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ECONOMIC INTELLIGENCE REPORT

**PRODUCTION OF CIVILIAN RADIO AND
TELEVISION RECEIVERS IN THE SOVIET BLOC**



CIA/RR 11-S-1

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CENTRAL INTELLIGENCE AGENCY

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(ORR Project 36.306)

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PRODUCTION OF CIVILIAN RADIO AND TELEVISION RECEIVERS
IN THE SOVIET BLOC*

Summary

The estimated production of radio receivers in the Soviet Bloc during 1953 amounted to about 3 million sets. Production is planned to increase to about 4 million sets during 1954. About 1.5 million receivers, or 50 percent of the total 1953 production, including 766,000 crystal sets, were produced in the USSR. Most of the radio receivers produced are of simple design incapable of receiving Western stations.

About 75,000 television receivers were also manufactured in East Germany, Czechoslovakia, and the USSR during 1953. Planned production of television receivers in the Soviet Bloc during 1954 is about 400,000 units. Most of the sets produced in East Germany were sold in the USSR. About 150,000 television receivers were in use in the USSR by the end of 1953, and an additional 34,000 had been produced but were not in use.

Despite the considerable expansion of the electronics industry of the Soviet Bloc since 1948, the civilian radio and television industries have claimed a practically constant share -- 6 to 8 percent -- of the total value of the output of the electronics industry. The electronics industry in the Soviet Bloc continues to be predominantly engaged in military work, although it is probable that in the future a larger proportion of its output will be devoted to civilian radio and television receivers.

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

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S-E-C-R-E-TI. Introduction.A. Statement of the Problem.

CIA estimates have been made of the production of various types of civilian radio and television receivers in the Soviet Bloc. 1/* The present report reviews these estimates, brings them up to date, and correlates additional data with them. In addition, this report classifies receivers by reception capability and thus furnishes indirect information about the listening audience in the Bloc.

The report is intended to serve three purposes: (1) to provide a consolidated reference of available data on Soviet Bloc radio and television receivers, (2) to make available more definite information on receivers capable of receiving international broadcasts, and (3) to provide an indication of the relative economic value of the civilian and military sectors of the electronics industry within the Bloc.

B. Definition of Product.

The products covered in this report are the civilian radio and television receivers distributed to civilian purchasers, institutions, and public places, and traded with the West and among the Soviet Bloc countries. Radios used by the civil police, 2-way radios manufactured for industrial consumers, radios used in relay stations, and wired radio-speaker systems are considered to be outside the scope of this report. Loud speakers and replacement parts have also been omitted.

C. General Description of the Industry.

In general, the receiver industry of the Soviet Bloc, like the electronics industry, is concentrated in the USSR, East Germany, Hungary, and Czechoslovakia. These industries operate on a broad production base to supply a wide variety of electronics apparatus for military, industrial, and civilian use. Telecommunications equipment, including all necessary electronics components and tubes, is supplied to both military and civilian users. To a certain extent, however, these industries are dependent upon imports from the West for specialized test equipment and for raw and semifabricated production materials.



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Plans for the expansion of the receiver industry in the Soviet Bloc are advancing more rapidly than for the electronics industry as a whole. This trend was first observed early in 1953 and was confirmed by A.I. Mikoyan, Minister of Internal and Foreign Trade, as the official Soviet policy in late 1953. 2/ The inauguration of the new policy is taking considerable time. No doubt the prescribed goals will be met, although there may be additional delays. 3/

1. USSR.

The USSR is known to have at least 30 plants whose facilities are totally or partially devoted to the production of radio and television receivers.* Most of these plants are making, or are capable of making, products for military as well as civilian use.

The USSR has not made an all-out effort to produce radio and television receivers. 4/ It has not devoted a major effort to the design of new receivers, and it continues to prefer to copy Western (particularly US) systems and tube designs. 5/

The USSR is encountering considerable difficulty in raising the production of television sets to Plan levels and is approximately 1 year behind schedule in organizing mass production of cathode-ray tubes and television sets. 6/ The burden of producing television sets has been placed on the local industries, and the result will probably be many small producers rather than a few large producers in the industry. 7/ Some of the small producers include Musical Combine, Kiev; Experimental Radio, Kuchino; and NII 380, Leningrad.

The mass-produced television sets will be of two types, 1-channel sets and sets of 2 or more channels with frequency modulation (FM) radio. Both types ultimately will have 16-inch screens. 8/

2. East Germany.

East Germany has 27 plants that have been reported as radio manufacturers and at least 3 other plants that have been reported as manufacturers of television receivers. 9/ Thirteen of these 30 plants manufacture about 85 percent of the radio and television receivers produced in the Soviet Bloc, in terms of value of production. 10/

* See Appendix A for a listing of the major radio and television plants in the Soviet Bloc.

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Frequency modulation (FM) at high frequency is making great progress in East Germany, and many of the sets sold there either have FM or have plug adapters, for FM tuners. Several new FM stations are being built during 1954, and an increased proportion of new radios have FM. 11/ The increased emphasis upon FM receivers may be a device for limiting reception to Soviet Bloc broadcasts as do the fixed station receivers now being mass-produced in East Germany. 12/*

3. Czechoslovakia.

Prewar export catalogues list numerous independent manufacturers of radio receivers in Czechoslovakia. In 1948, when the industry was nationalized and subsequently taken over by the USSR, there were seven producers capable of quantity production.

The major producers have been absorbed into the Tesla group, and only 3 plants remain as civilian radio producers. The A.S. Popov Institute for radio and television research has been moved to the Mikrofona plant in Prague-Strasnice, and is currently the sole producer of television receivers in Czechoslovakia. The Mikrofona plant has been renamed the Josef Haken Plant. [redacted]

[redacted] plants in Ostrava and Bratislava will manufacture television receivers, and [redacted] several types of television receivers will be manufactured. 13/

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50X14. Hungary.

There have been six producers of radios in Hungary since 1948. Of these, only one plant is at present a major producer of civilian radios. 14/ All the plants make radio goods, but their major effort is devoted to military production.

Four of the major prewar plants have been combined into a large establishment in Budapest-Kobanya called Orion. 15/ The former Phillips works is now engaged in tube manufacturing, and the Beloianniss Factory (formerly International Telephone and Telegraph) is an occasional manufacturer of radio sets.

* FM bands in the Soviet Bloc have been established within the 60- to 100-megacycle (MC) range. Some Bloc receivers designed for this FM service are reported as ultra high frequency (UHF) receivers.

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Television sets are being made by the Orion works at Budapest-Kobanya or by the smaller Orion plant in the Ujpest complex. It is presumed that the Orion Ujpest plant is not producing any civilian products, and that the new Kobanya plant is large enough to manufacture television sets as well as radio sets. 16/

5. Poland.

There were only two significant producers of radios and no producers of television sets in Poland in 1953. A small cooperative radio shop is scheduled to begin production of a prototype television set in 1954. This shop (Elektromatyka, at Warsaw) has some of the best engineers in Poland and will probably have the support of the Polish Industrial Telecommunications Institute in Praga, which is responsible for television experimentation. 17/

The two radio factories, T-3 (Marcina Kasprzaka, at Warsaw) which absorbed T-1 and T-13, and T-61 (Zaklady Premyslu Radiotechnicznego, at Dzieronow), are both state-owned. These factories concentrate on the mass production of class 2 and class 3 receivers.*

The Polish radio receiver industry has remained partially dependent upon foreign imports. For example, a large portion of the radio production of Poland consists of sets of Swedish A.G.A. (Svenska Aktiebolaget Gas Accumulator) design assembled in Poland from Swedish parts. The most popular mass-produced radio in Poland, the Pioneer, is constructed with tubes imported from Phillips of the Netherlands. 18/

6. Rumania.

Before World War II, Rumania did not possess any radio manufacturing facilities. The majority of the radios sold in Rumania were either imported or assembled from imported parts. At present there are 2 Rumanian plants that assemble radios; 1 plant, Electromagnetica, has only been in operation since 1952. Electromagnetica was the former International Telephone and Telegraph factory in Bucharest. The major plant, Radio Popular, uses the equipment of the Post Telephone and Telegraph Factory in a new large plant on the site of the old Phillips plant in Bucharest. 19/

* The various classes of Soviet Bloc radio receivers are defined on p. 13.

S-E-C-R-E-T7. Bulgaria.

The only factory manufacturing radio receivers in Bulgaria is part of the industrial enterprise Elprom -- Elektricheskaya Promishlenost. Elprom consists of several manufacturers. Radios are made in one of the Kliment Voroshilov plants, which is now undergoing expansion. The new plant is located in Knyazheva, a suburb of Sofia, on the premises of the prewar Khristo Botev radio factory. The central radio plant is composed of the old State radio factory and machinery from former privately owned plants. Many of the tubes and components are still imported.

II. Production of Civilian Radio and Television Receivers, 1946-54.A. Radio Receivers.1. Production.

In general, the assembly of civilian radio and television receivers is a relatively simple undertaking. If the assembling industry is supplied with sufficient quantities and types of tubes, resistors, capacitors, and other components, large numbers of receiving sets of varying degrees of complexity and performance can be produced. Ample plant capacity and skill for the assembly of these sets on almost any desired scale exists in the Soviet Bloc.

Soviet Bloc plans include large increases in the production of receivers. 20/ These increases will require larger supplies of components than in former years. The supply of components could be the limiting factor in increasing production, as there have been occasional shortages of components in all Bloc countries. 21/ To supply the necessary components for the receiver industry, the existing production facilities must be expanded. There are indications that the components industry will be expanded to keep pace with requirements.

