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ECONOMIC INTELLIGENCE REPORT

PRODUCTION OF AGRICULTURAL MACHINERY
IN THE USSR



CIA/RR 48
5 January 1955

CENTRAL INTELLIGENCE AGENCY

OFFICE OF RESEARCH AND REPORTS

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(ORR Project 34.235)

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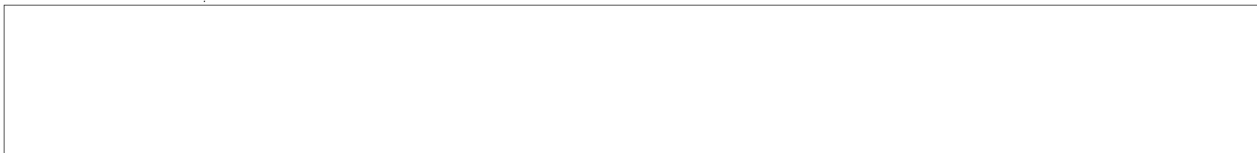
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PRODUCTION OF AGRICULTURAL MACHINERY IN THE USSR*

Summary

The production of agricultural machinery in the USSR will have doubled in value from 1 billion rubles in 1948 to 2 billion rubles in 1955. This enormous increase in production is essential to the fulfillment of the 1954-55 Soviet plans stressing the mechanization of agriculture, the extension of cultivated areas, and the increased production of food required by the new consumer goods program.

Present parks of agricultural machinery are inadequate for the task, and the substitution of hand labor for machinery would be unrealistic in a program of this size. The USSR is therefore engaged in a large expansion of the agricultural machinery industry. Facilities are obtained by decreasing the production of machinery in good supply; by farming out orders to other ministries or transferring plants to the Ministry of Automobile, Tractor, and Agricultural Machine Building; and by expanding producing plants and building new facilities.

Although levels of production by units are difficult to estimate and not a fair measure of production, it is assumed that the present program will produce about 2.1 million units of agricultural machinery in 1954 and about 2.4 million units in 1955.

Soviet trade in agricultural machinery is very limited. Imports during 1945-53 amounted to less than 2 percent of all domestic production, and exports from 1949-53 were about 2.5 to 3.0 percent of Soviet domestic production. The motivating factor for the export of agricultural machinery to the Satellites, judging from the relatively small quantities exported, the types of machines involved, and the accompanying press and radio comment, appears to be the propaganda value of the transactions.

* The estimates and conclusions contained in this report represent the best judgment of the responsible analyst as of 1 September 1954.

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The Soviet level of productivity in 1953 in the manufacture of agricultural machinery is estimated at about 55 percent of that of the US, rising to about 65 percent in 1954, and about 70 percent by 1955. The quality and design of machinery is inferior, however, to US equipment. US machines are lighter in weight, less complicated, and more productive.]

Inputs into the industry included about 4 percent of the Soviet total production of rolled steel and a labor force of about 120,000 workers in 1951. The direct vulnerability of the industry to Western export controls is almost negligible.

The planned expenditures of time and labor directed towards increasing the productivity of the agricultural machinery industry and of agriculture, as a whole, are an indication that the Soviet economy is not being mobilized for war.

Agricultural machinery plants in the USSR were among the first to convert to the production of war materials under the threat of war before World War II, and they are still producing a limited amount of munitions. A sudden increase in the production of munitions or other war materials indicating a conversion of the plants from peacetime production is a possible indication of future Soviet intentions.

I. Introduction.

A. General.

1. Agricultural Machinery Defined.

For the purposes of this report, agricultural machinery is defined as machinery used for the preparation and cultivation of the soil, for the planting and harvesting of crops, for preparing crops for market or for use, and for performing other farm operations around farm buildings. Agricultural machinery may be stationary, horse-drawn, tractor-drawn, tractor-mounted, or self-propelled, depending upon the use to which it is to be put.

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The machinery used for the operations described above may best be broken down into the following major categories:* (a) plows and listers; (b) harrows, rollers, pulverizers, and stalk cutters; (c) planting, seeding, and fertilizing machinery; (d) cultivators and weeders; (e) sprayers and dusters; (f) harvesting machinery; (g) haying machinery; (h) machines for preparing crops for market or for use; (i) farm poultry equipment; (j) farm dairy machines and equipment; (k) barn equipment; (l) barnyard equipment; and (m) farm elevators and blowers.

2. Agricultural Machinery Industry Defined.

The agricultural machinery industry, as referred to in this report, is defined as that group of plants whose major product is agricultural machinery. As such, the industry in the USSR comprises 120 plants. The 36 plants listed in Appendix A are the most important, and are estimated to produce approximately 80 percent of the total Soviet output of agricultural machinery. 2/ Except as their production is included in the total inputs and the total production of agricultural machinery in the USSR, this report is not concerned with the hundreds of plants outside the agricultural machinery building industry which produce agricultural machinery as a secondary product on a regular or a special-order basis. 3/ The production of these plants in completed units probably accounted for less than 5 percent of total Soviet production in 1953, and, because of increased production within the industry, probably will account for no larger a percentage of production in 1954 and 1955.

The USSR is by far the largest producer of agricultural machinery in the Soviet Bloc, producing nearly eight times as much as the rest of the Bloc combined.

3. Importance of Agricultural Machinery Production.

The production of agricultural machinery, in the USSR as anywhere else, is vital to the increased mechanization of agriculture. Such mechanization, in turn, allows fewer people to produce more food

* These are the categories under which the US Department of Commerce reports on agricultural machinery production in the US. 1/

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on a larger area with less expenditure of effort per person, primarily through less waste and more timely fulfillment of farm operations. The latter factors are particularly important in times of adverse weather conditions, when land preparation and planting are unavoidably delayed. In the event of a war, the USSR would be able to forego production of agricultural machinery temporarily, by more intensive use of available machinery and by increased use of the younger and the older elements of the population for the many sowing and harvesting operations which can be done by hand. In an extended war, however, the USSR would be forced either to retain a part of the facilities for production of agricultural machinery instead of converting them to war materials, or to divert an ever larger part of the total labor force to agriculture as the park of machinery wore out.

B. Historical Development. 4/

The period from 1928 to World War II, comprising the First (1928-32), Second (1933-37), and part of the Third (1938-42) Five Year Plans, was the period of major development in the agricultural machinery industry in the USSR. With the aid of American and German engineers, old plants formerly engaged in the production of simple horse-drawn implements, particularly plows, were remodeled and enlarged. This was the period of the introduction of the more complex tractor-drawn types of machines and the decline in production of horse-drawn types. New plants were built in Rostov-on-Don, Zaporozh'ye, Syzran', Voronezh, Gomel', Novosibirsk, and Tashkent. At the outbreak of World War II there were about 20 plants which were important as specialized producers* of agricultural machinery, and these 20 are still among the most important producers. With few exceptions (Kurgan, Omsk, Novosibirsk, and Tashkent), the agricultural machinery plants were located west of the Urals, particularly in the Ukraine and the Central Industrial Region. As the danger of war increased in 1938 and 1939, most agricultural machinery plants were partially or wholly converted to the production of war materials, resulting in substantial decreases in the production of agricultural machinery.

The agricultural machinery industry was severely damaged during World War II. The plants in Rostov-on-Don, Zaporozh'ye, Odessa, Gomel', Kirovograd, and Pervomaysk, which accounted for about 75 to 80 percent

* For purposes of this report "specialized producers" are the producers that produce agricultural machinery as a major product.

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of all production of agricultural machinery before the war, suffered particularly heavy damage. Considerable equipment was evacuated beyond the Urals, however, and used to help set up new plants in Tashkent, Chirchik, Frunze, Akmolinsk, Kurgan, Rubtsovsk, and Krasnoyarsk. Production of agricultural machinery virtually ceased from mid-1941 through 1944, as all available facilities were concentrated on the production of war materials.

Facilities devoted to the production of agricultural machinery were expanded greatly in the postwar period. War damage was repaired, though somewhat slowly, not having been completed until 1949 or 1950. New plants were built, and old plants were expanded and converted to peacetime production. Particularly worthy of mention were the new plants in L'vov, Kamenka, Bezhetsk, and Tashkent (Ordzhonikidze Rayon). Other plants in Leningrad, Dnepropetrovsk, Stalino, Taganrog, Kazan', Tula, Voronezh, and Zlatoust were converted and became important producers of agricultural machinery and spare parts. A number of small plants, scattered throughout central and western USSR but concentrated in the Ukraine, Belorussia, and the Baltic area, also began production. In addition to these many "specialized" plants, literally hundreds of other plants outside the industry began limited production of agricultural machinery and spare parts, particularly the latter. There was a slackening of this production in some plants in 1949 and 1950, but it was taken up again with renewed vigor in late 1953 to assist in the mechanization program provided in the new agricultural decrees. The motivating force behind this postwar expansion of production facilities was the need not only to recoup enormous war losses of agricultural machinery but to increase machinery parks beyond prewar levels.

It is not possible to state the exact number of plants now involved in the production of agricultural machinery and even less possible to state the exact number which might be making spare parts. The number of the latter could easily exceed 600 or 700 if all producers identified since 1946 are still so engaged. The plants producing completed machines, as distinguished from spare parts alone, might number several hundred; but of these only about 120 have agricultural machinery as their major product. It should be mentioned that these specialized producers also produce consumer goods and, in some instances, munitions. It is interesting to note that, in spite

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of the great postwar expansion of facilities for production of agricultural machinery, the technological backwardness and poor production record of the industry have received almost constant attention in the Soviet press.

C. Technology.1. General.

Certain major points of similarity exist between the technology of the agricultural machinery industries of the US and the USSR. Producing plants in both countries employ much the same types of general-purpose metalworking machinery which is easily adapted to other uses. In each industry most of the individual types of agricultural machinery are manufactured by (in Soviet terms) "series production," that is, production at levels between those of mass production and those of "individual production." 5/* In each industry the product mix is extremely complex, comprising at least 100 or so different major types of machines,** almost every one of which is intended for a different farm operation.

On the whole the technological development in the US agricultural machinery industry is superior to that in the USSR. Whereas the leading producers of agricultural machinery in the US are reported to have the best equipped metalworking facilities in the country, with efficient modern plants, 8/ it is only in the past year or two that a concerted effort has been made in the USSR to modernize the leading plants of the industry and to provide them with equipment for the mechanization of the handling of materials and completed machines, for the shot-cleaning of castings, and for pneumatic sand molding.*** In spite of such measures, there is still a considerable amount of time consumed in the

* The Russians refer to tractor plows and grain combines as examples of mass-produced items, 6/ but these items are at best actually semi-mass-produced.

** In this count, all moldboard plows, for example, have been considered as a single type of machine, whether horse-drawn, tractor-drawn, or tractor-mounted. When the Russians reported that they produced 222 more types of agricultural machines in 1950 than in 1940, or a total of 316, 7/ they must have been referring to models and not types.

*** For a thorough explanation of the backwardness of the technology in the Soviet agricultural machinery industry and the plans for improvement, see Sel'khoz mashina (The Agricultural Machine), No. 3, March 1951,

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production of agricultural machinery. In March 1953, it was reported that in many plants 40 to 45 percent of all work was done by hand. 9/ The following reasons were given for this situation: (a) unsatisfactory organization of production, (b) incorrect assignment of workers, (c) existence of much unnecessary work in adjusting and finishing various parts during machine assembly, and (d) failure to make full use of available machinery. 10/ Thus, it appears that getting the human element to function properly constitutes one of the major and most difficult problems of the industry.

A US research organization made a study of the industrial productivity of the US in 1939 and of the USSR in 1937 and concluded that productivity in the Soviet agricultural machinery industry was only about 60 percent of that in the US agricultural machinery industry. 11/ The US agricultural machinery industry, in the face of the continued prosperity of its only customer, the farmer, has made great strides in improving its technical equipment and in building up an experienced working force since 1939. Only a small part of its facilities were converted to military items during World War II.* The agricultural machinery industry of the USSR, on the other hand, already behind US industry in productivity, suffered tremendous damage during World War II,** with complete conversion to military items in undamaged plants. As a consequence, Soviet industry fell even further behind the US in productivity and has had a difficult time in attempting to rebuild and reequip its plants. Productivity in Soviet industry, on the basis of weight of output per man, has been estimated at roughly 50 percent of the productivity in US industry in 1951 and roughly 55 percent in 1954.

2. Design and Quality.***

The Soviet agricultural machinery industry is not equal to that of the US in machinery design and quality. Not only has the US

* The 6-percent drop in the value of shipments (closely comparable to production) of agricultural machinery in the US between 1941 and 1943, probably as much the result of materials shortages as conversion, was more than made up for by the 61-percent increase in shipments in 1944 over 1941. 12/

** The Russians reported that the plants in Rostov-on-Don, Zaporozh'ye, Odessa, Gomel', Kirovograd, and Pervomaysk, which before World War II produced about 75 percent of all machinery used in agriculture, were reduced to ruins. 13/

*** Photographs of typical US and Soviet agricultural machines are shown following p. 8.

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designed and built a more complete line of machinery,* but US machines tend to be lighter, less complicated, and relatively more productive.** Soviet agricultural machines are probably somewhat heavier than their US counterparts since they are intended for harder use on larger areas of land. In 1953, however, the USSR began to realize that a number of the machines produced were unnecessarily heavy. The first step taken to help correct this situation was a plan to substitute hollow rectangular sections for I-beam sections.^{17/} A second step was the plan to favor production of tractor-mounted machines over tractor-drawn machines.^{18/} Tractor-mounted machines, as compared with tractor-drawn, are more convenient to use, relatively more productive per pound of weight and, being lighter in weight, result in savings of metal. In the US, 65 percent of the unit production of tractor moldboard plows were tractor-mounted in 1952.^{19/} In the USSR, tractor-mounted plow production in 1952 (and in 1953) has been estimated as negligible, although an actual quantity estimate was not possible.

The USSR, while claiming that its agricultural machinery was technically as good as any foreign-produced machinery, admitted in August 1953 that its machinery was inferior with respect to wear resistance of working parts such as plowshares, plow moldboards, cultivator teeth, gears, chains, and sprockets, and also with respect to external finish produced by casting, machining, and painting.^{20/} The high reject rates in castings and in completed machines serve as a constant target in complaints against the industry.^{21/}*** Much of the***

* The USSR has admitted that it needs at least 80 more types of machines to attain a complete line of machinery for all-around mechanization of agriculture (perhaps only 50 to 60 types, allowing for duplication, since this is probably a reference to models rather than major types).^{14/} In the US, there is scarcely a farm operation for which some type of machine is not produced.

** The US rates a tractor-drawn 3-bottom moldboard plow at 10 to 12 acres per 10-hour day.^{15/} The USSR rates a comparable plow at about 7.5 to 8.5 acres per 10-hour day.^{16/}

*** At the Tashsel'mash Agricultural Machinery Plant imeni Voroshilov in Tashkent, the major Soviet producer of cotton pickers, 39 percent of the cotton pickers and 76 percent of the cotton cleaners produced in 1951 were reported as rejected at the first inspection because of defects. Several hundred defective cotton pickers had piled up by the end of the year and had to be sent through the main conveyor again in February 1952, thus slowing up the production of new machines. Quality was said to be even worse in 1952, with 35 percent of the cotton cleaners still at the plant because of serious production defects.^{22/}**** Continued on p. 9.

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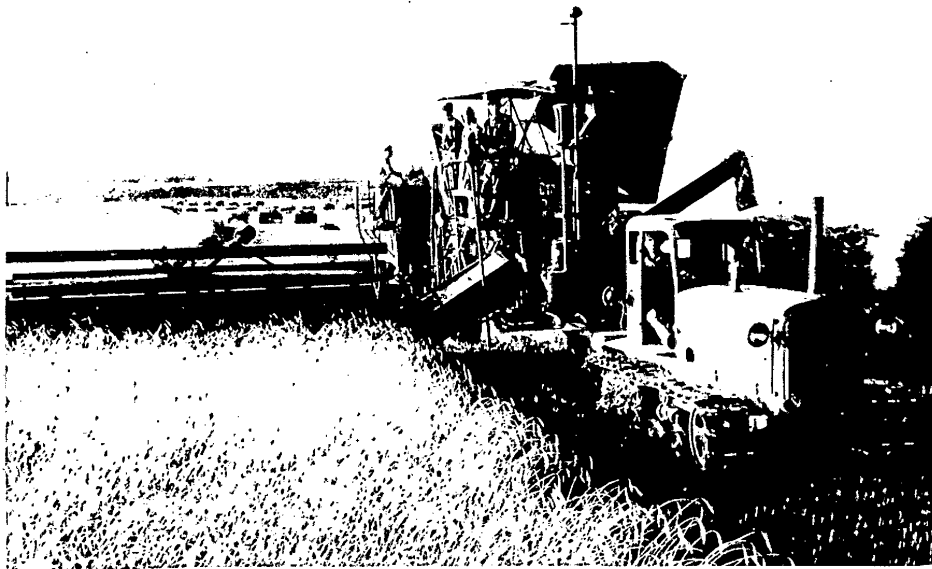


FIGURE 1. 16-FOOT TRACTOR-DRAWN GRAIN COMBINE PRODUCED IN THE USSR. This combine is operated by 4 workers -- 1 on the tractor and 3 on the combine itself. The machine has a 40-horsepower engine, operates on 4 large steel wheels, and weighs about 11,330 pounds, or about 283 pounds per horsepower of the engine compared with about 105 pounds for the US combine.

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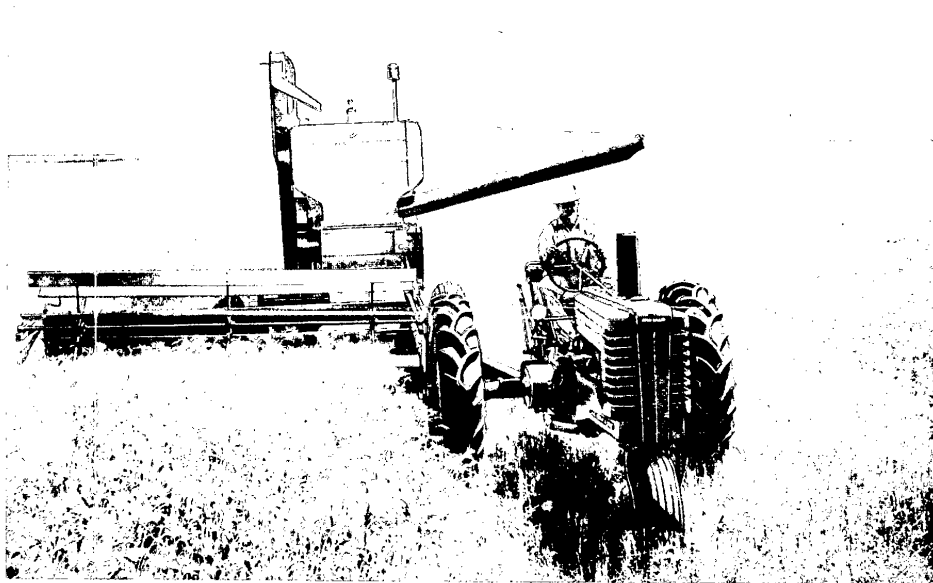


FIGURE 2. 12-FOOT TRACTOR-DRAWN GRAIN COMBINE PRODUCED IN THE US. This combine is operated completely by the tractor driver. The machine has a 56-horsepower engine, operates on 2 rubber-tired wheels, and has a shipping weight (with standard equipment) of about 5,900 pounds.

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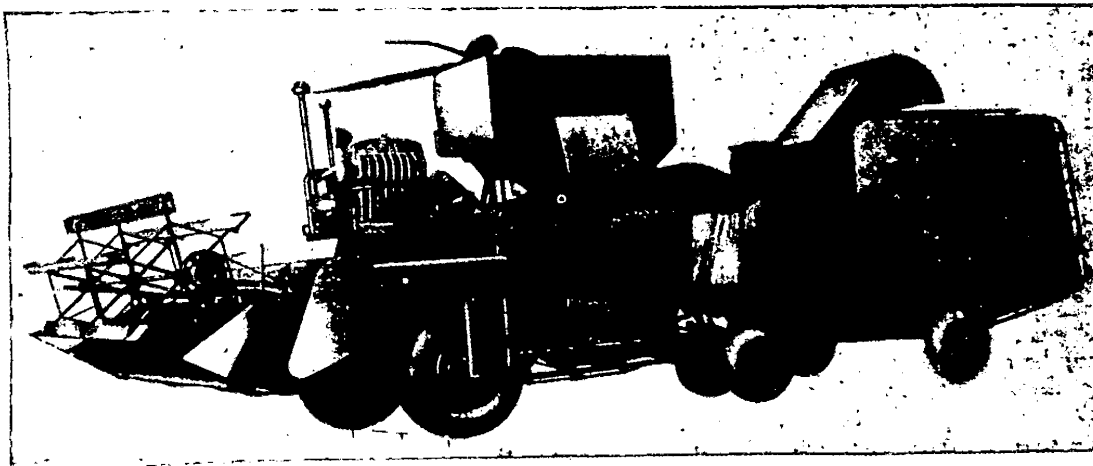


FIGURE 3. 13-FOOT SELF-PROPELLED GRAIN COMBINE PRODUCED IN THE USSR. The operator's platform is lower than on the US machine, and the operator must sit right next to the engine.

