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ECONOMIC INTELLIGENCE REPORT

# SE-38: SOVIET BLOC CAPABILITIES AND PROBABLE COURSES OF ACTION IN ELECTROMAGNETIC WARFARE (BELOW 30,000 KILOCYCLES)

## APPENDIX A: ECONOMIC FACTORS

EIC-R12-S1

20 April 1953

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Prepared by the EIC Subcommittee on Electronics and Telecommunications on the Basis of EIC-R12

ECONOMIC INTELLIGENCE COMMITTEE

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## Statement of Concurrence

This appendix to SE-38 has been approved by the EIC representatives of the Departments of the Army, the Navy, the Air Force, and State and of CIA.

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## APPENDIX A: ECONOMIC FACTORS

### I. Introduction.

1. From an economic point of view, the rapid telecommunications resources of the Soviet Bloc may be regarded as consisting of two principal components: (a) the radio and wire communication systems in being, which include (i) the operating equipment such as transmitters, telephone lines, monitor-control stations, etc.; (ii) the technical personnel who operate and maintain this equipment; and (iii) the essential services and supplies, notably electric power, needed to operate the system; and (b) the communications equipment industry, including its plant facilities, manpower, and supporting sources of essential materials and power.

2. The present physical capabilities of the Bloc for waging electromagnetic warfare are determined almost exclusively by the first component: namely, the radio and wire communication systems in being, particularly the quantity, technical characteristics, and geographic distribution of the operating equipment. These capabilities, moreover, could be increased by diverting communications resources now used for a variety of purposes to the specific task of waging electromagnetic warfare. In the present estimate, therefore, the electronics industry is important primarily in assessing the Bloc's ability to improve and expand its present capabilities

either by way of supplementing the diversion of existing communications resources or as an alternative to such diversion.

II. Bloc Resources in Telecommunications.

A. Bloc Telecommunications Facilities.

3. To support its varied activities over some 12 million square miles, the Soviet Bloc operates an extensive complex of rapid communications facilities. These facilities serve the domestic, intra-Bloc, and international needs of the Bloc countries. At practically all important military headquarters, wire and radio facilities are readily available.

4. The principal wire and radio facilities of the Bloc are shown on the accompanying maps (Figures 1 and 2*). Figure 1 shows the principal wire lines and more than 2,300 fixed radio station locations; Figure 2 shows the location of over 1,000 aeronautical radio communication stations (212 with radio navigation aid facilities), 333 maritime radio communication stations, and 103 maritime radio navigation aid facilities. The stations spotted on Figure 2 all operate or serve mobile radio units (aircraft, vessels, and vehicles).

5. All transmitters capable of emitting radio signals are potential jammers. It is estimated that the Bloc's wire and radio communication systems as a whole comprises some 9,600 significant transmitters. A complete breakdown of this total by type of service (for example, radio broadcasting, navigation aids, etc.) is not available, but Table 1 summarizes certain

* Following p. 21.

aggregate statistics on the Bloc's telecommunications system.*

6. The basic telephone and telegraph system of each Bloc country, employing both wire and radio, is integrated nationally and services primarily the state authority. Each of these in turn shows some integration into one massive Bloc-wide system with Moscow as the focal point. The basic system serves the general political, social, commercial, and military needs of the Bloc. In addition, there are functional systems, in the main connected with the basic system, which meet the need for security, police, industrial, aeronautical, maritime, meteorological, and military operations.

7. In the basic system alone there are believed to be over 30 main centers in the USSR with heavy concentrations of radio and wire facilities, 14 in Communist China, and some 36 in the other Bloc countries. For the handling of international point-to-point radio and wire communications, there are believed to be 12 gateway cities** in the USSR, 28 in Communist China, and 30 in the other Bloc countries. Table 2 is a tabulation of reported Bloc international telecommunications circuits.*** It shows not only the extent of the coverage but also the relation between the use of wire and radio for those circuits.

8. Large areas east of the Urals and north of the Trans-Siberian Railroad, as well as wide areas of Communist China, remain uncovered by

* Table 1 follows on p. 16.
** Gateway cities are cities with through international radio and/or wire channels.
*** Table 2 follows on p. 17.

wire lines or are only thinly covered. In these areas, rapid communications depend largely or wholly on radio.

9. Bloc dependence on radio is not limited to the areas lacking wire lines. Mobile units (such as vehicles, aircraft, and ships) are almost completely dependent on radio for rapid communications and certain navigational services.

10. Radio also is used heavily between many points within the Bloc which are connected by wire. The USSR employs radio more intensively and extensively than any other country in the world. Communist China's use of radio is relatively inconsequential as compared with that of the USSR, but low-powered radio stations of 1 kilowatt or less are located at many wire junctions and supplement wire facilities. The European Bloc, on the other hand, apart from Albania, where facilities are meager, is well served by wire facilities, and radio is not generally employed for points connected by wire lines.