Communist policymakers realize the value of radio as a mass communication medium and have concentrated available resources on the production of large quantities of small, less complex sets. The production of sets with four or fewer tubes has become very common in the Soviet Bloc, and even simple crystal sets are being produced in large numbers in the USSR. The manufacture of simple sets has enabled the Bloc to meet production plans. Although there is no positive indication that the production of such simplified

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types was not a part of Bloc plans, the emphasis on simple sets would seem to be a makeshift method of raising output without a corresponding increase in inputs.

It should be noted that for every country where a plan for radio receivers was established, the country has produced approximately the plan quota, although often the plan is achieved only by making masses of cheap, easily assembled, 1- to 3-tube receivers or crystal sets.

In Poland, Bulgaria, and Rumania the receiver industries were originally subsidiaries of Western companies. These facilities only assembled imported parts. The Soviet policy, however, has been to make each Satellite self-sufficient.

The Soviet Bloc produces civilian radios in a large number of plants. In the USSR alone there are 17 major and 13 minor producers.* In East Germany there are 12 major and 15 minor producers. In Czechoslovakia there are 3 major producers and no minor ones. In Hungary only 1 firm is a major producer, although there are indications that several former producers are going to renew production of civilian receivers. In Poland there are 2 major producers, and Bulgaria and Rumania have 1 major producer each.

East Germany and Hungary are historically exporters of better quality radio equipment. The USSR had begun its radio production well before World War II but had never become an exporter of radio receivers because of a lack of quality and quantity production. Since the war the USSR has attempted to export radio equipment to Western countries.

The estimated production of civilian radio receivers in the Soviet Bloc and in the USSR is shown in Table 1** and Table 2.*** The 1954-56 Plan for production in the USSR shows the stress placed on increasing the production of radio receivers. The production figures may be summarized as follows: 1953 (actual), 1,575,000 sets 22/; 1954 (planned), 2,861,000 sets 23/; 1955 (planned), 3,767,000 sets; and 1956 (planned), 4,400,000 sets.

* Major producers manufacture 25,000 or more sets per year; minor producers manufacture less than 25,000 sets per year.

** Table 1 follows on p. 8.

*** Table 2 follows on p. 9.

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Table 1

Estimated Production of Civilian Radio Receivers in the Soviet Bloc a/
1946-56

											Thousand Units				
Country	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955 Plan	1956 Plan				
USSR															
Tube	235	303	340	410	393	424	589	809	1,410	N.A.	N.A.				
Crystal	10	32	177	409	507	540	653	766	900	N.A.	N.A.				
Total USSR	<u>245</u>	<u>335</u>	<u>517</u>	<u>819</u>	<u>900</u> <u>24/</u>	<u>964</u> <u>25/</u>	<u>1,242</u> <u>26/</u>	<u>1,575</u> <u>27/</u>	<u>2,310</u>	<u>3,767</u> <u>28/</u>	<u>4,400</u> <u>29/</u>				
Bulgaria	N.A.	N.A.	N.A.	3	7	13	20	25	28	<u>30/</u>	N.A.	N.A.			
Czechoslovakia	121	163	267	245	200	230	270	320	340	N.A.	N.A.				
East Germany	60	100	150	220	275	374	<u>31/</u>	398	<u>32/</u>	600	813	<u>33/</u>	N.A.	N.A.	
Hungary	11	15	24	51	100	165	140	150	<u>34/</u>	180	<u>35/</u>	N.A.	N.A.		
Poland	4	7	30	68	119	140	<u>36/</u>	190	<u>37/</u>	250	<u>38/</u>	280	300	<u>39/</u>	N.A.
Rumania	4	8	10	20	24	31	<u>40/</u>	38	48	<u>41/</u>	56	100	<u>42/</u>	N.A.	
Total Soviet Bloc b/	<u>440</u>	<u>630</u>	<u>1,000</u>	<u>1,430</u>	<u>1,620</u>	<u>1,920</u>	<u>2,300</u>	<u>2,970</u>	<u>4,010</u>	N.A.	N.A.				

a. See Appendix C, Methodology.

b. Figures rounded.

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Table 2

Estimated Production of Civilian Radio Receivers in the USSR a/
1945-56

												Thousand Units	
Type and Class	Method of Production	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955 Plan	1956 Plan
1. Class 1	Non-Mass	7	17	25	18	17	14	17	42	61	150		
2. Class 2	Non-Mass	9	28	46	37	55	16	20	54	90	100		
3. Class 3	Non-Mass	b/	b/	b/	27	20	30	35	40	45	60		
4. Rodina c/ Class 2	Mass	35	90	97	108	110	30	15	50	70	50		
5. Rekord c/ Class 3	Mass	25	100	135	150	150	23	17	23	210	400		
6. ARZ c/ Class 4	Mass	N.A.	N.A.	N.A.	N.A.	50	180	200	250	208	400		
7. Moskvich c/ Class 4	Mass	N.A.	N.A.	N.A.	N.A.	8	100	120	130	125	250		
8. Crystal	Mass	4	10	32	177	409	507	540	653	766	900		
Total (1 to 8)		<u>80</u>	<u>245</u>	<u>335</u>	<u>517</u>	<u>819</u>	<u>900</u>	<u>964</u>	<u>1,242</u>	<u>1,575</u>	<u>2,310</u> d/	<u>3,767</u>	<u>4,400</u>
Total All Short-Wave Types (1, 2, 4, and 5)		<u>76</u>	<u>235</u>	<u>303</u>	<u>313</u>	<u>332</u>	<u>83</u>	<u>69</u>	<u>169</u>	<u>431</u>	<u>700</u>		
Total All Tube Types		<u>76</u>	<u>235</u>	<u>303</u>	<u>340</u>	<u>410</u>	<u>393</u>	<u>424</u>	<u>589</u>	<u>809</u>	<u>1,410</u>		

a. See Appendix C, Methodology; CIA/IR files on plants listed in Appendix A;

b. Negligible.

c. This receiver is typical of the group.

d. The Plan figure for 1954 was 2,861,000 units.

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For purposes of comparison, the estimated value of the electronics production of the Soviet Bloc is given as follows: 1953, US \$937 million 44/; 1955, US \$1,410 million; and 1956, US \$1,610 million.

It is assumed that the average value of a radio set in the USSR will be approximately constant during 1953-56, and that the USSR will produce a constant percentage of the radio receiver output and of the electronics industry output in the Soviet Bloc. Allowing these assumptions, the figures given show that the value of production in the electronics industry of the Soviet Bloc will increase from a base of 100 percent in 1953 to 150.5 percent in 1955 and 172 percent in 1956, whereas the value of production of radio receivers in the USSR will increase from a base of 100 in 1953 to 239 in 1955 and 280 in 1956. Thus it is probable that the civilian consumer will receive a larger share of electronics production in the future.

2. Receiver Characteristics.

The characteristics of vacuum tube receivers manufactured in the USSR and in the European Satellites are shown in Table 3* and Table 4.** Tables 3 and 4 reflect the systems used by the countries in the Soviet Bloc to classify radio receivers. 45/ These classifications are not fixed and inflexible, but are more or less standards to guide manufacturers as measures of minimum performance. In the Satellite countries many radios are designed to meet the requirements of the export market, and their standards differ from the standards for radios used in the USSR.

a. Crystal Receivers.

The most common crystal receivers incorporate the use of lead sulfide, germanium, graphite, or carborundum crystals. The characteristics of Soviet radio crystals have been covered elsewhere in intelligence literature. 46/ These sets are usually capable of receiving the 150- to 1,500-kilocycle (kc) bands.

* Table 3 follows on p. 11.

** Table 4 follows on p. 12.

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Table 3

Characteristics of Vacuum Tube Receivers Produced in the USSR a/

Class	Number of Tubes	Super	TRF	KC 150 to 415	KC 520 to 1,600	MC 3.95 to 12.1	Other Short-Wave Bands	Loud Speaker Output	Band Spread	Minimum Power	Loud Speaker Input
1 Line	7 or More	Yes		Yes	Yes	Yes	All	Yes	Yes	4.0	No
2 Line	6 to 7	Yes		Yes	Yes	Yes	1 Optional	Yes	Yes	1.5	Optional
2 Battery	6 to 7	Yes		Yes	Yes	Yes	1 Optional	Yes	Yes	0.15	Yes
3 Line	4 to 5	Yes	Optional	Yes	Yes	Optional	No	Optional	Optional	0.5	Optional
4 Line	3 to 4	Yes	Optional	Yes	Yes	No	No	No	No	N.A.	Optional
4 Battery	3 to 4	Yes	Optional	Yes	Yes	No	No	No	No	N.A.	Yes

a. CIA/IR files on plants listed in Appendix A;

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Table 4

Characteristics of Vacuum Tube Receivers
Produced in the European Satellites a/

Class <u>b/</u>	Number of Tubes	Super	TRF	KC 150 to 1,600	MC 5.8 to 12.5	Other Short-Wave Bands	MC 13.1 to 19	MC 87 to 100
1 Line	7 or More	Yes	No	Yes	Yes	All Wave	Yes	No
1 Line (UHF/FM)	7 or More	Yes	No	Yes	Yes	Optional	Yes	Yes
2 Line	6 to 7	Yes	No	Yes	Yes	All Wave Optional	Yes	No
2 Line (UHF/FM)	6 to 7	Yes	No	Yes	Yes	No	No	Yes
2 Battery	6 to 7	Yes	No	Yes	Yes	All Wave Optional	Yes	No
3 Line	4 to 5	Yes	Optional	Yes	Yes	1 Optional	Yes	No
3 Line (UHF/FM)	4 to 5	Yes	Optional	Yes	Yes	No	No	Yes
3 Battery	4 to 5	Yes	Optional	Yes	Yes	No	Yes	No
4 Line	3 to 4	Yes	Optional	Yes	No	No	No	Optional
4 Battery	3 to 4	Yes	Optional	Yes	No	No	No	No
5 Line	1 to 2	No	Yes	Yes	Yes	No	No	No
6 Line	1 to 2	No	Yes	Yes	No	No	No	No

a. CIA/IR files on plants listed in Appendix A.

b. These classes have not been completely identified.