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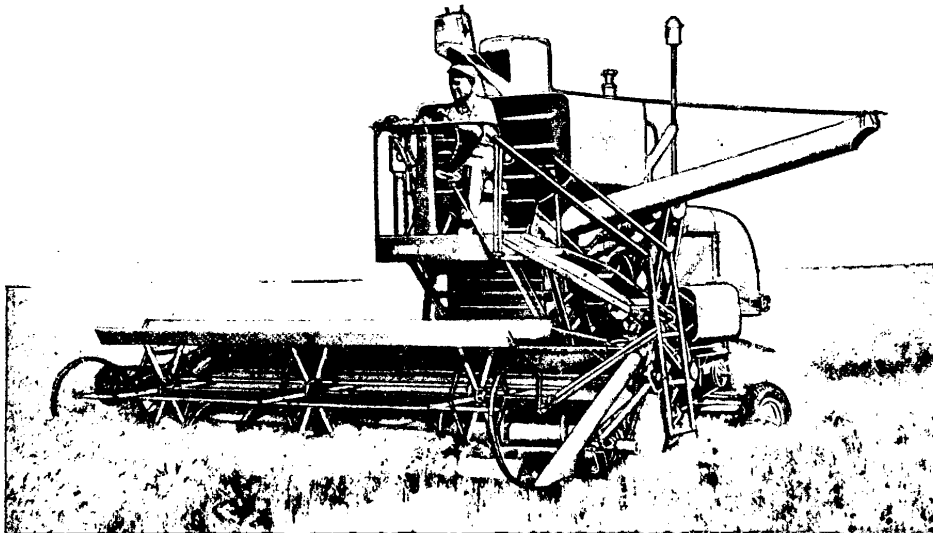


FIGURE 4. 12-FOOT SELF-PROPELLED GRAIN COMBINE PRODUCED IN THE US. The high platform puts the operator up out of the dust and dirt, and the placement of the engine behind the grain hopper keeps the engine heat and fumes away from the operator.

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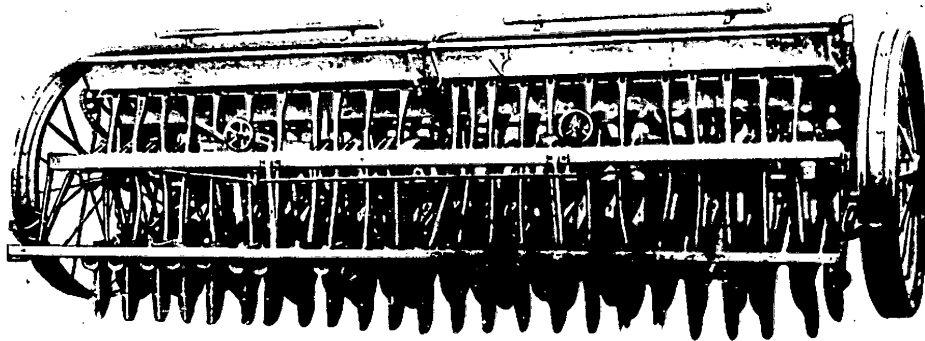


FIGURE 5. SEED DRILL PRODUCED IN THE USSR. This model is generally comparable to the US seed drill shown in Figure 6. Note the large wheels and the more complex appearance of the machine. Unlike the US model, a man must ride on the back of the Soviet drill when it is in operation to unclog the seed by hand.

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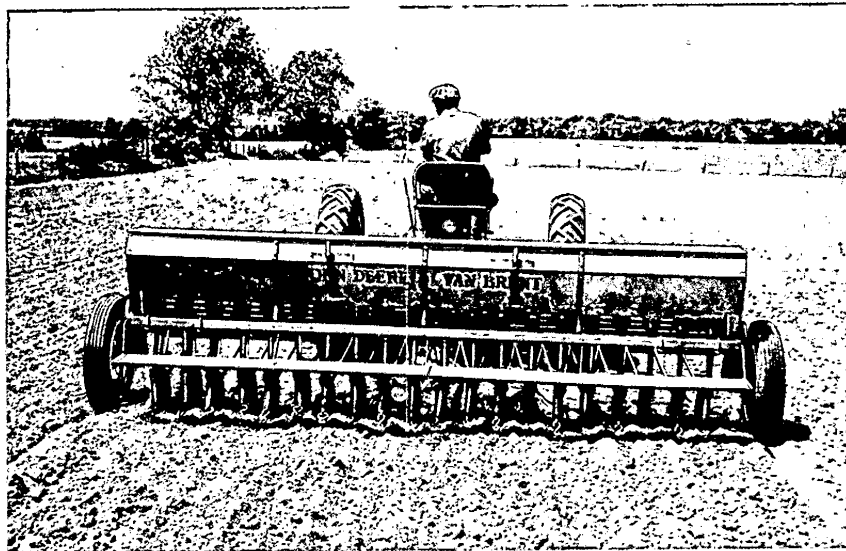


FIGURE 6. SEED DRILL PRODUCED IN THE US. This model, by changing row spacings, can be adapted to handle almost every crop. Note that the machine has small rubber-tired wheels. The use of rubber tires is becoming more and more common on US agricultural machinery.

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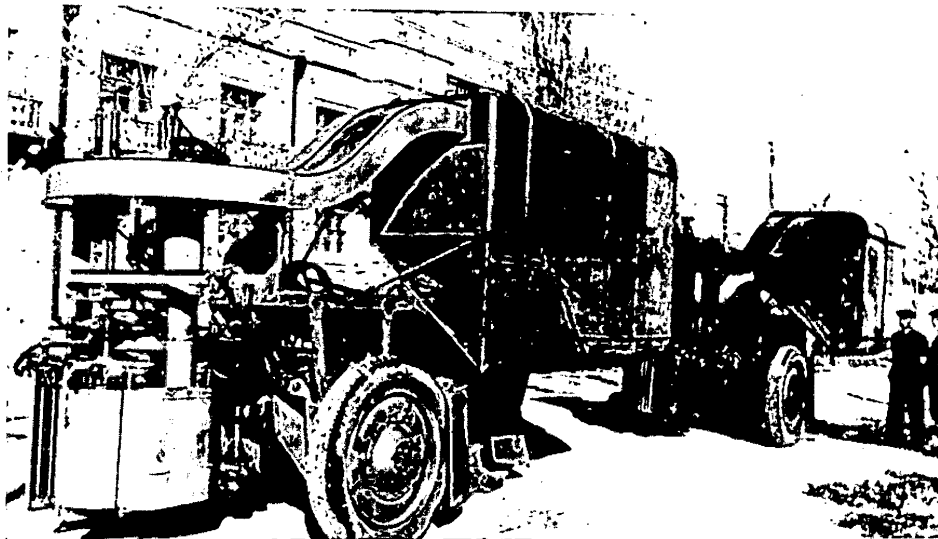


FIGURE 7. REAR VIEW OF A SOVIET-PRODUCED COTTON PICKER WITH ATTACHED BUNKER. The bunker innovation considerably complicates the machine without improving the quality of the cotton picked. The machine is said to replace about 40 hand pickers.

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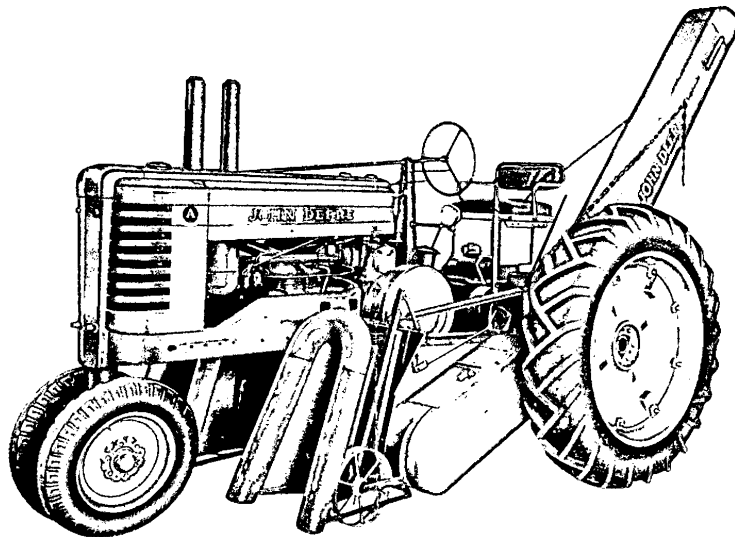


FIGURE 8. TYPE OF US COTTON PICKER DESIGNED TO FULL A WAGON. The wagon is drawn behind the picker and catches the cotton. The picker can pick about 15 acres a day. Like the Soviet machine, best results are obtained after the leaves have been removed from the plants by frost or a defoliant. Replacing from 30 to 40 hand pickers, the quality of the picked cotton is reported to be as good as hand picked.

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blame is placed on the failure of the plants to follow technical specifications, and on the practice of allowing a general slow-down of production during the first half of the month, followed by a frantic rush to make up the loss during the last half. 23/

3. Convertibility of the Industry.a. To War Materials.

The Soviet agricultural machinery industry should have little trouble in making a full-scale conversion from peacetime to wartime production within a matter of about 3 months. 24/ The industry began a gradual conversion to war production (primarily shells, shell cases, fuses, bombs, grenades, and parts for tanks and airplanes) as early as 1938 and converted completely during World War II. At the end of 1946, Pravda openly complained of the slowness with which the industry was terminating its war orders and reconverting to production of agricultural machinery. 25/ Numerous prisoner-of-war reports* as well as an examination of items picked up during the Korean War 26/ indicate that certain agricultural machinery plants may still be engaged in the production of shell cases, fuses, and other war materials. The industry has thus built up a wealth of experience in the production of war materials. Many of the workers in the industry during the war and in the immediate years thereafter probably are still available to serve as a nucleus should full-scale conversion to war production be ordered. The general-purpose, easily adapted metalworking machinery in agricultural machinery plants contributes to the ease with which such conversion could be made. In the US, the agricultural machinery industry reportedly had no difficulty in converting part of its facilities to the production of military items during World War II. 27/

b. To Consumer Goods.

The Soviet agricultural machinery industry differs substantially from its US counterpart in one respect. In the US, it is not the standard practice to produce a large line of strictly consumer goods items in the industry. The Soviet industry, on the other hand, produces many consumer goods items. Probably the best illustration of this point is the announced schedule of production for 1951. The following production was scheduled in 1951 in addition to the Plan:

* CIA Industrial Register plant consolidations. The bulk of these reports cover the period from 1946 through 1949, but a few are dated 1950.

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3,000 bicycles, 10,000 Pobeda clocks, 10,000 phonographs, 20,000 samovars, 30,000 teapots, 21,300 primus stoves and 80,000 burners for them, 100,000 pieces of ironware, 228,000 pieces of enamelware, 20,000 loudspeakers, and plastic products valued at 2 million rubles. 28/ It appears from a few isolated reports that such production is still characteristic of the industry. Under the new program of providing more consumer goods, such production may have been increased.*

4. Expansion of the Industry.

Because of the relatively simple construction of many agricultural machines, the agricultural machinery "industry" can easily expand by the simple expedient of farming out orders to other plants, with an almost total disregard for the type of plant to which the order is given. Under the new agricultural machine building program, which was initiated in September 1953, only one completely new plant is known to have been planned for to date, and only 5.5 million rubles have been allocated for reconstruction and expansion of four of the larger existing plants. 30/** The remainder of the necessary expansion was to have been achieved by allocating production to other ministries, or simply by transferring plants from other ministries to the main agricultural machinery producing ministry, the Ministry of Machine Building. Six such transfers have been reported. 32/

The agricultural machinery industry could expand also in the sense that the production of nonagricultural machinery items could be stopped.

It would be impossible to estimate the exact increase in capacity which the agricultural machinery industry might realize through such measures.

* In January 1954, it was announced that the October Revolution Agricultural Machinery Plant in Odessa, one of the largest plow producers in the USSR, had pledged to organize the production of consumer goods. 29/

** It was reported as early as January 1953 that an agricultural machinery plant was to be built in Batumi during the Fifth Five Year Plan. 31/ The plant planned in the September 1953 agricultural decree, however, was to be the responsibility of the Council of Ministers of the Belorussian SSR. It has not yet been identified by exact location.

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S-E-C-R-E-TD. Organization and Administrative Structure.*

Effective with the ministerial reorganization of 5 March 1953, primary responsibility for the production of agricultural machinery and spare parts in the USSR rested with the Main Administration of Agricultural Machine Building (Glavsel'mash) of the Ministry of Machine Building, to which most of the agricultural machine building plants were subordinated. 33/ The plants of this main administration probably produce as much as 80 percent of total agricultural machinery output. Secondary responsibility rested primarily with the Ministry of Transport and Heavy Machine Building, but the Ministry of Agriculture, the Ministry of Defense Industry, and the Ministry of Aviation Industry have undertaken commitments under the September 1953 agricultural decrees.

On 27 April 1954, the Ministry of Machine Building was divided into the Ministry of the Machine Tool Industry, the Ministry of Machine and Instruments Building, and the Ministry of Automobile, Tractor, and Agricultural Machine Building. 34/ For the Main Administration of Agricultural Machine Building, this was probably just a change on paper to the Ministry of Automobile, Tractor, and Agricultural Machine Building. Also, on 27 April the Ministry of Transport Machinery and the Ministry of Heavy Machine Building were formed from the Ministry of Transport and Heavy Machine Building. Both of these two new ministries are undoubtedly involved in producing agricultural machinery under the commitments set up for the old Ministry of Transport and Heavy Machine Building, but the exact extent of participation of each would depend upon the manner in which the individual producing plants were divided among them.

The picture with respect to the organization of construction, supplies, and sales in agricultural machinery building has not been clearly defined in the Soviet press. A separate main administration existed for each of these functions under the former Ministry of Agricultural Machine Building, which was dissolved on 5 March 1953 with the creation of the Ministry of Machine Building. 35/ Under the Ministry of Machine Building, it appears that the sale of all agricultural machinery was not handled by one organization in the Ministry. The sale of combines and their spare parts, for example, was handled by the Main Administration for Automobile and Tractor Sales (Glavavto-traktorosbyt) 36/ of the Ministry of Machine Building. Presumably all other agricultural machinery either was handled by a main administration

* See the chart following p. 12.

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for agricultural machinery sales or by the Main Administration of Machinery Sales (Glavmashsbyt) 37/ which also handled all other items produced by the Ministry of Machine Building. Agricultural machinery and spare parts produced in other ministries undoubtedly were handled by the sales organizations of these ministries. Construction and supply were probably set up along much the same lines as sales. Organizations with similar names and functions undoubtedly exist under the new Ministry of Automobile, Tractor, and Agricultural Machine Building.

The Main Administration of Agricultural Machine Building has taken over from the former Ministry of Agricultural Machine Building the scientific research institute and design bureaus which have primary responsibility for research, design, and testing for agricultural machinery. 38/ The institute, probably the All-Union Institute of Agricultural Machine Building (VISKhOM) in Moscow, 39/ has branch offices in about 10 of the more important agricultural machine building plants, 40/ apparently for ease of operation and the exercise of control over the work of the plant Special Design Bureaus (SKB's) and Design Bureaus (KB's). 41/ The three other design bureaus are the State Special Design Bureau (GSKB) in Moscow, 42/ the State Special Design Bureau for Cotton (GSKB po Khlopku) in Tashkent, 43/ and the State Special Design Bureau for Tea (GSKB po Chayu) in Tbilisi. 44/ In research and design, assistance is also received from outside the Ministry of Automobile, Tractor, and Agricultural Machine Building, particularly from technological research institutes of the Ministry of Agriculture 45/ and the Ministry of Higher Education. 46/

II. Supply.A. Production.1. By Value.

The estimated value of Soviet production of agricultural machinery (excluding attachments and spare parts) in 1945-55 is given in Table 1.* It is estimated that perhaps as much as 90 percent of this production has been accounted for in the physical unit production shown in Table 3.**

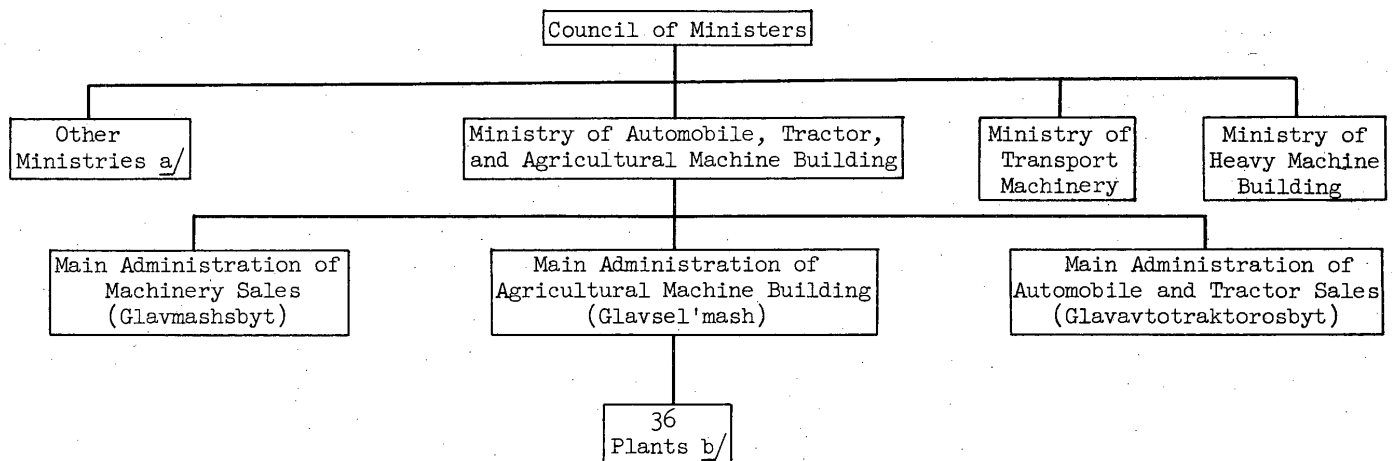
* Table 1 follows on p. 14.

** P. 19, below.

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FIGURE 9

SOVIET MINISTRIES RESPONSIBLE FOR THE PRODUCTION OF AGRICULTURAL MACHINERY
April 1954



a. Primarily the Ministries of Local Industry of the various Republics, the Ministry of Aviation Industry, the Ministry of Defense Industry, and the Ministry of Agriculture.

b. See Appendix A for a description of 36 plants believed to be under the Main Administration of Agricultural Machine Building.

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The basis for Table 1 is the production for 1947 and 1950 which was reported in actual ruble value. ^{47/} Fourth Five Year Plan (1946-50) production was also given in rubles (1926-27 prices). ^{48/} Adjusting the plan figure upward by 10 percent (see footnote at end of Table 1), planned production in 1946-50 may be estimated at about 4.95 billion rubles (1950 prices). In terms of value, then, the Fourth Five Year Plan for the production of agricultural machinery was fulfilled about 85 percent (an actual production of about 4.22 billion rubles against a planned production of 4.95 billion rubles). This fulfillment, however, is in terms of an adjusted Fourth Five Year Plan. Actual fulfillment on the basis of the original plan (perhaps as high as 6.3 billion rubles)* might be estimated at about 67 percent.

The failure to fulfill the plan was due primarily to the poor production record in the first half of the plan period. This in turn was a direct result of the slowness with which many agricultural machinery plants were reconstructed or reconverted from wartime munitions production to peacetime production of agricultural machinery. ^{49/}

The production of agricultural machinery in the USSR had begun to level off at around 1.4 to 1.5 billion rubles annually in the period 1951-53. Production in 1954 and 1955 probably would have increased no more than 4 to 5 percent over 1953 had it not been for a new impetus given to such production. In September 1953 agricultural decrees were issued which called, in part, for increased mechanization of farm tasks heretofore relatively ignored. The value estimates given in Table 1 for 1954 and 1955 are the best that can be made until more information on the implementation of the new agricultural decrees becomes available.

The great increases in production of a number of types of machines in 1954 and 1955 under the new program will, of course, be offset by decreases in production of other types of machinery, particularly those used for basic working of the soil and for grain growing, where the degree of mechanization is already rather high. After 1955, another leveling off in production may be expected (probably at about 2 billion rubles annually). The major drive of the first two years of the program will have spent itself, and planned

* Calculated from the revised total plan on the basis of the ratio of the original plan for production of grain combines to the revised plan for such production.

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mechanization, though not achieved, will have been approached to the extent of making further programs of such magnitude unnecessary.

Table 1

Estimated Value of Soviet Production
of Agricultural Machinery
1945-55 a/b/

Million Rubles^{c/}

<u>Year</u>	<u>Value</u>
1945	100
1946	250
1947	560
1948	1,000
1949	1,150
1950	1,265
1951	1,455
1952	1,410
1953	1,500
1954	1,800
1955	2,000

a. Estimated range of error, in 1945-50, ± 20 percent.

b. Attachments and spare parts are not included.

c. 1950 prices. For purposes of this table, a 10-percent upward adjustment of 1926-27 prices (in which 1947 production of agricultural machinery was reported) has been made, in an effort to obtain comparability with 1950 production which was reported in 1950 prices. This adjustment is estimated as the maximum which should be made, based on reported increases in the production of agricultural machinery in 1945-50.

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Unfortunately, it was not possible to obtain a suitable ruble-US dollar ratio for converting Soviet production to US dollars for comparison with US production.*

Table 2** gives the estimated percentage breakdown of Soviet production of agricultural machinery in 1953, by major categories, as compared with actual US production in 1952. It is significant that production of machinery in the US for use around farm buildings (as distinguished from machines used in the field) accounted for 11.4 percent of 1952 production,*** whereas the same types of machines accounted for only about 3 percent of Soviet production in 1953. The percentage for the USSR was even less in previous years. This situation emphasizes the US practice of mechanizing all types of farm operations concurrently, instead of concentrating on a particular sector as the USSR has done in mechanizing grain growing. In the US it has been the individual farmer, a man vitally interested in easing the labor of all farm operations, who has for the most part dictated the pattern of US production.

* At the official exchange rate of four rubles to the US dollar, the following comparison may be made between Soviet and US production (excluding attachments and spare parts) for the period 1950-53 (millions of US \$):

<u>Year</u>	<u>USSR</u>	<u>US</u>	<u>Percent USSR of US</u>
1950	316	793	40
1951	364	960	38
1952	352	860	41
1953	375	N.A.	N.A.

This rate of exchange is believed to place Soviet production in approximately the proper relation to US production; but until additional information becomes available which will permit a more detailed examination of this problem, the indicated rate is to be considered strictly tentative.

