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RECENT DEVELOPMENTS IN THE TRACTOR INDUSTRY OF THE USSR

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S-E-C-R-E-T

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(ORR Project 32.1886)

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FOREWORD

This report describes the level and the direction of the development of the tractor industry of the USSR since 1950. It delineates the new economic requirements for tractors which have influenced the development of products and the rate of production in recent years. The Soviet requirement for cultivating fodder crops and for reducing fuel costs by changing from kerosine engines to diesel engines in tractors is given careful treatment. Finally, the report presents valuable statistical information based on the analysis of official data [redacted] This information includes the composition of the agricultural tractor park and a time series for production of tractors, by geographic area, by plant, and by model. 50X1

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RECENT DEVELOPMENTS IN THE TRACTOR INDUSTRY OF THE USSR*

Summary

The Soviet tractor industry, in spite of rapid advances in production, is not meeting agricultural requirements for tractors. A shortage of cultivator row-crop tractors persists, but present policies for shifting production are expected to result in a better balanced composition of the Soviet tractor park in a few years. The tractor park has been modernized considerably and will be improved further during 1956-60, according to the original Sixth Five Year Plan (1956-60). The present small volume of exports of tractors is not expected to be enlarged substantially in the near future.

Annual production of tractors in the USSR increased from 108,800 in 1950 to 183,500 in 1956. Because production lagged during the Korean War, however, aggregate production was less than 900,000 tractors during 1950-56. Annual production of tractors rose 65 percent during 1953-56. The shift to row-crop tractors was greatly accelerated after 1953, with production of row-crop tractors as a percentage of total production increasing from 24 percent in 1953 to more than 50 percent by mid-1957. All new tractors were equipped with diesel engines by the end of 1956. All tractors produced in the USSR in 1957 were dieselized, whereas in 1950 only 62 percent of the total annual Soviet production had been dieselized.

Production of tractors was expected to increase only 11 percent in 1957, from 183,500 tractors in 1956 to approximately 203,000 units in 1957. The increase of production in 1957, like that of 1956, would fall short of the average annual increase of about 16 percent for 1958-60, which is necessary in order to achieve the planned 1960 goal of 322,000 tractors annually. This lag in the increase in production of tractors is likely to continue until at least mid-1958, when several efficiency factors will combine to raise the rate of increase. Nevertheless, because no major additions of new plant capacity are planned for 1958-60, attainment of the planned 1960 goal will be very difficult.

* The estimates and conclusions contained in this report represent the best judgment of ORR as of 1 December 1957.

It is estimated that if targets for production in 1960 are reached and allocations of tractors to agriculture are carried out as planned, the USSR will have a tractor park of about 2-1/2 million 15-horsepower (hp)* units by the end of 1960. Row-crop tractors, on which largely depends the success of Khrushchev's ambitious program to boost production of corn and other fodder crops for livestock, will constitute about 55 percent of all the tractors in the agricultural tractor park in 1960. Compared with 1955, the percentage of row-crop tractors in 15-hp units in the agricultural tractor park in 1960 will have been doubled. Although attainment of this goal would be an impressive achievement, it would provide a less desirable composition than that which prevails in the US and Canada today and which is desired by Khrushchev -- 90 percent row-crop types and 10 percent general-purpose types. It is estimated that by 1960 more than 90 percent of the tractor park will be dieselized.

The present agricultural tractor park is insufficient to meet current goals for increasing yields per hectare, for raising the productivity of agricultural labor, and for efficiently exploiting the greatly expanded small grain and corn acreages. By 1960 the park is expected to be adequate in terms of the physical ability to perform mechanized operations for the expanded crop area but not adequate in terms of performing these tasks in so timely a manner as to maximize yields. Nevertheless, the intended increase in the agricultural tractor park by 1960 will have reduced the cultivated land per tractor in the USSR from 4 times that of the US, as in 1956, to about 2.5 times.

Some diversion to military use of capacity for production of tractors may have occurred during 1951-53. The number of tractors produced in

* The 15-hp unit is a statistical measure used in the USSR to convert tractors of various types and horsepower into comparable units for purposes of planning and accounting. It is calculated by dividing the "rated" drawbar horsepower of the tractor by 15. Thus the DT-54 tractor with a drawbar horsepower of 36 equals two and two-fifths 15-hp units and the Universal-1 with a drawbar horsepower of 10 equals two-thirds of a 15-hp unit. Drawbar horsepower may be defined as the horsepower equivalent of the pull exerted upon the drawbar which is affixed to the rear of the tractor. This rating differs from ratings in terms of engine horsepower (more specifically brake horsepower) which measure the power delivered by the engine -- generally, the more powerful the engine, the greater the drawbar pull, regardless of the type of tractor. However, two engines of the same brake horsepower, one installed in a wheeled tractor and the other in a crawler type, would usually exert different drawbar pulls because of the different efficiencies of the two modes of traction. The wheeled tractor makes less efficient use of the engine's power but is indispensable in cultivating row crops. Thus the ability of diverse types of tractors to pull drawn implements may be most significantly compared by means of ratings in drawbar horsepower. The term horsepower as used in this report refers to drawbar horsepower unless otherwise indicated.

1951 was about 85 percent of that in 1950, and allocations of tractors, in terms of 15-hp units, to agriculture dropped about 28 percent during the Korean War. The more severe cutback in production of tracklaying tractors compared with that in production of wheel types indicates a further possibility of diversion to production for military use. The Stalingrad and Chelyabinsk Tractor Plants were most likely to have been diverted partly to production for military use.

Nonagricultural uses of tractors (including exports) absorbed almost 20 percent of the total production of row-crop tractors during 1950-55 and more than 5 percent in 1956. Almost 5,400 tractors were exported by the USSR in 1956. Of this total, 45 percent were estimated to be row-crop types. It is estimated that exports constitute at least 50 percent, and probably more, of all nonagricultural uses of row-crop tractors. There are indications that Soviet exports of tractors in 1957 included a larger share of row-crop tractors than in 1956. In view of the critical need of domestic agriculture for tractors of this type, it is apparent that, at least up to 1956, the USSR made considerable sacrifices for the sake of trade with the Sino-Soviet Bloc and economic penetration of the Free World.

The value of Soviet production of tractors rose about 52 percent during 1950-55, increasing from the equivalent of 1955 US $480 million* in 1950 to $729 million in 1955. The $729 million represents slightly more than 0.2 percent of the estimated Soviet gross national product (GNP) for 1955.

I. Developments in Production Since 1950.

A. Effect of the Korean War.

The effect of the Korean War on Soviet production of tractors is evident from an analysis of the industry's achievements since 1950.** Vigorous recovery efforts during the Fourth Five Year Plan (1946-50) culminated in over-all production of 108,800 tractors in 1950, as shown in Table 10.*** This production nearly equaled the highest prewar level, 112,900 tractors in 1936. In terms of 15-hp units, however, the prewar peak of production was surpassed in 1949. Significantly, tractors were not again produced at the 1950 rate until the end of 1953, when hostilities had ceased. Because of this

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* Dollar values are given in 1955 US dollars, and ruble values are given in 1955 rubles throughout this report unless otherwise indicated. A ruble-dollar ratio of 4 to 1 was used for the tractor industry.

** For estimated Soviet production of tractors for selected years between 1925 and 1960, see the accompanying chart, Figure 1, following p. 4.

*** Appendix A, p. 28, below.

lag in production, aggregate production during 1950-56 was less than 900,000 tractors.

Production of tractors dropped sharply in 1951 to about 85 percent of the 1950 level. The main producers of tracklaying tractors -- the Khar'kov, Stalingrad, Chelyabinsk, and Altay Tractor Plants* -- were most affected by the cutback, whereas the producers of smaller wheeled tractors continued to operate at about the same level. In fact, the Khar'kov Tractor Assembly Plant and the Lipetsk Tractor Plant actually increased their production in 1951. A loss of about 3,500 tractors was incurred in shifting production of the special-purpose KT-12 timber-hauling tractor from Leningrad to the new Minsk Tractor Plant.** Nevertheless, the selective nature of the cutback in 1951 suggested diversion of some capacity to production for military use at one or more plants -- particularly the Stalingrad and Chelyabinsk plants -- producing tracklaying tractors.

Over-all production in 1952 increased to 98,700 tractors, a 7-percent increase compared with 1951 but only 91 percent of production in 1950. Production of tracklaying tractors rose above the 1950 level at the Khar'kov Tractor Plant but remained below that level at the Stalingrad and Chelyabinsk plants. Production at the Altay Tractor Plant was somewhat below that in 1951, but this decrease was caused by a changeover from the ASKhTZ-NATI kerosine tractor to the DT-54 diesel tractor. Production of KT-12 timber-hauling tractors at the Minsk Tractor Plant was approaching the level of 6,000 tractors formerly attained at Leningrad.

B. Recovery and Expansion, 1953-56.

The period following the Korean armistice witnessed a determined drive by the Soviet leadership to intensify the mechanization of agriculture as a first step toward increasing agricultural productivity. Because production of tractors had lagged during the Korean War, vigorous efforts had to be made to increase this production before mechanization of agriculture could be intensified. Consequently, in September 1953 the USSR embarked on a bold program to boost production of tractors.

The original goals of the Fifth Five Year Plan (1951-55), finally announced in August 1952 after a delay of 2 years, had envisioned only a modest increase in production of tractors. In 1955,

* For locations of tractor plants, see the accompanying map, Figure 2, following p. 4.