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S-E-C-R-E-Tb. Vacuum Tube Receivers.

Examination of receivers made in the Soviet Bloc shows that the great majority of the receivers employing vacuum tubes fall into the class of superheterodyne receivers (referred to as supers). Superheterodyne receivers are grouped by class numbers 1 through 4, as follows:

Class 1 receivers usually employ 7 or more tubes and have complete long-, medium-, and short-wave coverage. The bands are 150 to 420 kc, long-wave; 520 to 1,500 kc, medium-wave; and 16, 19, 25, 31, and 49 meters, short-wave. These sets are always powered by wire, whereas all other classes may be battery- or line-supplied.

Class 2 receivers generally employ 6 or 7 tubes covering long- and medium-wave bands, 150 to 415 kc and 520 to 1,500 kc, respectively. This set has 1 short-wave band of 3.95 to 12.1 megacycles (mc), and sometimes a second band extending up to 15 mc.

Class 3 receivers generally employ 4 to 5 tubes covering long- and medium-wave bands, 150 to 415 kc and 520 to 1,600 kc, respectively. This receiver may have a short-wave band of approximately 3.95 to 12.1 mc. It should be noted that the most popular Soviet class 3 receiver, the Rekord, has a short-wave band, 4.28 to 12.3 mc. This class set may be tuned radio frequency (TRF) instead of superheterodyne.

Class 4 receivers represent a category that is in a considerable state of flux. The class 4 receivers are designed for selection or coverage of the long- and medium-wave bands, which would be anywhere from 150 to 1,600 kc. This class receiver generally contains 3 or 4 tubes and may be of the fixed station or select station type, similar to those of East German and Hungarian manufacture.

The estimated production of selected classes of civilian radio receivers in the European Satellites as percentages of national production is shown in Table 5.*

* Table 5 follows on p. 14.

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Table 5

Estimated Production of Selected Classes of Civilian Radio Receivers
in the European Satellites as Percentages of National Production a/*
1946-54

Class	Percent								
	1946	1947	1948	1949	1950	1951	1952	1953	1954
Bulgaria									
2 Line	b/	b/	b/	b/	b/	b/	1	1	1
3 Line	b/	b/	b/	b/	b/	7	6	6	6
4 Line	b/	b/	b/	100	100	93	93	93	93
Czechoslovakia									
2 Line	65.0	65.0	65.0	65.0	65.0	50.0	45.0	40.0	40.0
3 Line	35.0	35.0	35.0	34.5	34.5	49.5	54.5	59.5	59.5
4 D.C.	b/	b/	b/	0.5	0.5	0.5	0.5	0.5	0.5
East Germany									
1 Line	15	8	6	4	3	2	2	1	1
2 Line	10	9	8	7	7	6	6	6	5
2 Line (UHF/FM)	5	6	7	7	6	6	6	6	5
3 Line	20	20	18	16	18	18	18	18	13
2 Line (UHF/FM)	5	8	9	10	9	9	9	10	7
3 Battery	b/	b/	b/	b/	b/	2	3	3	3

* Footnotes for Table 5 follow on p. 16.

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Table 5

Estimated Production of Selected Classes of Civilian Radio Receivers
in the European Satellites as Percentages of National Production a/
1946-54
(Continued)

Class	Percent								
	1946	1947	1948	1949	1950	1951	1952	1953	1954
East Germany (Continued)									
4 Line	20	19	22	25	25	24	17	19	15
4 Battery	b/	b/	b/	1	2	3	3	3	3
5 Line	25	30	30	30	30	30	36	34	12
6 Line	b/	b/	b/	b/	b/	b/	b/	b/	36
Hungary									
1 Line	2	2	4	3	2	2	1	2	2
2 Line	18	18	15	17	14	16	16	17	19
2 Battery	b/	b/	b/	b/	2	2	1	1	2
3 Line	80	80	81	70	20	24	9	11	15
3 Battery	b/	b/	b/	b/	2	2	1	2	2
4 Line (Fixed Tuned)	b/	b/	b/	10	60	54	72	67	60
Poland									
1 Line	b/	b/	b/	1	b/	b/	b/	b/	b/
3 Line	b/	100	100	99	96	82	87	90	91
3 Battery	b/	b/	b/	b/	4	18	13	10	9

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Table 5

Estimated Production of Selected Classes of Civilian Radio Receivers
in the European Satellites as Percentages of National Production a/
1946-54
(Continued)

Class	Percent								
	1946	1947	1948	1949	1950	1951	1952	1953	1954
Rumania									
2 Line	b/	b/	b/	b/	6	10	7	5	5
2 Battery	b/	b/	b/	5	2	b/	b/	b/	b/
3 Line	100	100	100	75	17	10	16	14	12
4 Line	b/	b/	b/	20	75	80	77	81	83

a. CIA/IR files on plants listed in Appendix A.

b. Negligible.

S-E-C-R-E-T

S-E-C-R-E-TB. Television Receivers.1. Production.

At the present time there are 9 manufacturers of television sets in the USSR, 7 of which are just beginning production; 3 present producers and 1 future producer in East Germany; 1 present producer and 2 future producers in Czechoslovakia; and only 1 producer in Hungary. Poland is to start production during 1954 on a minor scale in one small cooperative workshop.

The production of television receivers in the Soviet Bloc has been very limited. The small production up to 1953 was of great propaganda value, and served to train technicians while engineers were standardizing models for the expansion of television production. Because of the similarity of techniques employed, this training is invaluable in the establishment of a corps of personnel able to design, build, and maintain military electronics equipment. 48/

The estimated production of television receivers in the Soviet Bloc in 1940 and 1947-56 is shown in Table 6.* The characteristics of television receivers produced in the Bloc are shown in Table 7.** The figures on production of sets of Soviet design made in East Germany for use in the USSR are particularly noteworthy.

Soviet press statements are so worded that existing facilities or production could easily be interpreted to include East German production. It is known that the USSR has been responsible for the television production quotas established for East Germany. 49/

The Soviet Fourth Five Year Plan (1946-50) scheduled a goal of 85,000 television receivers by 1950. Though much publicity was given to the production of television receivers, actual production fell far short of this figure. 50/

The Soviet Fifth Five Year Plan (1951-55) stated that by 1955 the total production of radio and television receiving units would be twice the 1950 rate. A series of statements released in 1953 by high-ranking officials gave figures on mass production of television

* Table 6 follows on p. 18.

** Table 7 follows on p. 19.

S-E-C-R-E-T

Table 6

Estimated Production of Television Receivers in the Soviet Bloc a/
1940 and 1947-56

Country	Units										
	1940	1947	1948	1949	1950	1951	1952	1953	1954 Plan	1955 Plan	1956 Plan
USSR	100	1,000	3,000	5,000	9,000	11,000	15,000	34,000	325,000 <u>51/</u>	760,000 <u>52/</u>	1,000,000 <u>53/</u>
East Germany b/	<u>c/</u>	<u>c/</u>	<u>c/</u>	<u>c/</u>	<u>c/</u>	30,600	34,500	40,100 <u>54/</u>	79,500 <u>55/</u>	N.A.	N.A.
Czechoslovakia	<u>c/</u>	<u>c/</u>	<u>c/</u>	<u>c/</u>	<u>c/</u>	<u>c/</u>	<u>c/</u>	1,200	5,000	N.A.	N.A.
Hungary	<u>c/</u>	<u>c/</u>	<u>c/</u>	<u>c/</u>	<u>c/</u>	<u>c/</u>	<u>c/</u>	<u>c/</u>	2,000	N.A.	N.A.
Total	<u>100</u>	<u>1,000</u>	<u>3,000</u>	<u>5,000</u>	<u>9,000</u>	<u>41,600</u>	<u>49,500</u>	<u>75,300</u>	<u>411,500</u>	<u>N.A.</u>	<u>N.A.</u>

a. See Appendix C, Methodology.

b. Production in plants owned by the USSR.

c. Negligible.

S-E-C-R-E-T

S-E-C-R-E-T

Table 7

Characteristics of Television Receivers Produced in the Soviet Bloc a/*

Model Number	Country and Manufacturer	Retail Price	Picture Tube			Number of Receiving Tubes	Features of Receiver
			Type	Tube Diameter (Inches)	Screen Diameter (Centimeters)		
T-5 and T-6	USSR	N.A.	N.A.	N.A.	N.A.	N.A.	New models, scheduled to appear in 1952.
OSW	East Germany Sachsenwerk-Radeberg	N.A.	N.A.	9 Rectangular	18 x 13	N.A.	Probably released under other names.
Avangard TL-1	USSR	N.A.	31LK1B	12	18 x 24	16	
Pioneer TL-2	USSR	N.A.	Electrostatic	7	14 x 10.5	9	
Sever-2	USSR	N.A.	23LK1B	9	18 x 13.5	17	Two-channel receivers have ultra high frequency (UHF).
Sever-3	USSR	N.A.	31LK1B	12	18 x 24	17	Three-channel receivers have UHF.
Svet	USSR	N.A.	40LK1B	16	24 x 32	16 to 22	
Temp	USSR	N.A.	N.A.	10 to 12	N.A.	16 to 22	Mentioned as new set to start in 1954; will have 16 to 22 tubes.
Volna	USSR	N.A.	N.A.	10 to 12	N.A.	16 to 22	Mentioned as new set to start in 1954; will have 16 to 22 tubes.
TZ-A	USSR	N.A.	N.A.	12	N.A.	N.A.	