** Table 2 follows on p. 16.

*** Machinery used around farm buildings has accounted for the following percentages of the value of US production of agricultural machinery in postwar years: 50/

1945: 22.1	1948: 9.8	1951: 11.1
1946: 18.6	1949: 10.5	
1947: 12.3	1950: 12.1	

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Table 2

Estimated Percentage Breakdown of Soviet Production
of Agricultural Machinery in 1953 and Actual US Production
in 1952, by Major Categories of Machinery a/

Category <u>b/</u>	Percent of Total	
	USSR 1953 <u>c/</u>	US 1952 <u>d/</u>
Plows and listers	15.0	7.1
Harrows, rollers, pulverizers, and stalk cutters	3.0	8.2
Planting, seeding, and fertilizing machinery	17.0	12.2
Cultivators and weeders	6.0	6.2
Sprayers and dusters	1.0	3.5
Harvesting machinery	35.0	29.6
Haying machinery	10.0	19.2
Machines for preparing crops for market or for use	10.0	2.6
Farm poultry equipment		2.7)
Farm dairy machines and equipment		1.6)
Barn equipment	3.0	1.5)
Barnyard equipment		1.7)
Farm elevators and blowers		3.9)
Total	<u>100.0</u>	<u>100.0</u>

a. It was not possible to convert the production of agricultural machinery in physical units for each major category into a total value figure for each major category, because of the lack of suitable prices for all the types of machines concerned. The estimated breakdown for the USSR, therefore, is based primarily on the production in physical units of various types of machinery in each major category for which estimates were possible -- taking into consideration the types of machines not included in the estimates and the relative value of the machines in each category -- and on the reported degree of mechanization in various farm operations.

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Table 2

Estimated Percentage Breakdown of Soviet Production
of Agricultural Machinery in 1953 and Actual US Production
in 1952, by Major Categories of Machinery a/
(Continued)

- b. The categories are those used by the US Department of Commerce in reporting on US production of agricultural machinery. 51/
- c. The year 1953 was chosen for the USSR because it provides a slightly more favorable picture than 1952 in terms of the spread of production among the various categories.
- d. A breakdown of US production in 1953 is not yet available.

In the USSR, mechanization has followed a strict plan of mechanizing those farm operations which not only are the easiest to mechanize, such as plowing, but which will contribute most directly to the solution of the grain problem, that is, to maintain sufficient acreage under cultivation to keep pace with the food requirements of an ever increasing population, and, at the same time, to make certain that the grain is harvested with a minimum loss.

As might be expected, harvesting machinery, as the largest and most expensive agricultural machinery, accounted for the largest percentage of production in the US and the USSR. The US has attained a higher degree of mechanization in grain harvesting by combine than has the USSR, and thus has less need for machinery used for the subsequent processing of grains cut by hand or by grain binders.* In the USSR, on the other hand, threshing machines account for the greater part of the production of machinery used for preparing crops for market or for use.

The Soviet pattern shown in Table 2 is not expected to change significantly by the end of 1955. Any increases in the production of machines for use around farm buildings will be offset by increases in the production of planting, cultivating, and harvesting machines for use in potato and vegetable growing.

* The US produced only 731 stationary grain threshers in 1951 and only 802 in 1952. 52/

S-E-C-R-E-T2. By Physical Units.

Estimated Soviet production of selected types of agricultural machinery by physical units, both planned and actual, in 1940, 1941, and 1945-55 are given in Table 3.* It is estimated that approximately 80 percent of total unit production for the period 1950-53 has been accounted for, and this percentage was used to estimate total unit production for 1954 and 1955.

Estimates contained in Table 3 are based upon one or a combination of the following: (a) studies of individual producing plants,** (b) plan figures as indicated, (c) numerous isolated reports of plan fulfillment at the plant and national level, (d) numerous isolated reports of production increases of one year over another; and (e) linear interpolation and extrapolation. An attempt was made to keep the latter type of estimate to a minimum, but even so such estimates account for about 25 percent of the total. In some cases, plan figures were of necessity assumed to represent actual production. The plan figures released with the September 1953 and subsequent agricultural decrees were of inestimable value in expanding the product mix of Table 3.

a. Production during the Fourth Five Year Plan (1946-50).

It may be noted from Table 3 that production for most types of agricultural machinery increased rapidly immediately after the war. The production levels of 1940 were generally attained in 1948 and 1949.

These figures, however, tell only part of the story. Table 4*** shows the Fourth Five Year Plan (1946-50) planned production****

* Table 3 follows on p. 19.

** For a list and short description of the major agricultural machinery producing plants in the USSR, see Appendix A. It was necessary to consider a total of about 910 different plants in preparing this report. Of these plants, it was concluded that only about 120 are devoted primarily to the production of agricultural machinery. The remainder are plants which produce agricultural machinery as a secondary product, or on a job-lot basis, or make repairs. 53/ The production of the latter plants, however, was taken into consideration in making production estimates for the USSR as a whole.

*** Table 4 follows on p. 24.

**** Continued on p. 23.

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Table 3
Estimated Soviet Production of Selected Types of Agricultural Machinery
Planned and Actual, 1940-41 and 1945-55 a/*

Type of Machine	1940		1941		1945		1946		1947		1948		1949		1950		1951		1952		1953		1954		1955		
	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	
Plows and Listers																											
Plows, Tractor-Drawn	45.6	41.45	7.9	13.8	N.A.	26.7	N.A.	62.0	N.A.	96.0	N.A.	141.2	N.A.	162.3	N.A.	116.3	N.A.	117.4	N.A.	87.0	N.A.	87.0	N.A.	87.0	N.A.	87.0	N.A.
Moldboard	39.2	35.45	6.8	11.9	32.0	23.8	80.0	53.3	N.A.	82.6	110.0	121.4	N.A.	139.6	N.A.	100.0	N.A.	101.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0
5-Bottom	N.A.	N.A.	5.0	8.7	N.A.	17.4	N.A.	39.0	N.A.	60.0	N.A.	88.6	N.A.	102.0	N.A.	73.0	N.A.	73.7	N.A.	55.0	N.A.	55.0	N.A.	55.0	N.A.	55.0	N.A.
Other Types	6.4	6.0	1.1	1.9	N.A.	3.9	N.A.	8.7	N.A.	13.4	N.A.	19.8	N.A.	22.7	N.A.	16.3	N.A.	16.4	N.A.	12.0	N.A.	12.0	N.A.	12.0	N.A.	12.0	N.A.
Plows, Horse-Drawn	61.0	71.0	17.0	30.0	80.0	60.0	140.0	70.0	N.A.	90.0	N.A.	100.0	N.A.	90.0	N.A.	80.0	N.A.	80.0	N.A.	60.0	N.A.	60.0	N.A.	60.0	N.A.	60.0	N.A.
Harrows, Rollers, Pulverizers, and Stalk Cutters																											
Disc Harrows, Tractor-Drawn	N.A.	N.A.	1.0	2.0	N.A.	4.0	N.A.	8.0	N.A.	12.0	N.A.	18.0	N.A.	21.0	N.A.	22.0	N.A.	23.0	N.A.	25.0	N.A.	25.0	N.A.	25.0	N.A.	25.0	N.A.
Harrows, Horse-Drawn	60.0	120.0	25.0	50.0	N.A.	75.0	N.A.	90.0	N.A.	100.0	N.A.	110.0	N.A.	120.0	N.A.	100.0	N.A.	100.0	N.A.	90.0	N.A.	90.0	N.A.	90.0	N.A.	90.0	N.A.
Planting, Seeding, and Fertilizing Machinery																											
Seed Drills, Tractor-Drawn	21.9	33.5	1.7	7.1	30.0	19.8	67.0	41.7	N.A.	65.1	83.3	120.3	N.A.	138.3	N.A.	110.0	N.A.	90.0	N.A.	80.0	N.A.	80.0	N.A.	80.0	N.A.	80.0	N.A.
Seed Drills, Horse-Drawn	26.0	37.0	5.0	10.0	38.8	26.0	49.55	30.0	N.A.	50.0	N.A.	60.0	N.A.	70.0	N.A.	60.0	N.A.	50.0	N.A.	40.0	N.A.	40.0	N.A.	40.0	N.A.	40.0	N.A.
Transplanters, Tractor-Drawn SR-6 and SR-6M b/	0	0	0	0	0	0	0	0	0	0	0	0	0	0	N.A.	0.1	N.A.	0.1	N.A.	0.2	N.A.	0.7	2.0	2.0	2.0	2.0	2.0
Transplanters, Tractor-Mounted, SRN-4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	N.A.	0	N.A.	0.01	0.2	0.03	5.0	2.5	2.5	7.5	4.5	4.5	
Vegetable Planters, Tractor-Mounted, SON-2.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	N.A.	0.03	N.A.	0.05	0.05	0.3	6.0	4.0	6.0	6.0	6.0	6.0	
Grain and Vegetable Drills, Tractor-Drawn, SOD-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	N.A.	0.05	N.A.	0.1	N.A.	0.5	3.0	2.5	5.0	5.0	5.0	5.0	
Potato Planters, Tractor-Drawn g/	N.A.	N.A.	N.A.	0.1	N.A.	0.3	N.A.	1.0	N.A.	1.0	N.A.	1.1	N.A.	1.2	N.A.	1.3	N.A.	2.0	20.0	15.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Fertilizer Spreaders, TR-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	N.A.	0	N.A.	0.02	N.A.	0.1	5.0	3.0	10.0	8.0	8.0	8.0	

* Footnotes for Table 3 follow on p. 22.

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Table 3
Estimated Soviet Production of Selected Types of Agricultural Machinery
Planned and Actual, 1940-41 and 1945-55 a/
(Continued)

Type of Machine	1940		1941		1945		1946		1947		1948		1949		1950		1951		1952		1953		1954		1955		
	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	
Thousand Units																											
Planting, Seeding, and Fertilizing Machinery (Continued)																											1
Manure Spreaders	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	1.0	N.A.	2.0	4.0	3.0	11.0	8.0		
Universal Manure Spreaders, TUR-7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	N.A.	0.005	1.0 d/	0.5	3.0 d/	1.5		
Manure Loaders	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.1	N.A.	0.1	2.5	1.8	5.0	4.0		
Cultivators and Weeders																											
Cultivators, Tractor-Drawn and Tractor-Mounted	32.2	32.5	0.9	15.3	37.0	32.1	55.0	42.1	N.A.	59.7	82.3	99.8	N.A.	116.8	N.A.	97.0	N.A.	97.0	N.A.	85.0	N.A.	85.0	N.A.	85.0			
Cultivator-Killers, Tractor-Mounted, KON-2.8P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	N.A.	0.2	0.5	0.45	12.0	18.0	15.0	
Cultivator-Fertilizers, Tractor-Mounted, KRN-2.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	N.A.	0.05	0.5	0.3	10.0	8.0	12.0	10.0
Cultivators, Horse-Drawn	28.5	43.0 e/	12.0	33.5	78.0	50.0	85.0	60.0	N.A.	70.0	N.A.	75.0	N.A.	80.0	N.A.	70.0	N.A.	60.0	N.A.	45.0	N.A.	45.0	N.A.	45.0			
Sprayers and Dusters																											
Duster-Sprayers, Tractor-Mounted, ONK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	N.A.	N.A.	0.5	0.5	2.0	2.0	3.0	3.0	
Sprinkling Units, DDP-308	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	N.A.	N.A.	2.0	0.1	2.0	1.2	3.0	2.7	
Harvesting Machinery																											
Grain Combines	12.8	13.0	0.3	1.35	7.0	2.8	25.0	14.4	30.0	29.0	60.0	46.0	50.0	53.0	50.0	41.0	N.A.	41.0	N.A.	37.0	N.A.	37.0	N.A.	37.0			
Tractor-Drawn	12.8	13.0	0.3	1.35	6.3	2.52	N.A.	10.7	N.A.	17.0	N.A.	23.0	N.A.	24.0	N.A.	20.0	N.A.	19.0	N.A.	20.0	N.A.	20.0	N.A.	20.0			
Self-Propelled	0	0	0	0	0.7	0.28	N.A.	3.7	N.A.	12.0	N.A.	23.0	N.A.	29.0	N.A.	21.0	N.A.	22.0	N.A.	17.0	N.A.	17.0	N.A.	17.0			
Cotton Pickers	N.A.	N.A.	N.A.	N.A.	N.A.	0.01	0.03	0.03	1.1	0.3	N.A.	2.0	N.A.	10.0	N.A.	8.0	N.A.	6.0	N.A.	6.0	N.A.	6.0	N.A.	6.0			
Beet Harvesting Combines	0	0	0	0	N.A.	0.15	1.0	0.3	N.A.	0.4	N.A.	0.6	N.A.	0.9	N.A.	1.1	N.A.	1.6	N.A.	2.4	N.A.	2.4	N.A.	2.5			

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Table 3
Estimated Soviet Production of Selected Types of Agricultural Machinery
Planned and Actual, 1940-41 and 1945-55 a/
(Continued)

Type of Machine	1940		1941		1945		1946		1947		1948		1949		1950		1951		1952		1953		1954		1955		
	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	
Harvesting Machinery (Continued)																											
Beet Diggers, Tractor-Drawn and Tractor-Mounted	2.0	N.A.	0.5	2.0	4.0	4.0	4.0	4.0	4.0	N.A.	5.0	N.A.	5.5	N.A.	6.0	N.A.	6.0	N.A.	6.0	N.A.	6.0	N.A.	6.0	N.A.	6.0	N.A.	6.0
Potato Harvesting Combines	0	0	0	0	0	0	0	0	0	N.A.	0	N.A.	0.1	N.A.	0.1	N.A.	0.1	1.3	0.5	15.0	13.5	25.0	25.0	25.0	25.0	25.0	
Potato Diggers, Tractor-Drawn	2.5	2.5	0.2	0.5	11.0	5.0	2.0	2.0	2.0	N.A.	3.0	N.A.	5.0	N.A.	7.0	N.A.	8.0	N.A.	9.0	N.A.	10.0	N.A.	10.0	N.A.	12.0	12.0	
Potato Diggers, Horse-Drawn	N.A.	N.A.	0.5	1.0	N.A.	3.0	N.A.	3.0	N.A.	4.5	N.A.	7.5	N.A.	11.0	N.A.	12.0	N.A.	10.0	N.A.	10.0	N.A.	10.0	N.A.	10.0	N.A.	10.0	
Forage Harvesting Machines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	N.A.	0	N.A.	0.02	N.A.	0.04	N.A.	0.1	2.0	2.0	2.0	4.0	
Corn Harvesting Combines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	N.A.	0.05	N.A.	0.5	2.5	1.5	3.5	3.0		
Cabbage Picking Machines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	N.A.	0	N.A.	0.01	N.A.	0.05	2.0	1.5	4.0	
Flax Harvesting Combines	0	0	0	0	0	0	0.1	0.1	0.1	N.A.	0.4	N.A.	0.8	N.A.	1.1	N.A.	1.5	N.A.	1.6	N.A.	1.6	N.A.	1.8	N.A.	2.0		
Flax Pullers	1.5	1.0	N.A.	0.1	2.0	0.3	N.A.	0.5	N.A.	1.0	N.A.	1.3	N.A.	1.5	N.A.	1.7	N.A.	1.9	N.A.	2.0	N.A.	2.0	N.A.	2.0	N.A.	2.0	
Haying Machines																											
Mowers, Self-Propelled	0	0	0	0	0	0	N.A.	0	0.3	0.2	N.A.	0.1	2.0	1.2	7.5	2.4	6.0	3.5	7.5	5.0	7.5	5.0	7.5	7.5	7.5		
Mowers, Tractor-Drawn and Tractor-Mounted	2.5	3.0	0.1	0.3	N.A.	0.6	N.A.	1.14	N.A.	20.0	N.A.	45.0	46.0	80.0	102.0	100.0	N.A.	50.0	19.0	19.0	23.0	23.0	23.0	23.0	23.0		
Mowers, Horse-Drawn	44.5	60.0	5.0	10.0	55.0	30.0	114.0	60.0	N.A.	62.0	N.A.	65.0	N.A.	75.0	100.5	80.0	N.A.	80.0	N.A.	80.0	N.A.	80.0	N.A.	80.0	80.0		
Rakes, Tractor-Drawn	N.A.	2.0	0.1	0.2	N.A.	0.4	N.A.	0.9	N.A.	1.5	N.A.	4.0	15.0	10.0	21.9	15.0	N.A.	20.0	35.0	35.0	35.0	35.0	35.0	35.0	45.0		
Rakes, Sweep, Tractor-Mounted	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	1.0	N.A.	1.5	N.A.	3.0	N.A.	10.0	25.8	20.0	83.0	75.0	123.0	123.0	123.0	123.0	123.0		
Rakes, Horse-Drawn	39.0	60.0	5.0	10.0	45.0	30.0	90.0	60.0	N.A.	62.0	N.A.	65.0	N.A.	75.0	N.A.	80.0	N.A.	80.0	N.A.	80.0	N.A.	75.0	N.A.	75.0	75.0		
Hay Stackers	0	0	0	0	N.A.	0	N.A.	0	N.A.	0	N.A.	N.A.	N.A.	0.05	N.A.	0.5	13.5	7.0	35.0	20.0	50.0	40.0	40.0	40.0			
Machines for Preparing Crops for Market or For Use																											
Threshing Machines, Complex	2.9	2.5	0.8	3.0	9.0	5.0	16.5	10.0	17.0	16.0	18.3	18.3	N.A.	19.0	N.A.	20.0	N.A.	20.0	N.A.	20.0	N.A.	20.0	N.A.	20.0	N.A.	20.0	
Threshing Machines, Horse-Drawn	6.5	6.5	2.0	7.5	22.4	15.0	34.95	25.0	N.A.	39.0	N.A.	45.0	N.A.	45.0	N.A.	45.0	N.A.	40.0	N.A.	40.0	N.A.	35.0	N.A.	35.0	N.A.	35.0	
Fodder Steamers	N.A.	N.A.	N.A.	N.A.	N.A.	1.0	N.A.	2.0	N.A.	2.0	N.A.	8.0	N.A.	14.0	15.0	15.0	N.A.	25.0	37.0	37.0	41.5	41.5	41.5	41.5	41.5		

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Table 3
Estimated Soviet Production of Selected Types of Agricultural Machinery
Planned and Actual, 1940-41 and 1945-55 ^{a/}
(continued)

Type of Machine	1940		1941		1945		1946		1947		1948		1949		1950		1951		1952		1953		1954		1955	
	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan
Farm Dairy Machines and Equipment																										
Milking Units	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	1.0	N.A.	2.0	N.A.	3.0	7.5	7.5	15.0	15.0	
Cream Separators	N.A.	N.A.	3.0	20.0	N.A.	200.0	N.A.	225.0	N.A.	275.0	N.A.	300.0	N.A.	140.0	g/ 140.0	150.0	N.A.	200.0	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	250.0
Barn Equipment																										
Automatic Watering Troughs	N.A.	N.A.	N.A.	2.0	N.A.	5.0	N.A.	10.0	N.A.	16.0	N.A.	100.0	N.A.	260.0	300.0	300.0	N.A.	350.0	N.A.	400.0	N.A.	500.0	N.A.	500.0	N.A.	500.0
Units Accounted For	389.4		88.0	289.8		596.2		823.2		1,082.1		1,446.2		1,613.7		1,557.6		1,601.2		1,694.7		1,954.7		1,954.7		1,954.7
Estimated Actual Unit Production	N.A.		N.A.	N.A.		N.A.		N.A.		1,629.0		1,746.0		2,053.0		2,041.0		2,041.0		2,100.0 ^{b/}		2,400.0 ^{b/}		2,400.0 ^{b/}		2,400.0 ^{b/}
Percent of Total	N.A.		N.A.	N.A.		N.A.		N.A.		66		83		79		76		78		80.0 ^{b/}		80.0 ^{b/}		80.0 ^{b/}		80.0 ^{b/}

a. plus or minus 20 percent.
 b. Model SR-6M only in 1954 and 1955.
 c. Model SKG-4 check-row type only in 1954 and 1955.
 d. These figures represent an arbitrary division between 1954 and 1955 of a reported planned 1954-55 production of 4,000 units.
 e. Includes an indeterminate number of hand-operated cultivators.
 f. These figures represent an arbitrary division between 1954 and 1955 of a reported planned 1954-55 production of 6,000 units.
 g. Estimated marked decrease in production from 1950 due to production of larger capacity cream separators.
 h. Figures rounded.

The over-all estimated range of error is

50X1

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and estimated actual production of 7 major types of machinery for which data were available. Table 4 also shows the two revisions in planned production and the dramatic effect these revisions had upon Plan fulfillment.

It is evident from Table 4 that the actual increase in production, although spectacular, was by no means as spectacular as that originally planned.

By the end of the first 2 years of the Fourth Five Year Plan, it must have become painfully apparent that the original goals could not be met. The slowness with which war orders were terminated in agricultural machinery plants after the war and the slowness of reconstruction of war-damaged plants 55/ had completely upset the original plans for agricultural machinery production. Even the help received from the many plants of other industries was insufficient to fill the gap. To compensate for these difficulties, the plan was very quietly lowered, in an effort to make it coincide more closely with actual production. In March 1948, a new grain combine figure of 124,000 units for the Fourth Five Year Plan was released without reference to the previously announced plan of 174,000 units. A short 6 months later the planners were in trouble again. They proceeded to lower the plan again, this time to 98,000 units, only 56 percent of the original plan of 174,000 units. Again, no reference was made to previous plan figures. Even the final plan figure of 98,000 units was met by only 96 percent. Production nearly doubled in 1949 and 1950, but it was too late to make up for the losses of 1946, 1947, and 1948.

It was assumed that the percentage reduction in planned grain combine production, as outlined above, might apply also to the other types of machines listed in Table 4. This assumption is substantiated by the following: At the time of the second revision of the planned grain combine production, it was also announced that 236,000 tractor seed drills were to be produced during the Fourth Five Year Plan. If it is assumed that the ratio of production of tractor seed drills to the total production of tractor seed drills, tractor cultivators, tractor disc harrows, and tractor mowers was the same in the original plan as in actual estimated production, the original plan for tractor seed drills may be estimated to have been about 410,000 units. Thus the total reduction in the original plan for tractor seed drills (42 percent) compares favorably with the total reported reduction in the original plan for grain combines (44 percent).