** For designations and characteristics of models of tractors, see Table 11, Appendix A, p. 31, below.

Figure 50X1

USSR

PRODUCTION OF TRACTORS, 1925-56, 1957 PLAN, AND 1960 PLAN

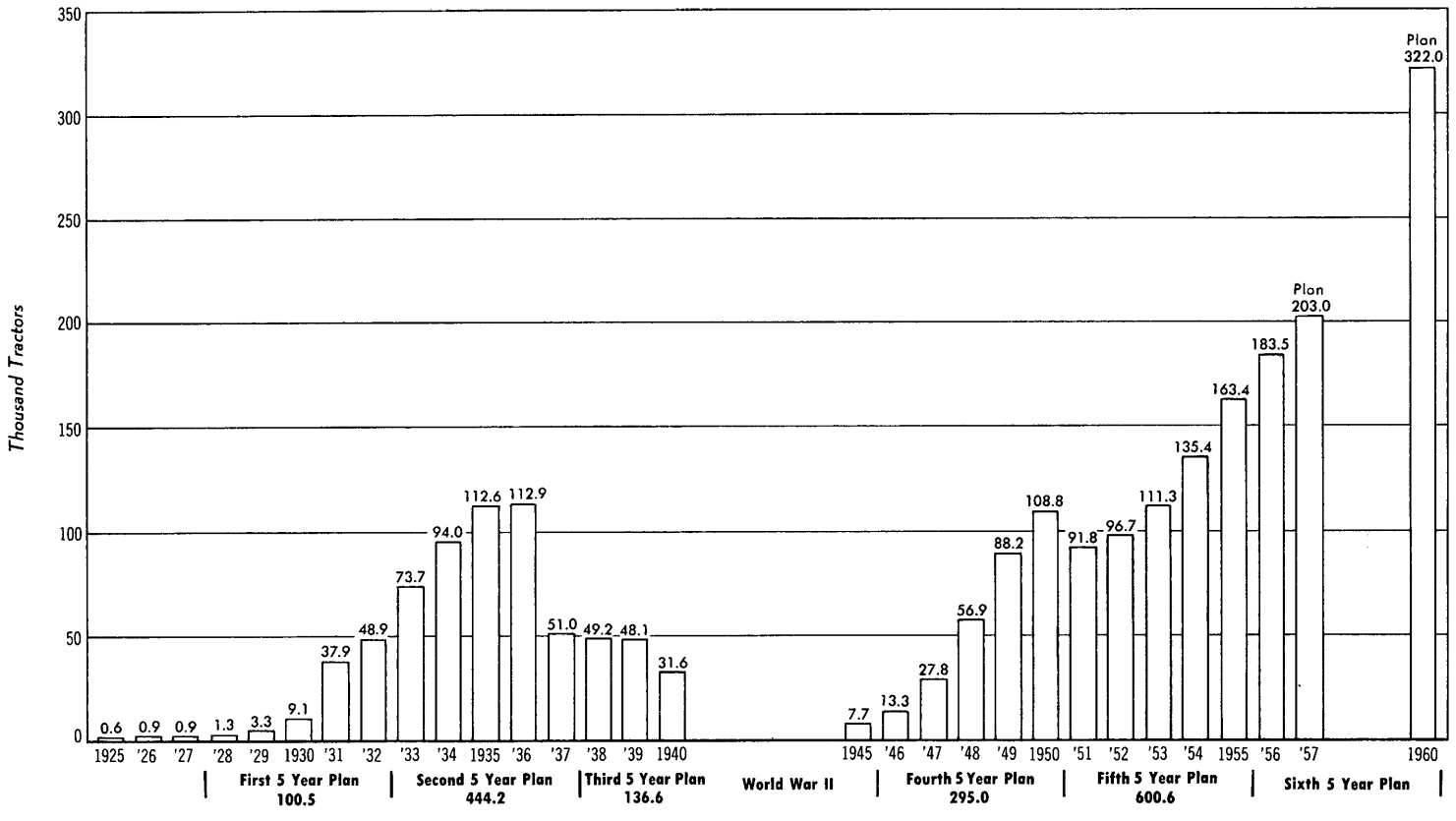

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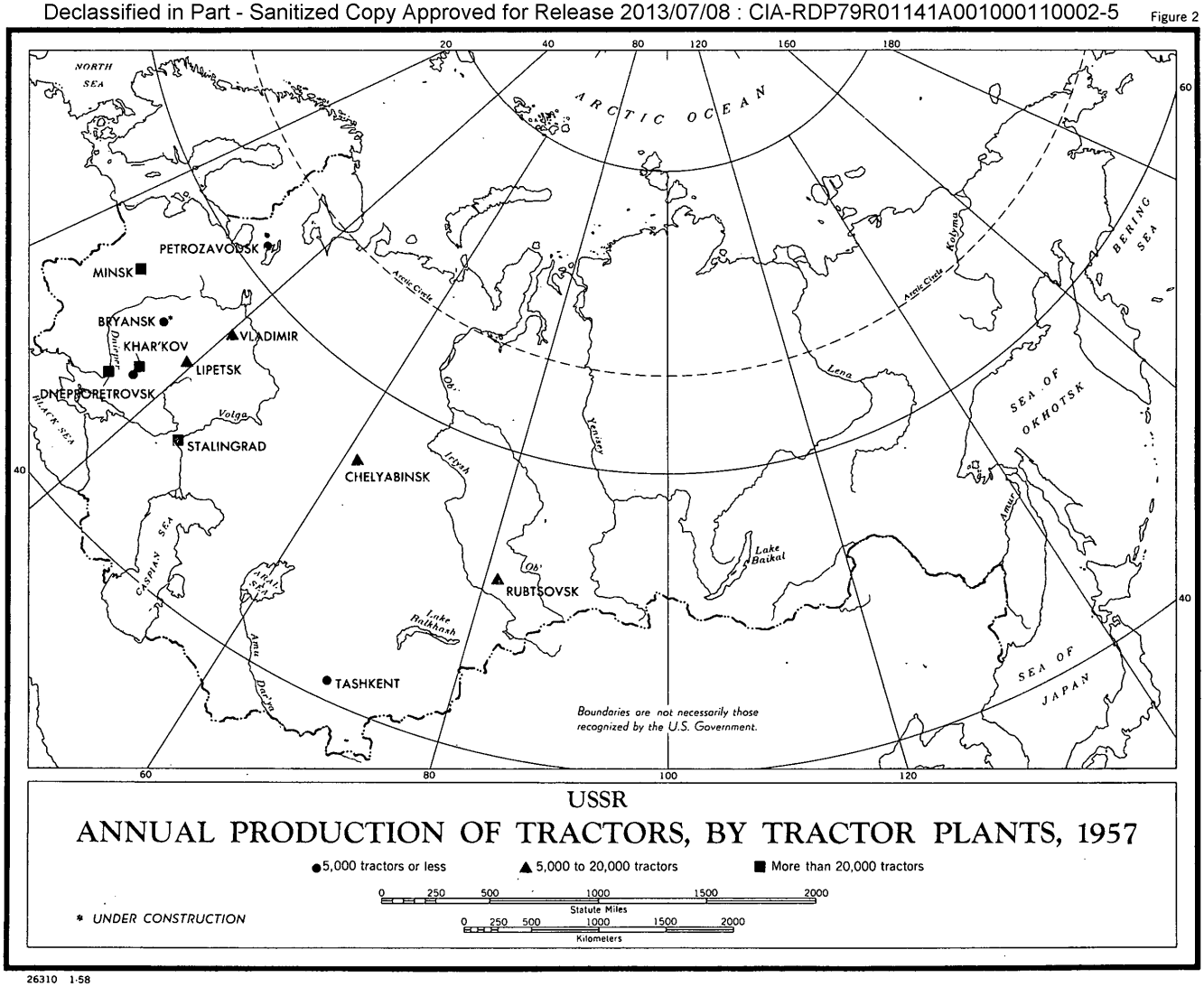
Figure 2



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planned production of tractors was to be 287,000 15-hp units, and row-crop tractors were to account for more than 90 percent of the increase. 1/*

The goals of the Fifth Five Year Plan were revised upward by decrees of September-October 1953. According to these decrees of the Communist Party and the Council of Ministers, allocations to agriculture in the USSR from 1954 to 1 May 1957 were to be "not less than 500,000 general-purpose (track-laying diesel) tractors expressed in 15-hp units, and 250,000 row-crop tractors expressed in physical units." 2/

For the tractor industry the new goals for production meant an increase compared with the original goals of the Fifth Five Year Plan for 1955 of about 46,000 15-hp units, and almost all of these units were to be row-crop tractors. 3/ "Belarus" and KDP-35 tractors were to be mass produced under the revised plan.**

The program for increased production under the Fifth Five Year Plan was to be accomplished without construction of additional tractor plants. Instead, funds were to be allocated to complete construction at existing plants and to increase capacity at several completed plants. In addition, the Ministry of the Defense Industry, according to a decree published on 20 September 1953, was obligated to produce at least 5,000 "Belarus" tractors in 1954 and 10,000 in 1955, using engines supplied by the tractor industry itself. 5/ The plant of the ministry is located at Dnepropetrovsk.

These developments had a stimulating effect on production of tractors, which rose from 111,300 tractors in 1953 to 183,500 tractors in 1956, an increase of 65 percent. By 1953 the 1950 level of production had been surpassed by all plants producing tracklaying tractors with the exception of the Stalingrad Tractor Plant, which lagged behind its 1950 peak until 1955.*** A comparison of production of tractors in the US and the USSR is shown in Table 1.**** In 1956 the USSR ranked second in world production of tractors.

C. Expansion of Production of Row-Crop Tractors.

From 1946 to 1953, Soviet production of row-crop tractors was considered a task of secondary importance for the tractor industry. Until 1950, production of row-crop tractors depended almost

[redacted] 50X1

** In the USSR, "mass production" of tractors is defined as production at a rate of at least 5,000 tractors per year. 4/

*** For details on achievements in production at individual plants, see Appendix B, p. 41, below.

**** Table 1 follows on p. 6.

Table 1

Production of Tractors in the US and in the USSR a/
1950-56

Year	US b/ (Thousand Tractors)	USSR (Thousand Tractors)
1950	542.4	108.8
1951	617.1	91.8
1952	467.3	98.7
1953	442.2	111.3
1954	288.7	135.4
1955	377.1 c/	163.4
1956	N.A.	183.5

a. 6/
b. Excluding garden tractors, for comparability with Soviet statistics.
c. Preliminary.

entirely on the Vladimir Tractor Plant, which produced the "Universal'" wheeled model. Beginning in 1950 the Lipetsk Tractor Plant produced the KDP-35, a tracklaying tractor with high ground-clearance and narrow treads for cultivating row crops. In addition, the Khar'kov Tractor Assembly Plant turned out a 7.5-hp gasoline wheeled tractor, the KhTZ-7. Production of row-crop tractors in 1950 was only 22 percent of over-all production of tractors, as shown in Table 2.*

Increased emphasis on production of row-crop tractors stemmed from the general shift in Soviet agricultural policy in the fall of 1953. Khrushchev's plans for increasing production of row crops implied an increase in the proportion of row-crop tractors in total production of tractors. In a decree published on 29 September 1953, goals for production of row-crop tractors from 1954 to May 1957 were outlined in detail, as shown in Table 12.**

The significance of the shift in emphasis toward wheeled models was that, given the policy of extending areas sown to vegetable and fodder crops which require cultivation by wheeled tractors, production of this type of tractor did not meet the demand. Soviet

* Table 2 follows on p. 7.
** Appendix A, p. 34, below.

