery required to produce ball bearings. 248/ Evidently Rumania received an oscillating groove

\* Appendix C indicates the types of machine tools required to produce antifriction bearings.

S-E-C-R-E-T

grinder, which is one of the special machines needed to grind the races of the rings of ball bearings, since Steagul Rosu is reported to have produced ball bearings with a 50-mm bore in May 1951. As noted above, the balls were imported, which would be an indication that the plant does not have the special machines for grinding and lapping balls.

C. Imports.1. Method of Procurement.

Imports of antifriction bearings are made principally through Masinimport and Technoimport, which are controlled by the Ministry of Trade. 249/ The imports are obtained from the USSR and legally and illegally from Western European countries.

2. Estimated Imports.a. USSR.

Under the 1950 USSR-Rumania trade agreement the USSR agreed to export to Rumania 120,000 bearings, 250/ reported to have a value equivalent to \$1.5 million, 251/ or an average price of \$12.50 per bearing. The fact that this is a rather high average price suggests that the USSR is either exporting large-size bearings or is charging Rumania higher prices. It is reasonable to assume that this trade agreement was still in effect in 1951.

b. Western Europe.

Table 20\* shows the estimated weight, value, and quantity of antifriction bearings exported legally to Rumania by Italy, Austria, and Switzerland from 1949 through 1951. In 1950 the total value was over \$1 million, estimated to be 478,000 bearings. In 1951 the total value had decreased to about \$300,000, estimated to be 161,000 bearings. From these figures, it would appear that the trade embargo has been partially effective. Rumania is not self-sufficient in the production of bearings and, even if it were, the needs of the other Satellites would prevent any voluntary decrease in imports.

\* Table 20 follows on p. 76.

S-E-C-R-E-T

S-E-C-R-E-T

Sweden has discontinued exporting bearings to Rumania because property owned by Swedish companies was nationalized by the Rumanians. 252/ However, Rumania has been attempting to procure Swedish bearings through Poland. Under the Rumania-Poland trade agreement of 1950, Poland agreed to re-export \$300,000 worth, approximately 160,000 units,\* of antifriction bearings acquired from Sweden or Germany. 253/ Since Sweden needs Polish coal, the Soviet Bloc had evidently intended to use this lever to procure antifriction bearings for Rumania. It is doubtful that this operation was completed, since exports of bearings from Sweden to Poland decreased in both 1950 and 1951 compared with 1949 (see Table 18\*\*) and since Poland lacks adequate supplies of antifriction bearings for its own industry.

50X1

c. Estimated Imports in 1951.

The total known imports of antifriction bearings by Rumania in 1951 have been estimated to be 281,000 bearings, including shipments to Rumania by the USSR and the legal exports from Western Europe shown in Table 20.

\* In 1951, Rumania imported bearings valued at \$300,000, estimated to be 161,000 bearings. The quantity of money involved in the Rumania-Poland trade agreement is also \$300,000. Therefore, the quantity of bearings has been estimated to be about the same.

\*\* P. 67. above.

50X1

S-E-C-R-E-T

Table 20

Estimated Imports of Antifriction Bearings by Rumania  
 from Western Europe through Legal Transactions  
 1949-51

<u>Country</u>	<u>Year</u>		
	<u>1949</u>	<u>1950</u>	<u>1951</u>
<u>Italy</u>			
Weight (Metric Tons)	135.2 <u>a</u> **	191.7 <u>a</u> /	50.0 <u>a</u> /
Value			
\$ US	456,000 <u>b</u> /	646,910 <u>c</u> /	169,000 <u>d</u> /
Units <u>e</u> /	198,000 <u>f</u> /	281,000 <u>f</u> /	73,000 <u>f</u> /
<u>Austria</u>			
Weight (Metric Tons)	N.A.	N.A.	28.0 <u>g</u> /
Value			
\$ US	N.A.	200,000 <u>h</u> /	91,852 <u>i</u> /
Units <u>e</u> /	N.A.	116,000 <u>j</u> /	53,000 <u>j</u> /

\* Footnotes for Table 20 follow on p. 77.

- 76 -

S-E-C-R-E-T

S-E-C-R-E-T

Table 20

Estimated Imports of Antifriction Bearings by Rumania  
from Western Europe through Legal Transactions  
1949-51  
(Continued)

Country	Year		
	1949	1950	1951
<u>Switzerland</u>			
Weight (Metric Tons)	16.3 <u>k/</u>	31.6 <u>k/</u>	13.6 <u>k/</u>
Value			
\$ US	62,323 <u>k/</u>	155,550 <u>k/</u>	38,740 <u>k/</u>
Units <u>e/</u>	42,000 <u>l/</u>	81,000 <u>l/</u>	35,000 <u>l/</u>
Totals			
Weight (Metric Tons)			<u>91.6</u>
Value (\$ US)		<u>1,002,460</u>	<u>299,592</u>
Units <u>e/</u>		<u>478,000</u>	<u>161,000</u>

- a. Value has been converted to metric tons at a rate of \$3,374 per metric ton. This estimate [redacted] gave the weight as 135 metric tons for a portion of Italy's shipments of bearings to Rumania in 1950, valued at \$455,484. 256/
- b. Italy was reported to have exported bearings valued at \$456,000 to Rumania in 1949. 257/
- c. Italy was reported to have exported bearings valued at \$646,910 to Rumania in 1950. 258/
- d. Italian exports to Rumania for the first 8 months of 1951 were reported

S-E-C-R-E-T

S-E-C-R-E-T

Table 20

Estimated Imports of Antifriction Bearings by Rumania  
from Western Europe through Legal Transactions  
1949-51  
(Continued)

- 
- as \$124,000. 259/ Italian licenses granted for exports of bearings to Rumania for the last 3 months of 1951 were reported as \$45,000. 260/ The combined total of \$169,000 was accepted as total exports for 1951.
- e. Estimates of units have been rounded off to the nearest thousand.
- f. Metric tons were converted to units at a rate of 1.5 pounds per bearing, or 1,467 bearings per metric ton. (See Table 5, footnote f, p. 19, above, for methodology.)
- g. Austria was reported to have exported 21 metric tons to Rumania in the first 9 months of 1951. 261/ For the full year, if exports continued at the same rate, this would be 28 metric tons.
- h. The Rumania-Austria trade agreement signed 17 April 1950 included a \$200,000 quota of bearings. 262/
- i. Compiled from official data. 263/
- j. Converted from value at the rate of \$1.73 per bearing, which is the average price of bearings that Austria charged Czechoslovakia. (See Table 15, p. 57, above.)
- k. Swiss official statistics. 264/
- l. Swiss exports of bearings were converted from metric tons at a rate of 0.86 pounds per bearing, or 2,558 bearings per metric ton. (See Table 15, footnote t, p. 50, above, for methodology.)



S-E-C-R-E-TD. Requirements.

[redacted] It is possible to make an estimate of the requirements in 1950 by totaling the estimated domestic production, the estimated imports from Western Europe, and the proposed imports from the USSR. On this basis the requirements in 1950 would have been about 798,000 bearings. Assuming an increase of 10 percent in requirements for bearings, it is estimated that the requirements in 1951 would have been over 850,000 bearings. Obviously, this is not a desirable method of computing requirements, but in the absence of more accurate information the estimate has been considered acceptable. Rumania is not a highly industrialized country, and the requirements for bearings would be considerably smaller than those of Czechoslovakia or of Poland.

50X1  
50X1E. Balance (Surplus or Deficit).

The following computations must be viewed while keeping in mind the method of estimating requirements for bearings. It is estimated that in 1951 Rumania supplied about 35 percent of its requirements through domestic production. Including the estimated imports, about 68 percent of the requirements have been fulfilled. The deficit in 1951 has been estimated to have been over 250,000 bearings, as indicated in Table 21.

Table 21

Estimated Position of the Antifriction Bearings Industry in Rumania  
1951

		Thousand Units
Requirements		850
Production	300	
Imports	281	
Production plus Imports	<u>581</u>	
Total Supply Available <u>a/</u>	<u>581/</u>	581
Balance (Deficit)		-269

a. Carry-over stocks assumed to be negligible.

S-E-C-R-E-TVII. Hungary.A. General Information.

Hungary depends almost entirely on imports of antifriction bearings to fulfill its requirements. During the past few years the Matyas Rakosi Combine (formerly the Manfred Weiss Works) has been manufacturing a small quantity of antifriction bearings for motor-cycles and motor vehicles. The quality of the bearings is reported to be poor. [redacted] the Keletmagyarorszagi Golyoscapagygyar (East Hungarian Ball Bearings Factory) is being constructed on the outskirts of Debrecen, and it is expected that this plant will be in production before the end of the current Five Year Plan. 265/ Present production is on so limited a scale as to be negligible for purposes of this report.

50X1

The limited production at the Matyas Rakosi Combine was started with the assistance of Sweden, which claims that this action was necessary to prevent the erection of a complete government-owned ball bearings plant, as had been planned by the Hungarians. 266/ Apparently Sweden is continuing to lend assistance -- under the proposed Hungary-Sweden trade agreement in 1951, there is included 1.5 million Swedish kronor worth of bearings steel. 267/

The shortage of antifriction bearings is probably more critical in Hungary than in any of the other Satellites. In 1951 the Hungarian State Planning Office issued a decree that all antifriction bearings and cages which were 20 mm or greater in diameter and which had previously been used but were not currently in service must be reported in writing and offered for sale. 268/ The severity of the shortage underlying this stringent decree is corroborated by reports that in 1950 the shortage of antifriction bearings had caused a number of work stoppages in the machine and motor-vehicle industries. 269/ The shortage apparently continued to be extremely critical in 1952.

[redacted] a complete embargo of antifriction bearings by the West would result in a serious breakdown of Hungary's industry. For the embargo to be effective, [redacted] it should be continued for 6 months or longer. 270/

50X1

50X1

S-E-C-R-E-TB. Imports.1. Method of Procurement.

Although the trading operations are carried out through the official state import corporation, Metalimpex, all those Hungarian commercial agencies previously in this line of business and with good contacts in the West have received every encouragement to facilitate imports of antifriction bearings. 271/ The imports are obtained from the USSR and, legally and illegally, from Western European countries. There is inadequate information to make an estimate of the quantity of bearings which Hungary acquires from the West by illegal transactions.

2. Estimated Imports.a. USSR.

The USSR agreed to export to Hungary during the period 1 October 1948 - 31 December 1949 a quota of bearings valued at \$350,000. 272/ Converted at a rate of \$2 per bearing, this would be approximately 175,000 bearings. It is reasonable to assume that this quota of bearings as a minimum was still in effect in 1951.

b. Western Europe.

Table 22\* shows the estimated weight, value, and quantity of antifriction bearings exported legally to Hungary by Western European countries from 1948 through 1951. The most important exporters have been Italy, Austria, and Switzerland. In 1950, Sweden is reported to have exported no bearings, and the quantity exported in 1951 was small as compared with exports from Sweden to Hungary in 1948 and 1949. France has also exported some bearings to Hungary.

In 1948 the total value of bearings imported by Hungary was about \$900,000, estimated to be 415,000 bearings. Even without exports by Sweden in 1950, the total value had increased to about \$2.7 million, estimated to be 1,171,000 bearings. This substantial increase in exports by the West was caused by the increased exports by Italy. Western exports to Hungary decreased in 1951 to about \$2.2 million, estimated to be 924,000 bearings. The 1951 exports, however, are still more than double those of 1948.

\* Table 22 follows on p. 82.

S-E-C-R-E-T

S-E-C-R-E-T

Table 22

Estimated Imports of Antifriction Bearings by Hungary  
from Western Europe through Legal Transactions  
1948-51

Country	Year			
	1948	1949	1950	1951
<u>Sweden</u>				
Weight (Metric Tons)	170.9 <u>a</u> /*	302.2 <u>a</u> /	0	58 <u>b</u> /
Value				
\$ US	499,510 <u>a</u> /	693,237 <u>a</u> /	0 <u>c</u> /	224,710 <u>d</u> /
Swedish Kronor	1,796,800	3,591,900		
Units <u>e</u> /	251,000 <u>f</u> /	443,000 <u>f</u> /	0	85,000 <u>f</u> /
<u>Italy</u>				
Weight (Metric Tons)	26 <u>g</u> /	212 <u>g</u> /	426 <u>g</u> /	312 <u>h</u> /
Value				
\$ US	144,337 <u>g</u> /	774,400 <u>g</u> /	1,584,000 <u>g</u> /	1,287,000 <u>h</u> /
Italian Lire	83,000,000	484,000,000	990,000,000	
Units <u>e</u> /	38,000 <u>f</u> /	311,000 <u>f</u> /	625,000 <u>f</u> /	456,000 <u>f</u> /
<u>Austria</u>				
Weight (Metric Tons)	16.0 <u>i</u> /	52.4 <u>j</u> /	124.9 <u>i</u> /	85.7 <u>i</u> /
Value				
\$ US	69,020 <u>k</u> /	226,780 <u>j</u> /	540,540 <u>l</u> /	370,865 <u>m</u> /
Units <u>e</u> /	41,000 <u>k</u> /	93,000 <u>j</u> /	262,000 <u>n</u> /	180,000 <u>n</u> /

\* Footnotes for Table 22 follow on p. 84.

S-E-C-R-E-T

S-E-C-R-E-T

Table 22

Estimated Imports of Antifriction Bearings by Hungary  
from Western Europe through Legal Transactions  
1948-51  
(Continued)

Country	Year			
	1948	1949	1950	1951
<u>France</u>				
Weight (Metric Tons)	N.A.	7 <u>o</u> /	42.6 <u>p</u> /	14.4 <u>p</u> /
Value				
\$ US	N.A.	45,189 <u>o</u> /	274,903 <u>q</u> /	92,686 <u>r</u> /
Units <u>e</u> /	N.A.	13,000 <u>s</u> /	81,000 <u>s</u> /	27,000 <u>s</u> /
<u>Switzerland</u>				
Weight (Metric Tons)	33.1 <u>t</u> /	49.5 <u>t</u> /	79.2 <u>t</u> /	68.9 <u>t</u> /
Value				
\$ US	178,563 <u>t</u> /	230,566 <u>t</u> /	313,800 <u>t</u> /	249,620 <u>t</u> /
Units <u>e</u> /	85,000 <u>u</u> /	127,000 <u>u</u> /	203,000 <u>u</u> /	176,000 <u>u</u> /
Totals				
Weight (Metric Tons)		<u>623.1</u>	<u>672.7</u>	<u>539.0</u>
Value (\$ US)		<u>1,970,172</u>	<u>2,713,243</u>	<u>2,224,881</u>
Units <u>e</u> /		<u>987,000</u>	<u>1,171,000</u>	<u>924,000</u>

S-E-C-R-E-T

S-E-C-R-E-T

Table 22

Estimated Imports of Antifriction Bearings by Hungary  
from Western Europe through Legal Transactions  
1948-51  
(Continued)

- a. Compiled from official figures 273/ and converted from Swedish kronor to US dollars in 1948 at a rate of 3.6 kronor = \$1.00, and from 1949 to 1951 at 5.18 kronor = \$1.00.
- b. Sweden increased prices 30 percent in early 1950 and another 30 percent in December 1950. This would be a total increase of 169 percent in 1951 over the 1949 prices. With this price increase and by comparison with the value and metric tons exported in 1949, the quantity exported in 1951 would be equivalent to 58 metric tons:

$$\frac{224,710}{1.69} \times \frac{302.2}{693,237} = 58 \text{ metric tons}$$

- c. Official records show no exports to Hungary in 1950. 274/
- d. Sweden exported bearings valued at 582,000 kronor from January to June 1951. 275/ This value has been doubled to obtain the total value of bearings exported to Hungary in 1951 (converted to US dollars at a rate of 5.18 kronor = \$1.00).
- e. Estimates of units have been rounded off to the nearest thousand.
- f. Metric tons have been converted to units at a rate of 1.5 pounds per bearing, or 1,467 bearings per metric ton. (See Table 5, footnote f, p. 19, above, for methodology.)
- g. Compiled from official figures 276/ and converted from Italian lire to US dollars in 1948 at a rate of 575 lire = \$1.00, and from 1949 to 1951 at a rate of 625 lire = \$1.00.
- h. US official statistics. 277/
- i. Converted at a rate of \$4,328 per metric ton, the price which Austria charged Hungary per metric ton in 1949.
- j. In 1949, Austria was reported to have exported to Hungary 93,000 bearings valued at 2.3 million schillings, 278/ and weighing 52.4 metric tons 279/ converted at an exchange rate of 10.14 schillings = \$1.00.
- k. In 1948, Austria exported to Hungary 41,000 bearings valued at 700,000 schillings 280/ (converted at an exchange rate of 10.14 schillings = \$1.00).
- l. In 1950, Austria was reported to have exported to Hungary bearings valued at \$540,540. 281/
- m. Compiled from official figures. 282/
- n. Converted at a rate of \$2.06, which is the average price of a bearing on the 1948 and 1949 shipments to Hungary.
- o. Official figures. 283/

S-E-C-R-E-T

Table 22

Estimated Imports of Antifriction Bearings by Hungary  
from Western Europe through Legal Transactions  
1948-51  
(Continued)

- 
- p. Converted at a rate of \$6,456 per metric ton, the price which France charged Hungary per metric ton in 1949.
- q. In 1950, France was reported to have exported to Hungary bearings valued at \$274,903. 284/
- r. US official statistics. 285/
- s. Converted at a rate of \$3.40 per bearing. (See Table 18, footnote t, p. 70, above, for methodology.)
- t. Swiss official statistics. 286/
- u. Swiss bearings exports have been converted from metric tons to bearings at a rate of 0.86 pounds per bearing, or 2,558 bearings per metric ton. (See Table 15, footnote t, p. 60, above, for methodology.)

S-E-C-R-E-Tc. Estimated Imports in 1951.

The total known imports of antifriction bearings by Hungary in 1951 have been estimated at 1,099,000 bearings, including the quota of bearings from the USSR and the legal exports from Western Europe, as shown in Table 22.

C. Requirements.

There is no information available on the requirements for antifriction bearings in Hungary. In view of the industrial development of Hungary as compared with Czechoslovakia and East Germany, an estimate of over 5 million bearings is believed to be reasonable.

D. Balance (Surplus or Deficit).

The following computations must be viewed while keeping in mind the method of estimating requirements for bearings. Hungary's domestic production is believed to have been negligible. It is apparent that Hungary is dependent on imports to fulfill requirements for bearings. The legal imports of bearings in 1951 fulfilled only 22 percent of the estimated requirements. The deficit in 1951 has been estimated at about 4 million bearings, as indicated in Table 23.

Table 23

Estimated Position of the Antifriction Bearings Industry in Hungary  
1951

		Thousand Units
Requirements		5,000
Production	Negligible	
Imports	1,100	
Total Supply Available <u>a/</u>	<u>1,100</u>	1,100
Balance (Deficit)		<u>-3,900</u>

a. Carry-over stock assumed to be negligible.