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Table 4

Estimated Soviet Production of Selected Types of Agricultural Machinery
as Compared with the Original Fourth Five Year Plan and Subsequent Revisions
1946-50

Type of Machine	Planned Production			Estimated Actual Production b/ (Thousand Units)	Fulfillment of Plans		
	Original Plan (Thousand Units)	First Revision a/ (Thousand Units)	Second Revision a/ (Thousand Units)		Original Plan (Percent)	First Revision (Percent)	Second Revision (Percent)
Grain Combines	174.0 <u>56/</u>	124.0 <u>57/</u>	98.0 <u>58/</u>	93.6	54	75	96
Tractor Seed Drills	1,000.0 <u>59/</u>	713.0 <u>c/</u>	563.3 <u>d/</u>	614.0	61	86	109
Tractor Cultivators							
Tractor Disc Harrows							
Tractor Mowers							
Mowing Machines, All Types (Including Tractor Mowers)	500.0 <u>60/</u>	356.5 <u>c/</u>	281.6 <u>d/</u>	294.3	59	83	105
Rakes, All Types	400.0 <u>61/</u>	285.2 <u>c/</u>	225.3 <u>d/</u>	236.5	59	83	105

a. The date of the first revision was March 1948, and the second, September 1948, based on the date in 50X1 which the revisions were reported.

b. Estimates taken from Table 3, p. 19, above.

c. Decrease in plan assumed to be the same as for grain combines, or 28.7 percent.

d. Decrease in plan assumed to be the same as for grain combines, or 21.0 percent.

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Table 4 emphasizes the Soviet practice of magnifying their accomplishments by the simple expedient of unobtrusively lowering the plan to suit reality. Such reductions in plan achieved absolutely nothing in the practical sense of getting needed machines into the fields; but the propagandist goal was admirably achieved -- the plan was overfulfilled for all the machines listed in Table 4 except for grain combines.

Table 4 also reflects the apparent inability of the Russians to maintain close coordination and control of various segments of the economy for the accomplishment of a specific task -- in this case the termination of war orders and the reconstruction of plants for the production of agricultural machinery. This same difficulty, as it applies to the various administrations of a particular ministry, was pointed up in November 1953 by Pravda in connection with the implementation of plans for the production of agricultural machinery in 1954-55. Pravda's complaint was that: "Main administrations of the Ministry of Machine Building issue decrees and orders calling for increased output of equipment for agricultural purposes, but there is no effective system for seeing that these decrees and orders are carried out." 62/

b. Production in 1951-53.

The Fifth Five Year Plan (1951-55) as released did not give figures for the production of agricultural machinery. The few isolated plan figures included in Table 3 were picked up piecemeal from the press and radio, or were estimated from information published in connection with planned production in 1954 and 1955. There is, therefore, little over-all data for the period from which plan fulfillment might be judged.

For the 10 types of machines for which 1953 Plan figures were available, an over-all fulfillment of about 63 percent has been estimated. Actual fulfillment of the 1953 Plan for 6 types of machines was announced, with fulfillment ranging from 13 percent to 89 percent. 63/ In addition, it was reported that in the first 9 months of 1953 the production plans for grain combines, sugar beet harvesting combines, potato planters, cultivators, and hay stackers were not fulfilled, 64/ and that production in the first 10 months of 1953 fell short of the plan by thousands of tractor cultivators and hundreds of cotton pickers, self-propelled mowers, and sugar beet harvesting combines.

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Production in 1953 reportedly was poor simply because the producing plants did not take the proper measures to improve production or else ignored production orders completely. ^{65/} Supporting plants which were supposed to supply component parts were particularly remiss. ^{66/} At the risk of oversimplification of the problem, it appears that there is an almost constant underfulfillment of plans for production of agricultural machinery simply because the producing plants actually are amazingly indifferent to their production tasks. The industry as a whole seems to be in an almost constant state of lethargy. Workers are alternately praised and pushed, and plant directors are issued medals or veiled threats. The production which is achieved stems from the sheer number of workers and plants involved.

The decrease in production in 1952, the first general decrease of the postwar period, was due to certain adjustments in the product mix. Production of machines used for grain growing decreased and new types of machines entered production. Nine of the 48 types of machines listed in Table 3 were introduced into production in 1951 and 1952. According to reported figures, production in 1953 remained at approximately the level of 1952.

c. Production in 1954-55 and Future Production.

In September 1953 the first of a series of decrees for the advancement of agriculture was announced. ^{67/} Perhaps the most important aspect was the increase which was decreed in a number of new or relatively new types of machines intended for the mechanization of potato and vegetable growing and operations dealing with animal husbandry. Increases in production of up to 7 to 10 times those originally called for in the plans for 1954 and 1955 were announced. The only reference made to machines customarily reported upon in the past -- cultivators, grain combines, threshers, and similar machines used in grain growing -- was to the effect that a new plan for these machines would have to be drawn up. ^{68/}

Little thought seems to have been given to the effect of the new program on the production of the latter machines. The reason for the new program, however, was undoubtedly the high degree of mechanization already attained in the farm operations for which such machines were used. Production of these machines had already decreased in 1952 and 1953.

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Over-all fulfillment of the unit production program for agricultural machinery in 1954-55 has been generously estimated at about 85 percent in 1954 and about 94 percent in 1955. These estimates are based upon the lowered production of other types of machines not mentioned in the agricultural decrees, upon reported fulfillment of the 1953 plan for 6 of the new types involved in the program, 69/ upon estimated fulfillment for 4 other types of machines in 1953, and upon a number of isolated reports concerning the implementation of the program in the first quarter of 1954. It has been assumed that much of the confusion at the plant level, resulting from the sudden manner in which the new program was initiated, will be remedied, and that underfulfillment in late 1953 and early 1954 will be made up to some extent later. The shifting of production from plant to plant and the sudden replacement of old models by new ones should decrease as time passes and plant commitments are more clearly outlined. It is estimated that available facilities (planned and actual) for the production of agricultural machinery are adequate to produce the planned quantities of machinery. The Russians have reported that the facilities of the agricultural machine building enterprises, if employed to the full and in the most efficient manner, are adequate for the production tasks of 1954 and 1955. 70/ Presumably, then, planned production closely approximates capacity of the industry, including assisting plants.*

Future increases of the 1954-55 magnitude are not believed possible without a further expansion in producing facilities, either by actual new construction or by an increased farming out of orders to other industries. Increases of this magnitude should not actually be necessary in view of the degree of mechanization which should be realized by the end of 1955. An over-all increase in production of perhaps 6 to 8 percent may be expected in 1956 over 1955.

* The Russians undoubtedly were taking into consideration the assistance of plants outside the agricultural machinery industry. Indeed, the very fact that production assignments for plants of the Ministry of Aviation Industry, Ministry of Transport Machine Building, Ministry of Heavy Machine Building, and Ministry of Defense Industry were announced indicates that the agricultural machinery industry could not cope with the job alone. It must be remembered, however, that agricultural machinery plants themselves produce secondary products which may occupy as much as 20 to 25 percent of the employment of the industry. The utilization of these workers would decrease the need for assistance from outside the industry considerably.

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An increase of 13 million hectares sown area (mainly for grains) is planned for 1954-55. 71/ The effect of this increase on production of agricultural machinery is almost impossible to estimate because of unknown factors related to machine utilization, a detailed consideration of which is outside the scope of this report. The agricultural decrees of late 1953 envisaged better training of operators, better machine utilization, better repair facilities, and an increased supply of spare parts, all of which would tend to bring more of the existing park into use, prolong its life, and increase its efficiency. This in turn would tend to decrease the need for new machines. A degree of success is certain in all of the above measures, although spare parts production still lagged in early 1954, and only 57 percent of the 1953 plan for the building of Machine Tractor Station (MTS) workshops was fulfilled. 72/ It should be noted that, at the end of 1953, the USSR already had more than enough combines to harvest all of the 1953 grain area plus the 13 million hectares to be added in 1954-55. It could do so by using only 75 percent of the 1953 park instead of the 50 percent apparently used in 1953. Thus, an increase of approximately 40 percent in the 1953 park would make possible 100 percent harvesting of Soviet grain crops including the additional acreage planned, in 1954.

3. Comparison of Production in the USSR and the US.

Table 5* gives the estimated Soviet unit production and the actual US unit production for selected types of agricultural machinery in 1952.

Since certain agricultural machines produced in the US and the USSR are of varying sizes, comparisons may best be made by expressing production in terms of working width. Such a comparison was possible only for grain combines and tractor moldboard plows. (See Table 6**.)

Soviet production compares favorably with US production because of the concentration on larger sizes of machines. The average tractor-drawn grain combine produced in the USSR in 1952 had about 2.3 times the width of cut of the average tractor-drawn combine produced in the US. The average Soviet tractor moldboard plow produced ***

* Table 5 follows on p. 29.

** Table 6 follows on p. 34.

*** Continued on p. 33.

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Table 5

Estimated Soviet and Actual US Production of Selected Types
of Agricultural Machinery
1952

Type of Machine	Thousand Units	
	USSR	US <u>73/</u>
Plows and Listers		
Plows, tractor-drawn	116.3	216.3
Moldboard	100.0	102.8
Less than 5-bottom	27.0 <u>a/</u>	86.0 <u>a/</u>
5-bottom or larger	73.0 <u>b/</u>	16.8 <u>c/</u>
Other types <u>d/</u>	16.3	113.4
Plows, moldboard, tractor-mounted	N.A. <u>e/</u>	141.0 <u>f/</u>
Plows, horse-drawn	80.0	34.3
Harrows, Rollers, Pulverizers, and Stalk Cutters		
Disc harrows, tractor-drawn	22.0	198.3 <u>g/</u>
Harrows, horse-drawn	100.0	337.8 <u>h/</u>
Planting, Seeding, and Fertilizing Machinery		
Seed drills, tractor-drawn	110.0	
Seed drills, horse-drawn	60.0	57.9
Transplanters, tractor-drawn	0.2	
Transplanters, tractor-mounted	0.01	12.1
Vegetable planters, tractor-drawn or mounted	0.05	1.0
Fertilizer distributors, drawn or mounted	0.02 <u>i/</u>	95.6 <u>i/</u>
Manure spreaders	1.0	93.7
Manure loaders	0.1	92.9 <u>j/</u>
Cultivators and Weeders		
Cultivators, tractor-drawn or mounted	97.0 <u>k/</u>	295.9 <u>l/</u>
Cultivators, horse-drawn	70.0	27.1
Harvesting Machinery		
Grain combines	41.0	81.5
Tractor-drawn	20.0 <u>m/</u>	62.9 <u>m/</u>
Self-propelled	21.0 <u>n/</u>	18.6 <u>n/</u>

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Table 5

Estimated Soviet and Actual US Production of Selected Types
of Agricultural Machinery
1952
(Continued)

Type of Machine	Thousand Units	
	USSR	US <u>73/</u>
Cotton pickers	8.0	4.8
Beet harvesting combines	1.1	1.3 <u>o/</u>
Potato harvesting combines	0.1	0.4
Potato diggers, tractor and horse-drawn	20.0	0.4
Forage harvesting machines	0.04	30.2 <u>p/</u>
Haying Machinery		
Mowers, self-propelled	2.4 <u>q/</u>	0 <u>q/</u>
Mowers, all other types	180.0 <u>r/</u>	187.8 <u>r/</u>
Rakes, all types	105.0	124.5
Hay stackers	0.5	4.0
Machines for Preparing Crops for Market or for Use		
Threshing machines, complex, all types	20.0	1.8 <u>s/</u>
Farm Dairy Machines and Equipment		
Milking units	2.0 <u>t/</u>	91.8 <u>t/</u>
Cream (milk) separators, all types	150.0 <u>u/</u>	26.5 <u>u/</u>
Barn Equipment		
Automatic watering troughs	300.0 <u>v/</u>	295.0 <u>v/</u>

a. It is estimated that 3- and 4-bottom plows accounted for nearly all of this figure. Eighty-one percent of US production was represented by 2- and 3-bottom plows.

b. It is estimated that nearly all of these plows were 5-bottom.

c. The breakdown as given in US statistics is "4-bottom and larger." This figure has been used here.

d. This item includes disc plows, subsoil plows, surface plows, and terracing and ditching plows.

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Table 5

Estimated Soviet and Actual US Production of Selected Types
of Agricultural Machinery
1952
(Continued)

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- e. The Russians have been aware of the convenience of operation, relatively greater productivity, and savings of metal afforded by tractor-mounted plows, but it was not until 1953 that any steps were taken to develop tractor-mounted plows for mass production.
- f. Ninety percent of these plows are 2-bottom and larger.
- g. The US also produced 59,613 tractor-mounted disc harrows in 1952.
- h. These harrows are not all horse-drawn in the strict sense of the word. This figure represents total US production in 1952 under the category "spike-tooth and spring-tooth harrows." It was not broken down as to method by which powered. Large harrows for use with tractors undoubtedly are included, and even horse-drawn harrows may be coupled together in sections for pulling by a tractor. The same would be true, of course, for Soviet horse-drawn harrows, although they refer to them separately from tractor-drawn types.
- i. This figure represents production only of the new TR-1 model. It was impossible to estimate total fertilizer distributor production in the USSR. Since the mechanization of fertilizer distribution is an extremely new area of emphasis in Soviet agriculture, total unit production of fertilizer distributors in 1952 was probably but a very small fraction of US production. The 1954-55 planned production of the TR-1 model is only 15,000 units.
- j. This figure includes both manure and general utility loaders (except hay, beet, and sugar cane loaders).
- k. It was not possible to break down Soviet production into the number of tractor-drawn and of tractor-mounted cultivators. It is roughly estimated that possibly as much as 80 to 90 percent of this figure is represented by tractor-drawn types.
- l. Fifty-four percent of this figure is accounted for by 2-row, tractor-mounted cultivators.
- m. All Soviet tractor-drawn grain combines produced in 1952 were of the 16-foot type. Eighty-eight percent of the tractor-drawn grain combines produced in the US in 1952 fell in the category "6 feet and under", and only 5 percent in the category "12 feet and over."

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Table 5

Estimated Soviet and Actual US Production of Selected Types
of Agricultural Machinery
1952
(Continued)

- n. All Soviet self-propelled grain combines produced in 1952 were of the 13-foot type. Eighty-six percent of the self-propelled grain combines produced in the US in 1952 fell in the category "over 10 feet." In 1951, only 6 percent of the US self-propelled grain combine park was less than 10 feet in size and 75 percent were in the 12-foot and 14-foot size groups.
- o. Beet diggers are not reported in US statistics as a separate item.
- p. This figure includes forage harvesters, field ensilage harvesters, and field hay choppers (basic machine only).
- q. The Soviet self-propelled mower has a 10-meter cut (nearly 33 feet). Mowers of this type were produced in the US many years ago but were discarded as unwieldy and uneconomical. Their use in the USSR definitely must be limited to large, flat areas of uniform grass or hay growth where rocks and other obstructions do not exist or have been removed before mowing.
- r. About 55 percent of Soviet production is estimated to have been of the tractor-powered types, 60 percent of which are estimated to have been tractor-drawn. In the US, 86 percent were tractor-mounted or semi-mounted.
- s. This figure includes 1,000 peanut pickers and threshers.
- t. It is difficult to be certain that close comparability has been achieved for milking units. The 91,771 units produced in the US are listed as "Milker units for stationary installations." The milking units included as Soviet production are believed to be for installation in barns and milking sheds, that is, stationary installations. It is possible that some of the Soviet production may be of the smaller, portable type with self-contained power unit of which the US produced 2,551 in 1952.
- u. It is estimated that 50 to 60 percent of Soviet production was of the 60-liter (136 pounds) per hour type. Only about 3 percent of US production fell in the nearest comparable category, "250 pounds or less per hour." The number of farms in the USSR which have milking machines of one kind or another is not known. It is planned to mechanize milking on 5,000 farms in 1954 and 10,000 in 1955. ^{74/} In the US, it is estimated that nearly 700,000 farms had milking machines on 1 January 1952.

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Table 5

Estimated Soviet and Actual US Production of Selected Types
of Agricultural Machinery
1952
(Continued)

v. Automatic watering troughs in the USSR are roughly estimated to have accounted for as much as 80 to 85 percent of total unit production of barn equipment items in 1952. Automatic watering troughs ("live-stock water bowls, inside") accounted for 33 percent of barn equipment unit production in the US in 1952. 1952 represented the year of peak production in the USSR up to that time. Over 387,000 of these troughs were produced in the US in 1951, when they accounted for about 37 percent of barn equipment unit production.

in 1952 had twice the number of bottoms of its US counterpart. Such factors, including longer use per machine per season allow the USSR to produce fewer machines than the US on a unit basis and yet to cultivate approximately the same acreage. On the other hand, there are varying rates of productivity and more particularly, the matter of repair, which tend to offset the advantage of the smaller unit production of larger size machines by the USSR. Large size can be a disadvantage if it prohibits the use of a machine in hilly or marshy areas of the country. Large size can also be disadvantageous if, by slowing down the rate of speed at which the machine can be used, it lowers the relative productivity of the machine.* US farmers take prompt and efficient repair

* A small, tractor-drawn grain combine on rubber tires, typical of tractor-drawn grain combines in the US, is much more adaptable to varying types of terrain and crop conditions than is the huge, lumbering model on steel wheels which typifies the USSR tractor-drawn combine. The Russians have admitted that their grain combines are too large with motors too weak to be used in all parts of the country. 79/

A 3-bottom, tractor-mounted plow, very common in the US, is in fact about 14 percent more productive than a 5-bottom tractor-drawn plow, a fact of which the Russians are well aware but upon which they have just begun to act. They have pointed out that a 3-bottom, tractor-mounted plow can average about 4 hectares in a 10-hour day whereas a 5-bottom, tractor-drawn plow can average only about 3.5 hectares in a 10-hour day. 80/

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Table 6

Estimated Soviet and Actual US Production of Grain Combines and Tractor Moldboard Plows
1952 ^{a/}

Type of Machine	Average Machine Size ^{b/} (In Terms of 1-Foot Units)		Units ^{b/} (Thousand)		US Production as Percentage of Soviet Production	
	USSR	US	USSR	US	On Basis of Total Production	Adjusted on Basis of Unit Size
Grain Combines						
All Combines	14.5	7.5	593.0	608.1	199	103
Tractor-Drawn	16.0	6.0	320.0	378.2	315	118
Self-Propelled	13.0	12.4	273.0	229.9	88	84
Plows, Moldboard, Tractor-Drawn and Mounted (In Terms of 1-Bottom Units)						
All Plows	4.6	2.3	459.5	555.6	244	121
Less Than 5-Bottom	3.5	2.1	94.5	482.2	841	510
5-Bottom and Larger	5.0	4.4 ^{c/}	365.0	73.4	23	20

a. This table is based on estimates of production (unrounded for the US) reported in Table 5 p. 29. US production of grain combines was converted to 1-foot units by a weighted average of 7.5 feet of cutting width per combine, computed from US Department of Agriculture statistics. ^{75/} The weighted averages of 6.0 and 12.4 feet, respectively, for tractor-drawn and self-propelled grain combines were computed from the same data. US production of tractor moldboard plows was converted to 1-bottom units on the basis of the production by size reported in an official publication of the US Department of Commerce. ^{76/}

The tractor-drawn grain combines produced in the USSR in 1952 were of the "Stalinets-6," 16-foot type; the self-propelled grain combines were of the "S-4," 13-foot type. ^{77/} Soviet production of tractor moldboard plows was converted to 1-bottom units on the basis of an estimated average of 3.5 bottoms per plow in the "Less than 5-bottom" category and an estimated average of 5 bottoms for the "5-bottom and larger" category. In 1947-48 the USSR produced a few experimental models of a 6-bottom plow which proved unsatisfactory and was not put into series production. ^{78/} No plows larger than 6-bottom are known to have been produced in postwar years.

b. Because of rounding, average machine size multiplied by unit production will not necessarily result in the exact figure given in the "Units" column.

c. US production statistics on the larger types of plows include only the category "4-bottom and larger." It is this category which has been used.

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of machinery almost for granted. In the USSR, on the other hand, it appears that nearly half of the grain combine park was out of service in 1953 for lack of suitable repairs. Annual unit production of new machines, as a consequence, is higher than should be necessary. It would be almost impossible to measure this "overproduction" in terms of actual quantity estimates. Actually, under the system by which the Russians use their machinery, perhaps it ought not even to be considered overproduction.

B. Imports.

Total Soviet imports of agricultural machinery (including spare parts) from Bloc and non-Bloc countries in 1945-53 are estimated at about 140.9 million rubles, or approximately 1.6 percent of total Soviet domestic production (excluding spare parts) during the same period. (See Table 7.)* Only in 1946 and 1947, when reparations deliveries were at their highest, did imports amount to more than 5 percent of Soviet domestic production. It was not possible to determine imports by type of machine, on a basis either of value or of physical units.

1. From Soviet Bloc Countries.

Reparations from East Germany accounted for approximately 95 percent by value of all Soviet imports of agricultural machinery in 1945-53. The value of such reparations is estimated at 134.5 million rubles out of total imports of agricultural machinery valued at 140.9 million rubles.

German obligations to supply agricultural machinery and spare parts as reparations in 1946-50 are estimated at about 115 million rubles. ⁸¹/_{**} This figure is estimated to have accounted for as much as 85 percent of total reparations obligations to the end of 1953. ⁸²/ _{The extent to which reparations obligations were fulfilled is not known, but assuming 100-percent fulfillment, the approximately 135 million rubles involved would amount to less than 2 percent of the estimated total value of Soviet domestic production in 1946-53.}

* Table 7 follows on p. 36.

** This estimate was obtained by converting Reichsmarks into US \$ at the rate of 1 Reichsmark = US \$0.40 and then converting US \$ to rubles at the official rate of 5.3 rubles = US \$1.

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Table 7

Estimated Value of Production and Imports of Agricultural Machinery by the USSR
1945-53 ^{a/}

	Million Rubles									
	1945	1946	1947	1948	1949	1950	1951	1952	1953	Total
Soviet Production ^{b/}	100.0	250.0	560.0	1,000.0	1,150.0	1,265.0	1,455.0	1,410.0	1,500.0	8,690.0
Soviet Imports	0.7	26.4	28.3	21.6	21.6	21.5	12.3	5.3	3.3	140.9
From Soviet Bloc Countries ^{c/}	0	25.4	25.4	21.2	21.2	21.2	12.0 ^{d/}	5.0 ^{d/}	3.0 ^{d/}	134.5
From Non-Soviet Bloc Countries	0.7	1.0	2.8	0.4	0.4	0.3	0.3	0.3	0.3	6.5
Total	<u>100.7</u>	<u>276.4</u>	<u>588.3</u>	<u>1,021.6</u>	<u>1,171.6</u>	<u>1,286.5</u>	<u>1,467.3</u>	<u>1,415.3</u>	<u>1,503.0</u>	<u>8,830.9</u>
Imports, as Percent of:										
Total Increment	0.7	9.5	4.8	2.1	1.8	1.7	0.8	0.4	0.2	1.6
Total Soviet Production	0.7	10.6	5.1	2.2	1.9	1.7	0.8	0.4	0.2	1.6

NOTE: Figures do not add to totals because of rounding.