Table 2

Production of Row-Crop Tractors
Compared with Over-All Production of Tractors
in the USSR
1945 and 1950 - June 1957

	Tractors		
Year	All Tractors a/	Row-Crop Tractors a/	Row-Crop Tractors as Percentages of All Tractors
1945	7,700	1,200	15.6
1950	108,800	23,900	22.0
1951	91,800	20,300	22.1
1952	98,700	21,900	22.2
1953	111,300	26,500	23.8
1954	135,400	54,100	40.0
1955	163,400	74,800	45.8
1956	183,500	89,000	48.5
January-June 1957	101,000	52,000	51.5

a. Rounded to the nearest 100 tractors.

planners realized that the capabilities of the USSR to increase production of corn and other fodder crops and thus to increase the amount of meat in the national diet depended, to a large extent, on the availability of larger numbers of row-crop tractors.

The visit of the Soviet agricultural delegation to the US and Canada in 1955 gave further impetus to expansion of production of row-crop tractors. By contrast with the USSR, where about 76 percent of the agricultural tractor park in mid-1955 were tracklaying tractors, 7/ the US and Canada were using mostly wheeled tractors, which were considered to have a number of advantages over heavier tractors for most operations. The Soviet delegation reported the following:

> In 1954, the US had a total pool of 4,625,000 tractors, including 4,046,000 wheeled types, 179,000 track-laying types, and 400,000 small garden tractors from 1 to 8 horsepower. Of the total number, 95.6 percent were wheeled. Wheeled tractors have

> become so popular in the US and Canada because of their lower cost, greater maneuverability, and all-purpose adaptability compared with track-laying types. 8/

In connection with the versatility of US wheeled tractors, the delegation noted that nearly all these tractors had belt pulleys for use as stationary power units, power takeoff shafts, and hydraulic systems for work with a large number of attached and mounted implements. 9/

Although production of row-crop tractors in the USSR had been considerably improved during 1954 and 1955, the low ratio of wheeled tractors to tracklaying tractors produced was severely criticized at the 20th Party Congress in February 1956 in a speech of G.S. Khlamov, then Minister of Tractor and Agricultural Machine Building, as follows:

> In the Party Central Committee report, Comrade Khrushchev pointed out that we need at least as many wheeled tractors as caterpillar /tracklaying/ tractors, if not more. Indeed, during the last Five Year Plan (1951-55) only 30 percent of the tractors produced by the tractor industry were wheeled tractors; this is not meeting the need of agriculture for wheeled tractors, especially in view of the expansion of areas sown to intertilled crops, corn, etc. 10/

To increase production of row-crop tractors in 1960 by 270 percent (more than 1955), as called for in the Sixth Five Year Plan (1956-60), 11/ Khlamov informed the 20th Party Congress that he and his ministerial colleagues "consider it expedient to transfer one of the plants which produce caterpillar tractors to the production of wheeled tractors of a new type of universal designation with diesel power of 40-50 (engine) horsepower and with pneumatic tires." He added that "the need of the economy for caterpillar tractors of the general designation type 'DT-54' ... can be fully satisfied by the other tractor plants which produce caterpillar tractors." 12/

In spite of Khlamov's promises, the Khar'kov, Stalingrad, and Altay plants were not withdrawn from production of DT-54 tractors in 1956. 13/ Probably it was this lag in shifting one DT-54 plant to production of wheeled tractors that provoked Khrushchev's

stinging criticism of the tractor industry for its "narrow departmental approach" in his report on decentralization of 29 March 1957. He intimated that departmental disputes among various ministries were responsible for the failure to implement Khlamov's plan during 1956. 14/

Khrushchev's report strongly reemphasized the importance of wheeled tractors as follows:

> Workers of agricultural bodies and machine builders are well aware that wheeled tractors have considerable advantages over caterpillar tractors in some kinds of work. The experience of several machine and tractor stations and of agriculture abroad shows that to achieve the best results, caterpillar tractors should account for some 10 percent of the total tractor fleet, with wheeled tractors accounting for the other 90. To arrive at this proportion, the output of caterpillar tractors should be reduced by several tens of thousands in 1957 and that of wheeled tractors increased accordingly. 15/

His statement on the experience with tractors of "agriculture abroad" is an obvious reference to the visit of the Soviet farm delegation to the US and Canada in the summer of 1955.

It is not at present clear how reduction in production of track-laying tractors demanded by Khrushchev was to be undertaken during 1957. If it is assumed that the plan outlined by Khlamov in February 1956 was to have been implemented, it follows that it would have been necessary to cease production of the DT-54 at Khar'kov, Stalingrad, or Altay. Under this assumption the Altay Tractor Plant would appear to have been the most likely candidate because both the Khar'kov and the Stalingrad plants were scheduled to "carry out a modernization of the DT-54 in 1956" and were fulfilling that task. 16/ It was announced, however, in July 1957 that the Altay Tractor Plant would produce the timber-hauling tractor TDT-60 in the third quarter of 1957 simultaneously with the DT-54.* 18/ Hence

* This announcement does not necessarily imply supersedure of earlier plans according to which the Altay plant was scheduled to replace the DT-54 with the DT-70 in 1959. The DT-70 was produced experimentally in the summer of 1954 and differs from the DT-54 mainly in respect to durability of treads and wider range of speeds. 17/

there is as yet no evidence that the original Khlamov plan is being carried out.

It is possible that further expansion of production of the "Belarus" tractors may offer an alternative to reduction of production of the DT-54 tractor. The Minsk Tractor Plant is to produce only the "Belarus" model, according to a directive of the Belorussian SSR. 19/ In preparation for this change, the Minsk plant apparently is transferring production of the TDT-40 to the new Onega Tractor Plant in Petrozavodsk and the TDT-60 to the Altay Tractor Plant, as previously noted.* Moreover, the Dnepropetrovsk plant (formerly subordinate to the Ministry of the Defense Industry) was to produce about 30,000 "Belarus" tractors in 1957, a full year's production. Previously the plant was not expected to produce tractors past the expiration date of the special order for tractors (covering 1954 to 1 May 1957). 20/

D. Shift to Diesel Power.

1. Advantages and Disadvantages of Diesel Engines.

Diesel engines have a number of important advantages over gasoline and kerosine engines in tractors. Diesel engines have the lowest fuel combustion per unit of output of power of all internal combustion engines and can burn grades of petroleum fuel which are much less refined and, therefore, cheaper than gasoline. As a result of lower consumption of fuel, diesel tractors can reduce the cost of plowing 1 hectare of land by 1/3. 21/ Further savings can be realized for the economy as a whole through the reduction in storage facilities for petroleum products in the farm areas and the lessened burden on the transportation system. Generally the kolkhozes and a number of machine tractor stations (MTS's) are fairly remote from railheads and must rely on fleets of tank trucks to supply their requirements of fuel. In the "new lands" the kolkhozes are under an additional handicap of having to provide their own roads. 22/ Diesel engines are more reliable in operation and require less skilled maintenance and fewer spare parts.

The main disadvantages of diesel engines are their greater weight per horsepower and higher cost of production. Because tractors frequently operate day and night on kolkhozes, however, intensive use results in fuel savings which compensate for the higher initial cost of the diesel tractor.

* For developments in production at the Onega Tractor Plant and other tractor plants, see Appendix B.

2. Dieselization.

A significant development in 1956 was the completion of the shift to diesel engines in Soviet agricultural tractors. This shift had been scheduled for completion before the end of the Fifth Five Year Plan (1951-55) 23/ and was thus a year late. Nevertheless, the progress of dieselization was impressive, production of diesel tractors increasing by 82 percent between 1950 and 1955 according to source 24/. A summary of production of diesel tractors is shown in Table 3.

Table 3

Production of Diesel Tractors in the USSR
1940 and 1950-56

	Tractors		
Year	All Tractors a/	Diesel Tractors a/	Diesel Tractors as Percentages of Production of All Tractors
1940	31,600	6,900	21.8 b/
1950	108,800	67,600	62.1
1951	91,800	59,700	65.0
1952	98,700	70,500	71.4
1953	111,300	82,200	73.9
1954	135,400	99,500	73.5
1955	163,400	125,000	76.5
1956	183,500	175,100	95.4

a. Rounded to the nearest 100 tractors.
b. 25/

Production of diesel tractors in the USSR began in 1936, when the Chelyabinsk Tractor Plant shifted production from the S-60 tracklaying tractor with a ligroine* engine to the S-65 diesel tractor. Since 1946 the Chelyabinsk plant has produced the S-80 diesel tractor, based on the US caterpillar diesel D-7. Until recently the S-80 has been the largest Soviet tractor. The trend toward dieselization was accelerated in 1949, when the Khar'kov and Stalingrad

* The fraction, known to the USSR as ligroine, is a light petroleum distillate used as a tractor fuel and as a solvent. In English-speaking countries this fraction is known as heavy naphtha or a heavy gasoline.

plants changed over from production of the ASKhTZ-NATI kerosine tractor to the diesel DT-54 tractor. The Altay Tractor Plant changed over in 1952. 26/ Production of the small tracklaying KD-35 and KDP-35 tractors at Lipetsk reached the level of mass production in 1951 (see Table 10*). Beginning with the "Belarus" in 1953, all new row-crop models were dieselized. No more kerosine tractors were produced after November 1955, when the Vladimir Tractor Plant changed over from the "Universal'" to the DT-24 row-crop tractor. By fall of 1955 the Khar'kov Tractor Plant had shifted production from the gasoline-powered KhTZ-7 to the DT-14 diesel version. 27/ The Khar'kov Tractor Assembly Plant continued to produce the KhTZ-7 tractor until some time in 1956. 28/ Confirming the imminent completion of the trend to diesels, G.S. Khlamov, then Minister of Tractor and Agricultural Machine Building, announced in February 1956 that "from 1956 on, all Soviet tractors will have diesel engines." 29/

Meanwhile, logging operations in the Soviet north were becoming progressively dieselized. Since 1948 the timber industry has been supplied with the gas generator KT-12 tractor. This tractor had the virtue of being able to consume wood chips for fuel, although this method of power generation was very inefficient. Tractors of this type were difficult to operate and did not develop enough power for dragging heavy logs over rough terrain. To improve the productivity of logging operations, a number of KT-12 tractors were reconstructed as diesel-engined TDT-40 tractors during 1956. Most of the conversions were done in engineering plants subordinate to the Ministry of the Timber Industry. 30/ In addition, all new timber-hauling tractors are diesel powered.