S-E-C-R-E-TVIII. Bulgaria.A. Imports.

Bulgaria is entirely dependent on imports of antifriction bearings to fulfill its requirements. The imports are procured through Metalimport, a state-controlled import corporation. 287/ Table 24\* shows the estimated weight, value, and quantity of antifriction bearings exported legally to Bulgaria by the West from 1948 through 1951. Very few statistics are available, and the exports of bearings by Sweden and Italy in 1951 have been assumed to be the same as those in 1950. Total imports in 1951 have been estimated at about 60,000 bearings.

B. Requirements.

Bulgaria's requirements for antifriction bearings are small. In view of the small amount of industrial development in Bulgaria as compared with the other Satellites, it is unlikely that the requirements for bearings in 1951 are greater than 400,000 units.

C. Balance (Surplus or Deficit).

On the basis of the above estimate of requirements for bearings and the rather meager information available on imports, it is believed that Bulgaria had a deficit of over 300,000 bearings in 1951.

IX. Position of the Soviet Bloc, 1951.A. Soviet Bloc.

In 1951 the antifriction bearings industry of the Soviet Bloc had 16 major plants and 7 minor plants producing antifriction bearings. In addition, there was 1 major plant under construction, and there were 12 confirmed plants repairing antifriction bearings and 1 plant producing steel balls and rollers for the industry. The distribution of these plants in the Bloc is shown in Table 25.\*\* The balance of the

\* Table 24 follows on p. 88.

\*\* Table 25 follows on p. 92.

S-E-C-R-E-T

Table 24

Estimated Imports of Antifriction Bearings by Bulgaria  
from Western Europe through Legal Transactions  
1948-51

Country	Year			
	1948	1949	1950	1951
<u>Sweden</u>				
Weight (Metric Tons)	N.A.	N.A.	N.A.	N.A.
Value				
\$ US	168,069 <u>a</u> /*	119,454 <u>a</u> /	50,193 <u>b</u> /	50,193 <u>c</u> /
Swedish Kronor	605,000	430,000	260,000	
Units <u>d</u> /	92,000 <u>e</u> /	66,000 <u>e</u> /	28,000 <u>e</u> /	28,000 <u>c</u> /
<u>Italy</u>				
Weight (Metric Tons)	N.A.	N.A.	N.A.	N.A.
Value				
\$ US	200,000 <u>f</u> /	264,748 <u>f</u> /	54,000 <u>f</u> /	54,000 <u>g</u> /
Units <u>d</u> /	88,000 <u>h</u> /	116,000 <u>h</u> /	24,000 <u>h</u> /	24,000 <u>g</u> /
<u>Austria</u>				
Weight (Metric Tons)	N.A.	N.A.	N.A.	N.A.
Value				
\$ US	N.A.	98,600 <u>i</u> /	36,293 <u>j</u> /	467 <u>k</u> /
Units <u>d</u> /	N.A.	73,000 <u>i</u> /	27,000 <u>l</u> /	300 <u>l</u> /

\* Footnotes for Table 24 follows on p. 89.

S-E-C-R-E-T

S-E-C-R-E-T

Table 24

Estimated Imports of Antifriction Bearings by Bulgaria  
from Western Europe through Legal Transactions  
1948-51  
(Continued)

Country	Year			
	1948	1949	1950	1951
<u>Switzerland</u>				
Weight (Metric Tons)	0.1 m/	14.5 m/	9.5 m/	3.1 m/
Value				
\$ US	841 m/	42,165 m/	27,650 m/	11,365 m/
Units d/	300 n/	37,000 n/	24,000 n/	8,000 n/
Totals				
Weight (Metric Tons)				
Value (\$ US)		<u>524,967</u>	<u>168,136</u>	<u>116,025</u>
Units d/		<u>292,000</u>	<u>103,000</u>	<u>60,300</u>

- a. Compiled from official statistics 288/ (converted from Swedish kronor to US dollars at a rate of 3.6 kronor = \$1.00 for 1948 and 1949).
- b. Sweden was reported to have exported bearings valued at 260,000 kronor to Bulgaria in 1950 289/ (converted at a rate of 5.18 kronor = \$1.00).
- c. No information available; taken as for 1950.
- d. Estimates of units have been rounded off to the nearest thousand.
- e. Converted from value at a rate of \$1.82 per bearing. By taking the value and estimated quantity of bearings Sweden exported to Czechoslovakia in 1950 (see Table 15, p. 57, above), the average price per bearing has been estimated to be \$1.82.
- f. The Bulgaria-Italy trade agreement, signed in 1947, which is still in effect, included a quota

S-E-C-R-E-T

S-E-C-R-E-T

Table 24

Estimated Imports of Antifriction Bearings by Bulgaria  
from Western Europe through Legal Transactions  
1948-51  
(Continued)

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of bearings of \$200,000. The exports in 1949 and 1950 varied from the quota as indicated. 290/  
g. No information available; taken as for 1950.  
h. Converted from value at a rate of \$2.28 per bearing, which is the average price which Italy charged Czechoslovakia in 1951 (see Table 15, p. 57, above).  
i. Compiled from official figures. 291/  
j. In 1950 Austria was reported to have exported bearings valued at \$36,293 to Bulgaria. 292/  
k. Official report. 293/  
l. Converted from value at a rate of \$1.35 per bearing, which is based on the average price per bearing of Austria's 1949 exports to Bulgaria.  
m. Swiss official statistics. 294/  
n. Swiss exports of bearings were converted from metric tons at a rate of 0.86 pounds per bearing, or 2,558 bearings per metric ton. (See Table 15, footnote t, p. 60, above, for methodology.)

- 90 -

S-E-C-R-E-T

S-E-C-R-E-T

estimated total supply against the estimated total requirements is also shown in Table 25.

The total output of these plants in 1951 has been estimated to be over 115 million bearings, with approximately 88 percent of the total output being produced by the plants in the USSR.

The imports into and within the Soviet Bloc in 1951 have been estimated to be over 11 million bearings, including the estimated legal imports and a portion of the illegal imports from the West and the quotas of bearings which the USSR has established with the Satellites. The exports within the Bloc consist of the quotas of bearings mentioned above and a small quantity of bearings which East Germany exported to the USSR. The net imports into the Bloc in 1951 have therefore been estimated at over 8 million bearings, which, it is believed, would be considerably greater if it were possible to estimate the total clandestine trade in antifriction bearings.

The estimated total supply of antifriction bearings -- output plus net imports -- in the Soviet Bloc in 1951 has been estimated at about 124 million, and the total requirements of the Bloc in 1951 have been estimated at between 146 million and 153 million bearings, with the USSR requiring approximately 75 percent of the total requirements. Thus the deficit of antifriction bearings in the Bloc in 1951 has been estimated to be between 22 million and 29 million.

B. USSR.

The USSR is by far the largest producer of antifriction bearings in the Soviet Bloc and has made significant progress in the postwar years in its bearings industry. In 1951 the antifriction bearings industry of the USSR had 9 major plants operating, and 1 major plant was under construction. In addition, there were 12 confirmed plants repairing bearings.

As a result of the high priority given in Soviet planning to the expansion of the machine-building industry and industries producing military equipment, which are major consumers of antifriction bearings, the increased production of bearings in the Soviet Bloc has not, as yet, been able to fulfill the requirements for bearings of these

S-E-C-R-E-T

Table 25

Estimated Position of the Antifriction Bearings Industry  
in the Soviet Bloc a/  
1951

Million Units							
Area	Number of Plants	Output	Imports	Exports	Total Supply	Requirements	Deficit
USSR	9 Major Plants, 1 Plant under Construction, 12 Confirmed Repair Plants	103.0 <u>b/</u>	1.6 <u>c/</u>	2.0 <u>d/</u>	102.6	110.0-115.0	7.4-12.4
Satellites							
East Germany	4 Major Plants, 3 Minor Plants, and 1 Plant Manufacturing Steel Balls and Rollers	5.3	0.4 <u>e/</u>	1.0 <u>f/</u>	4.7	10.3	5.6
Czechoslovakia	3 Major Plants, 1 Minor Plant	6.2	5.0 <u>g/</u>	0	11.2	14.5- 16.0	3.3- 4.8
Poland	1 Minor Plant	0.5	2.8 <u>h/</u>	0	3.3	5.0	1.7
Rumania	1 Minor Plant	0.3	0.3 <u>h/</u>	0	0.6	0.8	0.2
Hungary	Negligible Production at 1 Plant	Negligible	1.1 <u>h/</u>	0	1.1	5.0	3.9
Bulgaria	None	0	0.1 <u>i/</u>	0	0.1	0.4	0.3
Total		<u>115.3</u>	<u>11.3</u>	<u>3.0</u>	<u>123.6</u>	<u>146.0-152.5</u>	<u>22.4-28.9</u>

- a. The method used to estimate these figures has been discussed in previous sections of this report.  
b. The major plants are estimated to have produced 101 million bearings and the repair plants 2 million bearings.  
c. Estimated legal imports from the West and estimated imports from East Germany.  
d. Soviet quotas of bearings to the Satellites.  
e. Estimated legal and illegal imports from the West.  
f. Estimated East German exports to the USSR.  
g. Includes a quota of bearings from the USSR and estimated legal and illegal imports from the West.  
h. Includes a quota of bearings from the USSR and estimated legal imports from the West.  
i. Estimated legal imports from the West.

- 92 -

S-E-C-R-E-T

S-E-C-R-E-T

industries. At the rate the antifriction bearings industry has been expanding, it is estimated that in 1953 or 1954 the requirements for bearings of the USSR should be fulfilled by domestic production. Imports of bearings, however, will continue to be needed for replacement purposes in the machinery already procured from the West, which contains types and sizes of bearings outside the production range of the USSR.

C. Satellites.

The antifriction bearings industries in the Satellites have been principally developed since World War II. After the partition of Germany the bearings plants in East Germany were almost completely dismantled by the Russians. An active antifriction bearings industry, however, consisting of 4 major plants, 3 minor plants, and 1 plant manufacturing steel balls and rollers, has been re-established in East Germany. Since the war the 1 small plant assembling bearings in Czechoslovakia has been expanded into an active antifriction bearings industry, consisting of 3 major plants and 1 minor plant. A plant to produce antifriction bearings has also been established in each of the following Satellites: Poland, Rumania, and Hungary.

In 1951 the antifriction bearings industries of the Satellites were in a much worse position than was the industry in the USSR. Although the antifriction bearings industries of East Germany and Czechoslovakia have made progress in the production of antifriction bearings, the shortage of steel, steel balls, abrasives, and equipment has been a continuous problem to these countries as well as to the other Satellites. These difficulties have resulted in a very poor supply of bearings in the Satellites relative to their requirements. The Satellites require about 25 percent of the estimated requirements for bearings of the Soviet Bloc and produce only 12 percent of the total supply of the Bloc. Since the USSR requires domestically all of its production of bearings, only small quantities of bearings are furnished to the Satellites from the USSR. The Satellites, therefore, must import a substantial quantity of bearings from the West. It is believed that the Satellites will continue to import antifriction bearings in substantial quantities.

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S-E-C-R-E-T

Table 26

Inputs into the Antifriction Bearings Industry in the US <sup>a/</sup>\*  
1947

<u>Items</u>	<u>Percentage of Total Cost</u>	<u>Cost of Inputs b/ (Dollars)</u>	<u>Inputs Required c/</u>	<u>Inputs Corrected to the Raw Product</u>
<b>Steel</b>				
Steel Mill Products (Tubing, Bar, Sheet, Wire)		49,663,000	309,549 short tons	413,174 metric tons <u>d/</u>
Iron and Steel Forgings		2,757,000	9,730 short tons	15,550 metric tons <u>d/</u>
Balls and Rollers		16,417,000		5,224 metric tons <u>e/</u>
Subtotal	68.9	<u>68,837,000</u>		<u>433,948</u> metric tons
Copper and Copper Base Alloys	2.3	2,348,000	2,459 short tons	2,232 metric tons <u>f/</u>
<b>Fuels</b>				
Bituminous Coals		578,000	102,000 short tons	92,620 metric tons <u>f/</u>
Fuel Oil		740,000	262,000 barrels	59,910 metric tons <u>g/</u>
Natural Gas		402,000	1,005 million cu ft	40,340 metric tons <u>g/</u>
Manufactured Gas		371,000	639 million cu ft	13,380 metric tons <u>g/</u>
Subtotal	2.1	<u>2,091,000</u>		<u>206,250</u> metric tons <u>g/</u>
Electric Power	3.6	3,593,000	318 million kwh	318 million kwh
<b>POL</b>				
Lubricants	1.8	1,842,000		4,640 metric tons <u>h/</u>
Abrasives	3.6	3,553,000		8,060 metric tons <u>i/</u>
Cutting Tools	2.7	2,666,000		152,000 units <u>j/</u>
Other Industries <u>k/</u>	15.0	15,020,000		
<b>Total</b>	<u>100.0</u>	<u>99,950,000</u>		

\* Footnotes for Table 26 follow on p. 96.

S-E-C-R-E-T

Table 26

Inputs into the Antifriction Bearings Industry in the US a/  
1947  
(Continued)

a. The value of the ball and roller bearings produced in the US for 1947 was given in the Census of Manufactures as \$339,927,000. In 1947 the US is estimated to have produced 20 million precision-type bearings per month, and it is believed that 3 companies in the US which produce unground, low-carbon steel bearings were capable of producing another 7 million bearings per month. This would be a total of 324 million bearings produced in the US in 1947 for an average price of \$1.05 per bearing.

b. The cost inputs have been obtained from the Division of Interindustry Economics, Bureau of Labor Statistics, and from the Census of Manufactures, 1947, Bureau of the Census. The total input costs and total production value for the industry have been corrected to cover ball and roller bearings only. The cost of castings has been deduced from the input costs, and the value of the cast items has been deduced from the total value of the industry. The values deducted were relatively small and would cause very little discrepancy in the other input calculations.

c. When the Census of Manufactures gives inputs for components of the industry by weight or by other units than dollars, these units are shown.

d. Inputs of steel were converted to metric tons of raw steel by using the following conversion factors: (1) 1 ton (short ton = 2,000 pounds) = 0.908 metric ton; (2) correction for steel mill components is 1.47; and (3) correction for iron and steel forgings is 1.76.

e. Inputs of balls and rollers were converted to metric tons of raw steel by using the following conversion factors: (1) Average-size ball of 3/8 inch outside diameter is priced at \$2.38 per pound; (2) a 20-percent loss of steel may be expected in manufacturing the ball and rollers from the rolled product; (3) correction factor for the steel wire is 1.39; and (4) 1 ton = 0.908 metric tons.

$$\frac{16,417,000}{2.38 \times 2,000} \times 1.20 \times 1.39 \times 0.908 = 5,224 \text{ metric tons}$$

f. Converted to metric tons by multiplying by 0.908.

g. Fuels listed herein have been converted to equivalents of bituminous coal of 13,000 Btu per pound at the following ratio: fuel oil, 19,500 Btu per pound; natural gas, 1,150 Btu per cu ft; manufactured gas, 600 Btu per cu ft. One barrel fuel oil = 336 pounds; 1 metric ton = 2,204 pounds.

$$\text{Fuel oil: } \frac{262,000 \times 336}{2,204} \times \frac{19,500}{13,000} = 59,910 \text{ metric tons}$$

$$\text{Natural gas: } \frac{1,005,000,000}{2,204} \times \frac{1,150}{13,000} = 40,340 \text{ metric tons}$$

$$\text{Manufactured gas: } \frac{639,000,000}{2,204} \times \frac{600}{13,000} = 13,380 \text{ metric tons}$$

h. Converted from the cost price to pounds at a rate of \$0.18 per pound, which was the 1947 price of greases used in the assembly of shielded and sealed bearings.

- 96 -

S-E-C-R-E-T

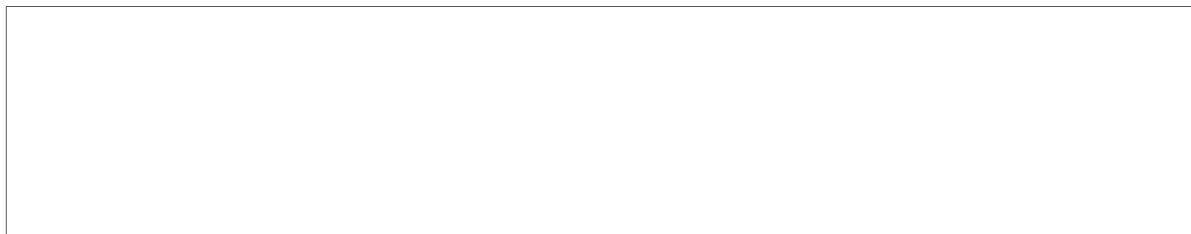
S-E-C-R-E-T

Table 26

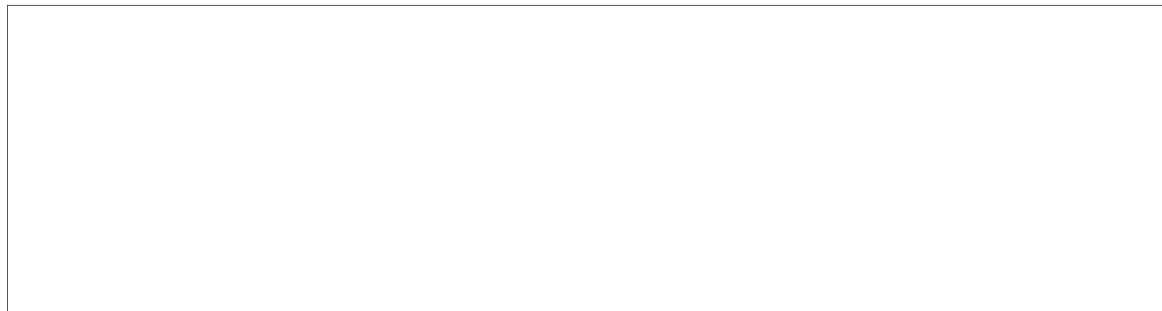
Inputs into the Antifriction Bearings Industry in the US  
1947  
(Continued)

- 
- i. The principal abrasive used in the bearings industry is in the form of a wheel. An aluminum oxide grain with a rubber or vitrified bond makes up the majority of the wheels used in the industry. The average cost of abrasive in grinding wheels was estimated at \$0.20 per pound for 1947.
- j. Cutting tools in the bearings industry are mainly high-speed steel tools of the circular-formed and reamer types. The average cost of a cutting tool in the US bearings industry was estimated to be approximately \$17.50 per cutting tool for 1947.
- k. Other industries are composed of three groups: (1) small hand tools, wood and paper products, assorted items such as leather goods, soap, carbon black, and canvas products; (2) a small group of maintenance repair parts for motors and generators, machine tools, and industrial furnaces; and (3) an unallocated group valued at \$9,395,000.