- a. Estimated range of error for Soviet production is \pm 20 percent; estimated range of error for imports is \pm 30 percent.
- b. Estimated value of Soviet production was obtained from Table 1, p. 14, above.
- c. Imports from the Soviet Bloc represent deliveries from East Germany.
- Quantity estimates of imports from the remaining Satellites were not possible, but such imports are believed to have been negligible.
- d. The value of reparations from East Germany for 1951-53, estimated at 20 million rubles, was arbitrarily broken down by year as indicated.

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Reports of Soviet imports of agricultural machinery and spare parts from other Satellites are too meager to permit estimates of value. It is believed, however, that such imports were negligible compared to reparations from East Germany. 83/

An increase in imports from the Satellites of unknown proportions is anticipated by the USSR beginning in 1954. In the Soviet agricultural decrees of September 1953, it was stated, without mentioning quantities, that the Soviet Ministry of Internal and Foreign Trade and the Soviet Ministry of Machine Building were, within 2 months' time, to draw up a plan for placing orders for agricultural machinery and spare parts with the "People's Democracies." 84/ This implies either that there were no orders for agricultural machinery from the Satellites at that time, except for reparations, or that existing orders were to be changed. No information on trade has been received which can definitely be attributed to the decree. A report dated January 1954 mentions that Czechoslovakia is sending the USSR some type of underwater mowing machine for cutting reed, cane, and other water plants in ponds. 85/ If this report may be considered an indication of future developments in trade, certain Satellites might be asked to produce various types of specialized agricultural machinery which the USSR does not care to produce. It would be impossible to estimate 1954-55 imports from the Satellites in terms of actual value. A 100-percent increase in 1954 over 1953 -- a possibility -- would mean imports of about 6 million rubles, or only 0.3 percent of estimated Soviet domestic production in 1954.

The total value of combined Satellite production of agricultural machinery in 1948-53 may be estimated at approximately 1.05 billion rubles* or roughly 13 percent of Soviet domestic production during the same period. The USSR could not, therefore, add substantially to its supply of agricultural machinery through imports from the Satellites unless it imported total Satellite production. Such a move is highly unlikely.

* Since a study of the Satellite agricultural machinery industry has not been completed, this estimate is necessarily rough. It was obtained by totalling estimated East German production for the period 86/ and assuming that this total would account for approximately 40 percent of total Satellite production.

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S-E-C-R-E-T2. From Non-Soviet Bloc Countries.

In 1945-47, the USSR received from the US agricultural machinery and spare parts valued at \$638,590 (about 3.4 million rubles),* 60 percent of which was in small machinery not elsewhere classified, 30 percent in the larger items such as grain combines and binders (a total of 9 units), threshing machines, balers, and horse- and tractor-drawn plows, drills, planters, and cultivators, and 10 percent in spare parts. 87/ US exports of agricultural machinery to the USSR ceased after 1947.

The UK and Sweden together are known to have shipped agricultural machinery valued at \$72,000 (about 288,000 rubles) to the USSR in 1951. 88/ The proportion which this figure represents to total UK and Swedish postwar exports of agricultural machinery to the USSR is not known. If the 1951 figure were assumed to represent the average annual rate of such exports for the entire postwar period (an assumption which would probably result in a maximum figure), then total exports might be estimated at about \$576,000 (about 2.7 million rubles).

No other country outside the Soviet Bloc is known to have exported agricultural machinery to the USSR in postwar years. For the period 1945-53, therefore, total Soviet imports of agricultural machinery from non-Bloc countries (US, UK, and Sweden) may be estimated at about 6.1 million rubles, or less than one-tenth of 1 percent of total estimated Soviet domestic production.

In view of possible Soviet difficulties in meeting 1954 and 1955 production schedules, the USSR may attempt to increase imports of agricultural machinery from outside the Soviet Bloc, particularly from the major producers, the US and the UK. In December 1953, the Director of Tekhnopromimport (the Soviet agency handling imports 89/) informed a US visitor that the USSR was interested in purchasing agricultural machinery (no quantities specified) from the US. 90/ As yet, however, there has been no move by the Russians to implement such purchases. Moreover, agricultural machinery has not been mentioned in the initial trade negotiations between the UK and the USSR which began in February

* US \$ values up to March 1950 have been converted to rubles at the official rate of 5.3 rubles to the dollar; after March 1950, at the official rate of 4 rubles to the dollar.

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1954. 91/ In view of the indicated Soviet interest in US agricultural machinery, it appears strange that the item was not brought up in negotiations with the UK. This may indicate either that the Russians prefer US machinery and intend to negotiate for such imports in the future, or that they have changed their minds about importing agricultural machinery from non-Bloc countries.

The USSR imposed a voluntary policy of "self-sufficiency" in agricultural machinery in the mid-1930's. Judging from the low level of mechanization which admittedly still exists in a number of farm operations, the USSR could have been importing tremendous quantities of agricultural machinery. It has chosen not to do so, however, and has depended almost entirely upon domestic production for increasing farm mechanization. There is little reason to believe that this policy will change significantly under the agricultural program for 1954-55. If the USSR should attempt to increase imports on a short-term basis, to fill in the gap left by underfulfillment of production in late 1953 and early 1954, such imports probably would not amount to more than a very small fraction of domestic production.

C. Inventories and Stockpiles.

Estimates of inventories are not tenable except for the machines for which the USSR has announced official figures. War losses of machines have been reported only in the very broadest categories, except for grain combines. 92/ An attempt to determine retirement rates from park figures for grain combines met with no success.* Because of the

* Analogy with the US could not be considered in estimating retirement rates, since no such rates have ever been calculated for US machines. The most exact statement which could be obtained for US machines was that the average machine probably will last 15 to 20 years. 93/ Even were US retirement rates available, there is one reason above all why they could not be applied to Soviet agricultural machines: the agricultural machinery in the USSR, under a system of some 98,700 large collective farms and state farms 94/ with an average sown acreage of nearly 4,000 acres per farm, obviously would not be used in the same manner as agricultural machinery in the US under a system of some 5.4 million farms with an average sown acreage of perhaps 100 acres per farm. 95/ The US farmer is pretty much on his own working his land and, therefore, must buy his own machinery, even though a plow he buys might be capable of plowing 5 or 10 times the acreage which the farmer possesses. The machine is

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completely different design and operation of a grain combine from most other agricultural machinery, a retirement rate, if determinable, would have limited value as applied to other machines.

Inventories of grain combines, cotton pickers, and tractor drills will not serve to indicate the over-all inventory of agricultural machinery. Since these machines plant the crops and harvest them, however, such inventories are worth consideration. Table 8* gives the estimated inventories of these machines for 1940 and 1951-53.

The adequacy of the 1953 parks to meet the requirements of USSR agriculture is discussed in Section IV.**

No reference to the stockpiling of agricultural machinery in the USSR has been found. Under a program of increasing the mechanization of agriculture as rapidly as possible, the USSR would not be likely to consider stockpiling agricultural machinery.

III. Demand.A. Use Pattern.

Agricultural machinery, by the very nature of its design and construction, has but one consumer -- agriculture. In the USSR the socialized sector of agriculture is broken up into collective farms and state farms. The park of agricultural machinery for the collective farms is centered in the Machine Tractor Stations (MTS). The state farms maintain their own parks of machinery.

in service perhaps a week or so a year. Necessary repairs can usually be made promptly and efficiently by a quick trip to town. In the USSR conditions are just the reverse. Every available machine is used to the fullest until a particular farm operation is completed, even though it may mean shipping machines from one part of the country to another. 96/ Since many machines, technically a part of the park, are unserviceable at the time needed, 97/ the remaining machines must do even more, resulting in even faster wear. Moreover, spare parts and repair shops for machine maintenance are far from adequate 98/ and are, of necessity under a system of farms of thousands of acres, located considerable distances from the machine in the field.

* Table 8 follows on p. 41.

** P. 52, below.

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Table 8

Estimated Inventories of Selected Types
of Agricultural Machinery in the USSR,
1940 and 1951-53 a/

Type of Machine	Thousand Units			
	1940	1951	1952	1953
Grain Combines	182 <u>99/</u>	240 <u>b/</u>	275 <u>100/</u>	317 <u>101/</u>
Cotton Pickers	1 <u>102/</u>	11 <u>c/</u>	18 <u>103/</u>	22 <u>c/</u>
Tractor Seed Drills	315 <u>d/</u>	400 <u>e/</u>	480 <u>e/</u>	556 <u>104/</u>

- a. Estimated range of error is + 10 percent.
 b. Estimate based upon reported 1952 and 1953 parks.
 c. Estimates based upon reported 1952 park.
 d. Estimate based on reported 1939 park. 105/
 e. Estimates based upon reported 1953 park.

The MTS received nearly 80 percent of all the grain combines, tractor moldboard plows, tractor cultivators, tractor seed drills, and complex threshing machines produced from 1945 through 1951. 106/ It is assumed, therefore, that approximately 80 percent of the present total park of agricultural machinery belongs to the MTS. The remainder, except for the small fraction in research institutes and testing stations, belongs to the state farms.

Because of the large percentage of the total agricultural machinery park centered in the MTS, the distribution of the MTS has been considered a fairly reliable basis for estimating the over-all distribution of the machinery park. Table 9* gives the distribution of agricultural machinery in 1953 on this basis. Available information on the pattern of distribution of the MTS in earlier years did not permit the extension of Table 9 to cover the entire postwar period. It is probable, however, that the 1953 pattern does not differ greatly from that for the earlier years. The MTS were centered in the Ukraine and the RSFSR even before World War II. Information on the distribution **

* Table 9 follows on p. 42.

** Continued on p. 43.

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Table 9

Estimated Distribution of Agricultural Machinery in the USSR
Based upon the Number and Distribution of the
Machine Tractor Stations
1953 a/ 107/

<u>Republic</u>	<u>Number of MTS</u>	<u>Distribution of Agricultural Machinery (Percent of Total)</u>
RSFSR	5,594 b/	62.5
Ukrainian SSR	1,347	15.0
Kazakh SSR	459	5.1
Belorussian SSR	406	4.5
Uzbek SSR	245 c/	2.7
Lithuanian SSR	142 c/	1.6
Moldavian SSR	108	1.2
Latvian SSR	107	1.2
Georgian SSR	104	1.2
Azerbaydzhan SSR	99	1.1
Kirgiz SSR	70 c/	0.8
Estonian SSR	69	0.8
Armenian SSR	58 c/	0.6
Turkmen SSR	58 c/	0.6
Tadzhik SSR	50	0.6
Karelo-Finnish SSR	34	0.4
Total	<u>8,950</u>	<u>100.0</u>

a. Soviet reports on the number of MTS almost invariably include specialized stations such as land amelioration stations, pasture improvement stations, animal husbandry stations, and forest shelterbelt stations which cannot be broken out. The majority of the stations are of the general farming station type.

b. Total for the RSFSR obtained by subtracting total of other Republics from USSR total.

c. 1952.

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of the state farms is practically nonexistent. Only 129 out of about 4,700 could be accounted for and those only on an oblast basis. 108/

There are, of course, exceptions to the general distribution pattern indicated in Table 9, which are directly related to the area locations of certain crops. The three major concentrations of particular types of machinery concern those used for sugar beet, flax, and cotton growing. About 95 percent of the machinery used in sugar beet growing is concentrated in the northern part of the Ukraine, particularly in the Vinnitsa, Kiev, Poltava, and Khar'kov areas, and in the central regions of the RSFSR, particularly in the Voronezh, Kursk, and Orlov areas. Nearly 80 percent of the flax-growing machinery is concentrated in the northwest, particularly in Vologda, Kirov, Kalinin, Smolensk, and Yaroslavl' areas. Finally, about 75 percent of the cotton machinery is concentrated in the Kazakh and Central Asian regions, particularly in the Uzbek SSR, the Turkmen SSR, and the Tadzhik SSR.

The shift of machinery to take care of the added 13 million hectares to be opened up in Kazakhstan, western Siberia, the Urals, the Volga regions, and the northern Caucasus in 1954 and 1955 109/ will amount more to shifts within the RSFSR than it will to arrivals from outside regions. It is reported that over 28,000 tractor plows and seed drills, 8,429 grain combines, and thousands of harrows and cultivators are to be sent to the new state farms to be set up in the new areas in 1954. 110/ To help insure the success of the program, these machines probably will come from new production. The total number of machines planned for shipment to the new areas is not known. The percentage of the total machinery park in the RSFSR and the Kazakh SSR may increase slightly; but, in general, the pattern will remain much the same as it was in 1953.

B. Exports.

1. To Soviet Bloc Countries.

a. Quantity.

A complete breakdown of the value of Soviet exports of agricultural machinery to the Satellites for individual postwar years was not possible; nor was it possible, except for certain items, to give a breakdown by type of machinery. The estimated value of Soviet exports of agricultural machinery to the Satellites for

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the period 1949-53* are given in Table 10.** On the basis of these estimates, the USSR exported from 2.5 to 3.0 percent of the estimated value of domestic production of 6.78 billion rubles during that period.***

The estimated minimum value of exports of 163 million rubles was obtained by converting estimates of exports of individual unit quantities of machines to values on the basis of prices of Soviet agricultural machinery quoted at the 1952 Bombay Fair, lll/ the only price list available.**** To determine the possible maximum value of exports, it was necessary to balance the reports which mentioned actual quantities against those which did not and to roughly estimate the percent of the total accounted for by the former. On this admittedly rough basis, it was estimated that, for the Soviet Bloc as a whole, only about 80 percent of the total value of exports had been accounted for in the minimum estimate of 163 million rubles. The calculated maximum estimate of 200 million rubles, therefore, was considered the best estimate. The estimates for Bulgaria, Czechoslovakia, China, and East Germany, on which there were the greatest number of reports, are more firm than those for Rumania, Albania, Hungary, and Poland.

A survey of the factors, other than propaganda, which might have dictated the distribution of Soviet exports among the various Satellites would necessitate analyses of the agricultural economies of the individual Satellites. Such analyses are beyond the scope of this report. The breakdown of total exports by country has been presented in Table 10 as a percent of the total merely to indicate more clearly the uneven manner in which agricultural machinery has been exported.

Table 11***** gives estimated Soviet exports of selected types of agricultural machinery to the Soviet Bloc countries in

* Exports prior to 1949 were impossible to estimate in terms of value because of the paucity of reports covering earlier years.

** Table 10 follows on p. 45.

*** See Table 10.

**** Soviet production taken from Table 1, p. 14, above. Soviet production was estimated in terms of 1950 prices. It was necessary to assume that there were no major price changes in agricultural machinery between 1949 and 1950 or between 1950 and 1952.

***** Table 11 follows on p. 46.

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Table 10

Estimated Value of Soviet Exports of Agricultural Machinery
to the Satellites, 1949-53 a/

<u>Country</u>	<u>Minimum Value (Thousand Rubles) <u>b/</u></u>	<u>Maximum Value (Thousand Rubles) <u>b/</u></u>	<u>Best Estimate as Percent of Total <u>c/</u></u>
Albania	2,000	3,000	2
Bulgaria	68,000	75,000	38
Communist China	17,000	20,000	10
Czechoslovakia	30,000	35,000	18
East Germany	17,000	20,000	10
Hungary	8,000	12,000	6
Poland	5,000	15,000	8
Rumania	16,000	20,000	10
<u>Total</u>	<u>163,000</u>	<u>200,000</u>	<u>100 <u>d/</u></u>

a. Excludes exports of spare parts.

b. Based on 1952 prices.

c. Based on maximum value. Estimated range of error of best estimate is - 20 to +10 percent.

d. Individual figures do not add to total because of rounding.

1949-53. Estimated exports shown in Table 11 are expressed in Table 12* as a percentage of estimated Soviet production of the various types of machines. Exports of the group of machines as a whole have amounted to about 1 percent of USSR production in this period.

Although exports have, in general, been of only token size, the propaganda extracted therefrom has been tremendous. This factor is believed to be the primary motivation for agricultural machinery exports to the Soviet Bloc. To extract the greatest propaganda value possible from exports, the machines have been shipped on a rather selective basis with respect to size and operation, but with apparently**

* Table 12 follows on p. 48.

** Continued on p. 47.

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Table 11

Estimated Soviet Exports of Selected Types of Agricultural Machinery to the Satellites, in Units
1949-53 a/ 112/

Type of Machine	Units								
	Albania	Bulgaria	China	Czechoslovakia	East Germany	Hungary	Poland	Rumania	Total
Grain Combines	50	1,550	100	820	460	550	600	575	4,705
Beet Harvesting Combines	N.A.	5	N.A.	52	190	N.A.	N.A.	168	415
Flax Harvesting Combines	N.A.	3	N.A.	N.A.	50	N.A.	N.A.	N.A.	53
Potato Harvesting Combines	N.A.	N.A.	N.A.	N.A.	52	N.A.	N.A.	N.A.	52
Cotton Pickers	N.A.	15	N.A.	N.A.	N.A.	N.A.	N.A.	4	19
Threshing Machines, Complex	N.A.	5,200	N.A.	N.A.	291	N.A.	N.A.	140	5,631
Tractor Moldboard Plows	70	1,200	N.A.	7,000	50	N.A.	N.A.	N.A.	8,320
Tractor Seed Drills	70	400	N.A.	N.A.	50	N.A.	N.A.	N.A.	520
Tractor Cultivators	N.A.	300	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	300
Other Agricultural Machines	3 b/	1,330 c/	N.A. d/	670 e/	500 f/	N.A. g/	N.A. h/	120 i/	2,623

a. The over-all estimated range of error for all items except grain combines is - 0 + 50 percent. The estimated range of error for grain combines is \pm 5 percent.

b. Represents incubators of 20,000-egg capacity. Reaper-binders, horse-drawn plows, horse-drawn seed drills, and horse-drawn cultivators are known to have been exported to Albania, but no estimates of quantities were possible.

c. Represents grain-cleaning machines, reaper-binders, tree-planting machines, horse- and tractor-drawn mowing machines, and electric sheep-shearing machines. Tractor disc harrows and electric milking machines are known to have been exported to Bulgaria, but no estimates of quantities were possible.

d. Tractor moldboard plows, threshing machines, balers, sprayers, horse- and tractor-drawn mowing machines, and various other types of horse-drawn implements are known to have been exported, but no estimates of quantities were possible.

e. Represents grain-drying installations, tractor disc harrows, and electric milking machines. Flax pullers, potato planters and diggers, and fertilizer spreaders are known to have been exported to Czechoslovakia, but no estimates of quantities were possible.

f. Represents grain-drying installations, potato planters, reaper-binders, horse- and tractor drawn mowing machines, electric milking machines, and silage cutters. Electric sheep-shearing machines are known to have been exported to East Germany, but no estimate of quantity were possible.

g. Potato planters are known to have been exported to Hungary, but no estimate of quantity was possible.

h. Potato planters and diggers, tractor disc harrows, and horse- and tractor-drawn mowing machines are known to have been exported to Poland, but no estimates of quantities were possible.

i. Represents potato diggers and self-propelled mowing machines.

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little regard for domestic Soviet needs. Only a very small percentage of total production of tractor moldboard plows, tractor seed drills, and tractor cultivators, for example, has been exported, although the degree of mechanization in farm operations employing these machines is relatively high. Exports of these machines are not slighted in propaganda, of course, but the machines themselves are relatively unspectacular in appearance and in the work they perform. Harvesting machinery, on the other hand, is much more impressive, both in appearance and in operation. Thus, although admittedly only 6 percent of the Soviet potato crop was harvested by machine in 1952, 113/ at least 6.5 percent of total production of potato harvesting combines was exported in that year. Only 80 percent of the beet crop was harvested by machine in 1953, 114/ but nearly 10 percent of 1949-53 production of beet harvesting combines was exported. Had the USSR retained the 4,705 grain combines instead of exporting them to the Bloc, an extra estimated 1.2 million hectares of grain might have been harvested,* or about 1.2 percent of the estimated 1953 grain acreage.** In theory, the export of these machines did not affect Soviet plans for mechanization, since exports undoubtedly were taken into consideration in the plan. As a matter of fact, the USSR might have realized only a very slightly higher fulfillment of certain planned levels of mechanization had exports not occurred. If, for example, the 1.2 percent possible increase in area harvested by combines were added to the 77 percent actually harvested by combines in 1953, 116/ the 1953 planned level of 81 percent 117/ would have been met by 96.5 percent instead of 95 percent. It may be concluded, therefore, that the propaganda value of Soviet exports of agricultural machinery through 1953 far outweighed any adverse effect upon the mechanization program of the USSR.

Available information indicates that the USSR plans to increase exports of agricultural machinery to the Satellites in 1954. The full extent of these exports cannot be judged, but for certain types of machines percentage increases of nearly 80 percent have been reported.

* The average productivity per combine of about 260 hectares per harvesting season was obtained by dividing the estimated number of combines on hand in the USSR in 1953 by the total acreage harvested by combines in 1953.

** The figure used as estimated 1953 grain acreage was 103.8 million hectares. 115/

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Table 12

Estimated Soviet Exports of Selected Types of Agricultural Machinery
to the Satellites as a Percentage of Total Soviet Production
1949-53

<u>Type of Machine</u>	<u>Total Soviet Production a/ (Units)</u>	<u>Exports to Satellites b/ (Units)</u>	<u>Exports as Percent of Total Production</u>
Grain Combines	210,000	4,705	2.2
Beet Harvesting Combines	4,600	415	9.0
Flax Harvesting Combines	5,400	53	1.0
Potato Harvesting Combines	800	52	6.5
Cotton Pickers	26,300	19	0.1
Threshing Machines, Complex	93,300	5,631	6.0
Tractor Moldboard Flows	544,600	8,320	1.5
Tractor Seed Drills	523,700	520	0.1
Tractor Cultivators	470,300	300	0.1
Total	<u>1,879,000</u>	<u>20,015</u>	<u>1.1</u>

a. Estimated Soviet production was obtained from Table 3, p. 19, above.

b. Estimated Soviet exports to the Satellites was obtained from Table 11, p. 46, above.