* Footnote for Table 7 follows on p. 22.

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Table 7

Characteristics of Television Receivers Produced in the Soviet Bloc a/
(Continued)

Model Number	Country and Manufacturer	Retail Price	Picture Tube			Number of Receiving Tubes	Features of Receiver
			Type	Tube Diameter (Inches)	Screen Diameter (Centimeters)		
4001 A	Czechoslovakia Tesla	4,000 Crowns	25QP20	10	20 x 15	22	Tubes are copies of US or UK -- similar to KVN-49.
Moskva T-1	USSR Order of Lenin	1,500 Rubles	18LK1B	7 Round	14 x 10.5	20	Table model receiver, tuneable for probably 1 or possibly 2 television channels at about 50 mc and for FM radio at about 70 mc, 625-line picture.
Leningrad T-1	USSR Kazitskiy	2,000 Rubles	18LK1B	7 Round	14 x 10.5	22	Table model receiver, probably for 441- and 625-line pictures.
KVN-49	USSR Order of Lenin Electrosignal	1,275 Rubles	18LK1B	7	14 x 10.5	16	Table model receiver, designed for lower production cost; probably similar to T-1.
Leningrad T-2	East Germany Sachsenwerk- Radeberg	2,196.50 Rubles	23LK1B	9 Round	18 x 13.5	32	Combination table model receiver for AM radio, television, and FM radio. Three picture channels (49.75, 59.25, and 77.25 mc); FM radio band at 67 mc; low- and medium-wave AM radio bands. Both 441- and 625-line pictures.

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Table 7

Characteristics of Television Receivers Produced in the Soviet Bloc a/
(Continued)

Model Number	Country and Manufacturer	Retail Price	Picture Tube			Number of Receiving Tubes	Features of Receiver
			Type	Tube Diameter (Inches)	Screen Diameter (Centimeters)		
Leningrad T-3	USSR Kazitzkiy	USSR	30LK1B	12 Round	24 x 18	34	Console model television, AM radio and phonograph combination, probably for standard 625-line picture. Prototype models only.
T-4	USSR	N.A.	LK100	N.A.	Approximately 90 x 67	N.A.	Projection console model television, AM radio, and phonograph combination, for use in public places. Prototype models.
T-4-50 Fe 852	USSR East Germany Werk HF and Sachsenwerk- Radeberg	N.A. 1,800 DME	LPK100 HF 2963	N.A. 12	38.1 x 50.8 24 x 18	35 24	Same as T-4 (new model). Uses miniature tubes in prototype stage only.

S-E-C-R-E-T

Table 7

Characteristics of Television Receivers Produced in the Soviet Bloc a/
(Continued)

Model Number	Country and Manufacturer	Retail Price	Picture Tube			Number of Receiving Tubes	Features of Receiver
			Type	Tube Diameter (Inches)	Screen Diameter (Centimeters)		
Fe 852 A	East Germany Werk HF and Sachsenwerk- Radeberg	1,800 DME	HF 2963	12	24 x 18	24	Same as Fe 852, without miniature tubes.
Fe 852 B	East Germany Werk HF and Sachsenwerk- Radeberg	1,800 DME	HF 2963	12	24 x 18	20	Latest revision of FE 852 adapted for use in East Germany. Will receive 92.5 mc FM Berlin.
Orion	Hungary Orion	N.A.	N.A.	N.A.	N.A.	N.A.	New set in production in 1954.
Experimental Television	USSR	N.A.	N.A.	N.A.	300 x 400	N.A.	Projection type for use in movies.

a. CIA/IR files on plants listed in Appendix A.

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receivers and also revised former goals, as follows 56/: 1954 Plan, 325,000 units; 1955 Plan, 760,000 units; and 1956 Plan, 1,000,000 units.

These goals are a departure from former trends and represent part of an increased effort to produce civilian goods. The Ministry of Electrical Industry, formerly responsible for the production of television receivers, is responsible for only 60 percent of the new planned production; the remainder presumably is to be made by the local industries. 57/ The USSR will attempt to increase production of television receivers without decreasing military production. The recently announced creation of a new Ministry of Radio Technical Industry may be a clue to the importance placed on reaching planned production goals. The new ministry should achieve the desired effect of either producing or acquiring the necessary components of production without conflict to end use, thus eliminating the main bottleneck in production caused by shortages of components. Once the components are made available, the assembling can be done with existing facilities and manpower.

There are several indications that before 1953 the Soviet effort to produce television receivers was little more than groundwork for the future. This may have been a direct result of the limited extent of cathode-ray picture tube facilities in the USSR and the failure to standardize on a few tubes that can be mass produced. Before the end of 1953 there was no indication that the USSR had successfully mastered the necessary technology to mass produce any type of cathode-ray tube for television purposes. Although the capacity and facilities may now exist, they are used for other purposes. Another and more reasonable explanation behind the lack of Soviet production of cathode-ray tubes may be the fact that East Germany can produce the required television sets. The sets produced in East Germany up to the end of 1953 were largely Soviet-designed T-2 Leningrad receivers. This receiver costs the Germans 1,325 DME to make and is sold to the USSR for 675 DME. The sets on arrival in Moscow are inspected by the Technical Control Division (OTK), which deducts from 25 to 90 percent of the price paid as penalty for "fault or damage." The sets have a 500-working-hour guarantee, checked by Soviet timekeepers and therefore not usually fulfilled, so that the manufacturer usually has to replace the complete set of 32 tubes plus 1 cathode-ray tube at a cost of 600 to 700 DME. It is far more advantageous for the Russians to buy an East German set for 675 DME and get a 50-percent rebate plus a new set of tubes worth 675 DME, than to build the set in the USSR. 58/

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The future for television in the Soviet Bloc looks bright according to the Soviet plan to produce 1 million television receivers in 1956 in the USSR alone. There are about 79,500 sets planned for East Germany in 1954, and many of these will go to the USSR and Satellites. A limiting factor to realization of the Soviet plan for 1956 lies in the shortage of components, especially cathode-ray picture tubes. As the Russians begin to standardize on a few picture tube types and enlarge their facilities, this factor should be eliminated. Part of the required picture tubes can be imported from the growing facilities of East Germany.

The design trend in Soviet television receivers is 4 to 5 years behind that of the US. Television receiving sets are becoming simpler and cheaper, while the picture tubes are growing larger.

2. Operation.

Television stations are currently operating in Moscow, Leningrad, Kiev, Khar'kov, Gor'kiy, Berlin, Warsaw, Prague, and Budapest. Amateur or test centers exist in Sverdlovsk, Tomsk, Baku, Riga, Minsk, and Vladivostok. There may also be others.

Soviet television channels have been established as follows 59/:

<u>Channel</u>	<u>Picture (mc)</u>	<u>Sound (mc)</u>
I	49.75	56.25
II	59.25	67.75
III	77.25	83.75

An FM radio band established from 66.0 to 67.5 mc leaves a gap from 67.5 to 75.5 mc in the TV band of 48 to 84 mc. This gap is required to accommodate the early-warning low-frequency radar of the older designs operating in the 70-mc region. 60/

S-E-C-R-E-TC. Availability and Price.1. Receivers.

The price information given in the following discussion is an indication of price ranges and is not the specific price of any particular receiver. In the large cities radio receivers are available, even though a short waiting period may exist. The waiting period increases with the price of the receiver up to class 1, which requires a special purchase permit or the payment of an amount above the quoted price. This practice is believed still in operation. The prices of radio and television receivers in the USSR are shown in Table 8.

Table 8

Prices of Radio and Television Receivers in the USSR 61/

<u>Type or Class</u>	<u>Number of Tubes</u>	<u>Approximate Price (Rubles)</u>	<u>Subscription Fee (Rubles) ^{a/}</u>
Radio Receivers			
Class 1	7 or More	1,200 to 1,600	36
Class 2	6 to 7	600 to 700	54
Class 3	4 to 5	220 to 400	75
Class 4	3 to 4	180 to 250	N.A.
Crystal	0	30 to 60	5
Wired Speaker	0	N.A.	4
Television Receivers			
Leningrad T-1	22	2,000.0	N.A.
KVN-49	16	1,275.0	N.A.
Leningrad T-2	32	2,196.5	N.A.

a. The subscription fee is the fee paid to the state giving the owner the right to use the radio. This amount is over and above the registration fee of about 14 rubles.

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Television receivers can be purchased in the Soviet Bloc only after a long wait and at a relatively high price, and even then the most influential and outstanding workers seem to obtain the existing sets first. This situation will probably change as production increases and additional lower priced sets become available to a larger consumer group. 62/

There is no doubt that a shortage of certain components exists in the USSR. Shortages, which appear to be perennial in one line or another, have existed in tubes, resistors, capacitors, cathode-ray picture tubes, and even in manpower for servicing. 63/

In recent years, Soviet articles have discussed the interchangeability of Hungarian and Soviet tubes. At the same time there has been a more abundant supply of all types of tubes for replacement purposes with the exception of cathode-ray picture tubes, which are still in short supply. Batteries have been in short supply and, although there is evidence which tends to show a more abundant supply at present, the shortage still exists.