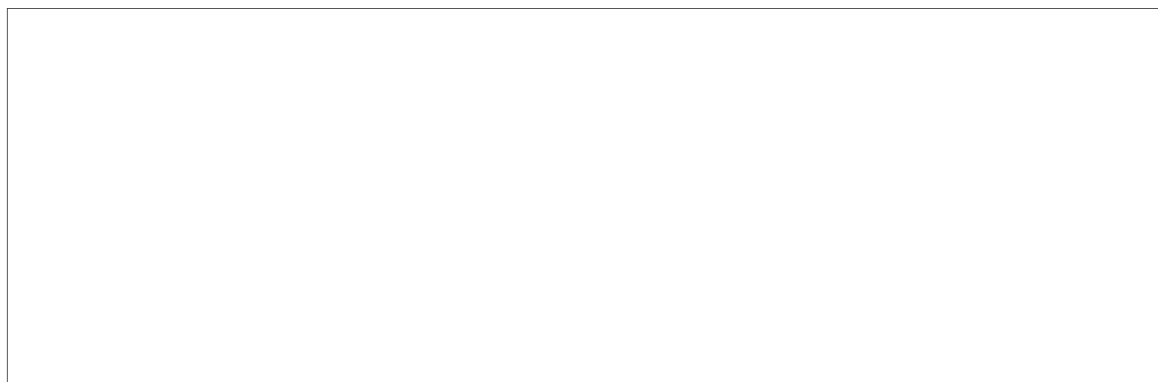
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XI. Conclusions.

A. Capabilities.

1. USSR.

Because of the importance of antifriction bearings to an industrial economy and the need for a large uninterrupted supply of antifriction bearings in a war economy, the USSR has given this industry high priority. The major objective of the USSR is to become self-sufficient and independent of the West. The industry had originally been developed with foreign equipment and foreign technical



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S-E-C-R-E-T

S-E-C-R-E-T

Table 27

Estimated Inputs of Machine Tools, General Industrial Equipment, and Gage and Laboratory Equipment Required in the Production of Antifriction Bearings in a Ball Bearings Plant and a Roller Bearings Plant with a Combined Annual Capacity of 6 Million Units a/\*

Items	Ball Bearings (Annual Capacity of 3 Million Units)		Roller Bearings (Annual Capacity of 3 Million Units)		Ball and Roller Bearings (Annual Capacity of 6 Million Units)	
	Number Required	Total Weight (Pounds)	Number Required	Total Weight (Pounds)	Number Required	Total Weight (Pounds)
<b>Machine Tools</b>						
Wet Grinders	127	479,400	78	296,000	205	775,400
Honing and Lapping	35	207,600	31	187,200	66	394,800
Lathes	28	81,980	20	133,500	48	215,480
Screw Machines	22	357,050	35	382,450	57	739,500
Milling Machines	6	24,580	4	15,380	10	39,960
Shapers	3	21,750	2	14,500	5	36,250
Boring Mills	4	103,155	2	67,550	6	170,705
Surface Grinders	11	50,425	11	50,425	22	100,850
Dry Grinders	28	116,800	0	0	28	116,800
Drill Presses	10	18,065	10	18,065	20	36,130
Planers	1	11,850	1	11,850	2	23,700
Saws	5	1,640	5	1,640	10	3,280
<b>Total</b>	<b>280</b>	<b>1,474,295</b>	<b>199</b>	<b>1,178,560</b>	<b>479</b>	<b>2,652,855 b/</b>
<b>General Industrial Equipment</b>						
Washers	8	22,000	3	16,000	11	38,000
Bench Grinders	10	2,500	9	2,375	19	4,875
Presses	42	257,000	48	223,350	90	480,350
Hammers	1	38,000	1	38,000	2	76,000
Tumblers	42	51,000	21	25,200	63	76,000
Headers	31	132,600	30	134,400	61	267,000

\* Footnotes for Table 27 follow on p. 100.

S-E-C-R-E-T

Table 27

Estimated Inputs of Machine Tools, General Industrial Equipment, and Gage and Laboratory Equipment Required in the Production of Antifriction Bearings in a Ball Bearings Plant and a Roller Bearings Plant with a Combined Annual Capacity of 6 Million Units <sup>a</sup>/<sub>\*</sub>  
(Continued)

Items	Ball Bearings (Annual Capacity of 3 Million Units)		Roller Bearings (Annual Capacity of 3 Million Units)		Ball and Roller Bearings (Annual Capacity of 6 Million Units)	
	Number Required	Total Weight (Pounds)	Number Required	Total Weight (Pounds)	Number Required	Total Weight (Pounds)
General Industrial Equipment (Continued)						
Cleaning Equipment	5	32,500	4	25,500	9	58,000
Heat-Treating Equipment	47	128,200	34	134,000	81	262,200
Welding Equipment	42	870	2	870	4	1,740
Miscellaneous	113	257,150	115	239,538	228	496,688
	(Plus)		(Plus)		(Plus)	
Total	301	921,820	257	839,233	568	1,761,053 <sup>c</sup> / <sub>d</sub>
	(Plus)		(Plus)		(Plus)	
Gaging Machines and Laboratory Equipment						
Ball and Roller Gaging Machines	84	24,920	14	10,420	98	35,340
Laboratory Equipment	19	23,250	17	19,050	36	42,300
Total	103	48,170	31	29,470	134	77,640 <sup>d</sup> / <sub>e</sub>

- a. The itemized equipment has been taken from reports of proposed installations of plants for the production of ball and roller bearings prepared with the assistance of engineers from the US bearings industry in 1943. The equipment is the minimum required for economic operation of the plants. <sup>296</sup>/<sub>f</sub>
- b. Equivalent to 1,203 metric tons, or an average weight per item of equipment of 2.5 metric tons.
- c. Equivalent to 799 metric tons, or an average weight per item of equipment of 1.4 metric tons.
- d. Equivalent to <sup>3</sup>/<sub>4</sub> metric tons, or an average weight per item of equipment of 0.25 metric tons.

S-E-C-R-E-T

Table 28

Estimated Inputs into the Antifriction Bearings Industry in the Soviet Bloc  
and the Minimum Quantity of Equipment Required by the Soviet Bloc  
to Produce the Estimated Output of Bearings  
1951

Item	Soviet Bloc	USSR	East Germany	Czechoslovakia	Poland	Rumania	Hungary	Bulgaria
Labor (Man-Years) a/	63,000	52,000	6,500	3,100	1,000	400	Negligible	0
Steel (Metric Tons) b/	154,493	137,958	7,159	8,304	670	402	Negligible	0
Copper and Copper Base Alloys (Metric Tons) b/	795	710	37	43	3	2	Negligible	0
Coal (Metric Tons) c/	75,752	67,645	3,510	4,072	328	197	Negligible	0
Electric Power (Million Kwh) b/	112.8	101	5	6	0.5	0.3	Negligible	0
POL and Lubricants (Metric Tons) b/	1,650	1,473	77	89	7	4	Negligible	0
Abrasives (Metric Tons) b/	2,870	2,563	133	154	12	8	Negligible	0
Cutting Tools (Units)	54,109	48,317	2,508	2,908	235	141	Negligible	0
Equipment d/								
Machine Tools (Units)	9,205	8,219	427	495	40	24	Negligible	0
General Industrial Equipment (Units)	10,919	9,751	505	587	47	29	Negligible	0
Gaging Machines and Laboratory Equipment (Units)	2,575	2,300	119	138	11	7	Negligible	0

a. Labor (Man-Years) have been compiled from the plant studies (Appendix B).

b. The inputs into the Soviet Bloc have been estimated by setting up the following ratio with the estimated inputs into the US industry for 1947, as calculated in Table 26, and with the estimated total production in the US for 1947 (see Table 26, footnote a, p. 96, above):

$$\text{Soviet Bloc Country Input} = \text{Soviet Bloc Country Production} \times \frac{\text{US Input}}{\text{US Production}}$$

$$\text{Soviet Bloc Country Input} = \text{Soviet Bloc Country Production} \times \frac{\text{US Input}}{324,000,000}$$

S-E-C-R-E-T

S-E-C-R-E-T

Table 28

Estimated Inputs into the Antifriction Bearings Industry in the Soviet Bloc  
and the Minimum Quantity of Equipment Required by the Soviet Bloc  
to Produce the Estimated Output of Bearings  
1951  
(Continued)

c. The estimate of bituminous coal equivalent shown in Table 26, footnote g, p. 96, above, has been converted to a Soviet Standard Fuel equivalent of 12,600 Btu per pound, as follows:

$$\text{Coal (Soviet Standard Fuel equivalent)} = 206,250 \text{ metric tons} \times \frac{13,000 \text{ Btu/lb}}{12,600 \text{ Btu/lb}} = 212,790 \text{ metric tons}$$

The ratio set up in b, above, was then used to estimate the quantity of the Soviet Standard Fuel equivalent required in the Soviet Bloc.

d. The quantity of equipment noted consists of the estimated minimum machine park required to produce the estimated output in 1951. The inputs of equipment into the Soviet Bloc have been estimated by setting up the following ratio with the inputs of equipment required to produce 6 million bearings as shown in Table 27, p. 99, above:

$$\text{Soviet Bloc Country Input} = \text{Soviet Bloc Country Production} \times \frac{\text{Equipment Inputs}}{6,000,000}$$

S-E-C-R-E-T



S-E-C-R-E-T

assistance. During World War II, additional machinery was received through Lend Lease. After the war, dismantling of the German and Austrian industries by the Russians was another source of equipment.

Since the war the Soviet antifriction bearings industry has been built up, and it now has nine major plants in the principal industrial areas and a number of bearings repair plants dispersed throughout the country. These plants are not, as yet, capable of fulfilling the needs of the machine building industries and industries producing military equipment.

The use of repaired bearings as a substitute for new bearings is a probable indication of the shortage of antifriction bearings in the USSR. The practice of using repaired bearings as a substitute for new bearings in the US has been found to be costly and inefficient. Sleeve bearings are also used in a limited number of applications in which antifriction bearings are normally used. The sleeve bearing, however, is limited by speed and efficiency of operation. Recently, an air or fluid bearing was designed and developed in France 297/ which may eventually become a practical substitute for the antifriction bearings. The possible design and development of this type of bearing in the USSR should be closely observed.

At the rate at which the antifriction bearings industry has been expanding in the USSR, the Soviet requirements for bearings should be fulfilled by domestic production by 1953 or 1954. The USSR is still handicapped by Western economic warfare, but production in the USSR is reaching a point at which the country will not be directly handicapped by the economic trade restrictions on antifriction bearings. The continued restrictions of trade with the Satellites, however, will cause a strain on the Soviet antifriction bearings industry if it attempts to fulfill the shortage in the Satellites.

## 2. Satellites.

The antifriction bearings industries in the Satellites have been developed largely since World War II. They have received high priority during this period. The major objective, as in the USSR, is to become self-sufficient and independent of the West. The shortage of steel, brass, steel balls, abrasives, and machine tools has been a continuous problem to the development of the industry in the Satellites. Because of the shortage of materials, East Germany has

S-E-C-R-E-T

S-E-C-R-E-T

been experimenting with ceramic materials as a substitute for high-carbon chrome steel and with pressed wood retainers and sintered iron retainers as substitutes for brass. 298/

The shortage of antifriction bearings in the Satellites would prevent the development of a strategic stockpile. The Russians, however, have been storing antifriction bearings for tank repair at Kirchmoeser near Brandenburg/Havel.

Since the USSR requires domestically all of its production of bearings, only small quantities of bearings are furnished to the Satellites from the USSR. Because the Satellites are dependent on the West for antifriction bearings, they are directly handicapped by Western trade restrictions.

B. Vulnerabilities.

Because the Soviet Bloc is still dependent on the West for antifriction bearings, the embargo by the West would continue to handicap the development of the machine building industries and industries producing military equipment.

In the event of a hot war, the shortage of antifriction bearings would be a considerable handicap to the maneuverability of the Soviet war machine. The vulnerability of the antifriction bearings industry itself to aerial attack is questionable. In 1943 the antifriction bearings industry of Germany was selected as a target bombing system by the Allied Air Forces. In all, over 12,000 tons of bombs were dropped. Destruction of buildings in these raids amounted to almost half the prewar floor space of the industry. The susceptibility of machine tools to damage was not very great -- only 12 percent of the original inventory was destroyed. Fire proved to be more effective than blast. The organization of a bearings plant into departments, each of which carried through the manufacture of one component, was such that, even though production of one or more components was halted, the other manufacturing processes could continue and final assemblies could be made from stock. To prevent slowdowns in production caused by damaged equipment, machinery in one department could be adapted for use in another department. Vigorous production measures, dispersal from large centers of production to numerous small plants, the construction of underground plants, the bomb proofing and erection of blast walls around vital machinery, and the rapid repair or replacement of damaged machinery and equipment enabled production to return to adequate levels before the cushion provided by stocks had ceased to exist.

- 104 -

S-E-C-R-E-T

S-E-C-R-E-T

In conclusion, the Soviet Bloc has been, and will continue to be, handicapped by economic warfare in antifriction bearings. Aerial attack on the antifriction bearings industry could possibly be effective if it were by complete surprise and if it were completed in conjunction with an over-all attack on all industries.

C. Intentions.

The antifriction bearing is essentially a vital commodity required in the machine building industries and in equipment with moving elements. To keep industry and equipment rolling, the basic objectives of the antifriction bearings industry in the Soviet Bloc are to obtain an output of bearings capable of fulfilling the requirements of the expanding machine economy of the Bloc and to increase the number of types and sizes of antifriction bearings in production. Because of the wide use of bearings in both civilian and military items, little can be deduced about Soviet intentions until very detailed factual information is available.

S-E-C-R-E-T

APPENDIX A

MAJOR INDUSTRIES CONSUMING ANTIFRICTION BEARINGS

The industries and commodities which are the principal consumers of antifriction bearings during peace and war are as follows:

Tanks and Armored Force Vehicles  
General Ordnance  
Naval Construction  
Shipbuilding  
Aircraft  
Automotive  
Machine Tool  
General Industrial Equipment  
Railroad Equipment  
Iron and Steel Industry  
Electric Motor  
Electrical Equipment  
Farm Equipment  
Home Appliances

The antifriction bearings industry in an industrial economy occupies a dual position, being an important contributor to both war and peace economy. In time of war, highest priority on the output of the antifriction bearings industry would be for military end items and for those industries which directly support the production of military equipment. During peacetime, under normal conditions, there would be a reduction in the output of military equipment and in the demand for antifriction bearings by the military. However, the demand for antifriction bearings by an expanding industrial economy would continue to absorb the output of the antifriction bearings industry. It is assumed that under cold war conditions antifriction bearings are used to the same extent as under actual war conditions.

S-E-C-R-E-T

APPENDIX B

PLANT FACILITIES FOR PRODUCING ANTIFRICTION BEARINGS  
IN THE SOVIET BLOC

PART I: USSR

I. No. 1 State Bearings Plant imeni Kaganovich, Moscow.

A. Background.

[redacted] State Bearings Plant in Moscow was built between 1930 and 1932 under the direction of Italian and US engineers. Practically all the equipment installed for the production of bearings was imported. The equipment was estimated to be capable of producing annually 15 million units of all types and sizes. Provision was made for the subsequent expansion of capacity to approximately 30 million bearings.

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In the fall of 1941, equipment evacuated from this plant was sent to Kuybyshev, Tomsk, and Saratov. By the end of 1942 the plant was in partial operation, re-equipped with Lend-Lease machinery. It is now the largest ball and roller bearings plant in the USSR. 299/

B. Location.

[redacted] State Bearings Plant is located in Moscow at No. 45 Sharikopodshipnikovskaya street 300/ [redacted]

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S-E-C-R-E-TC. Production Information.1. Estimated Output.\*

<u>Year</u>	<u>Output (Thousand Units)</u>
1946	12,000
1947	18,200
1948	26,000
1949	34,000
1950	46,000
1951	53,000
1952	57,000

2. Types Produced.

State Bearings Plant produces a wide variety of types and sizes of ball, roller, spherical roller, taper roller, and needle bearings, including high-precision instrument bearings and extra large roller bearings up to 1.5 meters outside diameter and weighing up to 4 tons. 301/

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D. Plant Information.1. Personalities.

Devyatov	Director (1952). <u>302/</u>
N.M. Potapov	Director (1951) <u>303/</u> ; now Deputy Director of the Automobile and Tractor Industry (1952). <u>304/</u>
A.A. Gromov	Chief Engineer (1952). <u>305/</u>
N. Gorin	Chief Designer of the Central Design Bureau of the Bearings Industry (1952). <u>306/</u>

\* The estimates of output for the Soviet plants as given in this appendix are taken from Table 2, p. 12, above.

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S-E-C-R-E-T

foundry, 400 by 800 feet, with a capacity of 100 metric tons of complex brass or steel castings a year have been established in the plant. 317/

In July 1945 the building had a considerable amount of floor space available 318/ and could easily have absorbed the tire plant while continuing to install additional equipment for the production of bearings.

5. Electric Power.

In 1943 the electric power was reported to be obtained from the Moscow municipal network. 319/

E. Distribution of Output.

As the major producer of ball and roller bearings in the USSR, this plant supplies bearings to almost all the industries in the USSR.

F. Remarks.

Steel is reported to be delivered from the Serp i Molot and Elektrostal steel plants, both in the Moscow area. 320/

II.  State Bearings Plant, Moscow.

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A. Background.

State Bearings Plant was set up by the Swedish firm SKF at the end of World War I. It was operated by SKF until 1931, when the plant was taken over by the Soviet government.

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In the fall of 1941 the ball bearings department was evacuated to Tomsk and Sverdlovsk. In 1942 the plant as a whole was in operation again, re-equipped with some of the original machinery and some new machinery. 321/

B. Location.

State Bearings Plant is located in Moscow on Shabolovka street 322/ approximately 250 meters north of the Moscow Radio and Television Center at coordinates 55°43'16"N-37°36'52"E. 323/

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S-E-C-R-E-TC. Production Information.1. Estimated Output.

<u>Year</u>	<u>Output (Thousand Units)</u>
1946	3,500
1947	4,000
1948	4,600
1949	5,000
1950	6,000
1951	7,000

2. Types Produced.

Ball and roller bearings of various types are produced. Instrument and precision bearings are reported to be produced in an independent shop with a closed production cycle. 324/

D. Plant Information.1. Personalities.

- I. Bakhvalov Director (1952). 325/  
 N. Koptsov Chief Engineer (1949). 326/  
 I. Ginden Chief of the automatic lathe shop  
 (1950). 327/

2. Personnel.a. Employees.

An estimate of 2,800 employees was reported for 1937 and 4,400 for 1945. 328/ No information is available on the present employment, but it is believed to be approximately 4,000 to 5,000 employees.