Table 13* gives the pattern of Soviet exports of grain combines to the Satellites in 1949-53 and the plan for 1954. To the three countries for which plan information was available (Czechoslovakia, East Germany, and Poland), exports are to increase 50 percent, from 1,100 units in 1953 to 1,655 units in 1954. It should be noted, however,

* Table 13 follows on p. 49.

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Table 13

Estimated Soviet Exports of Grain Combines to the Satellites
1949-53 and 1954 Plan, as Compared
with Soviet Production a/

Country	Estimated Exports						Units
							Planned Exports
	1949	1950	1951	1952	1953	Total 1949-53	1954
Albania <u>118/</u>	0	0	10	15	25	50	N.A.
Bulgaria <u>119/</u>	0	0	550	810	190	1,550	N.A.
China <u>120/</u>	0	0	10	30	60	100	N.A.
Czechoslovakia <u>121/</u>	0	0	120	300	400	820	600
East Germany <u>122/</u>	0	0	0	60	400	460	555
Hungary <u>123/</u>	0	220	330	0	0	550	N.A.
Poland <u>124/</u>	50	25	25	200	300	600	500
Rumania <u>125/</u>	0	0	75	300	200	575	N.A.
Total	<u>50</u>	<u>245</u>	<u>1,120</u>	<u>1,715</u>	<u>1,575</u>	<u>4,705</u>	<u>N.A.</u>
Soviet Produc- tion <u>b/</u>	29,000	46,000	53,000	41,000	41,000	210,000	N.A.
Percent Exports of Total Production	0.2	0.5	2.1	4.2	3.8	2.2	N.A.

a. For purposes of this table, it was assumed that the grain combines were exported in the same year in which they were produced.

b. Soviet production was taken from Table 3, p. 19, above.

that for each of these three countries there has been a gradual upward trend in recent years. An upward trend on a much smaller scale has been estimated for exports of grain combines to Albania and Communist China. For the remaining countries, the pattern is erratic. Assuming an overall increase to the Satellites of 50 percent over 1953, which is not unlikely, exports of grain combines may be estimated at about 2,360 units in 1954.

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Soviet exports of beet harvesting combines to Czechoslovakia are scheduled to increase from 52 units in 1952 126/ to 400 units in 1954. 127/ (1953 exports are unknown.) Exports to East Germany are scheduled to increase from 140 units in 1953 128/ to 250 units in 1954, 129/ or approximately 80 percent. Plan figures for other types of machines are not available.

Probably 1954 plan commitments will be met. The USSR could not very well renege on these commitments without losing much of the propaganda value already built up by press and radio. On the basis of estimates of exports in 1949-53, an increase of even 50 percent in exports of grain combines, for example, would not present a major threat to agricultural mechanization in the USSR. This conclusion is considered tenable even when viewed in the light of the additional 13 million hectares which are to be brought under cultivation in the USSR in 1954 and 1955, primarily for grain growing. With only a slight improvement in maintenance of the available combine park, as a result of the increased emphasis placed on repair under the new agricultural decrees, the USSR should be able to compensate for estimated 1954 exports of 2,360 grain combines.

b. Quality.

The glowing propaganda which accompanies Soviet exports of agricultural machinery to the Satellites makes it difficult to appraise the quality of the machines from the point of view of the Soviet Bloc. The one concrete report on this subject concerns the 460 grain combines which East Germany received from the USSR in 1952 and 1953. They cost East Germany only about one-third of the cost of a somewhat similar machine which is just beginning to be produced domestically; but their productivity was reported to be far below the expected average. The motor was reportedly rather weak for conditions in East Germany, crop losses were considerable, straw losses were considerable because of the high stubble left, and upkeep costs were extremely high. 130/ These complaints are borne out by the fact that similar complaints have appeared in the Soviet press with respect to the grain combines produced in the USSR. 131/ It would appear from such comments that Soviet propaganda probably makes very little impression on the actual users of the machines.

2. To Non-Soviet Bloc Countries.

Available information on Soviet exports of agricultural machinery to countries outside the Soviet Bloc in postwar years is ex-

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tremely fragmentary and includes unknown quantities of tractors. With the possible exceptions of Argentina, Finland, and Iran, there is no information to indicate that agricultural machinery is likely to become a regular Soviet export item to countries outside the Soviet Bloc. If the reports on India and Finland may be considered representative, one of the important deterrents to Soviet exports appears to be the relatively poor quality of the machinery offered. Important exporters of agricultural machinery, such as the US and the UK, have long been accustomed to meeting the demands of foreign markets for machinery of good quality. The USSR, on the other hand, has never engaged in large-scale exports of agricultural machinery to non-Bloc countries.

Soviet exports of agricultural machinery to countries outside the Soviet Bloc are difficult to estimate for 1954 and 1955 without information on the types of machinery involved in current trade negotiations. The regular use of the term "agricultural machinery" precludes an accurate appraisal of trade negotiations or agreements in terms of types of machines. The USSR might export to non-Bloc countries the types of machines employed in those areas where Soviet mechanization is most advanced, while not exporting those machines employed in areas where the USSR is attempting a rapid increase in mechanization. The export of a particular type of machinery, however, cannot serve as a criteria for the Soviet supply of that particular type of machinery. If the "right price" in terms of a scarce material or valuable propaganda could be gained from the transaction, the USSR undoubtedly would export potato harvesting combines, for example, even though the Soviet potato crop might have to be harvested by hand as a consequence.

C. Essentiality and Substitutes.

There are many farm operations in which hand labor may be substituted for the work done by machinery. It is true that the operations would be accomplished less efficiently but, nevertheless, they would be accomplished. In the USSR, the degree of mechanization is very low or almost nonexistent in many operations outside of grain growing; and even here a number of operations are performed by hand labor or by simple implements. Until the last year or so, for example, potato and vegetable growing in the USSR was based entirely upon hand labor. ^{132/} The use of hand labor for all farm operations would, of course, be inadequate to feed the Soviet population of some 200 million. It would be increasingly difficult during a period of war, as manpower requirements for military purposes decreased the supply of agricultural labor. The USSR

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already has about 53 million persons, or approximately 25 percent of its total population engaged in farm work of one kind or another. 133/* This number of persons certainly could not be left to agricultural pursuits during full-scale war. Should a full-scale war force the USSR to devote a large part of its industrial facilities to the production of military items to the complete exclusion of agricultural machinery, the loss in food production would be a major contribution to the loss of the war.

Agricultural machinery designed to perform particular farm operations does not lend itself to use outside agriculture.

IV. Degree of Mechanization of Soviet Agriculture and Requirements for Selected Agricultural Machinery.

A. Degree of Mechanization.**

1. USSR.

By concentrating on about a half dozen basic farm operations, the Russians have been able to achieve a higher degree of mechanization for particular crops than any other country in the world, including the US. It is on this level that the Russians base their claim of the most mechanized agriculture in the world. Actually, the Soviet effort has been concentrated on those areas in which mechanization appeared most desirable, such as grain growing, and in which machinery could be employed most efficiently, such as plowing. This policy has led to an imbalance in the mechanization of Soviet agriculture not found in any other major country in the world.

The imbalance in the mechanization of Soviet agriculture is apparent in Table 14,*** which shows the degree of mechanization on****

* In the US there were only about 9.8 million persons employed in farm work in 1952 or about 6 percent of the total population. 134/

** The degree to which a particular farm operation in the US and USSR is mechanized is defined as that percentage of the total acreage (or tonnage) involved in the operation which is worked by means of mechanical draft power (tractor-drawn or tractor-powered machinery and self-propelled machinery). 135/ The rest of the operation is, of course, performed by horse-drawn or horse-powered machinery and/or hand implements.

*** Table 14 follows on p. 53.

**** Continued on p. 54.

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Table 14

Estimated Degree of Mechanization of Selected Farm Operations
on Soviet Collective Farms, Actual and Planned
1940 and 1951-55

Farm Operation	Percent					
	1940 <u>136/</u>	1951 <u>137/</u>	1952 <u>138/</u>	1953 <u>139/</u>	Plan 1954 <u>140/</u>	Plan 1955 <u>141/</u>
Grain Harvesting by Combines	43	63	70	77	N.A.	80-90
Autumn Plowing	71)	94	97	99 <u>a/</u>	N.A.)	95
Fallow Plowing	84)		96	99 <u>a/</u>	N.A.)	
Sowing of Spring Grain Crops	59 (72	Plan-78	83	N.A.)	90-95
Sowing of Winter Grain Crops		(85	Plan-88	93	
Sugar Beet Planting	N.A.	N.A.	95	N.A.	N.A.	N.A.
Sugar Beet Harvest- ing	N.A.	70	Plan-90	80	N.A.	90-95
Cotton Planting	N.A.	N.A.	98	N.A. <u>b/</u>	N.A.	N.A.
Cotton Harvesting	Negligible	20	N.A.	N.A. <u>b/</u>	N.A.	60-70
Vegetable Planting	Negligible	Negligible	Negligible	Negligible	50	80-90
Seedling Planting	Negligible	Negligible	Negligible	N.A. <u>b/</u>	35	70-80
Vegetable Between- row Cultivation	Negligible	Negligible	Negligible	N.A. <u>b/</u>	70	80-90
Potato Planting	Negligible	Negligible	14	N.A. <u>b/</u>	45	80-90
Potato Between- row Cultivation	Negligible	Negligible	Negligible	N.A. <u>b/</u>	65	80-90
Potato Harvesting	Negligible	Negligible	6	N.A. <u>b/</u>	40	80-90
Haying (Cutting, Raking, Stacking)	N.A.	N.A.	Plan-41	N.A. <u>b/</u>	65	80
Silaging of Fodder	N.A.	N.A.	Plan-58	N.A. <u>b/</u>	65	75

a. The degree of mechanization was reported as "almost 100 percent." 142/

b. The 1953 plan for the mechanization of these operations was not fulfilled. 143/

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collective farms of the USSR for selected types of farm operations for 1940 and 1951-55. The figures apply to collective farms throughout the USSR, but not to the State Farms.* In certain important grain-growing areas such as the southern Ukraine and the Kuban' in the Lower Don-North Caucasus region, combines harvest 95 percent to 100 percent of the grain even in the collective farms. 146/ Likewise, combines harvest nearly all of the grain in Orel and Kursk Oblasts and other central regions of the RSFSR. 147/

Grain growing, as the most important branch of agriculture from the Soviet viewpoint, is the most mechanized, but even here there are extremes. The high level of mechanization in the plowing, sowing, and harvesting of grain crops contrasts sharply with the low level of mechanization in the gathering and stacking of chaff and straw, in the spreading of organic and mineral fertilizer, in grain transport, and in grain cleaning. 148/ Exact figures on the degree of mechanization of the latter operations have not been published, but it is roughly estimated that they are mechanized to no more than 20 percent to 25 percent. The extent to which potato and vegetable growing have suffered in the past as a result of the concentration on grain, sugar beet, and cotton growing is readily apparent in Table 14. An interesting point is the contrast in the mechanization of cotton planting and cotton harvesting. The lower degree of mechanization of cotton harvesting may be principally due to the fact that the Russians are still working to develop an acceptable cotton picker. It is reported that the cotton picker now employed, which has been in production since 1948, 149/ and has been improved several times, 150/ does not pick the cotton completely; that it allows too much to drop to the ground; and that it should be replaced by a new, improved machine. 151/

In the fall of 1953 the Russians instituted an intensive campaign designed to correct the imbalance in agricultural mechanization. In two years, that is, during 1954 and 1955, the Russians expect to achieve a level of mechanization in potato and vegetable growing, haying,

* Except for those operations connected with potato and vegetable growing and animal husbandry, State Farms, with their own parks of machinery, are reported to be from 95 to 100 percent mechanized. Potato and vegetable growing are to be from 80 to 90 percent mechanized on State Farms in 1954 and 95 percent mechanized in 1955. 144/ No specific levels of mechanization are reported for animal husbandry. It is reported only that levels of mechanization here are seriously lagging. 145/

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and silaging of fodder only slightly below, or equal to, those planned for the already highly mechanized operations connected with grain and sugar beet growing and cotton planting. It was precisely because such a high degree of mechanization had already been achieved in the latter crops that such a tremendous two-year mechanization program for other areas of agriculture could be considered at all.

The indications are that the planned 1955 goals for mechanization are already doomed to an underfulfillment, perhaps by as much as 20 to 25 percent, for those operations connected with potato and vegetable growing and animal husbandry.

As indicated in Table 14, no farm operation connected with the new program was mechanized in 1953 to the extent planned. The degree of underfulfillment was not announced. The reason for the failure to achieve planned levels of mechanization in 1953 is apparent in the figures announced for the production of the machines used in these operations. Plan fulfillment for such machinery ranged from 13 percent to 89 percent. The underfulfillment in 1953 will, of course, have to be made up at the same time that attempts to achieve the goals planned for 1954 and 1955 are underway. Fulfillment of plans for the production of agricultural machinery is estimated at only about 85 percent in 1954 and 94 percent in 1955. In addition, the fulfillment of the mechanization program will depend upon the availability of adequate repair shop facilities and spare parts for machine maintenance. The 1953 plan for the building of MTS repair workshops was fulfilled only 57 percent, and the plan for production of spare parts was not carried out. 152/ Thus it appears that the damage already done will preclude complete fulfillment of the plan.

The decision to increase the sown area in the USSR by 13 million hectares in 1954 and 1955, mainly in grain, 153/ was made after the mechanization program for potato and vegetable growing and for animal husbandry was released. This increase in acreage should have little effect on the mechanization of the latter farm operations, and should actually have little effect on plans for mechanization of grain harvesting in 1955. This estimate assumes a seasonal productivity rate at the estimated 1953 rate of about 265 hectares per combine in

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the park.* Due to the wide attention devoted to the program for area expansion and the frantic manner in which it is being pushed, there may be a more careless use of the machinery than usual, but at least some of this harder use should be offset by increased repair facilities and spare parts.

2. Comparison of Agricultural Mechanization in the USSR and the US.

The US and the USSR have roughly the same amount of sown area to mechanize (about 370 to 380 million acres),** but since the breakdown by crops is not the same, comparisons of mechanization are somewhat misleading. Nearly 25 percent of the sown area in the US was planted in corn in 1951, 158/ while only about 2 percent of the sown area of the USSR was planted in corn in 1953. 159/ The peripheral nature of the crop in the USSR and the consequent lack of attention to the mechanization of its harvest is apparent in Table 15.*** On the other hand, sunflowers are an important crop in the USSR, while in the US the acreage devoted to sunflowers is negligible.

Table 15 gives the estimated degrees of mechanization of selected farm operations in the US in 1953 and in the USSR for the years indicated. The table also shows the estimated acreages of the respective crops involved in such farm operations. In those farm operations on which the USSR has concentrated attention, the over-all degree of mechanization is impressive, particularly in the case of plowing. In 1954 and 1955, each of the operations in Table 15 are to be mechanized even further, although plan goals in this respect will not be met. By the end of 1955 the USSR will probably still compare unfavorably with****

* Total sown area in the USSR in 1953 has been estimated at about 157.2 million hectares, of which about two-thirds, or 103.8 million hectares, was in grain. 154/ Seventy-seven percent of the grain acreage, or about 80 million hectares, was harvested by grain combine. An estimated grain combine park during the harvest season of 1953 of about 300 thousand units, 155/ therefore, gives an average seasonal productivity of about 265 hectares per combine.

** The total sown area of the USSR in 1953 is estimated at about 157.2 million hectares (388.4 million acres), 156/ and the sown area of the US in 1951 was about 370 million acres. 157/

*** Table 15 follows on p. 57.

**** Continued on p. 59.

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Table 15

Estimated Degree of Mechanization of Selected Farm Operations
in the USSR and the US, for Selected Years a/ 160/

Crop Operation	Degree of Mechanization		Estimated Acreage (Million Acres)	
	US	USSR	US	USSR
	1953	b/	1951	1953
Small Grain			150.0	256.0
Plowing	95	99 -(1953)		
Seeding	85	88 -(1953)		
Discing and Harrow- ing (Cultivating)	90	50 -(1951)		
Harvesting	95	77 -(1953)		
Threshing	100	50 -(Estimated 1951)		
Corn			84.0	7.0
Plowing	85	99 -(1953)		
Planting	50	N.A.		
Cultivating	80	50 -(1951)		
Harvesting (for grain)	41 -(1946)	Negligible -(1951)		
Cotton			28.0	5.7
Plowing	65	99 -(1953)		
Planting	48	98 -(1952)		
Cultivating	56	75 -(Estimated 1951)		
Harvesting	20	20 -(1951)		
Sugar Beets			0.8	3.3
Plowing	90	99 -(1953)		
Seeding	60	95 -(1952)		
Cultivating	60	75 -(Estimated 1951)		
Fertilizing	65	N.A.		
Harvesting	75	80 -(1953)		
Spraying and Dusting	70	N.A.		

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Table 15

Estimated Degree of Mechanization of Selected Farm Operations
in the USSR and the US, for Selected Years a/ 160/
(Continued)

Crop Operation	Degree of Mechanization		Estimated Acreage (Million Acres)	
	US	USSR	US	USSR
	1953	b/	1951	1953
Potatoes			1.4	7.7 c/
Flowing	90	99 -(1953)		
Planting	55	14 -(1952)		
Cultivating	60	N.A.		
Harvesting	70	6 -(1952)		
Vegetables			N.A.	2.5 c/
Flowing	N.A.	Negligible -(1953)		
Planting	N.A.	Negligible -(1953)		
Cultivating	N.A.	Negligible -(1953)		
Harvesting	N.A.	Negligible -(1953)		
Total			<u>264.2</u>	<u>282.2</u>
Percent of Total Sown Area			71	73

a. Data for the USSR are for the collective farms only. For the operations listed, except those concerned with hay, potatoes, and vegetables, the state farms are said to be even more highly mechanized.

b. As indicated.

c. These are acreages for the socialized sector only. No machinery would be allotted to the remaining areas made up of small plots cultivated by individual farmers or urban dwellers.

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the US in the mechanization of over-all cultivation, grain threshing, corn harvesting, and potato planting and harvesting.

Without further qualification, Table 15 can present an extremely misleading picture with respect to the respective over-all degrees of mechanization in the US and the USSR. Two factors in particular should be mentioned with respect to the USSR: (a) the crops and the operations listed in Table 15 represent practically the total effort toward mechanization which the USSR has been able to achieve since the drive for mechanization began with the First Five Year Plan (1928-1932);* and (b) other types of farm operations not listed (such as gathering and stacking of chaff and straw, spreading of organic and mineral fertilizers, grain transport, grain cleaning, milking, poultry raising, cattle care and feeding) are mechanized not at all in the USSR or only to a negligible degree. 162/ In the US the individual farmer controls the degree of mechanization. Because the average US farmer always has been interested in saving labor without regard to a particular farm operation or crop, mechanization has tended to proceed at a more even pace throughout agriculture. Thus, in addition to the mechanization levels achieved in the farm operations listed in Table 15, the US farmer has saved untold hours of labor through his purchases of farm poultry equipment, farm dairy machines and equipment, barn equipment, barnyard equipment, and farm elevators and blowers. To satisfy this desire to save labor in the "peripheral" areas of agriculture, the agricultural machinery industry in the US has devoted from 10 to 20 percent of total output to the production of the above machinery throughout the postwar period. 163/ It is estimated that in 1953, the high year thus far, the USSR devoted about 3 percent of the total value of output to this machinery.

B. Requirements for Selected Agricultural Machinery.

Available evidence indicates that on a unit basis the USSR has already established parks of certain types of machinery sufficient to mechanize farm operations 100 percent. Under the system by which these parks are employed, however, mechanization of only 75 to 80 percent has been achieved. The discussion here is confined to grain combines, cotton

* There was considerable destruction of the agricultural machinery park in the USSR during World War II 161/ which adversely affected mechanization, but the areas of concentration in the nine postwar years have been the same as in prewar years.

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pickers, and tractor seed drills, but the implications of inefficient use of the machinery may be applied to other types of agricultural machinery as well.

Table 16* shows the estimated parks for selected types of agricultural machinery, and estimates actual productivity, based upon reported percentages of the total crop planted or harvested by machine (as contrasted with potential productivity, based upon the rated productivity of park machinery.)

At an average productivity of 500 hectares per machine per season,** the USSR could have harvested 100 percent of the 1953 grain crop with only about 210,000 grain combines, or 70 percent of the available park. At an average productivity of 300 hectares per machine per season, the USSR could have planted 100 percent of the grain crop with only about 350,000 tractor seed drills, or 67 percent of the available park. One hundred percent mechanization of cotton picking in 1952 would not have been possible with the available park, but mechanization could have been increased from the 20 percent which actually was achieved to at least 30 percent. The case for cotton pickers may be somewhat overstated, since there are machine design difficulties involved which are not present in the other two machines. 170/

The lack of full utilization of available machinery is perhaps the best measure of a problem previously mentioned -- the inadequacy of the supply of spare parts and of repair shops for machine maintenance, the need for which is aggravated not only by the poor quality of new machines but by improper use of machinery. The spare parts problem, which has plagued Soviet agriculture throughout the postwar period, 171/ is apparently such that the USSR has found it easier to produce new machines each year rather than try to keep all the old ones in operation. Plans to improve the repair facilities for agricultural machinery and the supply of spare parts were included in the agricultural decrees of 1953, as were plans for improving the training of machine operators.***

* Table 16 follows on p. 61.