2. Purchase Regulations. 64/

With the purchase of every receiver the new owner is given a set of instructions describing maintenance and conditions for best operation, including the following: (a) The owner must register the radio receiver within several days at the nearest postoffice. (b) The owner must register all radio receivers in his possession. (c) Evasion of registration is subject to fine and/or summary criminal liability. (d) Registration certificates are non-transferable and may be used only in the area in which issued. (e) The registration certificate, together with the receipt for the subscriber's fee, must be kept with the receiver.

III. Trends and Indications.

A. Trends in Production.

1. Radio Receivers.

The trend in the production of radio receivers in the Soviet Bloc is upward. Both the Satellites and the USSR are increasing their civilian radio output as fast as is compatible with growing military requirements. 65/

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Since 1950, radio sets have grown less complex, requiring fewer tubes and having smaller ranges of reception. ^{66/} Opposed to this observed trend in the Soviet Bloc is the future plan of the USSR to produce a larger percentage of the larger, more complex sets capable of all-wave reception. The production of more complex sets is at present very small as compared with over-all receiver production in the Bloc. By concentrating on less complex sets the USSR has been able to increase the production of radio receivers without a proportionate increase in the resources devoted to civilian radio receivers.

2. Television Receivers.

Facilities for the production of television sets in the USSR increased enormously in 1952-54. Before 1951 only 2 plants produced television sets, but by the end of 1954 there will be 9 or more producing plants. These plants have a 1954 Plan quota of 325,000 television receivers. Estimated production in 1953 was only 34,000 sets, and the 1954 quota probably will be too great for the USSR to fulfill. It is expected that the Fifth Five Year Plan, like the Fourth Five Year Plan, will fall far short of the goal for television sets. Although the production of television receivers will show continuous increases for the next few years, the USSR will probably be unable to reach the 1956 Plan goal of 1 million sets. Approximately 150,000 television receivers were in use in the USSR by the end of 1953, and an additional 34,000 had been produced but were not in use.

East Germany is a major manufacturer of television receivers; its production exceeds that of the USSR. There are two large plants in East Germany devoted to television assembly and several more plants that could easily be adapted to television assembly if the Soviet demand for sets increases appreciably over the present level. There is no indication at present, however, that East Germany will be required to produce over 80,000 sets per year. East Germany and Hungary probably will be required to produce television sets for use in the USSR and the Satellites.

It is believed that television production in Poland and Czechoslovakia for a few years will be limited to experimental efforts, designed mainly for propaganda and training purposes.

S-E-C-R-E-TB. Proportion of the Electronics Industry Devoted to the Production of Civilian Receivers.

The total value of production of the electronics industry in the Soviet Bloc for 1953 is estimated at US \$937 million, including tube production, which is valued at US \$104 million. The estimated value of radio and television receiving sets produced in the Soviet Bloc in 1953 is shown in Table 9.* The value of civilian radio and television sets produced in 1953 is estimated to be US \$57 million, or about 6 percent of the total value of production of the electronics industry. This 6 percent can be inflated by considering the sale price of the receiving sets rather than the factory f.o.b. manufacturing price. It is more accurate, however, to use f.o.b. factory prices, as they are more representative of true value than a retail price that includes markups of 40 to 100 percent.

The value of tubes used in the manufacture of radio and television sets plus the value of replacement tubes required to maintain existing radio and television facilities is estimated at US \$18 million, or approximately 17 percent of the total value of tube production in the Soviet Bloc in 1953.**

C. Indications.

Authorities in the Soviet Bloc countries understand the importance to the regime of maintaining a maximum amount of contact with their people by means of radio and at the same time of incurring a minimum drain on their already taxed electronics industry. The devices employed to provide this economical broadcasting coverage include the production of sets with few tubes, the production of sets with few or no short-wave bands, and the production of crystal sets and wired radio.

The Soviet Bloc in achieving economical broadcasting is also reducing the percentage of listeners who can be reached by Western broadcasts. This is a result of the increasing production of sets with no short-wave bands, of sets which cannot be tuned at the option of the listener (even on the broadcast band), and of wired radio.

* Table 9 follows on p. 29.

** See Appendix C, Methodology.

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Table 9

Estimated Value of Radio and Television Receiving Sets
Produced in the Soviet Bloc a/
1953

<u>Country</u>	<u>Number of Sets</u>	<u>Manufacturers' Price F.O.B. per Set (\$ US)</u>	<u>Value of Production F.O.B. Factory <u>b/</u> (\$ US)</u>
Radio			
Bulgaria	25,000	12.00	300,000
Czechoslovakia	320,000	22.00	7,040,000
East Germany	600,000	12.50	7,500,000
Hungary	150,000	22.00	3,300,000
Poland	250,000	12.00	3,000,000
Rumania	48,000	8.00	384,000
USSR	1,575,000	14.30	22,522,500
Television			
East Germany	40,100	200.00	8,020,000
USSR	34,000	150.00	5,100,000
Czechoslovakia	1,200	150.00	180,000
Total			<u>57,346,500</u>

a. See Appendix C, Methodology.

b. The f.o.b. factory price is the price a US factory would charge for the Soviet Bloc receiver if it were made by US methods.

Despite considerable publicity accorded the progress of television in the USSR, there is strong evidence that the Soviet civilian television production program has been purposely restricted to a modest scale and that at least until 1956 the television audience in the Soviet Bloc will be limited to residents of the USSR and privileged party members in the Satellites.

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The major effort of the electronics industry in the Soviet Bloc is devoted to the manufacture of military electronics products. Despite the magnitude of planned increases in output for the industry, the Plan for radio receivers will probably be met, but shortages will delay attainment of the Plan for television receivers.

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APPENDIX A

MAJOR RADIO AND TELEVISION PLANTS
IN THE SOVIET BLOC a/*
1954

Plant	Location
	USSR
Radio Assembly Plant	Irkutsk
Baku Radio Factory	Baku
Krasnyy Oktyabr' Works	Moscow
Ordzhonikidze	Sarapul
Leningrad Radio Factory b/	Leningrad
Order of Lenin Radio Factory b/	Moscow
Radiotekhnika-Popov Radio	Riga
Punane Ret	Tallin
V.E.F. Radio	Riga
Molotov Radio b/	Minsk
Kazitskiy Radio	Omsk
Elektrosignal b/	Voronezh
Aleksandrovskiy Radio	Aleksandrov
Electrical Equipment Plant	Novosibirsk
Berdsk Radio Plant	Berdsk
	East Germany
Stern Radio (formerly Phonetika)	Berlin
Elektro Apparate Werk (formerly AEG)	Berlin-Treptow
Stern Radio (formerly Graetz)	Rochlitz
Stern Radio (formerly Rundfunk)	Strassfurt
Stern Radio (formerly Elektro Apparate Werk Koppelsdorf)	Sonneberg
Funkwerk (formerly Mende)	Dresden
Funkwerk (formerly Koerting)	Leipzig
Stern Radio (formerly Opta)	Leipzig
Messgeraetewerk (formerly Siemens)	Zwoenitz
Rema	Stahlberg

* Footnotes follow on p. 33.

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<u>Plant</u>	<u>Location</u>
	East Germany (Continued)
Sachsenwerk <u>c/</u>	Radeberg
Sachsenwerk <u>c/</u>	Niedersedlitz
Werk H.F. fuer Fernmeldewesen <u>c/</u>	Berlin
	Czechoslovakia
Phillips I <u>d/</u>	Prague-Hloubetin
Radiotechna (formerly Telefunken)	Prelow
Telefunken	Bratislava
Tesla (formerly Telegrafia)	Pardubice
Electrum	Brno
Navotny	Hardec Kralove
Mikrofona	Prague-Strasnice
	Hungary
Orion <u>e/</u>	Budapest XIII-Ujpest
Orion <u>e/</u>	Budapest-Kobanya
Telefunken <u>e/</u>	Budapest
Siemens <u>e/</u>	Budapest VI
Beloianiss (formerly International Telephone and Telegraph)	Budapest XI
Phillips <u>f/</u>	Budapest
	Poland
Marcina Kasprzaka	Warsaw
Zaklady Premyslu Radiotechnicznego	Dzieroniow
	Rumania
Electromagnetica (formerly International Telephone and Telegraph)	Bucharest
Radio Popular	Bucharest

S-E-C-R-E-T

Plant	Location
Kliment Voroshilov	Bulgaria Knyazhevo, Sofia

-
- a. Data from CIA/IR files on plants listed.
 - b. Manufactures television receivers as well as radio receivers. All Soviet plants listed produce radio sets.
 - c. Manufactures television receivers. The plant in Radeberg is the major television receiver manufacturer.
 - d. All of the listed Czechoslovak plants have been absorbed into the Tesla group.
 - e. Combined into one large establishment in Budapest-Kobanya, called Orion.
 - f. Manufactures tubes at present.