The plant was awarded the title of "Stakhanovite" in 1950. 329/

S-E-C-R-E-T.

b. Shifts.

Two 11-hour shifts were reported. 330/

3. Buildings.

[ ] State Bearings Plant has been reported to consist of 2 narrow multistoried buildings and several small workshops with a ground area of 391,000 square feet and a roof cover of 90,000 square feet. 331/

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4. Plant Expansion.

No expansion of the building or floor space has been proposed, but the equipment and production methods have been greatly improved and modernized. 332/

5. Electric Power.

The electric power is reported to come from the Moscow municipal network. 333/

E. Distribution of Output.

Bearings are reported to be delivered to a number of the industries in the Moscow area, and a large quantity of bearings is also reported to be delivered to the Irkutsk Airframe Plant [ ] 334/

50X1-HUM

F. Remarks.

In 1951, steel wire for balls and sheet metal were to be received from the Serp i Molot Steel Plant in Moscow in 240 metric-ton lots per quarter. Production is handicapped, however, by the irregularity of deliveries. 335/

III. [ ] State Bearings Plant, Saratov.

50X1-HUM

A. Background.

The construction of No. 3 State Bearings Plant was begun in 1936, and it was in partial operation by 1940. In the fall of 1941, some of the machinery evacuated from the [ ] State Bearings Plant in Moscow was sent to this plant. 336/ It was slightly damaged by air

50X1-HUM

S-E-C-R-E-T

attack in 1942. 337/ The war damage was repaired in late 1945, and in 1946 the construction of a new forge and a new production building was started. The equipment from the Norddeutsche Kugellagerfabrik, Berlin (Lichtenberg), was transferred to this plant in August 1946. 338/

B. Location.

[redacted] State Bearings Plant [redacted] 50X1-HUM  
[redacted] immediately west 50X1-HUM  
of the Saratov Airfield South, and approximately 2 miles west of the Volga River at coordinates 51°29'N-45°56'E. 339/

C. Production Information.1. Estimated Output.

<u>Year</u>	<u>Output (Thousand Units)</u>
1946	1,900
1947	2,100
1948	2,400
1949	3,400
1950	5,000
1951	7,800

2. Types Produced. 340/

Various types and sizes of ball, roller, and needle bearings are produced. Aircraft bearings made of a plastic material known as "peritnax" also were reported in production.

D. Plant Information.1. Personalities.

N.N. Orlov Director (1949). 341/

2. Personnel.a. Employees. 342/

In late 1948 the plant was reported to have 2,800 employees in each of the 2 main shifts and 1,500 in the third shift.

S-E-C-R-E-T

In addition, a varying number of prisoners of war were used both in production and in construction operations.

b. Shifts.

There are 3 shifts, 6 days per week.

3. Buildings.

The plant area is approximately 2,000 by 3,000 feet. The approximate sizes of the buildings are as follows: 343/ the main production shop, 690 by 590 feet, which includes ball forge, grinding, and polishing sections, a heat treating shop, a machine shop and punch presses, a small foundry and an assembly; a new production shop, 525 by 425 feet; a forge, 360 by 115 feet; a new forge, 328 by 100 feet; a machine shop, 360 by 180 feet; a machine shop and garage, 360 by 180 feet; a boiler house; and warehouses and other unidentified buildings.

4. Plant Expansion. 344/

By late 1949 the new forge and the new production shops were completed and in partial operation. Excavation for the construction of 1 or 2 new buildings in the southern area of the plant was started in 1949.

5. Electric Power.

Electric power is supplied by the Saratov Heat and Power Plant and the Saratov Thermal Power Plant. 345/ A factory power station in the main building operates as a standby unit. 346/

E. Distribution of Output.

The bulk of the bearings produced is used by industries manufacturing aircraft, tractors, and tanks. 347/ Some bearings are reported to be used in ship construction, and, in particular, for submarines. 348/ A Soviet newspaper in July 1951 stated that this plant had received and was fulfilling orders for the Volga-Don Canal projects. 349/

S-E-C-R-E-TIV.  State Bearings Plant, Kuybyshev.

50X1-HUM

A. Background.

No. 4 State Bearings Plant was set up in late 1941, using machinery which had been evacuated from  State Bearings Plant in Moscow. 350/ The plant occupied the buildings and barracks of a former military garrison and was in operation by 1942. New buildings have been constructed since 1941. 351/ It had an affiliate bearings plant producing rings in nearby Bezymyanka, which is now known as No. 9 State Bearings Plant. 352/

50X1-HUM

B. Location.

No. 4 State Bearings Plant is located approximately  $1\frac{1}{2}$  miles northeast of the main railway station in Kuybyshev and approximately 5,000 feet southeast of the east bank of the Volga River at coordinates  $53^{\circ}12'20''N-50^{\circ}09'23''E$ . 353/

C. Production Information.1. Estimated Output.

<u>Year</u>	<u>Output (Thousand Units)</u>
1946	5,500
1947	8,500
1948	9,500
1949	11,000
1950	13,000
1951	15,000

2. Types Produced. 354/

Various types of ball, roller, taper roller, and needle bearings are produced. This plant also produces or processes the following items for tank production: crankshafts, bogie wheels, armor, and bearing housings.

S-E-C-R-E-T

D. Plant Information.

1. Personalities.

Vasil'yev Director (1952). 355/

Yusim Director (1947). 356/

Domokurov Engineer (1947). 357/

2. Personnel. 358/

a. Employees.

Labor figures vary widely, but it is believed that there were approximately 6,000 to 8,000 employees at the plant in 1949, of whom approximately 60 percent were women.

b. Shifts.

From 1945 to 1949 there were three 8-hour shifts, 7 days per week with the first day of the month off.

3. Buildings.

The plant area is triangular in shape, measuring approximately 4,400 feet east to west, 3,800 feet southwest to north-east, and 2,400 feet northwest to southeast. Production is dispersed in no clear-cut pattern among the more than 100 small- and medium-size buildings comprising the plant. 359/

4. Plant Expansion.

In 1945 the construction of new buildings was started, and machinery dismantled in East Germany was transferred to this plant. 360/

5. Electric Power.

Electric power is furnished from power plants in the Kuybyshev area. 361/

S-E-C-R-E-TE. Distribution of Output.

The bearings are reported to be distributed to industries which manufacture aircraft, tractors, tanks, and industrial machinery. 362/

F. Remarks.

Steel is reported to be obtained from the Kuznetsk Metallurgical Combine imeni Stalin and from the Zlatoust Steel Plant imeni Stalin. 363/

V. No. 5 State Bearings Plant, Tomsk.A. Background.

In late 1941, [ ] State Bearings Plant was set up in the barracks of a former military garrison, using some of the machinery evacuated from No. 1 State Bearings Plant in Moscow, and began operations in January 1942. Two new buildings were constructed, and the machinery was installed in them by 1943. This plant has concentrated on the production of small ball and roller bearings. 364/

50X1-HUM

B. Location.

[ ] State Bearings Plant is located in the northeastern outskirts of Tomsk, about 2 miles east of the Tom River and about a half mile southwest of the Tomsk railroad station and train yards No. 2 at coordinates 56°30'N-85°00'E. 365/

50X1-HUM

C. Production Information.1. Estimated Output.

<u>Year</u>	<u>Output (Thousand Units)</u>
1946	3,000
1947	3,400
1948	3,800
1949	4,500
1950	5,500
1951	6,500

S-E-C-R-E-T

2. Types Produced.

Various types of ball and roller bearings, mainly in the smaller sizes, are produced. 366/ At the end of 1947 it was reported that the plant was planning to construct a shop to produce extra-large bearings. 367/

D. Plant Information.

1. Personalities.

Slinko Director (1948). 368/

Edelstein Director (1943). 369/

Beskin Chief Mechanic (1943). 370/

2. Personnel.

a. Employees.

Approximately 2,000 employees, of whom 60 percent were women, were reported in 1943. 371/

b. Shifts.

Two 11-hour shifts were reported in 1943. 372/

3. Buildings.



50X1-HUM

4. Plant Expansion.

The construction of a new forge, grinding department, and automatic machine department recently has been reported, but there is no further information available on construction at this plant. 374/



S-E-C-R-E-T

5. Electric Power.

Electric power is reported to be provided by a 3,000-kw station in the plant, supplemented by the Tomsk Power Plant. 375/

E. Distribution of Output.

In 1947, approximately one-fifth of the total output was intended for the coal industry of the eastern area. Large quantities were also reported to be consigned for the ministries of the following industries: aviation, transport engineering, ferrous metals, agricultural engineering, armaments, electrical, and automobile and tractor. 376/

F. Remarks.

In 1943 the plant received steel from the Kuznetsk Metallurgical Combine imeni Stalin. 377/

VI. No. 6 State Bearings Plant, Sverdlovsk.

A. Background.

Equipment from the [ ] State Bearings Plant was evacuated to No. 6 State Bearings Plant in Sverdlovsk, which may have already been producing a small quantity of heavy industrial bearings before World War II. Two new wooden buildings were built during the war, 378/ and in 1947 two of the workshops were destroyed by fire. 379/ In 1948 the plant was reported to be installing new machinery and introducing new techniques in production. 380/

50X1-HUM

B. Location.

[ ] State Bearings Plant is located about 2 miles south-east of Sverdlovsk's main railway station and about 2 miles west of Lake Shartash. 381/

50X1-HUM

S-E-C-R-E-TC. Production Information.1. Estimated Output.

<u>Year</u>	<u>Output (Thousand Units)</u>
1946	400
1947	470
1948	650
1949	730
1950	910
1951	1,080

2. Types Produced.

Various types of ball, roller, and taper roller bearings are produced for heavy industrial equipment, 382/ and, during the war, crankshafts were also produced. 383/

D. Plant Information.1. Personalities.

Khudyeyev Director (1949). 384/

Smirnov Chief Engineer (1946). 385/

2. Personnel.a. Employees.

It is reported that there were 5,000 employees at this plant in 1946. 386/

b. Shifts.

There is no information on the number of shifts.

3. Buildings.

The plant area is situated in the middle of a residential section and measures approximately 500 by 300 feet. Three or four

S-E-C-R-E-T

main production buildings and some smaller buildings occupy this area. 387/

4. Plant Expansion.

Construction of additional buildings was reported in the summer of 1947, 388/ although the buildings destroyed by fire still had not been rebuilt in the summer of 1948. 389/

5. Electric Power.

Electric power is obtained from the municipal system. 390/

E. Distribution of Output.

This plant supplies bearings to the machine building plants in the Urals area, such as the Sverdlovsk Heavy Equipment Plant Uralmash. 391/ In 1947 it was reported to be delivering roller bearings for coal mining machinery and petroleum industrial equipment. 392/

VII.  State Bearings Plant, Baku.

50X1-HUM

A. Background.

No. 7 State Bearings Plant was being built and was in partial operation during 1947. 393/ The second section of the construction was to be in operation by the middle of 1948. 394/

B. Location.

The plant is reported to be located at Kishly, a suburb of Baku. 395/

C. Production Information.1. Estimated Output.

<u>Year</u>	<u>Output (Thousand Units)</u>
1946	0
1947	30
1948	50
1949	70
1950	90
1951	120

- 123 -

S-E-C-R-E-T

S-E-C-R-E-T

2. Types Produced.

Large-size roller bearings are produced for swivels and for other types of equipment in the oil industry. 396/

D. Plant Information.

1. Personalities. 397/

I. Dzhavarov Director (1951).

Nikel'berg Chief Engineer (1951).

Prokof'yeva Chief Metallurgist (1951).

2. Personnel.

a. Employees.

The number of employees is unknown; however, specialized workers trained in Moscow, Tomsk, and Saratov were transferred permanently to this plant in 1947, and teams of specialized workers were sent temporarily to this plant from other bearings factories to supervise the initial production. 398/

b. Shifts.

The number of shifts is unknown.

3. Buildings.

Very little information is available. The first part of the plant which was in operation by 1947 was reported to be the forge and mechanical assembly shops. The number of buildings is unknown, but this part of the plant is reported to have the following shops: a heat treating shop, a chromium plating shop, a forge, a ball shop, a foundry, a grinding shop, a machine shop, and an assembly shop. 399/

4. Plant Expansion.

There is no information on possible plant expansion. The building under construction in 1948, however, probably is in operation.

S-E-C-R-E-T5. Electric Power.

The source of electric power for this plant is unknown, but it is believed that it comes from the Baku municipal network.

E. Distribution of Output.

[ ] State Bearings Plant specializes in bearings for plants producing oil-drilling equipment, 400/ including the Machine Building Plant imeni Stalin of the Azerbaydzhan Petroleum-Machine Building Trust, the Sverdlovsk Heavy Equipment Plant Uralmash, and the Novokramatorsk and Starokramatorsk plants. 401/

50X1-HUM

VIII. [ ] State Bearings Plant, Khar'kov.

50X1-HUM

A. Background.

The buildings used for [ ] State Bearings Plant were damaged during World War II, and their reconstruction was begun in 1946. This plant was in limited operation in late 1946 and in partial operation during 1947. In May 1948, one main production shop had been completed, and during the summer of 1948 a second building was in the process of construction. 402/ Machinery and equipment from the Erkner plant in Berlin and the Steyr plant in Austria are believed to have been shipped to this plant. 403/

50X1-HUM

B. Location.

This plant is located in the eastern extremity of Khar'kov, about 8 miles east of the center of the city, approximately 2 miles northeast of the northern edge of the Khar'kov Airfield Grobli, and 2 miles northwest of the northern tip of the Khar'kov Airfield Rogan at coordinates 49°57'N-36°24'E. 404/

C. Production Information.1. Estimated Output.

<u>Year</u>	<u>Output (Thousand Units)</u>
1946	100
1947	300
1948	1,500
1949	2,000
1950	3,200
1951	5,500

- 125 -

S-E-C-R-E-T

S-E-C-R-E-T

2. Types Produced.

Various types and sizes of ball, roller, and taper roller bearings up to 250-mm outside diameter are produced. 405/

D. Plant Information.

1. Personalities.

Ikryanistov Director (1949). 406/

2. Personnel.

a. Employees.

In 1947 there were 1,000 employees, approximately 30 to 50 percent being women. 407/ In 1949 there were an estimated 3,000 employees, approximately 30 to 35 percent being women. 408/

b. Shifts.

There was one 8-hour shift in 1947 which was believed changed to three 8-hour shifts, 6 days per week. 409/

3. Buildings.

The plant area is generally rectangular with maximum dimensions of about 2,200 feet west-northwest - east-southeast by 1,600 feet north-northeast - south-southwest. 410/ In 1949 there were approximately 10 buildings in the plant area 411/: the main production building, 400 by 650 feet, included 2 machine shops, punch presses and shears, a forge, a ball mill shop, electric furnaces, heat treating, and an assembly shop; a transformer station attached to the main building; an administration building; barracks (5 to 6 wooden buildings); and a new building under construction.

4. Plant Expansion.

The new building under construction was approximately the same size as the main building. 412/ It should at present be in operation.

S-E-C-R-E-TE. Distribution of Output.

The plant specializes in the production of bearings for tractors, combines, automobiles, and machine tools. 413/ It supplies bearings to the adjoining Khar'kov Tractor Works imeni Ordzhonikidze as well as to other plants in the city. 414/

F. Remarks.

The production capacity of this plant is planned to be 10 million bearings per year. 415/

IX. No. 9 State Bearings Plant, Kuybyshev.A. Background.

Before World War II, [ ] State Bearings Plant was a loco-  
motive and railway equipment repair shop 416/ and during the war was  
set up as a branch of No. 4 State Bearings Plant in Kuybyshev, pro-  
ducing rings for the No. 4 plant. 417/ The plant is now known as [ ]  
State Bearings Plant, Kuybyshev (Bezmyyanka). Since World War II it  
has been producing and assembling antifriction bearings. 418/

50X1-HUM

50X1-HUM

B. Location.

No. 9 State Bearings Plant is located in the eastern part of the Kuybyshev urban area, known as Bezmyyanka. It lies adjacent to and southeast of the main rail line to Ufa near the Bezmyyanka railway station at coordinates 53°12'N-50°16'E. 419/

C. Production Information.1. Estimated Output.

<u>Year</u>	<u>Output (Thousand Units)</u>
1946	600
1947	1,000
1948	1,500
1949	2,300
1950	3,300
1951	5,000

S-E-C-R-E-T

2. Types Produced.

Various sizes of ball and roller bearings and bearing rings are produced. 420/ The foundry of this plant is also reported to produce items such as cylinders and drive wheels for tanks. 421/

D. Plant Information.

1. Personalities.

Dundukov Director (1952). 422/

2. Personnel.

a. Employees.

Estimates varied considerably, but a figure of 4,000 to 5,000 employees in 1949 appears reasonable. 423/

b. Shifts.

In 1949 there were reported to be three 8-hour shifts, 7 days per week with the first day of each month off. 424/

3. Buildings. 425/

The plant area is roughly rectangular in shape with maximum measurements of about 2,800 by 1,900 feet. The plant is comprised of approximately 30 buildings. The principal buildings are as follows: administration buildings; mechanical repair shops; a boiler house; a foundry; a production shop, which includes forge, heat treating, and grinding departments; a main machine and assembly shop; and a new production shop.

4. Plant Expansion.

The new production shop is believed to have been put into operation since 1949. 426/

5. Electric Power.

Electric power is obtained from the municipal power system. 427/



S-E-C-R-E-T

E. Distribution of Output.

The bearings from this plant are reported to be used by motor vehicle, tank, tractor, and aircraft plants, including the Kuybyshev Aircraft Engine Plant imeni Frunze, the Kuybyshev Airframe Plant imeni Stalin, and the Zaporozh'ye Agricultural Machinery Plant Kommunar. Bearing rings have also been shipped to the [redacted] State Bearings Plant 50X1-HUM in Kuybyshev. 428/

X. Plant under Construction, Minsk.

A. Background.

The construction of a bearings plant at Minsk was undertaken by two sections of the SMU (Stroitel'no-Montazhnoy Upravleniye -- Construction and Installation Administration). SMU-9 was to build the workers' settlements, and SMU-2 was to build the ball bearings plant itself. The work on the site was scheduled to begin in 1950. To keep up with their norm, SMU-9, however, started clearing ground on the workers' settlement in May 1949. 429/ The clearance of the woods and excavation work for the plant was started in February 1950 by SMU-2. 430/ The plant was scheduled to begin production in 1952, but the construction reportedly has been so far behind schedule that production may not begin until 1954. 431/

B. Location.

[redacted] 50X1-HUM

C. Production Information.

1. Estimated Output.

The plant may be in operation during 1953, but it is more likely that the operation of the plant will begin in 1954. 433/

S-E-C-R-E-T

2. Types Produced.

Although there is still no definite proof that this plant will be producing antifriction bearings, all reports call it a ball bearings plant.

D. Plant Information.

There is no information available on personalities or on employment.