II. Plans and Objectives, 1957-60.

A. Over-All Plans.

The original Soviet Sixth Five Year Plan (1956-60) called for production of 322,000 tractors in 1960. 31/ This goal was 175 percent of the actual production for 1956 of 183,500 tractors. 32/ Although production in 1956 increased 12 percent compared with 1955, it was below Soviet expectations. As explained above, the reason for the dissatisfaction was probably the lag in shifting a plant producing the DT-54 tractor to wheeled tractors. Whatever the reason, the tractor industry must increase production at a relatively higher rate than anticipated in 1955 if it is to reach the level of 322,000 tractors in 1960.

* Appendix A, p. 28, below.

B. Goals for 1957.

Production of about 203,000 tractors in the USSR was planned for 1957, an increase of only 11 percent more than 1956. This overall goal, announced in November 1957, was slightly less than that obtained by adding, for the individual producing republics, the goals of production which were announced at the beginning of 1957. The original and revised plans for production of tractors in the USSR in 1957 are shown in Table 4.

Table 4

Production of Tractors in the USSR
1956, January-June 1957, and 1957 Plan

Tractors

	1956	January-June 1957	1957 (Plan) (Original)	1957 (Plan) (Revised)
Russian Soviet Federated Socialist Republic	90,700 a/		106,100 b/	
Ukrainian SSR	71,600 c/		72,000 d/	
Belorussian SSR	21,200 e/		24,200 f/	
Uzbek SSR			3,000 g/	
Total	183,500	101,000	205,300	203,000 h/

a. 33/
b. 34/
c. 35/
d. 36/
e. Residual.
f. "3,000 more than 1956." 37/
g. 38/
h. 39/

The small increase for the Ukrainian SSR was accounted for in part by an expected increase in 1957 in production of the "Belarus" tractor at the Dnepropetrovsk plant (formerly subordinate to the Ministry of the Defense Industry). This plant produced 29,000 tractors in 1956 and was expected to produce 30,000 tractors in 1957. Plants formerly subordinated to the Ministry of Tractor and Agricultural Machine Building were scheduled to produce 154,000 of the original goal estimated for 1957 of about 205,000 tractors. 40/ Because the remainder, or 51,000 tractors, was to be produced by the Chelyabinsk Tractor Plant (formerly subordinate to the Ministry of Transport Machine Building) and the Dnepropetrovsk plant and because the Dnepropetrovsk plant was to produce 30,000 tractors in 1957, the

Chelyabinsk plant was to produce 21,000 tractors in 1957 (see Table 10*). It is estimated, on the basis of projections from mid-year results, that the USSR would produce about 106,000 row-crop tractors in 1957. Moreover, all 1957 production was dieselized.

C. Measures to Boost Production.

The increase of 11 percent in Soviet production of tractors in 1957, like that in 1956, would fall short of the average annual increase of about 16 percent required to achieve the original 1960 goal of 322,000 tractors annually. This lag in the increase in production of tractors is likely to continue until at least mid-1958, when specialization and other factors will combine to raise the rate of increase. Nevertheless, because no major additions of new plant capacity are planned for 1958-60, attainment of the original 1960 goal will be very difficult.

Soviet planners expected to obtain the increase in production of tractors during 1956-60, according to the original Sixth Five Year Plan, primarily from more efficient use of existing facilities and greater specialization of plants. The plan directive, issued in January 1956, called upon the tractor industry to achieve 69 percent of the planned increase in production "by means of better organization of production and use of existing production capacities," leaving 31 percent to be obtained from new facilities presumably to be constructed during 1956-60. 41/

Most of the new space for tractor assembly will be made available by converting plants of other industries rather than by building complete facilities. The Onega Tractor Plant, a converted plant, began production in 1956.** One major tractor plant is now under construction at Bryansk. On the basis of the former Bezhitsa Steel Foundry, the new plant was expected to produce tracklaying tractors of 140 (engine) hp by the end of 1957. 42/ The Tashkent Agricultural Machinery Plant in Uzbek SSR began production of DT-24-3 tractors on 26 April 1957. To increase mechanization of cotton growing, this plant planned to build 3,000 of these tractors in 1957 and to double its production in 1958. 43/ This plant assembles the DT-24-3 tractor from components supplied by the Vladimir Tractor Plant and makes those modifications necessary to meet the specifications of cotton culture. 44/ It is not considered likely that the Tashkent plant will become a major producer of tractors, but it is expected that it will, instead, cater to the special needs of mechanization of cotton growing in the Uzbek area.

* Appendix A, p. 28, below.

** For developments in production at the Onega Tractor Plant and other tractor plants, see Appendix B.

Considerable increases in productive capacity are to be effected by the removal of engine production to special plants. For example, all engines for tractors made at the Stalingrad Tractor Plant are to be produced at a new plant (as yet unbuilt) at Vol'sk, a town on the Volga River north of Stalingrad. The "Serp i Molot" (Sickle and Hammer) Plant in Khar'kov will specialize in producing diesel engines to be used interchangeably in tractors and combines, and a new "base for production of diesel engines for tractors" will be built at Pavlodar. 45/ The plant at Pavlodar is expected by 1960 to produce annually 60,000 combines and 100,000 diesel engines. 46/ Engines produced here and not needed for combines will probably be supplied to the Altay Tractor Plant in Rubtsovsk.

D. Further Expansion of Production of Row-Crop Tractors.

In accordance with directives of the 20th Party Congress the original 1960 Plan goal for Soviet production of row-crop tractors has been set at 2.7 times that of 1955, or an annual production of 202,000 tractors (based on official figures for production of row-crop tractors in 1955). 47/ At this rate, row-crop tractors would account for approximately 63 percent of over-all production of tractors in 1960, compared with 46 percent in 1955 and 22 percent in 1950 (see Table 2*). The Khar'kov Tractor Plant was directed to triple production of DT-14 tractors by 1960, 48/ and the Minsk Tractor Plant intends to triple production of "Belarus" tractors by 1960 in comparison with 1955 (see Table 10**). 49/

E. Technical Improvements.

Soviet plans envision an intensive development of specialized tractors during 1956-60. New designs for tractors emphasize increased productivity of the tractor aggregate (tractor plus implement), reduced consumption of metal, increased economy in fuel, increased durability and reliability of the mechanism, and also improved working conditions for tractor operators. The needs of certain crops and types of terrain will receive closer attention than before.

It was proposed to develop and begin, during the Sixth Five Year Plan, series production of the following new types of wheeled tractors: row-crop tractors of 30 and 45 (engine) hp, cotton-cultivation tractors of 30 (engine) hp, tractors of 30 and 45 (engine) hp with improved mobility, and steep-slope tractors of 30 (engine) hp. New types of self-propelled chassis of 30 (engine) hp will be developed for cultivation of subtropical crops on mountain flatlands

* P. 7, above.
** Appendix A, p. 28, below.

and of cotton as well as for general-purpose work. Small tracklaying tractors of 40 (engine) hp will be developed for cultivation of cotton and work in orchard-vineyards. 50/ On the basis of US experience, Soviet wheeled tractors will be converted to low-pressure tires with an increased cross section and improved tread design. This improvement will reduce skidding and compression of the soil by the tractor wheels and thus will reduce consumption of fuel per hectare of cultivated area.

Between 1957 and 1960 the Lipetsk Tractor Plant will replace its KDP-35 medium-power row-crop tracklaying tractor with a unified series of DT-40 tractors. The DT-40 tractor series will consist of a general-purpose tractor with a narrow working width, a row-crop tractor, a cotton-cultivator tractor with a 900-millimeter ground clearance and especially narrow treads, and an orchard-vineyard tractor.

The general-purpose DT-54 tracklaying tractor probably will be almost entirely replaced before 1960. The new tracklaying model will be lighter and somewhat narrower, and thus its operation with plows will be considerably improved. 51/

III. Development of the Agricultural Tractor Park.

A. Changing Composition of the Tractor Park.

The 1956 Soviet statistical handbook provides information on changes in the composition of the Soviet tractor park in response to shifts in production described in the preceding sections. These changes are summarized in Table 5* and are shown in the accompanying chart, Figure 3.** The steady drop in the ratio of wheeled tractors to tracklaying types in 1932-56 is readily apparent. Likewise, the increasing importance of diesel tractors in the postwar period clearly is demonstrated. The continued fall in the ratio of wheeled to tracklaying tractors in 1956 may seem surprising. The explanation for the fall in this ratio is that although allocations of wheeled row-crop tractors rose considerably in 1955-56, allocations of tracklaying tractors were even greater. Because of the large increase in total allocations in 15-hp units the heavy tracklaying types somewhat outweighed the lighter and less powerful row-crop types. Actually, in terms of tractors, row-crop tractors accounted for 30 percent of the total park in 1956. The relatively sharp increase in percentage of row-crop tractors between 1954 and 1956, while wheeled tractors declined relatively, is a reflection of higher production of the KDP-35 row-crop tracklaying tractor.

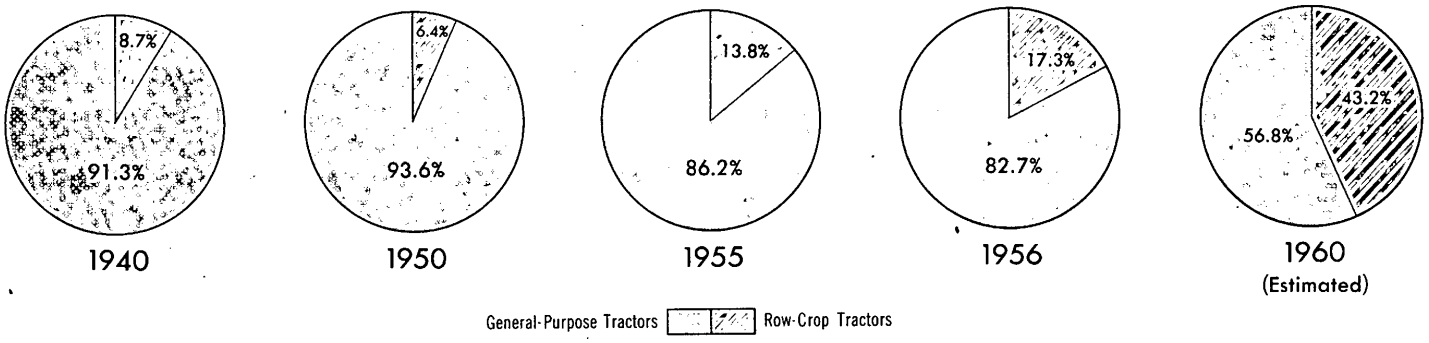
* Table 5 follows on p. 17.
** Following p. 16.