** Productivity figures taken from Table 16.

*** According to the plan, 1,173 workshops, 6,200 repair shops, 18,000 mobile motor workshops, 86 repair works, and 146 interrayon ; capital over-haul workshops are to be built between 1953 and 1956. 172/

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Table 16

Estimated Actual Productivity of Selected Types of Soviet Agricultural Machinery
Compared with Potential Productivity
1953

Type of Machine	In Terms of Machinery			In Terms of Total Acreage			Percent Actual Coverage of Potential Coverage
	Park <u>a/</u> (Thousand Units)	Average Area Covered per Machine (Hectares)	Potential Area Covered per Machine (Hectares)	Total Crop Area <u>164/</u> (Million Hectares)	Total Area Covered by Machinery <u>b/</u> (Million Hectares)	Potential Area Covered by Machinery <u>c/</u> (Million Hectares)	
Grain Combines	300	265	500 <u>d/</u>	103.8	80.0	150.0	53
Cotton Pickers <u>e/</u>	18	32 <u>165/</u>	45 <u>f/</u>	2.9	0.6	0.8	75
Tractor Seed Drills	520	173	300 <u>g/</u>	103.6	90.0	156.0	58

a. Estimated park at time planting and harvesting were in progress. End-of-year park figures from Table 8, p. 41.

b. This column was calculated on the basis of the following percentages of total crop harvested or sown by the machines listed: grain combines, 77; cotton pickers, 20; and tractor seed drills, 88 (estimate). (See Table 15, p. 58.)

c. This column is the estimated acreage which could be covered, assuming that the park would be utilized almost completely during the few weeks in which it was in use and that each machine in the park would operate approximately at rated productivity.

d. This figure is the reported average 1952 seasonal productivity of the machines in the park which were actually in use. 166/ This figure also represents the rated productivity of the machine for a 10-hour day over a 25-day period. 167/

e. Data on cotton pickers are for 1952.

f. This figure represents the estimated rate of productivity for a 10-hour day over a 20-day period. 168/

g. This figure represents the estimated rate of productivity for a 10-hour day over a 20-day period. 169/

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If the entire program for repair facilities in 1953-56 were fulfilled only to the extent of the 1953 program for repair workshops, or 57 percent, 173/ the USSR would have an additional 14,000 repair shops of various sizes by the end of 1955. The maintenance of the available parks of machinery undoubtedly will improve under such circumstances, although improvement in terms of a specific number of machines cannot be estimated.

The obvious solution to the problem would appear to be the diversion of materials and manpower which now go into producing completed units to the production of spare parts. The Russians have been well aware of this fact for some time, but have been unable to act upon it because of the attitude of many producing plants, in and out of the industry, toward the production of spare parts. Many plants either ignore orders for spare parts production completely, 174/ or fail to fulfill the plan. 175/ There appears to have been but scant success in the program during the first quarter of 1954, 176/ which means that "excess" production of completed units may be expected to continue in 1954 and 1955.

In terms of requirements for machinery in 1954 and 1955, it is apparent that the USSR does not actually need any new machinery. No startling improvements in machine utilization are expected in the next 2 years, however, so it may be assumed that rates of productivity in 1954 and 1955 will approximate those of 1953. In view of this fact, and of plans to add 13 million hectares to areas under cultivation in 1954 and 1955, it may be estimated that the USSR will require from 350,000 to 400,000 grain combines by the end of 1955. Estimated 1954 and 1955 production of 74,000 units added to the estimated end of 1953 park of 317,000 units, would give a park of about 390,000 units by the end of 1955, without allowance for retirement.

Roughly estimating a retirement of about 15,000 to 20,000 units, the USSR should have no trouble in achieving at least the minimum planned degree of mechanization in grain combining. Calculating requirements for tractor seed drills in the same manner, about 610,000 to 640,000 units would be required by the end of 1955. Estimated production of about 160,000 units in 1954-55, when added to the 1953 park of about 556,000 units, indicates that the planned degree of mechanization should be met here also. It is extremely doubtful that the plan for cotton picking can be fulfilled by more than about 70 percent. At the rates of production estimated for 1954 and 1955, the USSR could not

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have more than about 30,000 cotton pickers at the end of 1955. To pick 60 to 70 percent of the cotton by machine, on the basis of an estimated acreage of about 2.3 million acres, 177/ about 40,000 to 50,000 cotton pickers would be needed. It is doubtful that underfulfillment of the plan would seriously affect production of consumer goods made of cotton, since the remainder of the cotton would be picked by hand, as it has always been in the past.

V. Future Industry Expansion.

The new program for agricultural machinery issued in the agricultural decrees of 1953 was beyond the capabilities of the agricultural machinery industry. In order to correct this defect, the following measures were taken 178/: (a) the Ministry of Defense Industry, the Ministry of Transport and Heavy Machine Building, the Ministry of Agriculture and Agricultural Procurement, the Ministry of the Metallurgical Industry, the Ministry of the Coal Industry, and the Ministry of the Aviation Industry were given production assignments for 1954 and 1955 amounting to 6,000 machines for making peat-humus pots for potato and vegetable growing, 5,000 sprinkling units, 7,500 manure loaders, 14,000 potato harvesting combines, and 15,000 manure spreaders; (b) five plants were transferred from other ministries into the Ministry of Machine Building for the purpose of building agricultural machinery, including a plant from the Ministry of Aviation Industry, a plant from the Ministry of Railways, a plant from the Ministry of Internal Affairs, and two plants from the Ministry of Agriculture; and (c) plans were made to begin construction in 1954 of a new agricultural machinery plant (somewhere in the Belorussian SSR as nearly as can be determined) for the production of machinery for potato growing with a yearly capacity valued at 150 to 200 million rubles. This would represent about 10 percent of the total estimated value of Soviet production of agricultural machinery in 1953; (d) four existing plants of the agricultural machinery industry were to be expanded by construction and installations, valued at 5.5 million rubles, distributed as follows: 1.0 million rubles at the Belinsk'sel'mash Plant in Belinsk; 2.0 million rubles at the Krasnaya Zvezda Plant in Kirovograd; 1.0 million rubles at the Krasnyy Aksay Plant in Rostov-on-Don; and 1.5 million rubles at the Ryazsel'mash Plant in Ryazan'; and (e) the Tula Self-Propelled Combine Plant in Tula was charged with the organization of production of potato harvesting combines at the eventual rate of 15,000 a year (6,000 in 1954 and 12,000 in 1955) and the cessation of production of self-propelled combines.

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In addition to the physical expansion resulting from the construction of new facilities and the expansion of old ones, "expansion" was also to be achieved through the placing of orders for agricultural machinery and spare parts with other countries of the Soviet Bloc. Ministries supplying power, construction materials, and raw materials were charged with the responsibility for supplying adequate quantities of these materials to the plants producing agricultural machinery.

It may be observed that, except for the special orders outlined in (a) above and the orders for machinery placed elsewhere in the Soviet Bloc, these measures were designed to expand the production facilities of the agricultural machinery industry itself. Since most of these measures were not to take effect until 1954, there probably has not yet been a significant increase in production.

Available information indicates that these measures have not all been carried out with a uniform degree of success. Nothing has been reported on the Ministries of Aviation and of Defense. The ministries which are to supply the materials for expansion and for extra production have been particularly remiss since the issuance of the decree. Deliveries of raw materials and of component parts have not only been delayed but have not always been of the proper quality. These shortcomings are said to threaten disruption of the production programs at certain plants.^{179/} No information has yet been received on the location or progress in construction of the new plant in Belorussia, nor has anything been said on the planned expansion of the four existing plants. The Tula Combine Plant put out its last self-propelled grain combine on 31 January 1954 and began regular production of potato harvesting combines on 11 February, ^{180/} with a production for the month of February of 205 units, 5 over plan. ^{181/} Since the plant was supposed to have put out 55 units by the end of December 1953, ^{182/} it appears to be running about 6 weeks behind schedule. It is questionable whether the plant can make up the lost time and produce the planned 6,000 units for 1954. At its peak, the plant produced an estimated 7,000 self-propelled combines in 1951. ^{183/} Nothing has been reported on the extent to which orders for machinery have been placed with the Satellites.

The agricultural machinery industry can farm out many of its orders for products of relatively simple design and construction to other plants outside the industry. Future expansion on the present scale, therefore, will probably not be required.

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S-E-C-R-E-TVI. Inputs.A. Raw Materials.

Table 17* gives the estimated inputs of metal products used in the production of agricultural machinery in the USSR in 1936 184/ and in 1949-55. The categories shown are rolled steel, cast iron, and "other."

The primary basis for Table 17 is the estimated total weight of agricultural machinery produced for each year. Annual estimates of total weight were obtained by multiplying unit production by a weighted average weight per agricultural machine. These estimates of total weight and weighted average weight per agricultural machine are believed to be as accurate as possible on the basis of available information. Total metal products, which account for approximately 92 percent of the weight of the average Soviet agricultural machine, 185/ were broken down on the basis of official Soviet data and by analogy with the US.** Minor fluctuations in the material make-up of the average agricultural machine from year to year were considered too insignificant to invalidate the use of a constant percentage breakdown for metal products throughout the post-war period.

The agricultural machinery industry is reported to be one of the largest consumers of metal in the USSR. 186/ Production of agricultural machinery consumed in 1951 was an estimated 4 percent of the total Soviet production of rolled steel, 22.4 million metric tons. 187/ An even smaller percentage of US steel production is consumed by production of this type of machinery. In the US, about 1.36 million metric tons of steel, largely sheet and rolled products, were purchased directly for the production of agricultural machinery and tractors combined in 1950. 188/***

* Table 17 follows on p. 66.

** The percentage of weight in metal products in the average US agricultural machine does not differ appreciably from 92 percent. US machines are usually equipped with rubber tires whereas Soviet machines are more often equipped with wooden tires. For a more detailed explanation of the methodology used in determining inputs, see Appendix B.

*** This figure does not represent total steel inputs for the production of agricultural machinery and tractors; only direct purchases are given in this figure. Total inputs would include purchases of components, for which figures are not available.

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Table 17

Estimated Inputs of Metal Products in Soviet Agricultural Machinery Building
1936 and 1949-55 a/

Inputs	Thousand Metric Tons							
	1936	1949	1950	1951	1952	1953	1954	1955
Rolled Steel	582.7	548.5	730.4	888.9	796.3	779.7	808.5	933.1
Cast Iron	N.A.	185.3	246.8	300.3	269.0	263.4	273.2	315.2
Other b/	N.A.	7.4	9.9	12.0	10.8	10.5	10.9	12.6
Total Metal Products c/	<u>760.3</u>	<u>741.2</u>	<u>987.0</u>	<u>1,201.2</u>	<u>1,076.1</u>	<u>1,053.7</u>	<u>1,092.6</u>	<u>1,261.0</u>

a. Inputs for spare parts for agricultural machinery are not included. The estimated range of error is + 20 percent.

b. "Other," comprising about 1 percent of total metal products, includes cast steel, malleable iron castings, chromium, nickel, aluminum, zinc, copper, lead, and tin.

c. Total figures are accurate, although the rounding of individual estimates leads to some discrepancy.

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This quantity amounted to 2 percent of total US rolled steel production of 67.9 metric tons in 1950. 189/ It is estimated that in 1955, Soviet production of agricultural machinery will consume somewhat less than 3 percent of total production of rolled steel of 32 million metric tons. 190/ Agricultural machinery is expected to take a smaller share of total Soviet production of rolled steel primarily because it is estimated that such consumption will increase only 5 percent between 1951 and 1955, while total production of rolled steel will increase by 43 percent.

Shortages of metal products for agricultural machinery production in the USSR resulting from delayed deliveries have been reported. 191/ It is implied that deliveries of metal products are sometimes delayed to the extent of adversely affecting the output of agricultural machinery. 192/ Delays of from 1 to 3 months apparently are not uncommon. 193/ Sporadic deliveries of this nature undoubtedly contribute to the much maligned practice of producing half of the month's output in the last 10 days of the month. 194/

It was not possible to break down the 1 percent of metal products in the "other" category, except to estimate that cast steel and malleable iron castings comprised the greater part. 195/ The full list of items included in "other", as indicated in the footnote at the bottom of Table 17, were taken from data on US inputs. 196/ This list includes nickel and copper, which in time of war would undoubtedly be diverted entirely or primarily to the production of military items. The extent to which the production of agricultural machinery might suffer thereby cannot be ascertained in the absence of quantity estimates of inputs for these metals.*

* An impression of the relatively small quantities of chromium, nickel, aluminum, zinc, copper, lead, and tin which might be consumed in Soviet agricultural machinery production may be gained from the percentages of total US inputs of these items in 1949 which went into categories of agricultural machinery produced on a very small scale in the USSR. (See Table 2, p. 16). These categories were sprayers and dusters, farm elevators, and blowers, farm dairy machines and equipment, barn equipment, barnyard equipment, and farm poultry equipment. The percentages of total US inputs going into them were: chromium, 85; nickel, 57; aluminum, 6; zinc, 36; copper, 42; lead, 27; and tin, 40. 197/

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S-E-C-R-E-TB. Manpower.*

The total number of Soviet workers engaged in the production of agricultural machinery has been roughly estimated at about 120,000 in 1951 and about 100,000 in 1954. These estimates are based on an annual output per Soviet worker of approximately 11 tons per year in 1951 and approximately 12 tons per year in 1954, or about 50-percent and 55 percent, respectively, of US productivity per worker.** Estimating about a 5-percent increase in productivity per worker between 1954 and 1955 (certain plants hope to achieve up to 8 percent 200/), the 1955 labor force would only have to be about 105,000 to meet estimated production goals. In 1952 there were 91,000 US workers in the agricultural machinery industry. 201/ It was not possible to break down the total figures for the Soviet labor force into estimates of those within the agricultural machinery industry and those outside the industry engaged in production of agricultural machinery. Certainly the greater part of the labor force would be in the agricultural machinery industry.

In general, the production of agricultural machinery does not require a highly skilled labor force. A small nucleus of skilled workers is necessary in each plant for foundry and machine tool operations, but the bulk of the workers are semiskilled or unskilled and are engaged in materials handling, simple punching and pressing operations, finished assembly, painting, and other operations. Judging from Soviet comment

* A thorough examination of individual plant information contained in the CIA Industrial Register indicated that it would not be possible to estimate total employment in agricultural machinery building in the USSR from this source. Indeed, it was not possible to estimate even the total employment of the industry, not to mention the number of workers engaged in agricultural machinery production, as distinguished from those engaged in the production of secondary products, such as munitions and consumer goods. The figures in this section, therefore, are intended to reflect the number of workers engaged in agricultural machinery production (excluding spare parts) throughout the USSR, without regard to the plants in which the production took place.

** Before World War II, Soviet agricultural machinery building was rated about 60 percent as productive as in the US. 198/ For reasons indicated in the section on technology, it is estimated that the USSR has only now reattained the prewar position which it held with respect to the US. For purposes of the calculations on output of the Soviet worker, an estimated output per US worker of about 22 tons per year was used. 199/

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on the improper use of plant equipment in the major plants of the agricultural machinery industry, 202/ it appears that there may be a shortage of skilled workers. This may be partly due to the increase in new equipment which the industry has received in recent years, 203/ for which suitable operators have not yet been trained.

Until early 1950, there appear to have been a large proportion of female workers in agricultural machinery plants, up to 50 or 60 percent of the labor force in certain plants. 204/ The female workers were for the most part engaged in physical labor such as carrying materials and parts from one shop to another. The effect which such a large percentage of female labor might have had on agricultural machinery production is almost immeasurable; for there is no information available to indicate the percentage of the female labor force which worked on agricultural machinery, and the percentage which worked on munitions and consumer goods. For the latter reason, it would be impossible to estimate the percentage of female workers contained in the labor force estimates for 1951, 1954, and 1955.

VII. Intentions and Vulnerabilities.A. Intentions.

The close relationship between the agricultural machinery industry and agriculture makes any development in one an indication of Soviet intentions toward the other. Taken together, developments in these two fields reflect Soviet intentions toward the development of the economy as a whole, that is, whether the economy is to be directed toward peace or toward war.

Judging from Soviet expenditures of time and effort, both past and planned, for strengthening the agricultural base of the country (expanding agricultural machinery production facilities, introducing new types of machinery for agricultural mechanization, increasing crop yields through the increased use of fertilizers, expanding acreages, reorganizing the MTS, training farm operators and agricultural machinery operators, and increasing repair facilities for agricultural machinery), the Soviet economy is not being mobilized for war. Conversely, a sudden reduction in production of agricultural machinery, or the abandonment of the program as a whole, would serve as an indication that the USSR might be preparing for war. The measures which have been introduced, however, are of such a magnitude that every

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facility necessary for their realization will have to be utilized to the fullest extent possible. The agricultural expansion program in its present form can be carried out only under peacetime conditions.

Although the study of munitions production in the agricultural machinery industry is beyond the scope of this report, the very fact that such production does take place puts the industry in the position of a possible indicator of Soviet intentions. Thus, under the threat of war in the late 1930's, agricultural machinery plants were among the first to convert to war production. During the war in Korea, production of munitions in agricultural machinery plants increased, but after the war such production decreased. 205/

Any sudden increase of such production may well portend the outbreak of hostilities.

B. Vulnerabilities.

For all practical purposes, the agricultural machinery industry of the USSR cannot be considered vulnerable. The weaknesses of the industry, such as poor quality of products, improper utilization of plant equipment, poor organization of production, improper employee attitudes toward production, are not easily exploited on an industry-wide basis, even assuming the opportunity for exploitation were present.

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APPENDIX A

PLANT STUDIES

The 36 plants described in this appendix are those which the Russians have indicated are the most important plants in the agricultural machinery industry. The comment in the Soviet press on these 36 plants comprises as much as 75 to 80 percent of total comment on agricultural machinery plants. It is estimated that these account for about 80 percent of total production of agricultural machinery in the USSR. The remaining 20 percent is produced (a) by 85 to 90 small plants which are considered part of the agricultural machinery industry but are under the control of the various Ministries of Local Industries of the Republics, the Ministry of Agriculture, and the Ministry of State Farms, and (b) by the hundreds of plants outside the industry which produce agricultural machinery as a secondary product, on a regular or special order basis. It was not practicable to list each of these plants individually.

The name of each plant listed in Table 18* is the title normally given to the plant in the Soviet press.**

The shifts in production which have taken place since September and October 1953 in the major agricultural machinery plants, with consequent increases in output of some products and decreases in others, have made estimates at the plant level subject to wide margins of error. The general range of error of the estimates given below is 30 percent, except for those indicated as plan figures.

* Table 18 follows on p. 72.

** See the map following p. 82 which shows the location of the 36 plants described in Appendix A.

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Table 18

Agricultural Machinery Plants in the USSR

Location	Plant Name	Major Products	Production	Year	Labor	Remarks
Region IIB Belorussia						
Gomel' <u>206/</u>	Gomel'mash Agricultural Machine Building Plant imeni L.M. Kaganovich	Threshing Machines Tractor-Mounted Sweep Rakes Tractor-Mounted Hay Stackers Grain Dryers Straw Cutters Fanning Mills	5,000	1953	4,000 to 5,000	One of nine plants having primary responsibility for production of machines for animal husbandry and potato and vegetable growing. Plant delayed production of hay stackers by failing to install proper equipment. Plant is criticized for high reject rate of finished products, caused by sporadic manner of working.
Region III Ukraine						
Dnepetrovsk <u>207/</u>	Dnepetrovsk Agricultural Machine Building Plant imeni K.Ye.Voroshilov	Beet Harvesting Combines Cultivators Agricultural Machines (16 Other Types)	1,600 2,400 N.A.	1953 1954	3,000 to 4,000	This is the principal beet harvesting combine plant in the USSR. It was stated in official Soviet sources that the plant must radically improve its work methods to increase production and to improve quality.
Kharkov <u>208/</u>	Serp i Molot Agricultural Machine Building Plant	Threshing Machines Pickup Hay Rickers (new production in 1953) Check-row Planters Combine Motors Tea Harvesting Machines (experimental) Cultivators Mobile Grain Cleaners Self-Propelled Mowers	15,000	1953	8,000 to 10,000	This is the largest producer of threshing machines in the USSR. It has been designated as 1 of 9 plants primarily responsible for production of machines for animal husbandry and potato and vegetable growing. It is one of the larger agricultural machinery plants in the USSR.

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Table 18
Agricultural Machinery Plants in the USSR
(Continued)

Location	Plant Name	Major Products	Production	Year	Labor	Remarks
Region III Ukraine (Continued)						
Kirovograd <u>209/</u>	Krasnaya Zvezda Agricultural Machine Building Plant	Tractor-Drawn and Mounted Seed Drills Horse-Drawn Seed Drills	40,000	1953	7,000 to 8,000	This is the basic Soviet plant for the production of horse-drawn and tractor-drawn and mounted seed drills. It is 1 of 9 plants primarily responsible for production of machines for animal husbandry and potato and vegetable growing. The plant is scheduled for expansion valued at 2 million rubles. It was behind schedule in producing spare parts in 1953.
L'vov <u>210/</u>	L'vovsel'mash Agricultural Machine Building Plant	Fodder Steamers Tractor-Drawn Sprayers and Dusters Root Crop and Potato Washers (new product)	20,000 3,000	1953 1954 Plan	2,000 to 3,000	This is the basic Soviet plant for the production of fodder steamers.
Odessa <u>211/</u>	Odessa Agricultural Machine Building Plant imeni Oktyabr'skoy Revolyutsii	Tractor-Drawn and Tractor-Mounted Moldboard Plows Tractor-Drawn Disc Plows Tractor-Drawn Bog and Marsh Plows (new type) Plowshares	30,000 N.A. N.A. N.A.	1953	3,000 to 4,000	This is one of the basic plow plants in the USSR. The plant does not fulfill the plan for producing plowshares.
Pervomaysk <u>212/</u>	Pervomaysk Agricultural Machine Building Plant	Tractor Hay Rakes Tractor Hay Stackers Mowing Machines Rake Teeth	N.A. 1,000 N.A. N.A.	1953	1,000 to 2,000	This is 1 of 9 plants primarily responsible for production of machines for animal husbandry and potato and vegetable growing. Before World War II, it was 1 of 7 plants which produced 75 to 80 percent of all Soviet agricultural machinery.