50X1-HUM

50X1

E. Distribution of Output.

The plant will probably supply antifriction bearings to the Minsk motor vehicle plant and other industries in the Minsk area. 435/

S-E-C-R-E-TPART II: EAST GERMANYI. SAG-Leipziger Kugellagerfabrik, Leipzig.A. Background.

The Leipziger Kugellagerfabrik (formerly Deutsche Kugellagerfabrik) was taken over by the SAG-Awtowelo in 1946. 436/ It had not been dismantled nor had it suffered much war damage. The Leipziger Kugellagerfabrik, consisting of three plants is, at present, one of the largest bearings producers in East Germany. Although the original equipment was partly worn out and partially obsolete, the plant has been installing new machinery and equipment. 437/

B. Location. 438/

1. Main Plant: Gutenbergstrasse 6, Boehlitz-Ehrenberg, near Leipzig.
2. Plagwitz: Naumburgerstrasse 23, Leipzig.
3. Zellerhausen Plant: Torgauerstrasse, Leipzig.

C. Production Information.1. Estimated Output.\*

<u>Year</u>	<u>Output (Thousand Units)</u>
1949	1,100
1950	1,680
1951	1,840
1952	1,900

2. Types Produced. 439/

a. Ball bearings with bores of 40 mm and up to 200 mm are mass-produced.

\* The estimates for the East German plants as given in this appendix are taken from Table 9, and the method of making them is discussed in the footnotes for Table 9, p. 33, above.

S-E-C-R-E-T

b. Thrust ball bearings with bores up to 200 mm are in mass production, and those up to 400 mm are in limited production for the USSR.

c. Roller bearings, self-aligning, barrel-shape, with bores of 60 mm to 240 mm, are produced in quantities of about 100 of each size.

d. Roller bearings, self-aligning, double barrel-shape, with bores of 300, 350, 420, 640 or 650, 680, and 725 mm are produced on special orders and were planned for mass production in the proposed extension of the grinding shop to be completed by May 1951. Production of bearings with bores of 600 mm and 870 mm started at a rate of 5 each per month in early 1951 and was raised to 10 per month. It is planned to raise production to 20 per month by the end of 1951.

e. Self-aligning ball bearings with bores of 40 mm to 200 mm are mass-produced.

f. Roller bearings with bores of 20 mm to 120 mm are produced in lots of about 100.

g. Taper roller bearings with bores from 60 mm to 300 mm are produced in small sizes in lots of 100 to 120 pieces and in large sizes in lots of 5 to 10.

h. Needle bearings (Nadellager) with bores of 20 mm to 80 mm are also produced.

D. Plant Information.

1. Personalities. 440/

Kulkov	Russian General Director
Babanov	Russian Chief Engineer
Heinz Thiemicke	German Technical Director
Herbert Grobe	German Commercial Director

S-E-C-R-E-T

Boettger	German Chief Engineer
Erick Runkel	German Works Manager, Main Plant
Otto Vetter	German Works Manager, Plagwitz Plant
Winkler	German Works Manager, Zellerhausen Plant

2. Personnel. 441/a. Employees (1950).

Main Plant	1,700
Plagwitz Plant	600
Zellerhausen Plant	300
Total	<u>2,600</u>

It was planned to increase employment to 3,200 by the end of 1951.

b. Shifts.

There were 3 shifts (if raw materials allowed), 6 days per week.

3. Buildings. 442/

The main plant has the following buildings: a machinery department, a hardening department and forge, a grinding department, technical offices, storage facilities, and a main administration building.

4. Plant Expansion, Main Plant. 443/

The grinding shop of the main plant has been expanded by 40 by 30 meters. The extension was to be completed by May 1951. A second story was planned for the main storage building -- dimensions, 50 by 10 meters. Negotiations with the government to purchase land site to north of the work area were reported in 1950.

S-E-C-R-E-T5. Electric Power.

a. The main plant receives its power from the power station at Kulkwitz, whose output is unknown. It was built in 1930 and is in good condition. 444/

b. The Leipzig plants are reported to receive their power from the Leipzig power station. It generates between 60,000 to 70,000 kw and is reported to be in good condition. 445/

E. Distribution of Output.

In 1950, bearings from this plant were reported to be distributed as follows: USSR, 42 percent of current production (which did not include special orders for the USSR) 446/; for Soviet storage in Wildau, 5 percent 447/; and for Soviet storage in Kirchmoeser, near Brandenburg, 5 percent (this has been reported as headquarters of a tank unit). 448/ The East German Heavy Machine Industry distributed through the DHZ the balance of current production -- 48 percent of current production. 449/

Bearings have been supplied to the following firms 450/: SAG-BMW (Bavarian Motor Works) at Eisenach, SAG-Krupp Gurson at Magdeburg, SAG-Maschinenfabrik Buchau-Wolf at Magdeburg, Fichtel and Sachs at Reichenbach, and shipyards at Rostock and Stralsund.

In 1950 the Leipziger Kugellagerfabrik received an order for 10,000 roller bearings with an 80-mm bore. These bearings were to be delivered to a repair shop for Soviet tanks at Kirchmoeser near Brandenburg/Havel. The bearings were reported to be needed for a heavy Soviet tank, which recently had arrived in East Germany. Eight of these roller bearings are built into each tank and require replacement after 70 operational hours. The special chromium-molybdenum steel required for the manufacture of these bearings was not available to Leipziger Kugellagerfabrik. The plant was granted 300,000 DM (West) to make purchases in West Germany for this tank program. 451/ In April 1950 this plant bought 90 tons of steel in the Ruhr for the production of roller bearings. 452/ In addition, this plant received another order from the Russians for 500,000 ball bearings which reportedly were to be used for the tank program of the Soviet Army. This order was to be completed by December 1950. 453/

S-E-C-R-E-T

S-E-C-R-E-T

Two orders for needle bearings in quantities of 1.5 million and 2 million, respectively, reportedly were to be used for the Soviet submarine and torpedo boat program. The first order of 1.5 million needle bearings was completed in 1950, and the order for 2 million needle bearings was to be completed in 1951. 454/

II. VEB-Thueringer Kugellagerfabrik, Zella-Mehlis.A. Background.

During World War II this plant (then known as the Karl Reich Ball Bearings Plant) was a small independent producer having a capacity of 100,000 bearings per month with a peacetime labor force of 400 men. After the war, the plant was assigned to the SAG-Awtowelo. 455/ In 1952 this plant was turned over to the VEB's and is now known as the VEB-Thueringer Kugellagerfabrik. 456/

B. Location.

Zella-Mehlis.

C. Production Information.1. Estimated Output.

<u>Year</u>	<u>Output (Thousand Units)</u>
1948	600
1949	900
1950	1,400
1951	1,900
1952	2,700

2. Types Produced.

This plant specializes in the manufacture of ball bearings of small dimensions up to 25-mm outside diameter. 457/ Ball bearings up to 62-mm outside diameter have been produced, and roller bearings are also produced at this plant. 458/

S-E-C-R-E-T

D. Plant Information.

1. Personalities.

Paprikov Russian General Manager in 1949 459/

Wagner German Works Manager 460/

Kind German Chief Designer 461/

Schyschka German representative at the Antifriction Bearings Conference, Leipzig, December 1950. 462/

2. Personnel.

In 1948 there were 250 to 300 employees 463/; in 1951, 250 to 300. 464/

There is no available information on the buildings, proposed expansion, or sources of electric power.

E. Distribution of Output.

Production is reported to go to the SAG's or to the USSR. 465/

III. VEB-Walzkoerperfabrik, Schweina-Marienthal.

A. Background.

After the war this plant (formerly the Gebrueder Heller Plant) was assigned to the SAG-Awtowelo. 466/ It is the only large producer of steel balls in Eastern Germany. It has been referred to as the Schweina Bearing-Ball Factory and as the SAG-Gebrueder Heller. 467/ In 1952 this plant was turned over to the VEB and is now known as the VEB-Walzkoerperfabrik. 468/

B. Location.

The plant has been reported to be located at Schweina-Marienthal, 500 meters from the outskirts of Bad Liebestein on the Bad Salzungen - Steinbach railroad line. 469/



S-E-C-R-E-T

C. Production Information.

Planned production for 1951 was to be 420 metric tons of steel balls. 470/ This plant also manufactures some rollers, ball retainers, and knives. 471/

D. Plant Information.

1. Personalities.

Volukshin      Soviet General in charge      472/  
Loehr            German Director      473/  
Haefnen        German Plant Manager      474/  
Huebner        German representative at the Antifriction Bearings Conference, Leipzig, December 1950      475/

2. Personnel.

a. Employees.

Employees were reported to number 200 to 500 in 1951. 476/

b. Shifts.

There are 3 shifts, 6 days per week. 477/

3. Buildings.

The plant has 10 to 12 small brick buildings. 478/

4. Plant Expansion. 479/

Ball-grinding machines were reported to have been acquired clandestinely from West Germany through the Schmalz Company in Offenbach in 1951. The lack of steel wire prevented the utilization of the newly installed machines.

S-E-C-R-E-T

5. Electric Power.

There is no available information on sources of electric power.

E. Distribution of Output. 480/

Output of balls and rollers goes to the East German ball and roller bearings plants. This plant is incapable of meeting the needs of the East German antifriction bearings industry.

F. Remarks.

The requirements for steel balls in East Germany in 1951 amounted to approximately 1,130 metric tons; the SAG's required approximately 530 metric tons; and the VEB's needed approximately 600 metric tons. The needs of the VEB's for steel balls reportedly are expected to reach 1,200 metric tons in 1953 and 1,500 metric tons in 1955. There is no information available on the SAG's expansion in production of antifriction bearings or requirements for steel balls. The construction of a second VEB plant with a minimum capacity of 1,000 metric tons of steel balls was recommended at the Antifriction Bearings Conference held at Leipzig in December 1950. 481/ The Trade Ministry approved the construction of a ball bearings plant at Waltershausen in Thuringia. 482/ [redacted] the Soviet Control Commission cancelled the construction of this plant and that the VEB-Walzlagerfabrik, Fraureuth, will be expanded to produce balls and rolls for antifriction bearings. 483/

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IV. VEB-Walzlagerfabrik, Fraureuth.

A. Background.

During World War II (before 1944) the Kugelfischer Company of Schweinfurt, West Germany, took over the Fraureuth Porcelain Factory and began to produce cages for antifriction bearings. After World War II this plant was known as the Thuringia Pressed Wood Company and continued to produce cages for East Germany. 484/ In December 1948 this plant became the VEB-Walzlagerfabrik, Fraureuth, and the officials of the factory established a plan for an improved East German antifriction bearings supply. 485/ The VEB-Walzlagerfabrik, Fraureuth, is directly controlled by the Main Administration for Heavy Machine Construction and is listed under the VVB-WMW. 486/ It is

S-E-C-R-E-T

scheduled to become the most important ball and roller bearings plant in East Germany. 487/

B. Location. 488/

Julius Bartosch Strasse, Fraureuth, near Werdau.

C. Production Information.

1. Estimated Output.

<u>Year</u>	<u>Output (Thousand Units)</u>
1949	330
1950	390
1951	730
1952	900

2. Types Produced.

a. Antifriction bearings with an outside diameter of from 80 mm to 200 mm are produced in the following types 489/: ball bearings, self-aligning ball bearings, roller bearings, and thrust ball bearings.

b. Experiments have been made with beechwood sheets to replace brass cages in medium-size roller bearings, and with sintered iron cages for large size roller bearings. By the end of 1951, 70 percent of brass cages were to be replaced by beechwood or cast iron cages. 490/

c.  VEB-Walzlagerfabrik, Fraureuth, will be expanded to produce the balls and rolls which were originally to be produced at Waltershausen. 491/

50X1

D. Plant Information.

1. Personalities. 492/

Schack German Managing Director

Mewes German Technical Director

S-E-C-R-E-T

Sonntag German Works Manager

Koerner German Sales Manager

2. Personnel.

a. Employees.

In 1951, employees numbered 1,200. 493/ In 1952 there were reported to be 1,950 workers, including 160 office employees. 494/ In the course of the Fifth Five Year Plan (1951-55) this total is to increase to 5,000 or 6,000 workers. 495/

3. Buildings. 496/

The following buildings have been reported: a warehouse, a single-story building (housing automatics and grinders), two 3-story buildings connected by a corridor, and a foundry.

4. Plant Expansion.

Construction of this plant was still under way in 1951. 497/

5. Electric Power.

There is no available information on sources of electric power.

E. Distribution of Output. 498/

Output is distributed through DHZ.

V. VEB-Walzlagerfabrik, Ronneburg.

A. Background.

After World War II this plant was engaged mainly in the repair of roller bearings, and the production of new bearings was insignificant. 499/ In 1948 this plant became VEB-Walzlagerfabrik, Ronneburg, and it has received top priority under the key industries program. It is now controlled by the VVB-WMW under the Main Administration for Heavy Machine Construction. It is scheduled to become an important producer of ball and roller bearings in East Germany. 500/

S-E-C-R-E-TB. Location.

Ronneburg. The plant has been reported to be located on the premises of the former Felgenfabrik Herring (tire rim factory). 501/

C. Production Information.1. Estimated Output.

<u>Year</u>	<u>Output (Thousand Units)</u>
1949	3
1950	15
1951	20
1952	30

2. Types Produced. 502/

This plant produces cylindrical roller bearings, 215 mm to 400 mm in outside diameter, and thrust ball bearings, 215 mm to 400 mm in outside diameter.

D. Plant Information.1. Personalities. 503/

Herbert Rocktaeschel	German Works Manager
Otto Rapold	German Technical Director
Lindisch	German Production Manager

2. Personnel.a. Employees.

In 1951, employment was reported to be 225 to 400 workers. 504/

b. Shifts.

The number of shifts is unknown.

S-E-C-R-E-T

3. Buildings.

There is no available information on the buildings housing this plant.

4. Plant Expansion.

In 1951 a new, gas-fired heat treating department was built but was not in operation by November. 505/

5. Electric Power.

There is no available information on sources of electric power.

E. Distribution of Output.

Output is distributed through the DHZ. 506/

F. Remarks.

In the first quarter of 1949 the plant officials reported that the following material was required for the planned production of 750 bearings up to 350 mm in outside diameter 507/: forged rings for new bearings, approximately 40 metric tons; forged rings for repaired bearings, approximately 15 metric tons; rounded material for rolls, 6 metric tons; brass for solid cages, 6 metric tons; and rivet wire, 6-mm gage, 120 kilograms.

VI. VEB-Walzlagerfabrik, Berlin (Lichtenberg).

A. Background.

This plant, formerly a Kugelfischer subsidiary known as the Norddeutsche Kugellagerfabrik, had been partially dismantled by the Russians, but in 1946 the firm was given machinery which was to be used for the reconditioning of ball and roller bearings. By the end of 1948 the plant had about 35 workers. The production equipment was outmoded. 508/ It is now known as the VEB-Walzlagerfabrik, Berlin (Lichtenberg), and has received top priority under the key industries program. It is controlled by the VVB-WMW under the Main Administration for Heavy Machine Construction. It is scheduled to become an important producer of ball and roller bearings in East Germany. 509/

S-E-C-R-E-TB. Location. 510/

Rittergutstrasse 44-46, Berlin (Lichtenberg).

C. Production Information.1. Estimated Output.

<u>Year</u>	<u>Output (Thousand Units)</u>
1949	120
1950	250
1951	600
1952	1,000

2. Types Produced. 511/

Ball bearings, self-aligning ball bearings, and cylindrical roller bearings are produced with bores up to 62-mm outside diameter.

D. Plant Information.1. Personalities.

Kuehnert      German Works Manager 512/  
 Zugehoer      German Technical Manager 513/  
 Achterberg    German representative at the Antifriction  
 Bearings Conference, Leipzig, December  
 1950 514/

2. Personnel.a. Employees.

Employees in 1951 numbered 200 workers, including office help, 515/ and it was planned to increase employees to 970. 516/

b. Shifts.

The number of shifts is unknown.

S-E-C-R-E-T

3. Buildings.

There is no available information on the buildings housing this plant.

4. Plant Expansion.

Repair of existing buildings and the installation of additional machinery are under the key industries program. 517/

5. Electric Power.

There is no available information on sources of electric power.

E. Distribution of Output.

It has been assumed that distribution is through the DHZ.

VII. VEB-Gelenkwellenwerk, Stadtilm.

A. Background.

The VEB-Gelenkwellenwerk, which was formerly known as Rheinmetal-Borsig, is now controlled by the IFA under the Main Administration for Vehicle Construction (Hauptverwaltung Fahrzeugbau). 518/ This plant, however, has not been considered as a key enterprise. It is sometimes referred to as the Thuringia Cardan Shaft Plant. 519/

B. Location.

Strasse der Freundschaft, Stadtilm, Thuringia. 520/

C. Production Information.

1. Estimated Output.

<u>Year</u>	<u>Output (Thousand Units)</u>
1949	100
1950	180
1951	200
1952	200



S-E-C-R-E-T

2. Types Produced.

This plant produces taper roller bearings, 521/ needle bearings for universal joints, 522/ and universal joints. 523/

D. Plant Information.

1. Personalities.

Joseph Schuth	German Plant Director	<u>524/</u>
Mueller	German Technical Director	<u>525/</u>
Hans Nuding	German Commercial Director	<u>526/</u>
Eger	German representatives at the Antifriction Bearings Conference, Leipzig, December 1950	<u>527/</u>

2. Personnel.

a. Employees.

The total number of employees averages 500, 528/ and the number of employees in bearings production, including office workers, averages 150 to 200. 529/

b. Shifts.

There are 3 shifts, 5 days per week. 530/ An apprentice training program has been set up in the plant. 531/

3. Buildings. 532/

The main building is U-shaped and three stories high. The 2 wings and the middle portion vary in size between 60 by 12 meters and 80 by 12 meters. This building contains the following shops: a machine shop, an assembly section (bearings), an inspection section (bearings), an apprentice workshop, a universal joint production shop, a universal joint production shop, administration offices, a warehouse, and a tempering shop.

S-E-C-R-E-T

Building Number 2 was the plant boiler house. The turbines and generators were dismantled and sent to the USSR in 1946. It now contains the power switchboard, boilers for heating the main building, a compression station, and the repair departments.

Machinery and tools are in good condition.

4. Plant Expansion.

There are no reports of proposed expansion.

5. Electric Power.

Electric power is reported to be transmitted via high-tension cable from power plant reported to be called Gispersleben, 533/ which is probably the Stadtilm power plant.

E. Distribution of Output.

Output is distributed through the DHZ. 534/

F. Remarks.

During 1952 this plant intended to produce the whole taper roller bearings series, but all the prototypes were not available. 535/

VIII. VEB-Walzlagerfabrik, Arnshall.

A. Background.

The factory was completely dismantled by the Russians. In 1948 the plant was repairing ball bearings on a small scale. 536/ It has recently been reported to be a VEB directly subordinate to the Main Administration for Heavy Machine Construction. 537/ After 1 January 1953 this plant is to operate as Plant II of the VEB-Thueringer Kugellagerfabrik. 538/

B. Location.

Arnshall, Arnstadt.