Figure 3

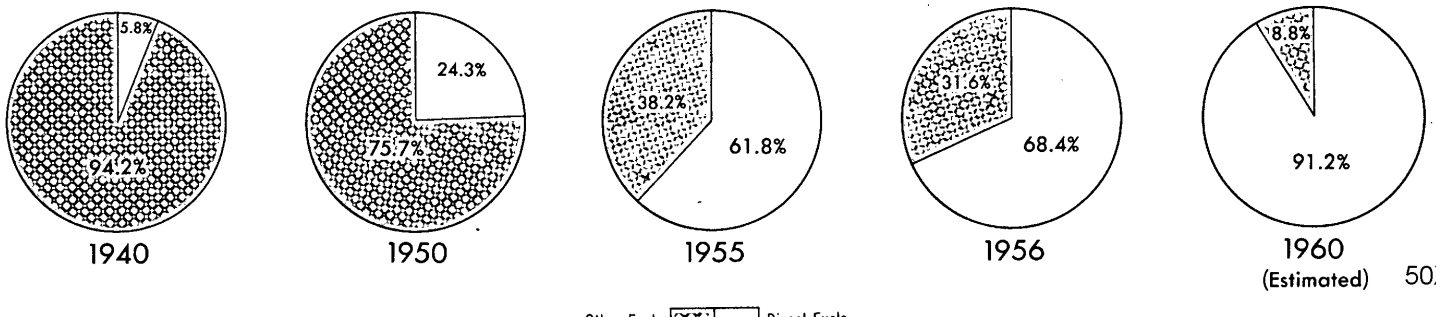
USSR

COMPOSITION OF THE TRACTOR PARK*, SELECTED YEARS, 1940-60

ROW-CROP VERSUS GENERAL-PURPOSE TRACTORS



DIESEL VERSUS OTHER FUELS



*Percentage of Total Drawbar Horsepower of the Park at the end of the year.

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Table 5

Composition of the Tractor Park in the USSR a/
Selected Years, 1932-56

Type of Tractor	Measure	1932	1937	1940	1950	1953	1954	1955	1956 b/
Purpose									
General	Percent c/	99.5	94.0	91.3	93.6	92.7	90.0	86.2	82.7
Row-crop	Percent	0.5	6.0	8.7	6.4	7.3	10.0	13.8	17.3
	Percent in terms of tractors	0.7	10.7	16.2	14.6	17.2	21.0	26.5	30.4
Fuel consumed									
Diesel	Percent		1.2	5.8	24.3	44.6	51.7	61.8	68.4
Other	Percent	100.0	98.8	94.2	75.7	55.4	48.3	38.2	31.6
Mode of traction									
Wheeled	Percent	90.9	67.9	58.3	32.9	25.3	24.4	23.0	22.8
Tracklaying	Percent	9.1	32.1	41.7	67.1	74.7	75.6	77.0	77.2

a. Based on source 52/.
b. As of 1 November.
c. Percent of total drawbar horsepower of the park at the end of the year except as otherwise noted.

B. Allocation of Tractors to Agriculture.

Estimates of the composition of allocations of tractors by model to the Soviet tractor park have been improved significantly as a result of the publication of the 1956 Soviet statistical handbook. 53/ Detailed information on allocations of tractors was unavailable during most of the postwar period, and the accuracy of previous estimates had to depend on fairly broad assumptions applied to estimates of production. Allocations of tractors to Soviet agriculture during 1946-56 are shown, by model, in Table 13.* Generally it was safe to assume that nearly all tractors suitable for row-crop cultivation were allocated to agriculture, but it was difficult to determine the extent to which row-crop tractors were exported. Many of these problems can be resolved in estimates based on the recently released data.

The over-all growth of the Soviet agricultural tractor park is shown in Table 14.** During the Korean War, allocations to agriculture in 15-hp units declined 28 percent from the 1950 level, whereas production in terms of 15-hp units dropped only 10 percent. This greater relative decline in allocation of agricultural tractors may be an indication that other uses of tractors, including uses as military end items, were given priority over agriculture during this period. In this respect, it is significant that the decline in allocations of tracklaying tractors between 1950 and 1952 was greater than that for wheeled tractors.

There was a marked increase in the number of tractors allocated to agriculture following the decrees of September-October 1953.*** Because of the large increase in production of small, low-powered row-crop tractors, there was a simultaneous upward trend in the ratio between tractors and 15-hp units. In 1950, tractors allocated to agriculture averaged 1 tractor to 1.98 15-hp units, whereas in 1956 the ratio was 1 to 1.76. The development of the tractor park of the USSR is compared with that of the US in Table 15.****

C. Completion of Retirement of Prewar Tractors.

A significant development in the increase of Soviet farm efficiency is the virtual completion in 1956 of the retirement of prewar tractors. It is estimated that the USSR emerged from World War II with 469,000 tractors in terms of 15-hp units. Of these tractors, all but about 20,000 were prewar. 54/ These tractors were

* Appendix A, p. 35, below.
** Appendix A, p. 37, below.
*** See I, B, above.
**** Appendix A, p. 38, below.

retired at a relatively modest rate during the reconstruction in the early postwar years. After 1950, retirements increased somewhat but were probably held to a minimum by the cutback in production and allocation of new tractors. The remaining prewar tractors, however, were becoming a serious liability, creating difficult problems of manufacturing spare parts for models which had gone out of production. By 1954, prewar tractors were at least 14 years old, twice the age at which they normally would be written off in calculations for planning. 55/

Beginning in 1954, retirement of prewar tractors was accelerated, apparently in a deliberate effort to get rid of obsolete machinery. Thus, by the end of 1956, cumulative additions to the park in the postwar period about equaled the estimated 1956 park of 1.6 million tractors in terms of 15-hp units, indicating that prewar tractors virtually had been eliminated (see Tables 13 and 14*). Thus the composition of the park, by model, at the end of 1956 closely corresponded to the cumulative additions of the postwar period.

D. Tractor Park in 1960. 56/

According to official announcements related to the original Sixth Five Year Plan, a total of 1,650,000 15-hp units of tractors was to be added to the Soviet park during 1956-60. Of this total, 248,000 15-hp units of tractors were allocated to agriculture in 1956 leaving 1,402,000 tractors in terms of 15-hp units to be allocated in 1957-60. On the assumption of an average age of 10 years at scrapping, it is estimated that retirements during 1957-60 will consist mainly of those tractors received by agriculture from 1946 to 1950. The resulting development in the agricultural tractor park is shown in Table 6.

Table 6

Estimated Development of the Agricultural Tractor Park in the USSR 1956 and 1960

Thousand 15-Horsepower Units

Year	Additions	Retirements	Park a/
1956			1,600
1960	<1,402	<502	2,500

a. At the end of the year.

* Appendix A, p. 35 and p. 37, respectively, below.

The composition of the tractor park in 1960 will reflect the great emphasis on row-crop and diesel tractors during 1956-60. Of the 1,650,000 15-hp units of tractors to be allocated to agriculture during 1956-60, a total of 680,000 tractors (approximately 892,000 15-hp units*) will be row-crop tractors. With allowance for retirement of 10-year-old tractors (allocated during 1946-50), the composition of the park in 1960 is estimated as shown in Table 7.

Table 7

Estimated Composition of the Agricultural Tractor Park in the USSR 1955-60

Million Drawbar Horsepower

Type of Tractor	1955 a/	Allocations 1956-60	Retirements b/ 1956-60	1960 Park	Percent of Total 1960 Park
Purpose					
General	18.7	11.2	8.6	21.3	56.8
Row-crop	3.0	13.6	0.4	16.2	43.2
Fuel consumed					
Diesel	13.4	24.8	4.0	34.2	91.2
Other	8.3	0	5.0	3.3	8.8
Mode of traction					
Wheeled	5.0			24.4 c/	65.0 c/
Tracklaying	16.7			13.1 c/	35.0 c/
Total	21.7	24.8	9.0	37.5	100.0

a. At the end of the year.
b. Consisting of tractors allocated to agriculture during 1946-50 plus the last of the prewar tractors which were retired in 1956.
c. Absolute figures for the 1960 park are based on the official percentage figures given in the last column, as announced in source 57/.

* The quantity, 892,000 15-hp units, is based primarily on the average ratio of physical units to 15-hp units in 1956 allocations.

Changes in composition of the park between 1955 and 1960 are shown in Table 8.*

Table 8 further shows that present Soviet intentions are to double the percentage of row-crop tractors in the park in 5 years so that row-crop tractors will constitute more than half the tractors in the park. In terms of 15-hp units the percentage of row-crop tractors will be more than doubled, an indication of the shift to wheeled tractors of greater power. Although the attainment of this goal would be an impressive achievement, it nevertheless would fall short of the balanced composition desired by Khrushchev -- 90 percent row-crop types and 10 percent general-purpose types -- the ratio which pervails in the US and Canada today.

E. Tractor Park in Relation to Agricultural Requirements.

In spite of the relatively large numbers of tractors which the USSR has allocated to agriculture during the past 25 years, Soviet agriculture still is inadequately equipped in relation to the tasks set before it. The present Soviet agricultural tractor park is insufficient to meet current goals for increasing yields per hectare, for raising the productivity of agricultural labor, and for efficiently exploiting the greatly expanded small grain and corn acreages. The extent of the shortage of tractors in the USSR is suggested by comparisons with the US agricultural tractor park, as shown in Table 16.** In 1956 there was more than 4 times as much cultivated land per tractor horsepower in the USSR as there was in the US. Even if allowance is made for a higher rate of utilization of tractors in the USSR, the discrepancy is significant.

If the Soviet agricultural tractor park is enlarged according to the original Sixth Five Year Plan (1956-60), a substantial improvement in agricultural mechanization will have been realized. Thus by the end of 1960 the USSR, with an estimated park of 2.5 million tractors in 15-hp units, will have reduced the cultivated land per tractor from 4 times that of the US, as in 1956, to about 2.5 times. An agricultural tractor park of this size is estimated to be adequate in terms of the physical ability to perform necessary mechanized operations but not adequate in terms of performing these tasks in so timely a manner as to maximize yields.

Overcapacity in tractors in the US has proved desirable because such overcapacity has contributed to higher yields by facilitating better agronomic practices and by reducing harvesting losses. In the USSR, attempts currently are being made to raise yields by improving the level of field husbandry practices (through the introduction of the Mal'tsev system of small grain cultivation, by setting up row crops in checkrows, and the like), but the major effort is being concentrated on increasing yields by reducing harvest losses, especially in small grains. It would seem logical for the USSR to have some excess capacity in tractors because the weather severely limits the length of the harvesting period.

* Table 8 follows on p. 24.