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S-E-C-R-E-T

APPENDIX B

TYPES AND CHARACTERISTICS OF RADIO RECEIVERS
PRODUCED IN THE SOVIET BLOC a/*

<u>Country and Type</u>	<u>Class</u>	<u>Characteristics</u>	<u>Wave Bands</u>
USSR			
Moskva	1	10-Tube Console, R.P. b/	L, M, 2 SW c/ (9.2 to 18 mc)
Leningrad	1	12-Tube Console, R.P.	L, M, 4 SW (4.2 to 15.46 mc)
Marshal-M or Neva	1	8-Tube Console, R.P.	L, M, SW (6 to 9 mc)
Neva	1	9-Tube Console, R.P.	L, M, 3 SW (4.2 to 20 mc)
SVD-9	1	9-Tube Console, R.P.	L, M, 2 SW (3.5 to 18 mc)
Tekhnika	1	9-Tube Console, R.P.	Probably L, M, 2 SW
Radiotekhnika			
Radiogram	1	24-Tube Console, R.P.	9 Wave Lengths
Riga T-689	1	9-Tube Console, R.P.	L, M, 3 SW (3.96 to 15.5 mc)
Radiola	1	8-Tube Console, R.P.	L, M, SW
D-11 Radiola	1	11-Tube Console, R.P.	L, M, SW (6.0 to 18.0 mc)
T M-7	1	7-Tube Console, R.P.	L, M, 2 SW (3.5 to 18.0 mc)
T M-8	1	7-Tube Console, R.P.	L, M, 2 SW (3.5 to 18 mc)
Byeloruss	1	13 or 14 Tubes	L, M, 3 SW (5.4 to 15.45 mc)
PTS-47	1	10 Tubes	L, M, 4 SW (4.0 to 15.6 mc)
PTB-47	1	8 Tubes	L, M, 4 SW (4.0 to 15.6 mc)
RL-1	1	7 Tubes	N.A.
Riga	1	21-Tube Console, R.P.	N.A.
L-50 Leningrad	1	15 Tubes (Also Used in T-3 Television)	L, M, 3 SW
Minsk R-7	1	7 Tubes, R.P.	
Ukraina	1	8 Tubes, R.P.	L, 2 M, SW, 8 Bands
Neva-52	1	9 Tubes, R.P.	L, M, 3 SW (4.2 to 20 mc)
Riga-10	1	10 Tubes (Two Models)	L, M, 3 SW (3.95 to 12.1 mc)
Latvia or Riga or M-137	1	13 Tubes, R.P.	L, M, 3 SW (4.28 to 15.5 mc)
MIR	1	13 Tubes, R.P.	N.A.
RET	2	6 Tubes, R.P.	N.A.
Minsk R-7	2	6 Tubes, R.P.	N.A.

* Footnotes follow on p. 43.

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Country and Type	Class	Characteristics	Wave Bands
USSR (Continued)			
Zvezda	2	6-Tube, R.P.	N.A.
7N-27 Vostok	2	7-Tube, R.P.	L, M, 2 SW (4.3 to 15.5 mc)
New Pioneer	2	6 or 7 Tubes	L, M, SW (6 to 20 mc)
528-6 Moskvich	2	7 Tubes	L, M, SW (4.3 to 12.2 mc)
EL-2 or Elektro- signal-2	2	7 Tubes	L, MW
6 N-25	2	6 Tubes	L, MW
Baku-51 or Baku	2	6 Tubes	L, M, 2 SW (N.A. to 18.7 mc)
VM-697 or VEF-M-697	2	6 Tubes	L, M, SW (4.28 to 12.1 mc)
Baltika	2	6 or 7 Tubes UHF d/, 43 to 60 mc (Two Models)	L, M, 2 SW UHF (3.95 to 12.1 mc)
Bootok-49	2	6 Tubes	L, M, 2 SW (4.0 to 16.1 mc)
Vostok-49	2	6 Tubes	L, M, 2 SW (4.0 to 16.1 mc)
RE-1	2	6 Tubes	L, M, 2 SW
RE-14	2	6 Tubes	L, M, 2 SW
62-UR	2	7 Tubes	L, M, SW
Rodina	2	6 or 7 Tubes, Battery	L, M, SW (9.2 to 12.2 mc)
VEF-M-557	2	6 Tubes	L, M, SW (4.28 to 12.1 mc)
6N-1	2	6 Tubes	L, M, SW (5.8 to 19.10 mc)
M648-Moskva	2	6 Tubes	N.A.
Rodina-47	2	6 Tubes, Battery	L, M, SW (4.3 to 12 mc)
Elektrosignal-3	2	6 Tubes, Battery	L, M, SW (4 to 12 mc)
Ural	2	6 Tubes, R.P.	L, M, SW (4 to 12 mc)
Ural-47	2	6 Tubes, with or without R.P.	L, M, SW (4.4 to 15.5 mc)
Ural-49	2	6 Tubes, with or without R.P.	L, M, SW (4.5 to 15.5 mc)
Minsk	2	6 Tubes	L, M, 2 SW (4.3 to 15.4 mc)
VV-661	2	6 Tubes	L, M, SW (6 to 16 mc)
VV-662	2	6 Tubes	L, M, SW (3.92 to 19.5 mc)
Riga-6	2	6 Tubes	L, M, SW
Volga	2	6 Tubes	N.A.
Pioneradiola	2	6 Tubes, R.P.	L, M, SW (6 to 20 mc)
Riga-8	2	6 Tubes	N.A.
Vostok-48	2	7 Tubes	L, M, 2 SW (4.0 to 16.1 mc)
PU-563	3	5 Tubes, Battery	N.A.

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Country and Type	Class	Characteristics	Wave Bands
USSR (Continued)			
Zarya	3	N.A. Tubes, Printed Circuit	N.A.
Tekhnik-K	3	5 Tubes	N.A.
Moskva	3	5 Tubes	L, M, SW (9.2 to 12.4 mc)
Efir-48	3	5 Tubes, AC or Battery	N.A.
Rekord-47	3	5 Tubes	L, M, SW (4.0 to 11.8 mc)
Rekord	3	5 Tubes, with or without R.P.	L, M, SW (4.28 to 12.3 mc)
RV-461	3	4 Tubes, Battery	N.A.
RL-9	3	4 Tubes, Battery	L, M, SW (6.0 to 18.6 mc)
Salyut	3	5 Tubes	L, M, 3 SW (4.28 to 16.1 mc)
Pioneer	3	5 Tubes	L, M, SW (6 to 20 mc)
URS	3	5 Tubes	L, M, 2 SW
Leningradets	3	5 Tubes	L, 2 M, 4 SW (4.2 to 12 mc)
ECLS-3	3	5 Tubes, TRF e/	N.A.
ECLS-4	3	5 Tubes	N.A.
Rigat-755	3	5 Tubes	L, M, SW (4 to 12.5 mc)
T-35	3	5 Tubes, TRF	L, MW
RP-8	3	5 Tubes, TRF-1	L, MW
EKL-4	3	5 Tubes, TRF	L, MW
EKL-34	3	5 Tubes, TRF	L, MW
ECLS-2	3	5 Tubes, TRF	2 L, 2 MW
Vila	3	4 Tubes	L, M, SW (N.A. to 18.7 mc)
Baku	3	4 Tubes	L, M, 2 SW (N.A. to 18.7 mc)
Partisan	3	4 Tubes	L, M, SW
PU-562	3	5 Tubes	L, M, SW
Kuzbass	3	5 Tubes	L, M, SW
RL-4	f/	N.A. Tubes	N.A.
Dnepr-52	3	5 Tubes	L, M, SW
Dnepr-51	3	6 Tubes	L, M, SW
PR-4	3	Radio Relay	L, M, SW
Moskvich-3	3	5 Tubes	L, MW
Kama	4	3 Tubes, Improved Moskvich with R.P.	L, MW
V-207	4	3 Tubes	L, 2 MW
Iskra	4	4 Tubes	L, MW
4NBS-6	4	4 Tubes, Battery	L, MW
RPK-10	4	4 Tubes, TRF Battery (Also a Tube Aircraft Set)	L, MW

S-E-C-R-E-T

Country and Type	Class	Characteristics	Wave Bands
USSR (Continued)			
Tallin B-2	4	3 or 4 Tubes, Battery	L, MW
Small Super	4	3 or 4 Tubes	L, MW
Kolkhoznyy or Bl-234	4	3 Tubes, TRF Battery	L, MW
Sl-235	4	4 Tubes, TRF	L, MW
ARZ-49	4	3 or 4 Tubes	L, MW
ARZ-51	4	4 Tubes	L, MW
Moskvich	4	3 or 4 Tubes	L, MW
RPK-2	4	3 Tubes, Battery	L, MW
ARZ-52	4	4 Tubes	L, MW
RPK-9	4	3 Tubes, Battery	L, MW
Puteyets	4	4 Tubes, Battery or Line	L, MW
Dorozhnyy	4	4 Tubes, Battery or Line	N.A.
Moskvich-4	4	3 Tubes	L, MW
Ogener	4/	2 Tubes	L, MW
B-912 or Riga-912	4/	2 Tubes, TRF, Battery	L, MW
Salyut	4/	2 Tubes, TRF	L, MW
Tula	4/	2 Tubes, Battery	L, MW
B-1950	4/	2 Tubes, Battery	L, MW
R-461	4/	N.A. Tubes, Battery	L, MW
Standart	4/	2 Tubes, Battery	L, MW
Partisan	4/	2 Tubes, Battery	L, MW
V-207	4/	3 Tubes, 3 Fixed Stations	MW
One Tube	4/	1 Tube	3 Fixed Stations
Malyutka	4/	Crystal	L, MW
Crystadyne	4/	Crystal-Battery Amplifier Attachment	0
Komsomolets	4/	Pocket Set, Crystal	L, MW
ZIF-1	4/	Crystal	L, MW
ZIF-2	4/	Crystal	L, MW
DPKH	4/	Crystal	L, MW
Volna	4/	Crystal	L, MW
SIM-2	4/	Crystal	L, MW
Uzbekstan	4/	Probably Crystal	L, MW
Balena	4/	Probably Crystal	L, MW
Moldaviya	4/	Crystal	Fixed Station
Volsi	4/	N.A.	N.A.
Oktyabr'	4/	N.A.	N.A.