S-E-C-R-E-TC. Production Information.1. Estimated Output.

<u>Year</u>	<u>Output (Thousand Units)</u>
1949	N.A.
1950	N.A.
1951	55
1952	100

2. Types Produced.

The plant produces special bearings stamped with an Opel\* replacement parts number to be used as replacement parts for trucks. These bearings were originally designed by the Vereingite Kugellagerfabrik, Schweinfurt, West Germany. The assortment of types is to be extended in 1952; however, the prototypes can be found only in West Germany. 539/ In 1953 this plant is to expand its facilities to produce taper roller bearings. 540/

D. Plant Information.1. Personality.

Lohse            German representative at the Antifriction Bearings Conference, Leipzig, December 1950 541/

There is no available information on personnel, number of buildings, possible plant expansion, or source of electric power.

E. Distribution of Output.

Output probably is distributed through the DEZ.

\* The Opel was originally the General Motors automobile produced in Germany. The Russians moved the machinery into the USSR, and this machinery probably is now being used to make the Soviet Pobeda.

S-E-C-R-E-TPART III: CZECHOSLOVAKIAI. Zbrojovka Brno Plant  Lisen.

50X1-HUM

A. Background.

The plant, built during the German occupation and known as the Ostmark Aircraft Engine Plant, produced aircraft engine parts and shells during World War II. The war damage which occurred in 1944 was partially repaired by 1947, and new buildings were also erected next to the destroyed areas. The area and plant facilities were turned over to the Zbrojovka Brno Corporation by the Czechoslovak government. 542/ The plant was set up as a producer of ball bearings in September 1947, and production of bearings began in 1948. 543/ Machinery weighing approximately 770 tons was delivered to this plant as reparations from the Kugelfischer plant in Schweinfurt, West Germany. 544/ This equipment had been reported as damaged and with principal parts misplaced. 545/ Under the Five Year Plan (1949-53), \$200,000 was to be spent on buildings and \$2.4 million on machine equipment. 546/ The official name of the factory is Zavody Presneho Strojirenstvi, Zavod Antonina Zapotockeho, Lisen. 547/

50X1-HUM

C. Production Information.1. Estimated Output.\*

<u>Year</u>	<u>Output (Thousand Units)</u>
1948	800
1949	1,800
1950	2,500
1951	3,500
1952	4,500

\* The estimates for the Czechoslovak plants as given in this appendix are taken from Table 14, and the method of making them is discussed in the footnotes for Table 14, p. 48, above.

- 148 -

S-E-C-R-E-T

S-E-C-R-E-T

2. Types Produced. 549/

The following types are produced: ball bearings with bore diameters of from 12 mm to 80 mm, taper roller bearings with bore diameters of from 17 mm to 60 mm, thrust ball bearings with bore diameters of from 10 mm to 75 mm, and steel balls and rollers.

The plant also manufactures tractors and textile machinery. 550/

D. Plant Information.

1. Personalities. 551/

Dvorak	Director (1949)
Joseph Siroky	Deputy Director (1949)
Dvorak	Security Chief (1949)
Joseph Jilek	President of Trades Union Council
Obdrzalek	Technician
Petru	Technician

2. Personnel.

a. Employees. 552/

In 1950, total employment was reported to be 4,000 workers, including 1,200 in the bearings section. In 1951, reported employment in the bearings section was 1,500, including approximately 25 percent women.

b. Shifts.

Three shifts have been reported in the bearings section.

S-E-C-R-E-T3. Buildings. 553/

The total area of the plant covers approximately 3,316,500 square feet. There are approximately 15 single-story buildings (the numbers listed below are the actual designations used for these buildings at the plant): No. 1, general work shop, 330 by 175 feet; No. 2, assembly of tractors and small foundry, 425 by 300 feet; No. 3, assembly of textile machinery, 425 by 300 feet; No. 4, mechanical workshop for textile machinery, 200 by 300 feet (planned to be converted into workshop for ball bearings); No. 5, workshop for ball bearings, 425 by 300 feet; No. 6, workshop for balls and hardening shop; No. 8, a warehouse for raw materials, 255 by 50 feet, hardening of rings; No. 10, warehouse, 335 by 40 feet; No. 32, workshops for presses for raceways, assembly line and inspection room for balls, offices of general management, and offices of chief technicians; boiler house and central heating plant, 110 by 70 feet; and other buildings including sales office, locker rooms, railroad station, canteens, and main entrance buildings.

4. Plant Expansion. 554/

New buildings for tractors were partly completed in 1950. Two additional buildings are to be erected on adjoining land, but their use is not known.

5. Electric Power. 555/

Electric power is supplied by the West Moravian Electric Works power grid, Oslovany. The plant has generators which are not capable of driving all the machinery in the plant.

E. Distribution of Output.

The bearings produced are to be used in motor cars, tractors, and electric motors and are probably distributed to Czechoslovak industry through the Central Control Office for Bearings and Tools (Stredisko LN). 556/

F. Remarks.

Before the restrictions of exports to Czechoslovakia in February 1948, the Zbrojovka Corporation received 12 precision grinders

S-E-C-R-E-T

from US concerns. 557/ The machine tools for the grinding of balls were produced in Czechoslovakia pursuant to a license obtained from the Hoffman Manufacturing Company, Ltd., of Chelmsford, England, and in accordance with drawings and specifications supplied by Hoffman under an agreement concluded in 1947. 558/

II. Plant No. 28, Zbrojovka Brno Corporation, Perstejn.

A. Background.

Before World War II the Perstejn ball bearings plant was a branch of the Swedish SKF firm. It was a comparatively small plant, dependent on Swedish and German sources for supplies of balls and rings. During the war the plant was taken over by the Germans. In 1945, when the government confiscated the plant, the Swedes removed all machinery of Swedish origin. However, the Swedes later sold to Czechoslovakia machinery which was being installed in this plant up to 1949. In 1947 the Perstejn plant became Plant No. 28 of the Zbrojovka Brno Corporation. 559/

50X1-HUM

C. Production Information.

1. Estimated Output.

During the war, its maximum output was 59,000 assembled bearings per month (July 1943). 561/

<u>Year</u>	<u>Output (Thousand Units)</u>
1948	600
1949	900
1950	2,000
1951	2,300

S-E-C-R-E-T

2. Types Produced. 562/

The following types are produced: ball bearings with bore diameters of from 12 mm to 80 mm, taper roller bearings with bore diameters of from 17 mm to 60 mm, and thrust ball bearings with bore diameters of from 10 to 75 mm.

D. Plant Information.

1. Personalities.

Jan Froehlich (Engineer), Director (1951) 563/  
C. Suchanek (Engineer), Supervisor of Labs and Steel Tempering (1949) 564/  
Stepnicka Construction Supervisor (1949) 565/  
Ludmila Patkova Sales Director (1949) 566/

2. Personnel.

a. Employees.

Total employment was 550 with 350 to 400 on production in 1950. 567/

b. Shifts.

One 8-hour shift was reported. 568/

3. Buildings.

The total area of the plant site covers approximately 350,000 square feet. 569/ The following buildings are located in the plant 570/: the main production buildings, consisting of 2 or possibly 3 buildings constructed close to one another in an L-shaped assembly of buildings, which includes a machine shop, 152 by 120 feet, housing an automatics shop and a grinding shop, a machine shop, 161 by 92 feet, and a foundry, 86 by 92 feet; the production building, housing the engineering offices and the grinding and assembly shops, 274 by 68 feet; a hydroelectric power station;



S-E-C-R-E-T

administrative offices and warehousing of finished products, approximately 350 by 35 feet; a warehouse, 52 by 52 feet; a canteen (L-shaped building); and the Director's residence.

4. Plant Expansion.

No new buildings have been erected or are planned. It has been reported that the plant may be moved to Klasterec, which is 7 kilometers north of Perstejn. 571/ A branch plant is reported to be located at Kadan. 572/

5. Electric Power.

The plant produces its own electric power. The power plant consists of two water-powered turbines. When the water level is low, steam-driven turbines produce the power. 573/

E. Distribution of Output.

Bearings reportedly are to be distributed to Czechoslovak national enterprises. 574/

F. Remarks.

Sweden supplied this plant with steel up to 1949. The last shipment of Swedish steel was received in August 1949. 575/

III. Viliama Sirokeho Plant, Kysucke Nove Mesto.A. Background.

The construction of this plant was started under the Two Year Plan (1947-48) and was originally called the Vallo (Valiva Loziska) National Corporation. 576/ The foundation stone for the plant was laid by Deputy Prime Minister Viliam Shiroky on 1 May 1948. 577/ Under the Five Year Plan (1949-53), \$4.2 million was to be spent on buildings and \$5.8 million on machine equipment. 578/ One workshop was reported to have been opened on 28 October 1950, a second shop on February 1951, and three other shops were nearing completion by June 1951. The plant is an affiliate of the Zbrojovka Brno Corporation. The construction of the plant was supervised by engineers from the Lisen plant, who were placed in supervisory positions. 579/

S-E-C-R-E-T

50X1-HUM

C. Production Information.1. Estimated Output.

<u>Year</u>	<u>Output (Thousand Units)</u>
1949	0
1950	Negligible
1951	140

2. Types Produced. 581/

Up to June 1951, ball bearings in 2 sizes were reported in production: No. 6204, with a bore of 20 mm; and No. 6203, with a bore of 17 mm. A total of 10 different sizes were to be in production by the end of 1951, and during 1952 the number of different types and sizes was to be increased to 40.

D. Plant Information.1. Personalities. 582/

Muskar Plant Director (1951)  
 Wolf Supervisor, Workshop No. 1 (1951)  
 Kucar Supervisor of Production Planning (1951)  
 Homola Security Chief (1951)

2. Personnel.a. Employees.

In 1951 there were 350 to 400 workers, 50 percent of whom were women. In addition, there were about 60 apprentices. 583/  
 Planned employment is 3,000 workers. 584/

- 154 -

S-E-C-R-E-T

S-E-C-R-E-T

b. Shifts.

There are three 8-hour shifts, 6 days per week. 585/

3. Buildings.

The following installations were under construction or in partial operation in June 1951 (approximate sizes) 586/:

a. Production Workshop, 160 by 40 meters, with brick partition wall dividing this building into 2 sections. One section was in partial operation in June 1951 with a machine and grinding department and a heat-treating department.

b. Workshop, 140 by 40 meters, not equipped as of June 1951.

c. Workshop, 70 by 40 meters, not equipped as of June 1951.

d. Workshop, 40 by 40 meters, not equipped as of June 1951.

e. Workshop, 40 by 40 meters. Machinery installed was reported to have been used mainly for maintenance at the plant as of June 1951.

f. Boiler house, 40 by 40 meters, 3-story building with 3 brick smokestacks. Still under construction as of June 1951.

4. Plant Expansion.

Foundation walls for an administration building, 100 by 12 meters, and a garage, 50 by 12 meters, were laid in 1951. 587/ Underground installations have been reported under construction in the hills approximately 1,500 feet west of the plant site. 588/

5. Electric Power.

Power is supplied from Zilina through a high-tension transmission line. 589/

S-E-C-R-E-T

IV. Zbrojovka Brno Plant, Tyniste nad Orlici.

A. Background.

This plant (formerly owned by a person known as K.J. Stasek) was built before World War II. The plant was assigned to the Zbrojovka Brno Corporation after the war. It is a small plant with a relatively insignificant output. 590/ Old machinery from Plant [redacted] at Perstejn was reported to have been sent to this plant in 1949. 591/

50X1-HUM

B. Location.

The plant is reported to be located on the northwestern outskirts of Tyniste nad Orlici at a junction of the road running from Tyniste nad Orlici to Opocno. 592/

C. Production Information.

In late 1949, annual production was reported to be approximately 2 percent of the total output of the industry. 593/ This would be equivalent to approximately 100,000 bearings in 1950. Production is reported to be of an inferior quality. 594/

D. Plant Information.

1. Personalities.

Unknown.

2. Personnel.

a. Employees.

Employment was reported to be 120 workers in 1949, of whom 15 percent were women. 595/

b. Shifts.

One 8-hour shift was reported. 596/

S-E-C-R-E-T

3. Buildings.

The plant was reported to be small, covering an area of about 70 by 150 meters and consisting of 2 workshop buildings (1949). 597/ There is no available information on proposed plant expansion, source of electric power, or method of distribution of output.

- 157 -

S-E-C-R-E-T

S-E-C-R-E-T

PART IV: POLAND

Fabryka Wyrowbow Metalowych, Krasnik.

A. Background.

This plant, built prior to 1939, was used as a munitions factory. It was partly demolished as a result of wartime operations. 598/ Reconstruction of the plant began during the Three Year Plan (1947-49), and 94 million zlotys were to be invested in its construction. 599/ Toward the end of 1949, machinery was reported to have been moved into the shops, and the plant began to produce antifriction bearings in 1950. 600/ Very little information is available on the plant.

B. Location.



50X1-HUM

C. Production.

1. Estimated Output.

Output in 1949 was reported to be negligible and that for 1950 was estimated to be 200,000 bearings. A Warsaw newspaper on 30 January 1951 reported that the plant had experienced its first year (1950) under the production plan, which it not only fulfilled but exceeded by 60,000 antifriction bearings. 601/

Output for 1951 was estimated on the following basis: In the first quarter of 1951 the antifriction bearings industry increased output by 388 percent as compared with the first quarter of 1950. 602/ Assuming a straight line increase in production for 1950, the output in the first quarter of 1950 has been estimated to be 20,000 bearings. Therefore, the output in the first quarter of 1951 has been estimated to be about 100,000 bearings (20,000 x 4.88 = 97,600). By continuing to project estimated production on a straight line, output in 1951 has been estimated to be 570,000 bearings. In the third quarter of 1951, however, the plan was not achieved, although output did surpass the production in the third quarter of 1950. 603/ Therefore, output in 1951 has been estimated to be 500,000 bearings.

S-E-C-R-E-T

2. Types Produced.

Ball and roller bearings in the medium-size range are reported to have been produced up to April 1951. 604/

D. Plant Information.

1. Personalities.

Jan Tuszyński Managing Director (1949) 605/

2. Personnel.

The plant was reported to employ 1,000 workers in 1950, and this number was to increase to 3,000 when the plant operated at capacity. 606/ Thirty percent of the employees are reported to be women, and nearly all the workers are reported to be of peasant origin. The unskilled workers receive a 6 to 8 weeks' training program in the operation of the machinery. 607/

There is no available information on buildings or source of electric power.

E. Distribution of Output.

Roller bearings are being produced for tractors constructed by the State Engineering Works at Ursus near Warsaw. 608/ It would appear that this plant will supply bearings to the automotive factory under construction at Lublin. 609/

S-E-C-R-E-TPART V: RUMANIASteagul Rosu Plant, Orasul Stalin.A. Background.

A ball and roller bearings section was established in the Steagul Rosu Plant (formerly Astra-Vagoane) at Orasul Stalin (formerly Brasov), 610/ and production was begun in June 1949. 611/ Machines for the bearings section were imported from the USSR under the USSR-Rumanian trade agreement of 1949. 612/ Other machines are reported to have been transferred from the IAR factory in Orasul Stalin. 613/ Soviet technicians were sent to train the local workers, 614/ and two Italian bearings technicians had also worked in the plant until 1951. 615/

B. Location.

The plant is located about 2 miles southeast of the main railway station in Orasul Stalin, 1,500 feet southwest of the Orasul Stalin - Ploesti main highway at coordinates 47°37'30"N-25°38'30"E. 616/ The Metrom metallurgical plant is reported to be located about 1,500 feet northwest of this plant toward Orasul Stalin. 617/

C. Production Information.1. Estimated Output.

Production commenced in June 1949. Output in December 1949 was reported to be 1,860 bearings. 618/ Output for the year 1949 was estimated at 7,000 units and was obtained by projecting a smooth curve from June to December 1949.

Output in January 1950 was reported to be 6,400 bearings. 619/ In 1950, planned production was reported to be 192,273 bearings weighing 280,000 kilograms. Actual production in the first quarter of 1950 was reported to be 24,000 bearings. 620/ On 27 August 1950, Steagul Rosu was reported to have manufactured its 100,000th bearing. 621/ A Soviet publication reported on 14 March 1951 that the 1950 planned output in bearings at Steagul Rosu was fulfilled by 111.5 percent. 622/ The estimate of output for 1950 is 200,000 units.

- 160 -

S-E-C-R-E-T



S-E-C-R-E-T

The same publication also reported that the January and February plans (1951) had been fulfilled by 140 percent. 623/ The estimate of an output of 300,000 bearings in 1951 is based on the reported growth in output in 1950 and in the first 2 months of 1951.

2. Types Produced.

In 1949, two types were reported in production: taper roller and spherical roller bearings. 624/

In 1950 the plant was planning to produce over 40 different sizes in 4 different types of antifriction bearings: taper roller bearings, cylindrical roller bearings, spherical roller bearings, and ball bearings. Actual production up to April 1950 consisted of taper roller bearings with a bore size of 50 mm and cylindrical roller bearings with bore size of 60 mm and 110 mm. 625/

Ball bearings were not produced at this plant until 1951. In May 1951 the plant produced ball bearings with a 50-mm bore. 626/

The principal production of this plant actually is rail-way freight cars, oil tankers, and armaments. 627/ Production of antifriction bearings is a small segment of the output of this plant.

D. Plant Information.

1. Personalities.

Marcel Klein Director General of the factory (1952) 628/

Victor Gavet Chief Engineer (1950) 629/

2. Personnel.

a. Employees.

The plant in 1952 employed approximately 6,000 to 7,000 workers. 630/ The bearing section employed 150 workers in 1949, 631/ with a planned employment of 400 workers for January 1950. 632/

S-E-C-R-E-T

b. Shifts.

It was reported that in 1950 there were 2 shifts, 12 hours per day, 7 days per week. 633/

3. Buildings.

The plant area is reported to be surrounded by a rectangular fence measuring approximately 2,300 by 1,150 feet. 634/ There are more than 10 large-size production buildings in this plant area. The production of antifriction bearings is reported to be located in Building No. 530 (this is the number used at the plant for this building), which is in the northwest portion of the plant. The building measures approximately 425 by 325 feet, and the bearings section uses approximately 325 by 325 feet of this building. 635/

4. Plant Expansion.

The capacity of this plant in the production of anti-friction bearings has been increasing. There is no known information, however, that further sections of this plant will be used for production of bearings.