** Appendix A, p. 39.

Whereas some farm machinery can be and has been shifted after completion of harvesting in one region for the beginning of harvesting in another region (for example, from the southern Ukraine to the "new lands"), the risk of deviations from the normal seasonal pattern precludes heavy dependence on such measures.

Soviet attitudes on the proper size of the agricultural tractor park in relation to the task of maximizing yields have undergone a marked change. For a long time the USSR considered that a large part of the agricultural tractor park in the US was superfluous and underutilized. 58/ The Soviet agricultural delegation, however, reporting on its trip to the US and Canada in 1955, noted that "the large amount of tractors and farm machinery /on US farms/ enables the farmer to handle all operations on schedule and increase production per man." 59/

IV. Exports of Row-Crop Tractors Since 1950.

A comparison of recent Soviet statistics on production and allocation of tractors to agriculture indicates the extent of nonagricultural uses of tractors (including exports) in certain categories, as shown in Table 9.* Mainly, these categories include row-crop types, in which agriculture has the predominant interest, because general-purpose types can be absorbed readily in other sectors of the economy -- for example, construction and logging. Besides agriculture, almost the only logical domestic uses of row-crop tractors are in municipal maintenance (care of parks and lawns, snow clearance, street repair, and the like). Consumption of row-crop tractors for this purpose is probably relatively minor. Thus it is estimated that exports constitute at least 50 percent, and probably more, of all nonagricultural uses of row-crop tractors. Almost 5,400 tractors were exported by the USSR in 1956. 60/ If 50 percent of all row-crop tractors not allocated to agriculture in 1956 are assumed to have been exported, then row-crop tractors comprised about 45 percent of Soviet exports of tractors of all types in 1956. There are indications that Soviet exports of tractors in 1957 included a larger share of row-crop tractors than in 1956, although the total volume of exports of tractors is not expected to be enlarged substantially in the near future. It seems rather surprising that almost one-fifth of Soviet production of desperately needed row-crop tractors should have gone into nonagricultural uses. That substantial exports of row-crop tractors took place in 1954 and 1955 after the decrees of the Communist Party calling for tremendous expansion of production of row-crop tractors is evident in the export totals for the "Belarus" tractor, which was first produced in late 1953. It is estimated that in 1956, at least 2,600 "Belarus" tractors were exported (see Tables 10 and 13**). The high proportion of "Universal'" tractors exported is

* Table 9 follows on p. 25.

** Appendix A, pp. 28 and 35, respectively, below.

a measure of Soviet success in persuading the European Satellites and Communist China to accept obsolete machinery while perhaps conserving the more modern models for trade penetration in the Middle East and Southeast Asia. In view of the critical need of domestic agriculture for tractors of this type, it is apparent that, at least until 1956, the USSR made relatively large sacrifices for the sake of trade with the Sino-Soviet Bloc and economic penetration of the Free World.

V. Value.

The value of production of Soviet tractors rose about 52 percent during 1950-55, increasing in absolute amounts from the equivalent of $480 million in 1950 to $729 million in 1955 (see Table 17*). The value of production of tractors in 1955 represents slightly more than 0.2 percent of estimated Soviet gross national product (GNP) for 1955. 61/

* Appendix A, p. 40, below.

Table 8

Comparison of the Agricultural Tractor Park in the USSR in 1955 with the Park in 1960

Type of Tractor	1955				1960			
	Thousand Tractors	Percentage in Terms of Tractors	Thousand 15-Horsepower Units	Percentage in Terms of 15-Horsepower Units	Thousand Tractors	Percentage in Terms of Tractors	Thousand 15-Horsepower Units	Percentage in Terms of 15-Horsepower Units
General-purpose	617	73.5	1,246	86.0	671	44.6	1,420	56.8
Row-crop	223	26.5	203	14.0	832	55.4	1,080	43.2
Total	840	100.0	1,449	100.0	1,503	100.0	2,500	100.0

Table 9

Extent of Allocations to Nonagricultural Uses of Row-Crop Tractors and the KD-35 Tractor by the USSR 1950-55

Tractors

Model of Tractor	Quantity Allocated to Agriculture	Quantity Allocated to Nonagricultural Uses a/	Total	Quantity Allocated to Nonagricultural Uses as a Percentage of the Total
Row-crop				
KDP-35	24,200	2,300	26,500	8.7
"Belarus"	37,500	5,700	43,200	13.2
"Universal'"	73,100	25,000	98,100	25.5
KhTZ-7	43,000	3,500	46,500	7.5
Others	300	6,900	7,200	95.8
Total row-crop tractors	178,100	43,400	221,500	19.6
KD-35	24,200	4,700	28,900	16.3

a. This figure represents the total minus allocations to agriculture and includes exports.

APPENDIX A

STATISTICAL TABLES

Table 10

Production of Tractors in the USSR 1942-56, 1957 Plan. and 1960 Plan

Republic, Plant, and Model of Tractor	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957 Plan Original	1957 Plan Revised	1960 Plan
Ukrainian SSR																		
Khar'kov Tractor Plant																		
NATI				0.5	2.5	5.7	12.7	16.1	20.0	18.4	21.7	22.5	22.6	24.3	21.0	25.0 a/*		45.0 b/
DT-54								2.0						5.0				
KhTZ-7														1.0	17.0	20.0 a/		30.0 b/
DT-14															1.7			
KhTZ-20																		
Khar'kov Tractor Assembly Plant																		
KhTZ-7									2.7	4.9	4.6	6.0	11.3	12.0	1.4			
DSSh-14															1.5			
Ministry of the Defense Industry c/																		
"Belarus" (MTZ-2)													6.5	15.0	29.0	30.0		
Total				0.5	2.5	5.7	12.7	18.1	22.7	23.3	26.3	28.5	40.4	57.3	71.6	72.0 d/		{51.0 e/ a/ 85.8 f/ a/
Belorussian SSR																		
Minsk Tractor Plant																		
KT-12										0.8	5.1	6.1	6.0	5.4	3.8			
"Belarus" (MTZ-2)												0.5	8.3	12.9	16.1			35.0 a/
TDT-40 and TDT-60															1.3			
Total									Negligible g/	0.8	5.1	6.6	14.3	18.3	21.2	24.2		
Russian Soviet Federated Socialist Republic																		
Chelyabinsk Tractor Plant																		
S-80					1.0	7.0	9.5	19.0	19.5	16.5	18.5	20.1	19.1	18.0	17.5	{21.0		
S-100															0.5			

* Footnotes for Table 10 follow on p. 30.

Table 10

Production of Tractors in the USSR
1942-56, 1957 Plan, and 1960 Plan
(Continued)

Republic, Plant, and Model of Tractor	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957 Plan Original	1957 Plan Revised	1960 Plan
Russian Soviet Federated Socialist Republic (Continued)																		
Stalingrad Tractor Plant																		
NATI			0.5	3.0	4.2	7.2	17.7	19.2	23.0	17.4	16.8	20.8	21.0	22.4	22.0			<45.6 a/
DT-54								2.5						1.3	3.5			
DT-55, DT-57, DT-61, and GB-58																		
Altay Tractor Plant b/																		
NATI	0.5	0.6	2.5	3.0	3.6	5.0	8.0	9.0	11.4	8.0	2.5	8.3	11.6	15.0	18.2			
DT-54											5.2							
Vladimir Tractor Plant																		
U-1, U-2, and U-4				1.2	2.0	2.9	7.0	10.8	15.0	14.6	15.8	17.0	18.6	16.0	0.6			
DT-24														1.0	12.0			
Lipetsk Tractor Plant																		
KD-35							0.5	3.1	4.9	6.7	6.9	7.0	1.1	2.3				
KDP-35 i/									0.2	0.7	1.4	3.0	9.3	11.8	16.0			
"Kirov" Works j/																		
KT-12							1.5	3.5	6.0	1.7								
Onega Tractor Plant k/																		
TDT-40															0.4			5.0
Other (primarily VARZ) l/																		
STZ-1 (primarily)								3.0	6.1	2.1	0.2							
Total	0.5	0.6	3.0	7.2	10.8	22.1	44.2	70.1	86.1	67.7	67.3	76.2	80.7	87.8	90.7	106.1		

Table 10

Production of Tractors in the USSR
1942-56, 1957 Plan, and 1960 Plan
(Continued)

Republic, Plant, and Model of Tractor	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957 Plan Original	1957 Plan Revised	1960 Plan
Uzbek SSR																		
Tashkent Agricultural Machinery Plant																		
DT-24-3																3.0		
Total																3.0		
Grand total	0.5	0.6	3.0	7.7	13.3	27.8	56.9	88.2	108.8	91.8	98.7	111.3	135.4	163.4	183.5	205.3	203.0	322.0

a. Approximate.
b. Official estimate.
c. Plant located at Dnepropetrovsk. In the reorganization of 1957 this ministry was merged with the Ministry of General Machine Building and retained at the union level.
d. There is a discrepancy between this figure and the total planned production of individual models. The total for the republic and information on individual models were obtained from different sources and cannot be reconciled at present. Each figure is therefore given as received.
e. Tracklaying tractors.
f. Row-crop tractors.
g. About 40 KD-35 tractors were produced at Minsk in 1950.
h. At Rubtsovsk.
i. Including KD-35-2 models beginning in 1955.
j. At Leningrad.
k. At Petrozavodsk.
l. At Moscow.