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S-E-C-R-E-T

Country and Type	Class	Characteristics	Wave Bands
East Germany			
Elbia W-579	1	11 Tubes	L, M, 3 SW, UHF
Elbia W-666	1	9 Tubes	L, SW, UHF
Elbia W-465	1	8 Tubes	L, M, SW
9E91	1	9 Tubes	L, M, SW
9E94	1	9 Tubes	L, M, SW
9E95	1	9-Tube Console, A.R.P., h/ Tape Recorder	L, M, SW, UHF
7E84	1	7 Tubes	L, M, SW
Leader Super	1	12-Tube Console, R.P.	L, M, SW
N.A.	1	10-Tube Console, R.P.	L, M, SW
N.A.	1	16 Tubes, R.P.	L, M, SW
7E83	1	7 Tubes	L, M, SW
6E62	2	6-Tube Console, R.P.	L, M, SW (5.9 to 18.2 mc)
6D71	2	6 or 7 Tubes, AC or Battery	L, M, SW
6E95	2	6-Tube Console, A.R.P., Tape Recorder	L, M, SW, UHF
5E61D	3	5 Tubes	N.A.
5E63	3	5 Tubes	L, M, SW, UHF (5.9 to 12.5 mc)
5E64	3	5-Tube Console, R.P.	L, M, SW, UHF (5.9 to 12.5 mc)
5E66	3	5-Tube Console, R.P.	L, M, SW, UHF (5.9 to 12.5 mc)
5E68	3	5-Tube Console, A.R.P.	L, M, SW, UHF (5.9 to 12.5 mc)
5E69	3	5-Tube Console, A.R.P.	L, M, SW, UHF (5.9 to 12.5 mc)
5U61	3	5 Tubes	L, M, SW (5.8 to 19 mc)
5U63	3	5 Tubes	L, M, SW, UHF (5.9 to 12.5 mc)
5U64	3	5-Tube Console, R.P.	L, M, SW, UHF (5.9 to 12.5 mc)
5U66	3	5-Tube Console, R.P.	L, M, SW, UHF (5.9 to 12.5 mc)
5U68	3	5-Tube Console, A.R.P.	L, M, SW, UHF (5.9 to 12.5 mc)
5U69	3	5-Tube Console, A.R.P., Tape Recorder	L, M, SW, UHF (5.9 to 12.5 mc)
S1049C Auto Super	3	5 Tubes, Battery	L, M, SW
Olympia	3	4 or 5 Tubes (New Sets have UHF)	N.A.
4U64	4	4 Tubes	L, M, SW (5.8 to 19 mc)
4U65	4	4 Tubes	L, M, 2 SW, UHF
4U65B	4	4 Tubes, Battery	L, M, SW, UHF (5.9 to 12.5 mc)
4U65C	4	4 Tubes	L, M, UHF (5.9 to 12.5 mc)

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<u>Country and Type</u>	<u>Class</u>	<u>Characteristics</u>	<u>Wave Bands</u>
East Germany (Continued)			
4U67	4	4 Tubes	L, MW
4U68	4	4-Tube Console, R.P.	L, MW
4U69	4	4-Tube Console, A.R.P.	L, MW
Super Dwarf	4	3 Tubes	L, MW, UHF
Auto Standard	4	3 Tubes, Battery	MW
Small Super	4	3 Tubes	M, SW
1U11	5	1 Tube, TRF	L, M, SW (5.9 to 9.8 mc)
1U16	5	1 Tube, TRF	N.A.
Kolibri	6	1 Tube (Two Fixed Stations)	L, MW
Czechoslovakia			
Harmonia I	2	6 Tubes	L, M, 2 SW (13.5 to 50 M)
Indian Harmonia	2	10-Tube Radio Phonograph	L, M, 2 SW (13.5 to 150 M)
Klasic	2	6 Tubes	L, M, 2 SW (13 to 60 M)
Kongress	2	6 Tubes	L, M, 2 SW (13.5 to 52 M)
Romance	2	6 Tubes	L, M, 2 SW (13.5 to 50 M)
Largo	2	6 or 8 Tubes	L, M, 6 SW, UHF (11 to 52 M)
Symphonie	2	6 Tubes	L, M, 2 SW (13.5 to 50 M)
Dominant	2	6-Tube Radio Phonograph	L, M, 2 SW (13.5 to 50 M)
Liberator	3	5 Tubes (Similar to Klasic)	L, M, 2 SW (13 to 60 M)
Pioneer	3	4 or 5 Tubes	L, M, 2 SW (5.7 to 18.2 mc)
Harmonia II	3	5 Tubes	L, M, SW
F444	3	4 Tubes	L, M, 3 SW
Rythmus	3	4 Tubes	L, M, 2 SW (5.7 to 18.2 mc)
Philetta	3	5 Tubes	L, M, 2 SW (5.7 to 18.2 mc)
Beseda	3	5 Tubes	L, M, 2 SW (5.8 to 22.2 mc)
Talisman	3	5 Tubes	L, M, 2 SW (20 to 60 M)
Omikron	4	3-Tube Autoradio	N.A.
Two Tube	5	2 Tubes	MW (500 to 1,500 kc)
Krinta	N.A.	N.A.	N.A.
Melodik	N.A.	N.A.	N.A.
Alpha Popular	1 or 2	N.A.	N.A.

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Country and Type	Class	Characteristics	Wave Bands
Hungary			
A 117	1	8 Tubes	L, M, 2 SW (5.9 to 18.2 mc)
TU 117	1	8 Tubes	M, 5 SW (2 to 26.5 mc)
812 A	1	8 Tubes (Improved 881)	L, M, 4 SW (5.9 to 26.5 mc)
711 A	1	8 Tubes	L, M, 4 SW (2 to 21.8 mc)
882	1	8 Tubes	L, M, 4 SW (5 to 24 mc)
330	1	8 Tubes	L, M, 2 SW (6 to 23 mc)
881	1	8 Tubes	L, M, 4 SW (1.6 to 24 mc)
119	1	8 Tubes	N.A.
A 915	1	6 Tubes	L, M, 2 SW (2.4 to 21.8 mc)
TA 915	1	6 Tubes	M, 3 SW (5.9 to 21.8 mc)
519 A	1	6 Tubes	L, M, 2 SW (2.4 to 21.8 mc)
440	1	6 Tubes	L, M, 4 SW (6 to 22 mc)
442	1	6 Tubes	L, M, 4 SW (6 to 18.75 mc)
48	1	6 Tubes	L, M, 5 SW
47	1	6 Tubes	L, M, 2 SW
46	1	6 Tubes	L, M, 3 SW
45	1	6 Tubes	L, M, 4 SW
44	1	6 Tubes	L, M, 5 SW
75	1	6 Tubes	L, M, 2 SW
442G	2	6 Tubes, R.P.	L, M, 4 SW
441	2	6-Tube Great Super	L, M, 4 SW (6 to 22 mc)
443G	2	7 Tubes, R.P. (Similar to 313)	Reported 3 Fixed Stations
449G	2	6 Tubes, R.P.	N.A.
330	2	6 Tubes	L, M, SW (6 to 23 mc)
331	2	6 Tubes	L, M, SW (6 to 23 mc)
332	2	6 Tubes	L, M, 2 SW (2.5 to 22 mc)
332B	2	6 Tubes, Battery	L, M, 4 SW (6 to 22 mc)
519B	3	4 Tubes, Battery	L, M, SW (6 to 18 mc)
B915	3	4 Tubes, Battery	L, M, SW (5.9 to 18.2 mc)
429U	3	4 Tubes	M, 2 SW (3.34 to 21.8 mc)
429UT	3	4 Tubes	M, 2 SW (3.34 to 21.8 mc)
418 A	3	5 Tubes	L, M, SW (5 to 18.2 mc)
733	3	4 Tubes	L, M, SW (6 to 18.75 mc)
221	3	5 Tubes	L, M, SW (6 to 18 mc)
222	3	5 Tubes	L, M, SW (6 to 18 mc)

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Country and Type	Class	Characteristics	Wave Bands
Hungary (Continued)			
223	3	5 Tubes	L, M, SW (6 to 18 mc)
226	3	5 Tubes	N.A.
432	3	5 Tubes	L, M, 2 SW
434	3	5 Tubes	L, M, 2 SW
436	3	5 Tubes	L, M, 2 SW
672	3	5 Tubes	L, M, 3 SW
684	3	5 Tubes	L, M, 3 SW
686	3	5 Tubes	L, M, 3 SW
772	3	5 Tubes	L, M, 4 SW
782	3	5 Tubes	L, M, 4 SW
792	3	5 Tubes	L, M, 4 SW
Kissuper	3	3 or 4 Tubes	M, SW
RABA	3	5 Tubes	L, M, 4 SW
320B	3	4 Tubes, Battery	L, M, SW (6 to 18 mc)
322	3	5 Tubes	M, SW (6 to 18.75 mc)
323	3	5 Tubes	M, SW (6 to 18.75 mc)
324	3	5 Tubes	M, SW (6 to 18.75 mc)
733	3	4 Tubes	L, MW (6 to 18.75 mc)
339	3	4 Tubes	L, MW (6 to 18.75 mc)
Phillips	3	4 Tubes	L, MW (6 to 15.7 mc)
Rumania			
Rodina	2	6 Tubes, Battery	L, M, SW (6 to 15 mc)
Partisan	2	6 Tubes	L, M, SW
Baltika	2	6 Tubes	L, M, 2 SW
Orion	3	4 Tubes (Assembly of Hungarian Parts)	L, M (Short Wave May be Removed)
Popular	3	5 Tubes	L, M, SW (3.3 to 12 mc)
Pioneer Festival	3	5 Tubes	L, M, SW (6 to 15 mc)
S511A4	3	5 Tubes	L, M, 2 SW (4 to 12 mc)
Phillips 252-A-X	3	5 Tubes	L, M, SW
Phillips	3	4 Tubes	L, M, SW
Popular	4	4 Tubes	L, MW
512U	4	3 Tubes (Same as Pioneer)	L, MW
S521A Pioneer	4	3 or 4 Tubes (Peoples' Radio)	L, MW
Rekord	4	4 or 5 Tubes	L, MW