5. Electric Power.

Electric power is supplied by the plant's own hydro-electric power station, which is situated in the center of the plant area. 636/

E. Distribution of Output.

Bearings are used in tractors and petroleum producing equipment. 637/

F. Remarks.

The Astra Corporation was founded as a private concern in 1920. Before World War II it had gained control over 4 plants, 1 of which was the Astra Vagoane (now the Steagul Rosu). In 1941 the Astra Corporation virtually became state-owned, when the Malaxa Trust, which was controlled by the Rumanian government, absorbed all of a new stock issue of the corporation. In June 1948 the Astra Corporation was nationalized. The individual plants became independent of the parent corporation and were renamed. 638/

S-E-C-R-E-T

The first charge of special steel for antifriction bearings was smelted at Industria Sarmei (Wire Industry) in Campia-Turzii in July 1949. 639/

- 163 -

S-E-C-R-E-T

S-E-C-R-E-TPART VI: OTHER PLANTSI. USSR.A. Confirmed Bearings Repair Plants and Minor Bearings Plants.

<u>Location</u>	<u>Remarks</u>
Alma-Ata	The Alma-Ata Bearings Repair Plant repaired 59,000 bearings in the first 6 months of 1948. <u>640/</u>
Gomel'	This bearings repair plant fulfilled a 7-month program ahead of schedule in 1948. <u>641/</u>
Grodno	Reported to be a bearings repair plant, constructed in 1952. <u>642/</u>
Krasnodar	This bearings repair plant concluded contracts with industry and tractor stations for repair of ball and roller bearings in 1950. <u>643/</u>
Kursk	A bearings repair plant, reported to have begun operations in 1951. <u>644/</u>
Moscow	A special plant set up for repairing bearings. <u>645/</u>
Novosibirsk	The Novosibirsk Roller Bearing Plant took first place among the enterprises in the April competition, 1949. <u>646/</u>
Rostov	A bearings repair plant listed in the All-Union Bearings Repair Directorate. <u>647/</u> Output was reported to be about 70,000 bearings in first half of 1948. <u>648/</u> The plant was awarded the second All-Union prize for the fourth quarter of 1949. <u>649/</u>
Stalingrad	In 1949 this bearings repair plant, which was constructed after World War II, was manufacturing new ball and roller bearings as well as repairing them. Capacity in 1949 was reported to be 10,000 bearings per month. <u>650/</u>
Tambov	Listed under All-Union Bearings Repair Directorate in 1948. <u>651/</u> In 1947 it produced approximately 50 reconditioned bearings per day which were sent to Moscow, Stalingrad, and Tashkent. <u>652/</u>
Tashkent	Output of this repair plant was reported to be 62,900 bearings in the first half of 1948, <u>653/</u> and bearings production was reported as lagging in 1950. <u>654/</u>

S-E-C-R-E-T

S-E-C-R-E-T

<u>Location</u>	<u>Remarks</u>
Tomsk	Listed under All-Union Bearings Repair Directorate in 1948. <u>655/</u>

B. Unconfirmed Bearings Repair Plants and Minor Plants.

The production of ball and roller bearings at the following plants in the USSR is either unconfirmed or in limited quantities to fulfill the requirements of the plant for production of other products. In addition, there are approximately 70 other plants which have been reported to be producing ball and roller bearings. There is no confirmation on the latter reports.

<u>Location</u>	<u>Remarks</u>
Alapayevsk	The Serp i Molot Steel Plant was reported to be making ball and roller bearings (1946). <u>656/</u>
Alma-Ata	Ball bearings were reported to be manufactured at the Alma-Ata Heavy Machine Factory (1946). <u>657/</u>
Chita	A ball bearings plant was reported to be located 15 miles north of the No. 1 Chita Railroad Station (1946). <u>658/</u>
Chkalov	This tank factory at Chkalov was reported to be producing rolls and roller bearings for tanks (1949). <u>659/</u>
Irkutsk	Roller bearings were reported to be produced at the Kuybyshev Machinery Manufacturing Plant (1948). <u>660/</u>
Ivanovo	A ball and roller bearings factory was reported at Ivanovo (1949). <u>661/</u>
Kamenka	A bearings repair plant was reported to have been built in 1937 and to be producing roller bearings with about 1,500 workers in 3 shifts (1949). <u>662/</u>
Kiev	Ball bearings were reported to be produced at the Kiev Steel Plant (1947). <u>663/</u>
Kirov	Ball bearings were reported to be manufactured at the Ammunition and Farm Machine Factory (1947). <u>664/</u>

S-E-C-R-E-T

S-E-C-R-E-T

<u>Location</u>	<u>Remarks</u>
Kramatorsk	Novo Kramatorsk Plant of Heavy Machine Construction was reported to be required to manufacture large ball and roller bearings for the heavy machinery made at the plant (1941). <u>665/</u> Novo Kramatorsk was reported to produce ball bearings (1949). <u>666/</u>
Krasnoyarsk	A ball bearings shop was reported to be located in the No. 2 Foundry Farm Implement Factory (1946). <u>667/</u>
Leningrad	An instrument factory was reported to be manufacturing small ball bearings (1946). <u>668/</u>
Rustavi	Machinery from the Steyr Bearings Plant, Austria, was reported to be used to set up a plant (1948). <u>669/</u>
Sverdlovsk	Uralmash Machine-Building Plant was also reported to be producing large bearings. <u>670/</u> Ball bearings were machined at this plant (1946). <u>671/</u>

II. East Germany.

There is no confirmation of the following reports of the production of ball bearings at these locations.

<u>Location</u>	<u>Remarks</u>
Magdeburg - Backau	The production of the Ernst Thaelmann Works, formerly the Krupp Gruson Works, consists mainly of armor plate and ball bearings for tanks. <u>672/</u>
Nordhausen	The IWA Tractor Factory is manufacturing crank shafts, drive shafts, and ball bearings for tanks. <u>673/</u>
Erkner	The former subsidiary plant of VKF in Erkner, which had been completely dismantled by the Russians in 1945, was reported in operation, again producing antifriction bearings. <u>674/</u> A



50X1

S-E-C-R-E-T

S-E-C-R-E-TIII. Czechoslovakia.

There is no confirmation of the following reports of the production of ball bearings at these locations.

Location	Remarks
Dolni Mecholupy (about 7 km southeast of Prague)	A factory reported to have been built by the Germans during World War II is now producing nonprecision bearings of inferior quality. The factory in 1950 was reported to consist of 2 buildings with the main building measuring approximately 120 meters by 30 meters and to produce about 700,000 nonprecision bearings for agricultural machinery. <u>676/</u> This may be a plant referred to as the former Solman plant. <u>677/</u>
Turciansky Svaty Martin	A ball bearing plant was reported to be under construction at the foot of the Mala Fatra Mountains in the town of Turciansky Svaty Martin (1949). <u>678/</u>
Spisska Nove Ves	A factory for the production of ball bearings was reported to be built at Spisska Nove Ves (1949). <u>679/</u>

S-E-C-R-E-T

APPENDIX C

EQUIPMENT USED IN THE ANTIFRICTION BEARINGS INDUSTRY

The machine tools used in the antifriction bearings industry are for the most part considered as standard metalworking equipment. It must be understood, however, that this equipment is specially adapted to the materials and processes used in the industry. Special tooling includes forming tools, gages, fixtures, and other accessories which are peculiar to the manufacture of bearings.

There follows a list of the principal types of equipment used in the antifriction bearings industry. Those which can be considered as specially designed for the industry are designated by an asterisk (\*).

A. Balls and Rollers.

1. Heading machines, or upsetters.
2. Furnaces (for hardening and tempering).
3. Gages (for sizing and sorting).\*

Balls.

4. Rough grinders, vertical spindle type.\*
5. Furnaces (for annealing).
6. Finish grinders and lappers.\*
7. Tumbling, or burnishing, barrels.

Rollers.

8. Centerless grinders (for taper rollers very special tooling is required).
9. End grinders (for taper rollers very special tooling is required).

B. Rings.

1. Forging machines.
  - a. Upsetters.
  - b. Steam hammers.



S-E-C-R-E-T

2. Power saws, or cut-off machines.
3. Automatic turning machines.
  - a. Single spindle type.
  - b. Multiple spindle type.
  - c. Chucking machines.
4. Centerless grinders.
5. Bore grinders.
6. Surface grinders (Blanchard type).
7. Presses (for stamping manufacturer's identification).

Ball Bearing Rings.

8. Turret lathes.
9. Hand millers (for notched races).
10. Furnaces (for annealing, hardening, and tempering).
11. Oscillating groove grinders.\*

Roller Bearing Rings.

12. Furnaces (for carburizing).

C. Retainers.

1. Stamping presses (for steel stampings, involving complicated die sets).
2. Presses (presses for retainer assembly are required for ball retainers).

S-E-C-R-E-T

APPENDIX D

SUPPORTING STATISTICAL TABLES FOR THE ANTI-FRICTION BEARINGS INDUSTRY IN THE USSR

Table 29

Estimated Production of Antifriction Bearings at Individual Plants in the USSR a/\*  
1932-51

Thousand Units

State Bearings Plants	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945
No. 1. Moscow	1,100 <u>b</u>	5,100 <u>b</u>	11,300 <u>b</u>	16,600 <u>b</u>	19,500 <u>c</u>	21,500 <u>c</u>	23,000 <u>c</u>	25,000 <u>d</u>	32,000 <u>e</u>	17,000 <u>f</u>	10,000 <u>f</u>	15,000 <u>g</u>	18,000 <u>g</u>	19,000 <u>g</u>
No. 2. Moscow	1,500 <u>h</u>	2,000 <u>h</u>	2,300 <u>e</u>	2,600 <u>e</u>	2,800 <u>e</u>	3,000 <u>e</u>	3,200 <u>e</u>	3,400 <u>i</u>	3,500 <u>j</u>	1,500 <u>k</u>	3,000 <u>l</u>	3,000 <u>o</u>	3,300 <u>o</u>	3,500 <u>l</u>
No. 3. Saratov									500 <u>m</u>	1,500 <u>n</u>	2,000 <u>o</u>	2,000 <u>p</u>	1,900 <u>o</u>	1,900 <u>o</u>
No. 4. Kuybyshev											N.A.	800 <u>r</u>	1,800 <u>o</u>	3,000 <u>r</u>
No. 5. Tomsk											Negligible	1,800 <u>s</u>	2,400 <u>o</u>	2,700 <u>o</u>
No. 6. Sverdlovsk											Negligible	100 <u>t</u>	150 <u>t</u>	300 <u>t</u>
No. 7. Baku														
No. 8. Khar'kov														
No. 9. Kuybyshev (Bezmyanka)														
Total, 1932-45	2,600	7,100	13,600	19,200	22,300	24,500	26,200	28,400	36,000	20,000	15,000	22,700	27,550	30,400

\* Footnotes for Table 29 follow on p. 172.

S-E-C-R-E-T

Table 29

Estimated Production of Antifriction Bearings at Individual Plants in the USSR  
1932-51  
(Continued)

State Bearings Plants	Thousand Units					
	1946	1947	1948	1949	1950	1951
No. 1. Moscow	12,000 <u>u/</u>	19,200 <u>v/</u>	28,400 <u>v/</u>	36,000 <u>v/</u>	48,000 <u>w/</u>	51,500 <u>v/</u>
No. 2. Moscow	3,500 <u>x/</u>	4,400 <u>y/</u>	4,600 <u>c/</u>	5,200 <u>z/</u>	6,000 <u>aa/</u>	7,000 <u>bb/</u>
No. 3. Saratov	1,900 <u>g/</u>	2,100 <u>cc/</u>	2,500 <u>dd/</u>	4,000 <u>ee/</u>	5,700 <u>ff/</u>	7,400 <u>c/</u>
No. 4. Kuybyshev	5,500 <u>gg/</u>	9,000 <u>hh/</u>	10,000 <u>c/</u>	11,000 <u>ii/</u>	12,000 <u>jj/</u>	13,000 <u>jj/</u>
No. 5. Tomsk	3,000 <u>c/</u>	3,400 <u>kk/</u>	4,200 <u>c/</u>	5,000 <u>c/</u>	6,000 <u>ll/</u>	7,000 <u>c/</u>
No. 6. Sverdlovsk	400 <u>t/</u>	550 <u>t/</u>	700 <u>t/</u>	850 <u>mm/</u>	1,000 <u>mm/</u>	1,100 <u>c/</u>
No. 7. Baku		30 <u>nn/</u>	53 <u>oo/</u>	67 <u>oo/</u>	90 <u>oo/</u>	120 <u>pp/</u>
No. 8. Khar'kov	100 <u>qq/</u>	400 <u>rr/</u>	1,800 <u>ss/</u>	2,200 <u>tt/</u>	4,000 <u>uu/</u>	6,400 <u>vv/</u>
No. 9. Kuybyshev (Bezmyanka)	600 <u>ww/</u>	1,000 <u>ww/</u>	2,000 <u>xx/</u>	3,000 <u>yy/</u>	3,500 <u>zz/</u>	4,600 <u>aaa/</u>
Total, 1946-51	<u>27,000</u>	<u>40,080</u>	<u>54,253</u>	<u>67,317</u>	<u>86,290</u>	<u>98,120</u>

a. Range of estimate, plus or minus 20 percent. Blank spaces indicate that this plant was not yet in production.

b. Planned production: 1932, 3 million bearings; 1933, 12 million bearings; 1934, 24 million bearings. 680/ Reported actual production: 1932, 1.1 million bearings; 1933, 5.1 million bearings; 1934, 11.3 million bearings; 1935, 16.6 million bearings. 681/

c. For years for which data were lacking, estimates were interpolated mechanically between reported production estimates.

d. No. 1 State Bearings Plant planned to produce 3,855,000 bearings in August 1939 and actually produced 1,759,000 bearings in August 1939, or 45.6 percent of planned output. 682/ Assuming that the rate of output would increase in the last 4 months of 1939, actual production for 1939 was estimated to be 25 million bearings.

e. A Soviet publication reported on 24 September 1947 that production of bearings was 100,000 bearings per day. This figure would correspond to 32 million bearings per year in 1940 (based on 320 working days). 683/

f. Evacuation of the plant in the fall of 1941 caused production to drop. 684/ The plant was in partial operation by 1942, with the yearly output at the lowest level. 685/

g. Output in late 1943 was reported at approximately 2.5 million bearings per month. 686/ This monthly figure appears to be in excess of the probable output of antifriction bearings at this plant considering that the plant had been evacuated in late 1941 and only in partial operation in 1942. Annual output in 1943, therefore, has been estimated to be about half the annual output of this reported monthly figure. Output for 1944 and 1945 was estimated on the basis of this adjusted annual output in 1943.

S-E-C-R-E-T

S-E-C-R-E-T

Table 29

Estimated Production of Antifriction Bearings at Individual Plants in the USSR  
1932-51  
(Continued)

h. [redacted] State Bearings Plant produced 800,000 bearings in 1931 and planned to produce 2 million bearings in 1933 and 3 million annually on completion of the reconstruction. 687/ 50X1-HUM

i. [redacted] State Bearings Plant planned to produce 337,600 bearings in August 1939 and actually produced 158,800 bearings in August 1939. 688/ On the basis of this reported output, an estimated monthly average of 290,000 was assumed, which corresponds to an annual output of 3.4 million. 50X1-HUM

j. Production in 1940 was reported to be 3.5 million bearings. 689/

k. In the fall of 1941, equipment from [redacted] State Bearings Plant was evacuated to Tomsk and Sverdlovsk, but the plant was re-equipped and in operation again by the middle of 1942. 690/ Production was reported to be 3 million bearings in 1942. 691/ 50X1-HUM

l. Output of bearings in 1951 was reported to be double over 1945 output, 692/ which would put 1945 output at 3.5 million bearings.

m. Construction of [redacted] State Bearings Plant was not completed before World War II. 693/ Output in 1940 was estimated to be approximately 500,000 bearings. 50X1-HUM

n. Production was reported in 1941 at 1.5 million bearings. 694/

o. Production was reported in 1942 at 2 million bearings. 695/ The plant was bombed by Germans in 1942. 696/

p. Production was reported in 1943 at 2 million bearings. 697/

q. In 1945 the war damage was being repaired. Between 1945 and 1947 the daily rate of production was reported at approximately 4,300 ball bearings, 1,500 roller bearings, and 600 needle bearings. 698/ On the basis of this report, output was estimated to be approximately 1.9 million in 1945 and 1946.

r. In late 1941, [redacted] State Bearings Plant was set up with machinery evacuated from Moscow. 699/ In 1946 the statement was published that production of bearings in 1943 was 60,000 to 70,000 bearings per month and 290,000 bearings in October 1945. 700/ This output was reported to be for tractors, but tractor and farm machinery production was negligible during this period, and the reports were therefore assumed to be the total production at the plant. 50X1-HUM

s. In 1941 this plant was set up by machinery evacuated from Moscow, 701/ and the plant began operations in January 1942. 702/ In 1943, production was reported at 1.8 million. 703/

t. In 1941, [redacted] State Bearings Plant was set up with some of the machinery evacuated from the Moscow plants. 704/ Information on production is limited; however, this plant produces large-size bearings. On 4 June 1948 it was reported that the plant produced several million bearings to date. 705/ On the basis of this report, production of approximately 2 million bearings was distributed over the period from 1942 to 1948. 50X1-HUM

u. A Soviet publication on 29 March 1947 stated that in 1950 the plan calls for an increase to 400 percent of the 1946 planned output, 706/ which is interpreted as a fourfold increase. With production estimated to be 48 million bearings in 1950 (see footnote w), output of bearings in 1946 has been estimated to be 12 million bearings (48 ÷ 4 = 12). This is regarded as a reasonable figure

S-E-C-R-E-T

Table 29

Estimated Production of Antifriction Bearings at Individual Plants in the USSR.  
1932-51  
(Continued)

for 1946, since a Soviet newspaper on 20 July 1951 reported that the production area had been considerably reduced as compared with the prewar period (output by 1950, however, was worth considerably more than output in 1940), 707/ and in 1946 a tire plant was reliably reported to occupy parts of the plant. 708/

v. The percentage increases in production over the preceding year at [ ] State Bearings Plant are as follows: a Soviet publication on 3 February 1948 stated that in 1947 production of ball bearings increased by 60 percent as compared with 1946 709/; and another on 17 October 1948 stated that compared with the first 9½ months of 1947, production of ball bearings increased by 48 percent. 710/ It has been assumed that the percentage increase was maintained for the balance of the year. On 3 November 1949 it was stated that in 1949 production was to be increased by 38 percent for each square meter of effective floor space and by 39 percent for each unit of plant as compared with 1948. 711/ The same source on 4 November 1949 stated that the plan for the plant for 1949 was an increase of 32 percent over 1948, and another newspaper on 26 November 1949 stated that it was envisaged to fulfill the plan for 1949 by 1 December 1949. 712/ It would appear from these reports that the plan of 32 percent was going to be fulfilled; however, on 8 April 1950 it was reported that since July 1949 the plant has not been operating satisfactorily. There is no known report which definitely states that the planned production of antifriction bearings at this plant had been achieved in 1949. Therefore, the achieved percentage increase was estimated to be about 27 percent as compared with 1948. This figure has been estimated by using the achieved percentage increases and estimated production figures for 1948 and 1950.