Table 11

Designations and Characteristics of Selected Postwar Models of Tractors in the USSR

Designation	Characteristics
ASKhTZ-NATI -- Altayskiy Stalingradskiy Khar'kovskiy Traktornyy Zavod - Nauchno-Issledovatel'skiy i Eksperimental'nyy Avtotraktornyy Institut (Altay-Stalingrad-Khar'kov Tractor Plant - Scientific Automobile and Tractor Institute)	Type: Tracklaying, general-purpose Fuel: Kerosine Horsepower: 46-52 engine, 32-37 drawbar Weight: 5,100 kilograms (kg), or 11,200 pounds (lb)
DT-54 -- Dizel'nyy Traktor - 54 a/* (Diesel Tractor - 54)	Type: Tracklaying, general-purpose Fuel: Diesel Horsepower: 54 engine, 36 drawbar Weight: 5,400 kg, or 11,880 lb
KD-35 -- "Kirovets" Dizel' - 35 a/ (Kirov Diesel - 35)	Type: Tracklaying, general-purpose Fuel: Diesel Horsepower: 35-37 engine, 24-26 drawbar Weight: 3,700 kg, or 8,140 lb
KDP-35 -- "Kirovets" Dizel'nyy Propashnik - 35 a/ (Kirov Diesel Cultivator - 35)	The KDP-35 is a KD-35 modified so that there is additional ground clearance. It is fitted with very narrow tracks that can be used for row-crop cultivation. Its characteristics are essentially the same as the KD-35.
ChTZ-S-80 -- Chelyabinskiy Traktornyy Zavod "Stalinets" - 80 a/ (Chelyabinsk Tractor Plant "Stalinets" - 80)	Type: Tracklaying, general-purpose Fuel: Diesel Horsepower: 93 engine (maximum), 65-73 drawbar Weight: 11,400 kg, or 25,000 lb
U-1, 2, or 4 -- "Universal'" - 1, 2, or 4 b/ (Universal)	Type: Wheeled, row-crop Fuel: Kerosine Horsepower: 22-24 engine, 10-12 drawbar Weight: 3,000 kg, or 4,400 lb
KT-12 -- "Kirov" Trelevochnyy - 12 c/ (Kirov Skidding - 12)	Type: Tracklaying, special-purpose (timber-hauling) Fuel: Gas generator Horsepower: 35 engine, 25-30 drawbar Weight: 5,750 kg, or 12,600 lb
KhTZ-7 -- Khar'kovskiy Traktornyy Zavod - 7 c/ (Khar'kov Tractor Plant - 7)	Type: Wheeled, row-crop Fuel: Gasoline Horsepower: 12 engine, 7.5 drawbar Weight: 1,300 kg, or 2,800 lb

* Footnotes for Table 11 follow on p. 33.

Table 11

Designations and Characteristics of Selected Postwar Models of Tractors in the USSR (Continued)

Designation	Characteristics	
VTZ-T24 or DT-24 -- Vladimirskiy Traktornyy Zavod Traktor - 24 a/ (Vladimir Tractor Plant Tractor - 24)	Type:	Wheeled, row-crop
	Fuel:	Diesel
	Horsepower:	24 engine, 18 drawbar
	Weight:	2,500 kg, or 5,500 lb
GB-58 -- Gazogeneratornyy dlya Bituminoznykh Topliv - 58 (Gas-Generator Tractor Using Bituminous Fuel - 58)	Type:	Tracklaying, general-purpose
	Fuel:	Gas generator
	Horsepower:	53 engine, 30-35 drawbar
	Weight:	5,850 kg, or 12,880 lb
"Belarus" -- Named for the Belorussian SSR, in which the Minsk Tractor Plant, producer of the tractor, is located	Type:	Wheeled, row-crop
	Fuel:	Diesel
	Horsepower:	37 engine, 24 drawbar
	Weight:	3,250 kg, or 7,100 lb
DT-14 -- Dizel'nyy Traktor - 14 a/	Type:	Wheeled, row-crop
	Fuel:	Diesel
	Horsepower:	14 engine, 8 drawbar
	Weight:	1,460 kg, or 3,200 lb
DSSh-14 -- Dizel'noye Samokhodnoye Shassi - 14 a/ (Diesel, Self-Propelled Chassis - 14)	Type:	Wheeled, row-crop
	Fuel:	Diesel
	Horsepower:	14 engine, 9 drawbar
	Weight:	N.A.
KhTZ-20 -- Khar'kovskiy Traktornyy Zavod - 20 c/ (Khar'kov Tractor Plant - 20)	Type:	Tracklaying, row-crop
	Fuel:	Diesel
	Horsepower:	54 engine, 36 drawbar
	Weight:	5,000 kg, or 11,000 lb
TDT-40 -- Trelevochnyy Dizel'nyy Traktor - 40 a/ (Skidding Diesel Tractor - 40)	Type:	Tracklaying, special-purpose (timber-hauling)
	Fuel:	Diesel
	Horsepower:	40 engine, 26 drawbar (in first gear)
	Weight:	6,500 kg, or 14,330 lb
TDT-60 -- Trelevochnyy Dizel'nyy Traktor - 60 a/ (Skidding Diesel Tractor - 60)	Type:	Tracklaying, special-purpose (timber-hauling)
	Fuel:	Diesel
	Horsepower:	60 engine, 40 drawbar (in first gear)
	Weight:	10,500 kg, or 23,100 lb

Table 11

Designations and Characteristics of Selected Postwar Models of Tractors in the USSR
(Continued)

Designation	Characteristics
DT-55 -- Dizel'nyy Traktor - 55 a/	The DT-55 is a DT-54 modified with wide tracks for use in marshland improvement. Its characteristics are essentially the same as the DT-54
DT-57 -- Dizel'nyy Traktor - 57 c/	The characteristics of the DT-57 are essentially the same as the DT-54. It incorporates, however, unique gearing and other changes which enable it to use plows mounted at both ends of the tractor and to cultivate, according to the shuttle method, crops on steep slopes.
DT-61 -- Dizel'nyy Traktor - 61 c/	Type: Tracklaying, general-purpose Fuel: Diesel Horsepower: N.A. Weight: 5,000 kg, or 11,000 lb

a. The number is the rated engine horsepower.
b. The numbers are the model numbers.
c. The number is the model number.

Table 12

Goals for Production of Row-Crop Tractors in the USSR
1954 - 1 May 1957

	1954		1955		1956		1 January - 1 May 1957		Total	
Model of Tractor	Tractors	15-Hp Units	Tractors	15-Hp Units	Tractors	15-Hp Units	Tractors	15-Hp Units	Tractors	15-Hp Units
"Universal'"	18,200	12,140	19,000	12,670	20,000	13,340	6,700	4,490	63,900	42,640
KDP-35	10,340	16,540	17,000	27,200	17,000	27,200	5,400	8,640	49,740	79,580
KhTZ-7	10,500	5,250	18,000	9,000	21,000	10,500	7,000	3,500	56,500	28,250
"Belarus" a/	10,000	15,000	15,000	22,500	20,000	30,000	6,700	10,000	51,700	77,500
"Belarus" b/	5,000	7,500	10,000	15,000	10,000	15,000	3,300	5,000	28,300	42,500
Total	54,040	56,430	79,000	86,370	88,000	96,040	29,100	31,630	250,140	270,470

a. Produced in plants of machine building ministries other than the Ministry of the Defense Industry.
b. Produced in plants of the Ministry of the Defense Industry.

Table 13

Allocations of Tractors to Agriculture in the USSR
1946-56

Model of Tractor	Characteristics	1946		1947		1948		1949		1950		1951		1952		1953		1954		1955		1956		Total	
		Tractors	15-Hp Units a/	Tractors	15-Hp Units	Tractors	15-Hp Units	Tractors	15-Hp Units	Tractors	15-Hp Units	Tractors	15-Hp Units	Tractors	15-Hp Units	Tractors	15-Hp Units	Tractors	15-Hp Units	Tractors	15-Hp Units	Tractors	15-Hp Units	Tractors	15-Hp Units
ASKhTZ-NATI	37 drawbar hp, kerosine, tracklaying	10,000	24,600	16,400	39,800	35,100	85,500	40,400	98,300	7,700	19,000	6,700	16,400	2,100	5,100									118,400	288,700
DT-54	36 drawbar hp, diesel, tracklaying									40,200	96,500	32,400	76,900	34,800	81,400	42,000	99,100	45,900	107,300	50,800	121,000	53,300	127,000	299,400	709,200
S-80	60 drawbar hp, diesel, tracklaying	100	400	3,700	17,000	5,000	22,800	10,100	46,000	9,000	41,400	5,600	25,500	5,500	24,600	6,400	28,200	6,100	27,400	4,700	21,000	2,300	10,600	58,500	264,900
KD-35	24 drawbar hp, diesel, tracklaying					400	600	2,900	4,400	4,100	6,600	5,700	9,000	5,800	9,100	5,900	9,300	900	1,400	1,800	8,800			27,500	43,200
KDP-35	24 drawbar hp, diesel, tracklaying									200	300	600	900	1,300	2,000	2,800	4,400	8,700	13,500	10,600	16,800	15,600	24,800	39,800	62,700
"Belarus"	24 hp, diesel, wheeled															400	600	13,200	20,400	23,900	38,000	39,700	63,500	77,200	122,700
"Universal'"	10 drawbar hp, kerosine, wheeled	1,000	700	2,700	1,700	6,800	4,400	10,500	7,000	14,600	9,700	9,600	6,300	10,300	6,700	11,100	7,300	12,300	7,900	15,900	10,000	200	100	94,300	61,800
KhTZ-7	7.5 drawbar hp, gasoline, wheeled									2,700	1,400	4,500	2,300	4,200	2,100	5,500	2,700	10,300	5,100	15,800	7,600	1,400	700	44,400	21,900
DT-14	8 drawbar hp, diesel, wheeled																			400	200	16,200	8,600	16,600	8,800
DSSh-14	9 drawbar hp, diesel, wheeled																					1,400	800	1,400	800
DT-24	18 hp, diesel, wheeled																					9,800	11,000	9,800	11,000
Others, including STZ-1	15 drawbar hp, kerosine, wheeled									13,700	7,600					400	400	3,000	3,000	100	100	500	500	17,700	11,600
Total		11,100	25,700	22,800	58,500	47,300	113,300	63,900	155,700	96,200	182,500	65,100	137,300	64,000	131,000	74,500	152,000	100,400	186,000	123,300	217,700	140,400	847,600	805,000	1,607,300

a. Horsepower.

Table 14

Development of the Agricultural Tractor Park in the USSR
1946-60

Year	Park at the Beginning of the Year (Thousand 15-Hp Units)	Additions During the Year		Retirements During the Year (Thousand 15-Hp Units)
		Thousand Tractors	Thousand 15-Hp Units	
1946	469 a/	11.1 b/	25.7 b/	11
1947	484	22.8	58.5	14
1948	528	47.3	113.3	15
1949	627	63.9	155.7	16
1950	766	92.2 b/	182.5 b/	16
1951	933 c/	65.1	137.3	38
1952	1,032	64.0	131.0	37
1953	1,126	74.5	152.0	39
1954	1,239 c/	100.4	186.0	87 d/
1955	1,338 c/	123.3 b/	217.7 b/	107 d/
1956	1,449 c/	140.4 b/	247.6 b/	97
1957 (Plan)	1,600 e/	145.0 f/		
1958 (Plan)				
1959 (Plan)			1,650 g/	600 h/
1960 (Plan)				
1961	2,500			

a. 62/
b. 63/
c. 64/
d. Figures for these years are especially accurate because they are derived from official announcements for the park and allocations in successive years.
e. Preliminary estimate of 1,577,000 15-hp units given for 1 November 1956. Later Soviet statements were that the park consisted of "more than 1,600,000 tractors in 15-hp units." 65/
f. 66/
g. 67/
h. Estimated.