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Table 18
Agricultural Machinery Plants in the USSR
(Continued)

Location	Plant Name	Major Products	Production	Year	Labor	Remarks
Region III Ukraine (Continued)						
Stalino <u>213/</u>	Stalino Agricultural Machine Building Plant imeni Oktyabr'skoy Revolyutsii	Tractor-Drawn Marsh Tillers Tractor-Drawn Moldboard Plows, Plantation Plows Tractor-Drawn Land Scrapers Tractor-Drawn Sprayers Beet Diggers Cultivators	c. 1,000 25,000 N.A. N.A. c. 1,500 N.A.	1953 1953 1953	1,000 to 2,000	This is one of the basic plow plants in the USSR. The plant has been criticized for defective products and sporadic production.
Zaporozh'ye <u>214/</u>	Kommunar Agricultural Machine Building Plant	Tractor-Drawn Grain Combines Cotton Seed Dryers Corn Harvesting Combines (experimental)	7,000 to 8,000 N.A. N.A.	1953 1952	3,000 to 4,000	This is 1 of the 3 plants producing tractor-drawn grain combines in the USSR.
Region IV Lower Don - North Caucasus						
Rostov-on-Don <u>215/</u>	Rostsel'mash Agricultural Machine Building Plant imeni Stalin	Tractor-Drawn Grain Combines Self-Propelled Mowing Machines Tractor-Drawn Moldboard Plows Corn Harvesting Combines (new product) Rice Harvesters Sunflower Harvesters	10,000 2,500 15,000 to 20,000 50 N.A. N.A.	1953 1953 1953 1953	15,000 to 20,000	This is the largest agricultural machinery plant in the USSR, and 1 of 3 plants producing tractor-drawn grain combines. It is 1 of 9 plants primarily responsible for the production of machines for animal husbandry and potato and vegetable growing. It was reported in November 1953 that radical improvements in work methods must be made at the plant. The reject rate in 1953 increased over 1952. The plant is behind in production of spare parts.

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Table 18
Agricultural Machinery Plants in the USSR
(Continued)

Location	Plant Name	Major Products	Production	Year	Labor	Remarks
Region IV Lower Don - North Caucasus (Continued)						
Rostov-on-Don <u>216/</u>	Krasnyy Aksay Agricultural Machine Building Plant	Tractor-Drawn and Tractor-Mounted Cultivators Seed Drills and Planters Cultivator-Fertilizers Tree-Planting Machines	50,000 N.A. 300 N.A.	1953 1953	6,000 to 7,000	This is one of the largest and oldest agricultural machine building plants in the USSR. It is 1 of 9 plants primarily responsible for producing machines for animal husbandry and potato and vegetable growing. It is reported to have suffered considerable losses due to rejects in 1952 and is behind in production of spare parts. The plant is undergoing an expansion valued at 1 million rubles.
Taganrog <u>217/</u>	Taganrog Self-Propelled Combine Plant imeni Stalin	Self-Propelled Grain Combines Cotton Pickers (for un-irrigated cotton)	8,000 Small Series	1953 1952	8,000 to 9,000	This is the largest producer of self-propelled grain combines in the USSR. It was reported in November 1953 that self-propelled combine production would be concentrated at this plant and at Krasnoyarsk. Reportedly the plant must radically improve its work methods. Considerable losses were suffered in 1952 from rejects. The plant is far behind in production of spare parts.
Region VI Volga						
Kazan' <u>218/</u>	Kazan' Self-Propelled Combine Plant	Self-Propelled Grain Combines	1,000	1953	1,000 to 2,000	This is the smallest producer of self-propelled grain combines in the USSR. Other products of the plant are not known. The plant may cease production of combines with the concentration of such production at Taganrog and Krasnoyarsk.

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Table 18
Agricultural Machinery Plants in the USSR
(Continued)

Location	Plant Name	Major Products	Production	Year	Labor	Remarks
Region VI Volga (Continued)						
Saratov <u>219/</u>	Kombayn Agricultural Machine Building Plant	Tractor-Drawn Grain Com- bines	1,000 to 2,000	1953	3,000 to 4,000	This is 1 of 3 Soviet plants which produce tractor-drawn grain combines. Other agricultural machinery products of the plant is unknown.
Syzran' <u>220/</u>	Syzran' Self-Propelled Combine Plant	Self-Propelled Grain Combines Overhead Conveyors Forage Harvesting Ma- chines	1,500 N.A. 2,000	1953 1954 Plan	2,000 to 3,000	This is 1 of the 6 plants producing self-propelled grain combines in 1953. The plant may cease production of combines with the concentration of such production in Taganrog and Krasnoyarsk. The entire planned production of forage harvesting machines is concentrated in this plant.

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Table 18
Agricultural Machinery Plants in the USSR
(Continued)

Location	Plant Name	Major Products	Production	Year	Labor	Remarks
Region VII Central European USSR						
Belinskiy <u>221/</u>	Belinsksel'mash Agricultural Machine Building Plant	Tractor-Drawn Potato Planters Tractor-Drawn Seed Drills	1,500 10,000 N.A.	1953 1954	1,000 to 2,000	This plant is 1 of 9 plants primarily responsible for the production of machines for animal husbandry and potato and vegetable growing. It is to be the main plant for production of potato planters. It is operating very badly, having achieved only 15 percent fulfillment of planned production of potato planters in the first 10 months of 1953. It is poorly supplied with parts from other plants. The plant is undergoing expansion valued at 1 million rubles to improve production facilities.
Bezhetak <u>222/</u>	Bezhetksel'mash Agricultural Machine Building Plant	Flax Scutching Machines Winnowing-Sorting Machines (began July 1952) Flax Threshing Machines Hemp Threshing Machines (simple and complex)	c. 1,000 N.A. N.A. N.A.	1953	1,000	This is the basic Soviet plant for the production of flax and hemp machinery. Information is too fragmentary for any reliable estimates of production. The plant was reported to be far behind in production of spare parts in 1953.
Lyubertsy <u>223/</u>	Lyubertsy Agricultural Machine Building Plant imeni Ukhomskiy	Flax Harvesting Combines Self-Propelled Mowing Machines Tractor-Drawn and Tractor-Mounted Mowing Machines Hay Stackers	1,000 N.A. 20,000 N.A.	1953 1953	7,000 to 8,000	This is one of the basic mowing machine plants in the USSR. It has been designated as 1 of 9 plants primarily responsible for producing machines for animal husbandry and potato and vegetable growing. It is reported that drastic measures are needed to increase production of spare parts.

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Table 18
Agricultural Machinery Plants in the USSR
(Continued)

Location	Plant Name	Major Products	Production	Year	Labor	Remarks
Region VII Central European USSR (Continued)						
Ryazan' <u>224/</u>	Ryazsel'mash Agricultural Machine Building Plant	Potato Harvesting Combines	500 4,000 4,000	1953 1954 Plan 1955 Plan	2,000 to 3,000	This is one of the basic Soviet plants for the production of machines for potato growing. It is 1 of 9 plants primarily responsible for animal husbandry and potato and vegetable growing machinery. Only 50 percent of 1953 plan for potato harvesting combines was met. Plant suffers from insufficient deliveries by cooperating plants. To improve conditions, reconstruction valued at 1.5 million rubles is scheduled.
		Potato Planters	2,000	1953		
		Potato Cultivators (experimental in 1953)	N.A.			
		Potato Diggers	10,000	1953		
		Potato Graders	N.A.			
Tula <u>225/</u>	Tula Self-Propelled Combine Plant	Self-Propelled Grain Combines	6,000	1953	4,000 to 5,000	Until the end of 1953, this was the second largest producer of self-propelled grain combines in the USSR. The plant has been switched completely to potato harvesting combines. It was planned that 55 of the latter be made by 31 Dec 1953, but this plan was not met. Plant did not actually begin regular production until mid-Feb 1954, producing 205 in the remainder of the month. Presumably the plant will reach capacity some time in 1956. With cessation of self-propelled grain combine production at this plant, production is to be concentrated at Krasnoyarsk and Taganrog.
		Potato Harvesting Combines (new product)	c. 10 205	1953 Feb 1954		
			6,000	1954 Plan		
			12,000	1955 Plan		
			15,000	Capacity		
		Machines for making Peat Humus Pots	N.A.			
Voronezh <u>226/</u>	Voronezhsel'mash Agricultural Machine Building Plant	Grain-Cleaning Machines Seed-Cleaning Machines Sprayers	6,000	1953	2,000 to 3,000	This is the basic Soviet plant for the production of grain and seed-cleaning machinery. It has been awarded prizes for its good production record.
Region VIII Urals						
Chelyabinsk <u>227/</u>	Chelyabinsk Agricultural Machine Building Plant imeni Ordzhonikidze	Tractor-Drawn Moldboard Plows Cultivators Grain Cleaners	N.A. N.A. N.A.		3,000 to 4,000	This plant has had trouble because of delays by suppliers of parts. Information on production levels is extremely fragmentary.

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Table 18
Agricultural Machinery Plants in the USSR
(Continued)

Location	Plant Name	Major Products	Production	Year	Labor	Remarks
Region VIII Urals (Continued)						
Molotov 228/	Molotov Machine Building Plant imeni Dzerzhinskij	Cream Separators Small Engines	150,000 N.A.	1953	c. 1,000	This is the basic plant in the USSR for the production of cream separators. Most of the engines produced by the plant are of the ZID-3 type for use with small garden tractors.
Zlatoust 229/	Zlatoust Self-Propelled Combine Plant imeni Lenin	Self-Propelled Grain Combines	1,500	1953	3,000 to 4,000	This is 1 of 6 Soviet plants producing self-propelled grain combines. This plant may cease production of these combines with the concentration of such production in the Taganrog and Krasnoyarsk plants.
Region IX West Siberia						
Kurgan 230/	Uralsel'mash Agricultural Machine Building Plant	Hay Balers Grain-Sorting Machines Tree-Planting Machines Threshing Machines, Horse-Drawn	N.A. N.A. N.A. 15,000	1953		This plant was operating poorly at the end of 1953. Production was considerably under plan, both for hay balers and for spare parts. Plant was extremely slow in preparing for 1954 production tasks.

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Table 18
Agricultural Machinery Plants in the USSR
(Continued)

Location	Plant Name	Major Products	Production	Year	Labor	Remarks
Region IX West Siberia (Continued)						
Kurgan <u>231/</u>	Kurgansel'mash Agri-cultural Building Plant	Straw Cutting Machines Hay Balers Electric Water Pumps	N.A. N.A. N.A.		c. 1,000	This plant is reportedly operating well, producing over-plan products. It is supposed to save 100 tons of metal products during 1954. A substantial increase in production of water pumps is planned for 1954.
Novosibirsk <u>232/</u>	Sibsel'mash Agricultural Machine Building Plant	Tractor Seed Drills Tractor Surface Plows Tractor Disc-Harrows Cultivators, Horse-drawn	N.A. N.A. N.A. N.A.		1,000 to 2,000	This plant appears to have decreased in importance in recent years. Information on production is extremely fragmentary.
Omsk <u>233/</u>	Sibsel'mash Agricultural Machine Building Plant	Grain Separators Plows Automatic Pumps and Presses	N.A. N.A. N.A.		3,000 to 4,000	This plant appears to have decreased in importance in recent years. Information on production is extremely fragmentary.
Rubtsovsk <u>234/</u>	Altaysel'mash Agri-cultural Machine Building Plant	Tractor-Drawn Moldboard Plows Tractor-Drawn Drainage Plow (experimental) Tractor-Drawn Ridgers Vegetable Planters Flowshares	30,000 N.A. N.A. N.A. N.A.	1953	2,000 to 3,000	This is one of the basic plants producing tractor-drawn plows in the USSR. Production of special types of plows began in 1954, past production having been of the 5-bottom moldboard type. Production of vegetable planters began in early 1953. Through the installation of an automatic production line, the plant is to increase production of tractor plowshares considerably.
Region Xa Kazakh SSR						
Almolinsk <u>235/</u>	Kazakhsel'mash Agricultural Machine Building Plant	Tractor Rakes Tractor-Drawn Hay Stackers	N.A. N.A.		1,000 to 2,000	This is the only large agricultural machinery plant in the Kazakh SSR. Reportedly this plant from the time it was built (about 1945-46) up to 1952, had never fulfilled its program by

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Table 18
Agricultural Machinery Plants in the USSR
(Continued)

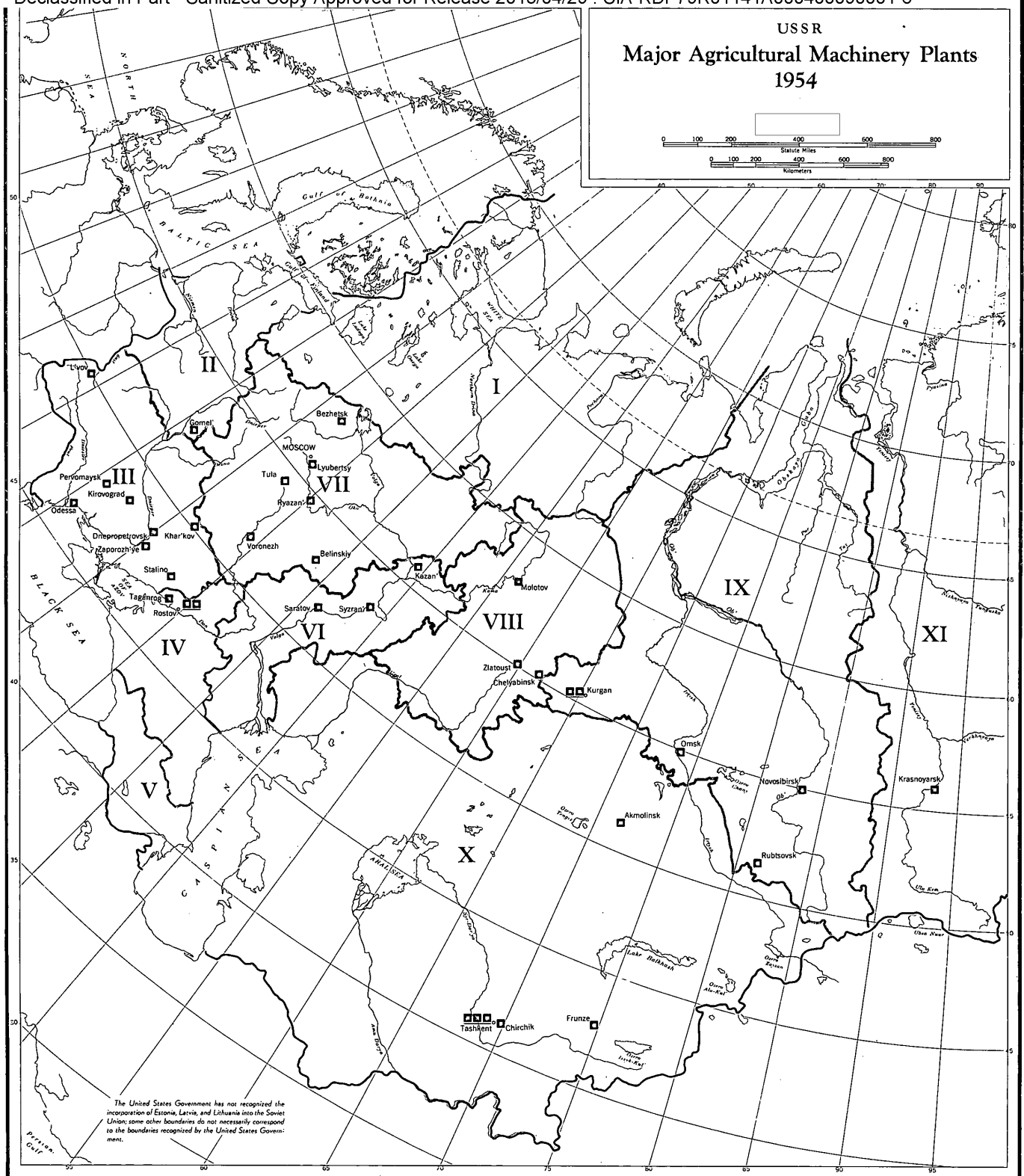
Location	Plant Name	Major Products	Production	Year	Labor	Remarks
Region Xa Kazakh SSR (Continued)		Overhead Conveyors	N.A.			more than 50 percent. The plant was already 500 tractor rakes behind in the first 9 months of 1953.
		Tractor-Drawn Land Scrapers	N.A.			
		Well Diggers	N.A.			
		Machines for making Peat	N.A.			
		Humus Pots	N.A.			
Region Xb Central Asia						
	Chirchik <u>236/</u>	Chirchiksel'mash Agricultural Machine Building Plant	Cultivator-Fertilizers Swivel Plows Trench Diggers Universal Couplers Cotton Planters Cotton Dryers Land Scrapers	N.A. N.A. 4,000 N.A. N.A. N.A. N.A.	1953 Plan	2,000 to 3,000
Frunze <u>237/</u>	Frunze Agricultural Machine Building Plant imeni Frunze	Tractor-Drawn Rakes Tractor-Drawn and Mounted Mowing Machines Tractor-Drawn Hay Stackers Tractor-Drawn Dusters	N.A. N.A. N.A. N.A.		c. 2,000	This plant is intended to be an important producer of machinery for animal husbandry, but it has a record for not fulfilling the plan. Only 50 percent of the plan for tractor-drawn hay stackers was met in 1953. Production of spare parts is also behind schedule. It is reported that radical improvements must be made in the plant's work methods.
Tashkent <u>238/</u>	Tashsel'mash Agricultural Machine Building Plant imeni K.Ye. Voroshilov	Cotton Pickers Cotton Cleaners Tractor-Drawn Cotton Planters	6,000 N.A. N.A.	1953	3,000 to 4,000	This is the basic plant in the USSR for the production of cotton pickers and cotton cleaners. The plant threatened the cotton mechanization program by fulfilling only 66 percent of its production plan for cotton pickers in the first half of 1953. It is also behind schedule in production of spare parts. Production equipment is reportedly operating at only 75 percent of capacity. It is reported that the plant must make radical improvements in its work methods.

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Table 18
Agricultural Machinery Plants in the USSR
(Continued)

Location	Plant Name	Major Products	Production	Year	Labor	Remarks
Region Xb Central Asia (Continued)						
Tashkent <u>239/</u>	Uzbeksel'mash Agricultural Machine Building Plant	Tractor-Drawn Dusters and Sprayers Horse-Drawn Dusters and Sprayers Tractor-Drawn Nest Cotton Planters Tractor Cultivators Tractor Couplings Rotary Hoes	500 N.A. 10 N.A. N.A. N.A.	1953 1953	2,000 to 3,000	This is one of the basic plants in the USSR for producing machinery for cotton growing. It is reportedly the largest agricultural machinery plant in the Uzbek SSR. Reject rate on completed machines was 7 percent to 8 percent higher in 1953 than in 1952. Plant is able to operate production equipment at only about 75 percent of capacity.
Tashkent <u>240/</u> (Ordzhonikidze Rayon)	Tashkhlopkomash Cotton Machine Building Plant	Cotton Machinery Cotton Cleaners	N.A. N.A.		N.A.	This plant has been producing cotton growing machinery for about 3 years. There is very little information available with respect to the specific products produced. The plant did not fulfill the plan for 1952.
Region XI East Siberia						
Krasnoyarsk <u>241/</u>	Krasnoyarsk Self-Propelled Combine Plant	Self-Propelled Grain Combines	4,000	1953	2,000 to 3,000	This is one of the basic plants in the USSR for the production of self-propelled grain combines. The plant has failed to fulfill the plan in the past because of sporadic production: 57 percent of all output is in the last 10 days of the month. It is reported that production of self-propelled combines is now to be concentrated in this plant and the Taganrog Combine Plant.

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APPENDIX B

METHODOLOGY

The methodology employed in this report is usually explained at the point of use. Particularly heavy reliance was placed upon official Soviet reporting on production of agricultural machinery, reporting which is believed to be of generally good quality.

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Two major points of methodology only suggested in the body of the report are explained below.

1. Production.

The estimates of production by physical units contained in Table 3* represent a combination of estimates made from plant studies and from industry-wide reporting on planned production, actual production, and reported increases in production in one year or period of years over another. The remaining gaps were filled either by interpolation or by extrapolation, on the assumption that planned production represented actual production if the two were approximately the same in other years, and on the estimate that for certain types of machines there is a relationship which causes the production of one to affect the production of the other. Production of threshing machines, for example, was estimated to have decreased as the production and park of grain combines increased. Likewise, the production of horse-drawn machines was estimated to have decreased as the production of tractor-drawn machines increased. For 1954 and 1955 heavy reliance was placed not only upon the reported plan figures but upon the reported record of fulfillment in the first six months after the issuance of the plan figures. In general, it was estimated that, as the production of non-grain growing machinery increased, the production of grain-growing machinery decreased. In attempting to estimate the value of Soviet production by major categories of machinery, it was necessary to draw upon a general estimate of the situation gathered from many months of reading comment on the sub-

* P. 19, above.

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ject, and the generally reported degrees of mechanization of the farm operations in which the various types of machinery are used.

2. Inputs.

The following method was used to determine a total weight of output of agricultural machinery: the average or actual weight of each type of machine listed in Table 3 was obtained from [redacted] and multiplied by total unit production for each year. It was assumed that no machine changed drastically in weight during the period, an assumption which was borne out for most of the larger machines [redacted]

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[redacted] An average weight was obtained for the machines not accounted for in Table 3 by going through the same process again, but limiting the calculations only to the smaller machines, on the basis that most of the heavy harvesting machinery and other heavy types had been accounted for. The total weight of production in completed units was thus obtained.

From such calculations, estimates of raw materials and manpower were derived. As stated in the body of the report, 92 percent of each year's production was in metal products. On the basis of Soviet and US data, this figure may be broken down approximately as follows 242/: rolled steel, 68 percent; cast iron, 23 percent; and other metals, 1 percent.

To determine the manpower engaged in the production of agricultural machinery, calculations were carried further to include the 8 percent of production not covered by metal products. On the basis of examination of pictures of each machine,* it was estimated that roughly 6.5 percent of the weight of the average machine was in wood. The remaining 1.5 percent of the weight was made up of such components as canvas, paint, and rubber tires.

In order to allow for waste, the figure for metals was increased by 20 percent, 243/ and the figure for wood by 5 percent. 244/ No allowance was made for waste of the remaining items.

By adding the 3 figures together -- total metal products consumed, total wood consumed, and total residual items consumed (unadjusted) --

* No input information on wood for US agricultural machinery was available.

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an estimate of the total weight of products necessary to produce the total weight of finished products was obtained.

The estimated annual rate of output per worker in the USSR was divided into total inputs to determine the total manpower for each year.

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