A Soviet newspaper on 20 July 1951 stated that output of basic products per unit of equipment increased 27.1 percent in 1950 as compared with 1949, and that output per square meters of production area increased 35.2 percent. The article stated that to increase output by more than a third and lower the production cost of goods by 29 percent, as the state plan demanded, every link of the plant's production had to be put on a higher organizational and technical level. 713/

A Soviet newspaper on 16 August 1951 stated that output of bearings in the first quarter of 1951 was 5.5 percent higher than same period of 1950. 714/

On 9 February 1952 it was reported that in 1952 this plant plans to increase the volume of production of bearings by 10 percent, using the present production area and the same number of workers as in 1951. 715/

<u>Year</u>	<u>Percentage Increases Over Preceding Year</u>	<u>Estimated Production (Million Units)</u>
1946	N.A.	12.0
1947	(Achieved) 60	19.2
1948	(Achieved) 48	28.4
1949	(Planned 32; Estimated Achieved) 27	36.0
1950	(Achieved) 33	48.0
1951	(First Quarter of 1951) 5.5	51.5
1952	(Planned) 10	56.7

- 174 -

S-E-C-R-E-T

50X1-HUM

S-E-C-R-E-T

Table 29

Estimated Production of Antifriction Bearings at Individual Plants in the USSR  
1932-51  
(Continued)

- w. A Soviet newspaper on 9 February 1952 stated that in 1950 this plant exceeded the prewar output of bearings by  $1\frac{1}{2}$  times. 716/ Another publication stated that in 1950 the output of bearings at this plant increased 79 percent, as compared with 1940. 717/ Production in 1950 was estimated to be 48 million bearings, since the increase in production of  $1\frac{1}{2}$  times was believed to be a more reliable report on actual production.
- x. On 19 April 1947 it was reported that production of ball bearings in 1947 is to be increased by 27 percent, as compared with 1946, and on 22 November 1947 that the annual Plan for 1947 was fulfilled on 15 November 1947. 718/ Using the 1947 estimate (see footnote y below), output of bearings in 1946 was estimated to be approximately 3.5 million bearings ( $4.4 + 1.27 = 3.47$ ).
- y. Production in 1947 was reported on 7 August 1947 to be in excess of 1940 output. 719/ On the basis of this report, actual output in 1947 was estimated to be 4.4 million bearings.
- z. A Soviet publication in August 1949 reported that the Fourth Five Year Plan (1946-50) was to be fulfilled in 4 years and that a 50-percent increase as compared with prewar production was to be achieved in 1949 instead of in 1950. On 10 August 1950 it was reported that the Five Year Plan was fulfilled in November 1949. 720/ On the basis of a 50-percent increase over 1940, production in 1949 was estimated at 5.2 million bearings.
- aa. On 10 August 1952 it was reported that in the first 6 months of 1950 production of ball bearings increased by 28.4 percent as compared with the same period of the previous year and by 70 percent as compared with before the war. 721/ On the basis of a 70-percent increase in 1950 over 1940 (which was estimated to be 3.5 million bearings), actual production for 1950 was estimated to be 6 million bearings.
- bb. On 22 December 1951 it was reported that in 1951 output increased by 20 percent as compared with 1950. 722/ Production of bearings in 1951 was estimated at 7 million bearings.
- cc. On 19 April 1947 it was reported that in 1947 production of bearings was to increase by 25 percent as compared with 1940. A technical journal in April 1948 reported that in 1947 the Plan was not fulfilled. 723/ Planned production of the ring department was for rings for the assembly of 3.5 million to 4 million bearings, but the rejection rate in 1947 was also reported at about 40 percent. 724/ Production in 1947 was estimated at 2.1 million bearings by applying the 40-percent rejection rate against the planned output of 3.5 million bearings. This estimate is an increase of approximately 10 percent as compared with 1946.
- dd. The old production shop was partly re-equipped with new machine tools from Germany. The construction of a large new workshop which was started in 1946 was nearing completion in late 1948 and was also to be equipped with German machine tools. By late 1948, production is reported to have increased by 30 percent as compared with 1945 production, 725/ or 2.34 million bearings; however, on 13 February 1949 it was reported that production of ball bearings in Saratov Province in 1948 increased by 24 percent as compared with 1947, 726/ or 2.60 million bearings. Actual output in 1947 is estimated to be 2.5 million, which is an average of the 2 reported percentage increases.

S-E-C-R-E-T

Table 29

Estimated Production of Antifriction Bearings at Individual Plants in the USSR  
1932-51  
(Continued)

ee. By late 1949 the new forge and the large new production shop were completed and equipped with machinery. 727/ On 30 October 1949 it was reported that the Plan for the first 10 months of 1949 was fulfilled 10 days before schedule. On 13 February 1949 it was reported that in 1949 the production of precision ball bearings for precision machinery and instruments was to be twice as much as in 1948 and that of cylindrical roller bearings for machine tool, automobile, and tractor industries, 2.5 times as much as in 1948. 728/ In 1949, production was estimated at 4 million bearings, 729/ which is approximately 1.5 times as much as in 1948. This estimate appears reasonable, since the new shops were not in operation until late 1949 and since their effect would be felt in 1950 rather than 1949.

ff. On 13 June 1946 it was reported that in 1950 this plant planned to produce 3 times as many bearings as in 1945. 730/ On 10 May 1950 it was reported that the Plan for the first quarter of 1950 was overfulfilled. Assuming that the plant overfulfilled the planned output, production in 1950 was estimated to be 5.7 million, which is more than 3 times the estimated output of 1.9 million for 1945.

gg. A report of 29 December 1945 stated that daily production jumped from 40,000 to 45,000 pieces of bearing rings in the first half of December to 52,400 pieces on 25 December. 731/ This would be an average of approximately 48,000 rings, which corresponds to 24,000 bearings per day (2 rings per bearing) for December 1945 and 1946. Assuming a 350-day work year and neglecting a rejection rate, this would be 8.4 million per year. A rejection rate of 30 to 40 percent on over-all operations in 1946 was not unreasonable, 732/ since some prisoner-of-war reports mention a higher rejection rate for rings alone. By applying a rejection rate of 35 percent, production was estimated to be approximately 5.5 million in 1946.

hh. On 19 April 1947 it was reported that production of ball bearings was to be increased by 33 percent in 1947 as compared with 1946. On 3 May 1947 it was stated that the Plan for the first 4 months of 1947 was fulfilled before schedule and that 1 million ball bearings were delivered in excess of the plan. On 20 November 1947 it was reported that the plan for 1947 was fulfilled  $2\frac{1}{2}$  months before schedule. 733/ On the basis of these reports and the estimated output in 1946, the monthly output in 1947 has been estimated at 770,000 bearings ( $1.33 \times 5.5$ ). Therefore, the output in 1947 is estimated at approximately 9 million.

9.5  
ii. In 1946 it was reported that output of bearings would be increased by 50 percent at the end of 5 years 734/; however, on 1 November 1948 it was reported that the Five Year Plan called for production to be doubled. 735/ The Estonian SSR on 8 December 1949 reported that the Five Year Plan was fulfilled in 3 years and 11 months. 736/ Because of the increased output reported during 1947, the report that production was to double during the Five Year Plan is believed to be the more reliable planned fulfillment. In 1949, output is estimated to be 11 million.

jj. On 25 July 1950 it was reported that the Plan for the first 6 months of 1950 was fulfilled, and on 3 November 1950 it was reported that the Plan for the third quarter of 1950 was overfulfilled. 737/ Without direct information on output, the increased production trend of 1949 and the reports on fulfillment of the Plan were used as the basis for the estimates in 1950 and 1951.

S-E-C-R-E-T

S-E-C-R-E-T

Table 29

Estimated Production of Antifriction Bearings at Individual Plants in the USSR  
1932-51  
(Continued)

kk. On 21 December 1947 the Plan for the fourth quarter of 1947 for ball bearings for agricultural machinery was reported to be only fulfilled to 52 percent to date. 738/ In 1947, production was reported to be 3.4 million. 739/  
ll. On 18 July 1946 it was reported that the capacity of the plant was to be doubled during the Five Year Plan. 740/ This would be 6 million in 1950 which is 2 times the output in 1946.  
mm. In September 1948 a publication reported that production is now increasing and that high-speed grinding is to be introduced in October 1948. 741/ On 2 February 1949 it was reported that the Sverdlovsk Bearings Works was lagging in the production of tractor spare parts (bearings), 742/ which would indicate that the increased production is still at a modest rate. Production was estimated to be 850,000 in 1949 and 1 million in 1950.  
nn. On 17 May 1947 it was reported that the main structure of this plant was put into operation and that the plant planned to produce 30,000 bearings in 1947. 743/ A newspaper on 10 October 1947 reported that the year's plan for 1947 was fulfilled, 744/ which would be a monthly average of approximately 5,000 bearings from the end of April to the middle of October. Assuming that the plant would then produce 15,000 bearings in the last 3½ months of the year, total output in 1947 would be 45,000. However, an independent and apparently reliable report stated that in the last 7 months of 1947 the factory produced approximately 18,000 bearings. 745/ By taking the average of these two production estimates, the total output in 1947 was believed to be approximately 30,000 ( $\frac{45,000 + 18,000}{2} = 31,500$ ).

oo. A newspaper on 8 February 1951 reported percentage increases of this plant in bearings production over 1946, but this plant did not begin production until the middle of 1947. The percentage increases were changed to a 1947 base year, and production for the ensuing years calculated as follows:

Year	Soviet Reported Percentage Increases (Base Year, 1946) <u>746/</u>	Actual Percentage Increases (Base Year, 1947)	Actual Output of Plant No. 7 (Units)
1946	100		0
1947	277	100	30,000
1948	485	175	52,500
1949	622	224	67,200
1950	826	298	89,400

pp. This plant failed to meet the 1951 gross production Plan (96 percent). 747/ Output was estimated to have the same percentage increase in 1951 as in 1950.

- 177 -

S-E-C-R-E-T



S-E-C-R-E-T

Table 29

Estimated Production of Antifriction Bearings at Individual Plants in the USSR  
1932-51  
(Continued)

qq. On 22 December 1946 it was reported that [redacted] Bearings Plant planned to go into production by June 1946 and planned to produce 470,000 bearings during 1946; however, production actually started in August 1946. The following table will show a comparison between planned and actual output 748/: 50X1-HUM

<u>Month (1946)</u>	<u>Planned</u>	<u>Actual</u>
June	30,000	0
July	35,000	0
August	45,000	6,000
September	60,000	18,000
October	80,000	30,000
November	100,000	12,000
December	120,000	55,000
<u>Total</u>	<u>470,000</u>	<u>121,000</u>

In the same report it was also stated that the output of 55,000 units in December is still to be found only in the plan of the ministry, which does not entirely agree with an earlier plan of the same ministry. 749/ The December figure does appear as though the actual output figures for the end of the year were being padded. Assuming that the output in December was no greater than any previous month, the output in 1946 was estimated at approximately 100,000.

rr. On 31 December 1947 a report stated that the first units of this plant started operating and are supplying products to automobile and tractor industries. On 18 November 1947 it was stated that on the eve of the 30th anniversary of the October Revolution the first ball bearings plant in the Ukraine started working in Khar'kov. 750/ It is evident from these reports and from the report (see footnote qq) on December output in 1946 that the plant was only in partial operation in 1947. Assuming that the plant averaged 20,000 per month (average of estimated output in 1946 for 5 months) until the end of October 1947 and that in the last 2 months of 1947, when the new units were reported to be in operation, production was assumed to increase to the planned output reported for November and December in 1946 (see footnote qq), total output in 1947 has been estimated at approximately 400,000 (20,000 x 10 + 100,000 + 120,000 = 420,000).

ss. On 20 November 1948 it was reported that the year's Plan for 1948 was fulfilled; and on 20 December 1948 that, in the first 11 months of 1948, 4.4 times as many ball bearings were produced in the same period in 1947, with the works being in full operation in 1948. 751/ In 1948, production was estimated at 1.8 million (400,000 x 4.4).

S-E-C-R-E-T

S-E-C-R-E-T

Table 29

Estimated Production of Antifriction Bearings at Individual Plants in the USSR  
1932-51  
(Continued)

tt. On 14 January 1950 it was reported that in 1949 more ball bearings were delivered as compared with 1948; however, in January 1950 it was reported that the year's plan for 1949 was not fulfilled. <sup>752/</sup> The percentage increase of the bearings industry in 1949 was 128 percent. Assuming this plant fulfilled a 25-percent increase, output was estimated at 2.2 million (1.8 x 1.25).

uu. On 9 November 1950 it was reported that the Fourth Five Year Plan (1946-50) was fulfilled on 7 November 1950. <sup>753/</sup> In 1950, production was estimated at 4.0 million bearings (using the 35-percent increase of the bearings industry as a basis for the estimate).

vv. In 1951, production of ball bearings in the Ukrainian SSR was fulfilled and increased by 59 percent as compared with 1950. <sup>754/</sup> [ ] Bearings Plant in Khar'kov is the only manufacturer of bearings in the Ukraine (excluding bearings repair plants). In 1951, production was estimated to be 6.4 million bearings.

ww. This plant produced bearing components for [ ] State Bearings Plant during World War II. <sup>755/</sup> It has, however, been producing and assembling bearings since the war. On 19 April 1947 it was reported that this plant planned to produce 61 percent more ball bearings in 1947 than in 1946. On 26 November 1947 it was reported that the annual Plan for 1947 was fulfilled. <sup>756/</sup> In 1947, production was reported to be approximately 1 million bearings, <sup>757/</sup> which would put 1946 output at approximately 600,000.

xx. On 20 December 1949 it was reported that the level of production envisaged for 1950 was achieved in June 1949 and that the average daily output of bearing rings had been raised from 14,000 to 20,000 and on individual days to 28,000. <sup>758/</sup> Two rings are required per bearing. In 1948 the rejection rate was reported to be approximately 15 percent. <sup>759/</sup> Taking into consideration this rejection rate, a 350-day work year, and an output of 14,000 rings, production in 1948 was estimated at approximately 2 million ( $\frac{14,000 \times 350 \times 0.85}{2} = 2,082,500$ ).

yy. The reported output of an occasional 28,000 rings per day evidently came toward the end of the year, and the average output of rings in 1949 has been assumed to be 20,000. (See footnote xx.) By applying the same approach to 1949 as was applied to 1948, production in 1949 was estimated to be approximately 3 million ( $\frac{20,000 \times 350 \times 0.85}{2} = 2,975,000$ ).

zz. Assuming that the output of rings in 1950 would fall between the reported 20,000 and 28,000, the average output of rings in 1950 would be approximately 24,000. (See footnote xx.) It is also probable that the rejection rate would be reduced, and a rejection rate of 15 percent for 1950 has been assumed. Output in 1950 has been estimated to be approximately 3.5 million ( $\frac{24,000 \times 350 \times 0.85}{2} = 3,570,000$ ).

aaa. On 7 April 1951 it was reported that production of bearing rings had increased by 50 percent in the last 6 months. <sup>760/</sup> In January 1952 it was reported that this plant still has a far too high percentage rejection rate and does not meet its production plans. <sup>761/</sup> Evidently the plant did not maintain the 50-percent increase throughout the year. Assuming a 30-percent increase for the year, which is the reported achieved increase of the bearings industry, total output in 1951 was estimated at 4.6 million ( $\frac{24,000 \times 1.30 \times 350 \times 0.85}{2} = 4,640,000$ ).

50X1-HUM

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S-E-C-R-E-T

Table 30

Average Estimate of Total Production of Antifriction Bearings in the USSR a/  
1946-51

	Thousand Units					
<u>Estimated Total Production</u>	<u>1946</u>	<u>1947</u>	<u>1948</u>	<u>1949</u>	<u>1950</u>	<u>1951</u>
Based on Individual Works b/	27,000	40,080	54,253	67,317	86,290	98,120
Based on Yearly Percentage Increases c/	27,000	36,180	46,440	59,400	80,190	104,220
Total	<u>27,000</u>	<u>38,130</u>	<u>50,347</u>	<u>63,359</u>	<u>83,240</u>	<u>101,170</u>

a. This estimate was made by taking the average of the estimated total production of individual works and the estimated total production by yearly percentage increases, 1946-51. Range of estimate, plus or minus 20 percent.

b. From Table 29.

c. Using the estimated total production for 1946 of 27 million units based on individual works and the published yearly percentage increases shown in Table 1, p. 11, above, the estimated total production based on yearly percentage increases was calculated.

S-E-C-R-E-T

APPENDIX E

METHODOLOGY

The principal objective of this report was to determine the ability of the Soviet Bloc to meet the requirements for antifriction bearings through domestic production. In conjunction with this objective, this report was to determine whether, if domestic production was unable to meet the requirements, the imports from the West would cover the deficit. A second purpose of the report was to determine the inputs needed in the domestic production.

In order to answer these questions, it was necessary to analyze the position of the antifriction bearings industry in each country as follows:

1. Plant studies were completed.
2. Output was estimated on the basis of the plant studies and on additional information obtained from the Soviet press and radio.
3. Imports were computed principally from trade statistics of the exporting countries.
4. Requirements for bearings were determined.
5. Finally, the total supply of output plus imports was balanced against requirements to compute a surplus-deficit position.

The information computed for each country was then compiled to estimate the position of the antifriction bearings industry in the Soviet Bloc. Whenever necessary, the details of the methods used have been explained in the text.

Inputs into the Soviet Bloc antifriction bearings industry, with the exception of labor, have been calculated by comparison with the inputs required by the US antifriction bearings industry. Labor inputs, however, have been estimated from reports which, although fragmentary, gave the number of workers employed at the bearings plants in the Bloc.

S-E-C-R-E-T

In preparing this report, units of bearings were used as a means of estimating the output, requirements, imports and exports, and the surplus-deficit position of the Soviet Bloc. It is believed that it was advantageous to use units as a means of measurement because: (1) output, requirements, and imports of the Bloc, particularly of the Satellites, are often reported in actual quantities of bearings; (2) [redacted] earlier years from which current estimates have been made are given in units; (3) the bearings industry and the engineering industries refer to units more frequently than to value or to metric tons when discussing output or requirements; (4) explanation of types and sizes and end-use requirements is simplified when the over-all estimates are made in terms of actual quantities; and (5) the reader is in a better position to understand the surplus-deficit position of the Bloc.

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The use of units of bearings as a means of measurement, however, creates certain difficulties, since the sizes of bearings vary considerably. In applying the unit as a yardstick to measure total output in the USSR, it was difficult to interpret whether the fragmentary percentage increases referred to the actual number of bearings produced or whether the percentage increases applied to some other units, such as metric tons or ruble value. The estimate of output in this report is an attempt to measure actual output in quantities of bearings.

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