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<u>Country and Type</u>	<u>Class</u>	<u>Characteristics</u>	<u>Wave Bands</u>
Poland			
Radiola	1	N.A.	L, M, SW
Aga-Baltic	3	5 Tubes (Swedish Licensed Set)	L, M, SW
Pioneer (U-1 and U-2)	3	4 Tubes (Copy of Phillips Receiver)	L, M, SW
Pioneer	3	4 Tubes, Battery	L, M, SW
Mazur	3	5 Tubes (New Model Pioneer)	L, M, SW
Mazurlux	3	N.A.	L, M, SW
Bulgaria			
506	2	6 Tubes	L, M, 2 SW
504	3	5 Tubes	L, M, SW
Pioneer	4	4 Tubes	L, MW
Naroden	4	4 Tubes (Peoples' Radio)	L, MW
Marek	4	4 Tubes	L, MW
Kliment Voroshilov	4	3 Tubes	L, MW
Christo Botev	4	4 Tubes	L, MW
Rodno	4	4 Tubes	L, MW

- a. Data from CIA/IR files on plants listed in Appendix A.
b. R.P.: record player.
c. L, M, SW: long-, medium-, short-wave bands. Only the short-wave bands are given.
d. UHF: ultra high frequency -- refers to the FM band. FM bands in the Soviet Bloc have been established within the 60- to 150-mc range. Some Bloc receivers designed for this FM service are reported as UHF.
e. TRF: tuned radio frequency.
f. Probably Class 3, 4 Tubes.
g. Classes are not given by the Russians. 67/
h. A.R.P.: automatic record player.

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APPENDIX C

METHODOLOGY1. Radio Receiver Analysis.

Slightly different techniques for estimating production were used for each country cited in this report. The basic methodology, however, was the use of official statements concerning installations or referring to production in conjunction with plant studies.

Official Soviet statements in the press provided the order of magnitude of the annual national estimates. Plant studies were used to establish the product mix for vacuum tube receivers. Production estimates for crystal receivers were derived on a manpower basis and projected in terms of 1949 production. The crystal set estimate was not confirmed by press statements.

The estimates on the production of radio receivers in the USSR were based on a series of press statements and checked by plant studies. Two methods, shown in Table 10,* were used to derive the estimates, both depending on the key year, 1950. Estimate 1 was derived by the use of stated yearly increases or stated production. Estimate 2 adds the factor that the 1950 Plan for the production of 925,000 receivers was not reached. Plant studies and one press statement indicate that 1950 production was actually between 800,000 and 900,000 receivers.

An additional check on the figures for the production of radio receivers in the USSR was made through a study of the major radio receiver plants in the USSR. The figures shown in Table 11** are for those years wherein estimates based on press statements appear inconsistent. Modifications must be made in plant study figures to eliminate radio receivers used in wired radio centers or for industrial use.

* Table 10 follows on p. 46.

** Table 11 follows on p. 47.

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Table 10

Methodology Used for Estimating the Production of Radio Receivers
in the USSR
1940 and 1946-53

<u>Year</u>	<u>Estimate 1</u>		<u>Estimate 2</u>	
	<u>Units Made</u>	<u>Method Used</u>	<u>Units Made</u>	<u>Method Used</u>
1940	200,000 <u>68/</u>	Number Given	200,000 <u>69/</u>	Number Given
1946	180,000 <u>70/</u>	1947 Divided by 1.66	180,000 <u>71/</u>	1947 Divided by 1.66
1947	300,000 <u>72/</u>	Number Given	300,000 <u>73/</u>	Number Given
1948	600,000 <u>74/</u>	Number Given	600,000 <u>75/</u>	Number Given
1949	990,000 <u>76/</u>	1.65 Times 1948	740,000 <u>77/</u>	1950 Divided by 1.22
1950	1,210,000 <u>78/</u>	1.22 Times 1949	900,000 <u>79/</u>	Over 4 Times Prewar
1951	1,400,000 <u>80/</u>	1.16 Times 1950	1,040,000 <u>81/</u>	1.16 Times 1950
1952	1,486,000 <u>82/</u>	1.06 Times 1951	1,100,000 <u>83/</u>	1.06 Times 1951
1953	1,890,000 <u>84/</u>	1.27 Times 1952	1,400,000 <u>85/</u>	1.27 Times 1952

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Table 11

Production of Radio Receivers in the Major Radio Plants
in the USSR
1949 and 1953

<u>Radio Plant</u>	<u>Units Made 1949</u>	<u>Units Made 1953</u>
Radiotekhnika	40,400	60,000
Molotov	34,800	60,000
Kazitskiy	100,000	150,000
Leningrad	8,000	20,000
Baku	20,000	35,000
Ordzhonikidze	50,000	60,000
V.E.F. Riga	27,000	100,000
Moscow Radio	3,000	10,000
Punane Ret	15,000	32,000
ARZ	160,000	200,000
Minsk	20,000	30,000
Order of Lenin	78,000	240,000
Red Oktyabr'	25,000	25,000
Vil'nyus	10,000	65,000
Kiev	51,000	40,000
Elektrosignal	100,000	240,000
Tula		100,000
Dnepropetrovsk	4,000	22,000
Novosibirsk		39,000
Berdsk		100,000
Others		200,000
Total	<u>746,200</u>	<u>1,828,000</u>

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For East Germany, documentary evidence was available to establish the production both of the country and of individual plants. The major plants were studied to obtain product mix and confirmation of production. There has been no documentary evidence of production in Czechoslovakia since 1950, and estimates were derived from plant studies and checked by manpower estimates. The estimates in Czechoslovakia could be in error if the production pattern since 1950 has not been constant. Official figures for production in Hungary check with available plant information. Information before 1950 in Poland was conflicting. [redacted]

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50X1

[redacted] there is insufficient plant information to establish a highly accurate product mix. Production in Bulgaria was derived from plant studies alone. There are no official statements that would aid production estimates. Information on installed receivers was confused because of imports from other Soviet Bloc countries. Plant studies offered sufficient information for estimates on the order of magnitude of production in Rumania. Because production is intermittent, depending on imports of parts and consumer demand, accurate estimates will require [redacted] [redacted] official figures.

50X1
50X12. Television Receiver Analysis.

Television estimates were derived mainly from estimates of installed receivers [redacted]. There were no official statements capable of definite interpretation on production, though there were definite statements of plans.

50X1

Production in the USSR was based mainly on former production rates and on the number of TV sets installed in the USSR. There is not enough plant information for an accurate estimate from plant studies.

Fairly accurate production rates were established for 1950 and 1951. These base years were multiplied by announced percentage figures to confirm estimates derived from estimated installation. The USSR has not announced any specific production figure that would establish a firm benchmark.

50X1

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Estimates of production in Poland, Hungary, and Czechoslovakia were made on the basis of press statements. Production is so small on new production lines that confirmation by usual methods cannot be made.

3. Proportion of the Production of the Electronics Industry Used for Civilian Receivers.

The total Soviet Bloc tube production for 1953 is valued at US \$104 million and the value of the 1953 electronics industry production is roughly US \$937 million.

The value of civilian radio and television sets produced in 1953 is estimated to be US \$57 million, or about 6 percent of the total value of the electronics industry. This 6 percent is inflated if the sale price of the receiving sets is considered rather than the factory f.o.b. manufacturing price, which was used to obtain the US \$57 million figure. It is more accurate to use the f.o.b. factory price, because it is more representative of value than is a retail price that includes average markups of 40 to 100 percent.

The Soviet Bloc made 2,202,000 radio receiving sets in 1953 (exclusive of crystal sets) requiring 11,010,000 tubes at a value of US \$6.1 million. This represents 5.8 percent of the value of the Bloc tube production in 1953.

The Soviet Bloc made 40,100 T-2 television sets in 1953, which required 1,285,000 receiving tubes at a value of US \$695,000 plus 35,200 cheaper television sets, which required 704,000 receiving tubes at a value of US \$380,000. These 75,300 sets required cathode-ray picture tubes worth US \$1.506 million. The value of tubes used in television production is US \$2.581 million, or 2.48 percent of the value of the Bloc tube production in 1953.

The total value of tubes used in 1953 in the production of civilian radio and television sets would be US \$8.681 million, or roughly 8.3 percent of the Bloc tube production in 1953.

To derive the total number of tubes going into civilian radio and television sets, the value of tubes used as replacement parts must be added.

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It is estimated that at the end of 1953 there were 12.67 million radio receiving sets in use, of which 2.2 million were 1953 production. Of the older 10.47 million receivers, each set averaged a replacement of one tube, making a total of US \$5.6 million for replacement tubes.

During 1953 there were 117,000 television sets having 3.3 million receiving tubes and requiring 820,000 replacement tubes worth US \$4.5 million. In 1953 these television sets required approximately 50,000 cathode-ray picture tubes worth US \$1 million.

Tubes used in the wired radio network and for miscellaneous radio amplifiers require an additional production of tubes valued at US \$1.5 million.

The total value of tubes used in the manufacture of new radio and television sets plus the value of replacement parts required to maintain the radio and television facilities of the Soviet Bloc is US \$18 million, or roughly 17 percent of the total value of the production of the Soviet Bloc tube industry in 1953.

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