Table 15

Comparison of Agricultural Tractor Parks in the US and in the USSR a/
Selected Years, 1950-56

	Thousand Tractors	
Year	US b/	USSR
1950	3,678	595
1953	4,243	744
1954	4,345	795
1955	4,450 c/	840
1956	N.A.	892 d/

a. 68/. Quantities are given for the ends of the years.
b. Excludes garden tractors for comparability with Soviet statistics.
c. Preliminary.
d. As of 1 November 1956.

Table 16

Area of Crop Land per Tractor in the US, 1956, and in the USSR, 1956 and 1961 a/

Measurement for Tractors	Agricultural Tractor Park (Thousand Tractors)			Area b/					
				Million Hectares			Hectares per Tractor		
	US	USSR		US	USSR		US	USSR	
	1956	1956	1961	1956	1956	1961	1956	1956	1961
Tractors	4,450 c/	840 c/	1,503 d/	166 e/	228 f/	236 g/	37	271	157
Tractors in 15-horsepower units	4,450 h/	1,449 i/	2,500 i/	166 e/	228 f/	236 g/	37	157	94

a. Quantities are given as of 1 January of each year.
b. In terms of total crop land.
c. See Table 15, p. 38, above.
d. See Table 8, p. 24, above.
e. Data are for 1950. 69/
f. 70/
g. Source 71/ states that the sown area will increase to 190 million - 200 million hectares in the "next few years" (presumably by 1960). On the assumptions that the relationship between expansion of the sown area and the total crop land during 1954-55 remains constant during the period under consideration 72/ and that the total sown area in 1960 will be 200 million hectares a total crop land of approximately 236 million hectares in 1960 is implied.
h. The average US tractor is equivalent to one 15-horsepower unit. 73/
i. See Table 14, p. 37, above.

Table 17

Value of Production of Tractors in the USSR a/ 1950-55

Model of Tractor	Price b/ 1 July 1955	Value 1950	1951	1952	1953	1954	1955
		(Thousand 1955 Rubles)					
Volume							
DT-54	16,200	696,600	579,960	707,940	835,920	894,240	999,540
KD-35	16,200	79,380	108,540	111,780	113,400	17,820	37,260
KDP-35	18,250	3,650	12,775	25,550	54,750	169,725	215,350
"Belarus"	22,000				11,000	325,600	613,800
"Universal'"	8,000	120,000	116,800	126,400	136,000	148,800	128,000
KhTZ-7	9,400	25,380	46,060	43,240	56,400	106,220	159,800
ASKhTZ-NATI	14,000 c/	159,600	112,000	35,000	d/		
DT-24	12,000 e/						12,000
DT-14	11,000 f/						11,000
KT-12	24,900	149,400	62,250	126,990	151,890	149,400	134,460
S-80	32,200	627,900	531,300	595,700	647,220	615,020	579,600
DT-55, DT-57, DT-61, GB-58	18,000 e/						23,400
STZ-1 and others	9,500 e/	57,950	19,950	1,900	c/		
Total		1,919,860	1,589,635	1,774,500	2,006,580	2,426,825	2,914,210
		(Thousand 1955 US $)					
Total		479,965	397,409	443,625	501,645	606,706	728,552
		(1950 = 100)					
Index of total		100.0	82.8	92.4	104.5	126.4	151.8

a. Ruble values have been converted into US dollar values at the official exchange rate of 4 rubles to US $1.
b. 74/
c. The price is estimated on the basis of the average price decline between 1950 and 1955 applied to the 1950 price for this model.
d. Discontinued after 1952.
e. The price is estimated on the basis of the general characteristics of the model.
f. The price is that reported in 1956. This model was first produced in late 1955.

APPENDIX B

DEVELOPMENTS IN PRODUCTION AT SELECTED TRACTOR PLANTS 1953-56

A survey of achievements in production of tractors and change-overs of models at individual Soviet plants is presented below.

1. Khar'kov Tractor Plant and Khar'kov Tractor Assembly Plant.

Production of the gasoline-powered wheeled tractor KhTZ-7 by the Khar'kov Tractor Plant and the Khar'kov Tractor Assembly Plant rose from 6,000 tractors in 1953 to 17,000 in 1955. In late 1954, some production of KhTZ-7 tractors was moved from the Khar'kov Tractor Assembly Plant to the Khar'kov Tractor Plant, which began to produce these tractors in January 1955. By the end of 1955 the Khar'kov Tractor Plant had replaced KhTZ-7 tractors with the 8-hp diesel DT-14 and also had produced about 1,700 KhTZ-20 tractors. The KhTZ-20 is a diesel tractor based on the DT-54 model but has a more powerful engine. In 1956, after producing about 1,400 KhTZ-7 tractors, the Khar'kov Tractor Assembly Plant began serial production of the diesel self-propelled chassis DSSh-14. The DSSh-14 has its engine mounted behind the driver's seat and in front of the driver's seat a frame to which agricultural implements may be attached for easy control by the driver.

2. Dnepropetrovsk Plant of the Ministry of the Defense Industry and Minsk Tractor Plant.

A spectacular increase in production of "Belarus" tractors, which were produced by the Dnepropetrovsk plant and the Minsk Tractor Plant, was achieved during 1953-56. From less than 500 in 1953, production soared to almost 28,000 in 1955 and about 45,000 in 1956. The Dnepropetrovsk plant, which was under the Ministry of the Defense Industry before the reorganization of 1957,* contributed 21,000 "Belarus" tractors in 1954 and 1955, or 6,000 tractors more than the minimum prescribed in the decree of 20 September 1953, and 29,000 in 1956. 75/ The share of the Minsk plant in production of "Belarus" tractors increased from 469 in 1953 to more than 16,000 in 1956. Production of the gas-generator KT-12 logging tractors slackened in 1955, and replacement of it with the diesel models TDT-40 and TDT-60 was initiated in 1956.

* In the reorganization of 1957 the Ministry of the Defense Industry was merged with the Ministry of General Machine Building and retained at the union level.

3. Chelyabinsk Tractor Plant.

In February 1956 the Chelyabinsk Tractor Plant, which was subordinate to the Ministry of Transport Machine Building before the 1957 reorganization, introduced the first of its series of S-100 tractors, a modification of the S-80 tractor having an engine with a capacity of 100 hp. The drawbar pull of the new tractor was supposed to be increased by 8 drawbar hp by this change. Because of design deficiencies, however, the tractor failed its tests; and, although plans called for 300 S-100 tractors to be completed by the end of February 1956, the tractor had not been placed in serial production by September 1956. 76/ Perhaps 500 S-100 tractors were produced by the end of the year.

4. Stalingrad Tractor Plant.

The Stalingrad Tractor Plant began production of the gas-generator GB-58 general-purpose tractor about 1 June 1955. 77/ In December 1955 the plant commenced serial production of the DT-55 marshland tractor based on the DT-54. 78/ The Stalingrad plant also developed a lighter and more powerful general-purpose version of the DT-54, designated as the DT-61, the first of which was assembled in January 1956. 79/ A special-purpose version of the DT-54, called the DT-57, probably was serially produced by the end of 1956. The DT-57 was designed mainly for cultivating wheat and is capable of maneuvering on mountain slopes up to 20 degrees without turning around at the end of a row. 80/

5. Vladimir Tractor Plant.

Apart from the shift in production from the KhTZ-7 tractor to the DT-14 at the Khar'kov Tractor Plant, the major changeover in models in 1955-56 took place at the Vladimir Tractor Plant. Beginning in November 1955 the Vladimir plant replaced the obsolete "Universal'" series with the diesel row-crop tractor DT-24. 81/ Because changeovers in models have caused production losses in most instances in the past, it is estimated that production at the Vladimir plant dropped from about 17,000 tractors in 1955 to about 13,000 in 1956.

6. Onega Tractor Plant.

Some expansion of productive capacity in the tractor industry took place in 1956 when the former Onega Machine Plant at Petrozavodsk was converted into a tractor plant. New facilities for production are under construction, and old buildings have been enlarged. The new plant, in the timber regions of Karel'skaya ASSR, is estimated to have produced 400 TDT-40 diesel tractors for log dragging in 1956. The

Onega plant is expected to produce diesel tractors at the rate of 5,000 a year by 1960. 82/ About 100 million rubles ($25 million) were allocated in the original Sixth Five Year Plan (1956-60) for reconstruction and development of the Onega plant. Production space is to be increased 150 percent. 83/

APPENDIX C

METHODOLOGY

1. Tables 2 Through 9 and Table 13.

Table 2 is based on Soviet official statistics [redacted] 50X1
[redacted], and the methodology for Tables 3, 4, 5, 6, 7, 8, 9, 50X1
and 13* is given in the text.

2. Table 10.**

Annual production figures for the USSR, the Russian Soviet Federated Socialist Republic, and the Ukrainian SSR, as well as for certain models of tractors, are based on official statistical handbooks. 85/ Data on the Stalingrad Tractor Plant are consistent with production indexes included in the handbook for Stalingradskaya Oblast. 86/

When this information is not sufficient to determine production for individual plants, it has been necessary to rely [redacted] 50X1
[redacted] on Soviet reports of percentage increases and 50X1
plan fulfillment. Data for 1957-60 are based on percentage increases. Some of these reports are related to official figures on production and are, therefore, very accurate. The accuracy of other estimates of the plan depends on the accuracy of the estimate of production for the base year.

For estimates on plants and models not related to official figures the margin of error in any given year may be up to 3 percent. Generally speaking, accuracy is improved over a span of several years. In the latter case the margin of error may be reduced to 2 percent.

3. Table 13.***

Basically, Table 13 is derived from official figures [redacted] 50X1
[redacted]. Detailed figures were given for 1946, 1950, 1955, 50X1
and 1956, and allocations for other years were included in cumulative totals for 1946-50 and 1951-55. In the latter case, estimates of allocations were adjusted to agree with the allocations for individual years as shown in Table 14.****

* Pp. 11, 13, 17, 19, 20, 24, 25, and 35, respectively, above.
** Appendix A, p. 28, above.
*** Appendix A, p. 35, above.
**** Appendix A, p. 37, above.

4. Table 14.*

Table 14 generally is based on official sources. Data on park and retirements for 1947-49 were interpolated. Data on retirements were estimated except when derived from official figures on park and allocations for two or more successive years. Allocations in terms of physical units were taken from Table 13,** unless official figures were given. Estimates of retirements based on the original Sixth Five Year Plan (1956-60) are discussed in the text in connection with Table 6.***

* Appendix A, p. 37, above.
** Appendix A, p. 35, above.
*** P. 19, above.

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