11. The Bloc mass aural radiobroadcasting systems are heavy users of radio. The Bloc domestic services use a minimum of over 400 radio transmitters, employing a wide range of powers and operating in the three major frequency bands below 30,000 kilocycles -- the low, the medium, and the high. Statistics on these services are shown in Table 3.* It is believed that some of these transmitters are at times employed in the

* Table 3 follows on p. 18.

jamming operation. The international service is itself considerable, though the number of transmitters employed for this service alone is not known. Table 4 gives some measure of the magnitude of this service.*

12. The wire line plays an increasingly significant role in Bloc mass aural domestic radiobroadcasting service. Wire lines are used to relay broadcasting programs between some cities. More important, however, is the use of wire lines for the distribution of broadcasting programs to loudspeakers. Such wire lines are generally independent and separate from the wire lines used for telephony and telegraphy. In the vicinity of radiobroadcasting stations wire lines connect the stations directly with the associated loudspeakers. The wire link is also used to transmit programs to more distant wire diffusion exchanges to which loudspeakers in the latter area are connected. Other remote areas are served by wire diffusion exchanges which pick up programs by radio, amplify them, and distribute these signals to wired loudspeakers. Table 5 gives estimates of the number and character of Bloc reception facilities for 1952 and 1953.**

B. Bloc Production of Telecommunications Equipment.

13. The electronics industry of the Soviet Bloc comprises an estimated 120 to 150 plants in the USSR and over 135 plants in East Germany, Czechoslovakia, and Hungary. Approximately 85 percent of the plants are

* Table 4 follows on p. 19.
** Table 5 follows on p. 20.

engaged in the assembly of end products and major subassemblies, and the remainder in production of tubes and other component parts.

14. It is estimated that the total production of the electronics industry of the Bloc in 1952, expressed in value terms at US prices was $750 million. Approximately three-fourths of the electronics equipment produced in the Bloc is allocated to military needs, and the remaining one-fourth to civilian needs.

15. The Bloc produces nearly all of its own transmitter equipment. Most of the production is from 12 known plants in the USSR, but East German and Hungarian production is also significant. East German production for the period 1950-52 was approximately 600 transmitters with a total rated power exceeding 2,500 kilowatts. Of particular importance because of their high power were 9 units ranging from 100 to 500 kilowatts and 17 units ranging from 3 to 50 kilowatts. Hungarian factories are reported to have produced 700 transmitters (5 of which ranged between 120 and 135 kilowatts) for the USSR during 1949-51.

16. It is estimated that the Bloc produced 64 million electron tubes of all types in 1952, nearly 3 million of which were transmitting and other special tubes (see Table 6).* There is no indication that the Bloc communication transmitter program has been hampered by shortages of tube manufacturing facilities since 1950. In fact, East Germany has a capacity to produce transmitting tubes which is currently not being fully utilized because of lower planned requirements.

* Table 6 follows on p. 21.

17. A significant development tending to reduce the Bloc's vulnerability to radio jamming is the production during the last 3 years of microwave radio relay equipment of predominantly eight-channel type. This equipment permits highly directional transmission at extremely high frequencies, with relay stations required at line-of-sight distances. It provides much greater security from hostile interference and enemy interception. It is estimated that the Bloc has produced about 2,700 microwave equipment units (each unit comprising a transmitter and a receiver) during the period 1949-52. Approximately 1,750 units were produced in East Germany (see Table 7),* and the remainder are believed to have been produced in the USSR. There is no evidence of microwave equipment production in the Satellites other than East Germany.

18. Production of all types of civilian radio receivers in the Bloc increased from slightly more than 1 million sets in 1948 to about 1.6 million sets in 1951.** During the same period the output of short-wave receivers decreased from 825,000 to roughly 650,000 sets. This decrease does not indicate any special difficulty encountered by the Bloc in producing short-wave sets, but probably reflects an effort to reduce the availability of radio sets capable of receiving Western broadcasts beamed to the Soviet and Satellite people.

* Table 7 follows on p. 21.
** Of the 1.6 million receivers produced in 1951, 450,000 were relatively insensitive crystal receivers.

19. Bloc production of telecommunications wire line equipment is adequate to maintain existing wire communication systems and to expand them in accordance with published plans. However, despite the rapid expansion of wire and cable plants since 1948, the Bloc is dependent on imports for 20 percent of its wire and cable. Production of wire could be greatly increased if raw copper were diverted from other uses. The Bloc requires an estimated 84,000 metric tons of copper, for its current production of both communications and industrial wire and cable. This requirement represents over 30 percent of the Bloc's production of copper, estimated at 268,000 metric tons. Bloc production of copper is supplemented by an estimated 80,000 metric tons of imported copper.

20. Soviet dependence on Western imports of critical electric and electronic test equipment is rapidly decreasing. In 1951 the estimated total of imports was $14 million, or 2 percent of Bloc production of electronic equipment. However, these imports included large shipments of transmitter equipment and tubes, items for which the Bloc is not estimated to be currently dependent on foreign sources.

21. Present trade controls have kept the Bloc's imports of electronic equipment below the 1951 level. However, significant quantities of materials and certain machines required in the manufacture of tubes and components are still being imported. Many of the materials moving in this trade, such as refractory metals and diamond dies, are difficult to interdict effectively because of the small tonnages involved.

C. Adequacy of Electric Power Supply.

22. The amount of electric energy consumed by rapid communications facilities and in the manufacture of electronic equipment is a small percentage of the total electric energy produced in any one of the Bloc countries. There are no indications of a shortage of electric power for the operation of the Bloc's communications facilities and the supporting electronics industry.

23. Electric power services are available from central stations to most of the Bloc area west of the Urals and to certain limited areas in the Asiatic part of the Bloc. In regions without central station supply, power must be obtained from more localized sources such as generators or batteries. Consequently, in large areas of Siberia and China it may be difficult to assure reliable rapid communications services under conditions of sudden heavy demand.

D. Bloc Telecommunications Manpower Resources.

24. Through stepped-up training programs, the USSR had by 1950 largely overcome the more critical postwar shortages of skilled workers. It is estimated that 4,600 electrical engineers from college level institutions, and 10,000 technicians from advanced communications schools, are now being graduated annually.

25. The Soviet Bloc would not encounter a serious manpower shortage in increasing its electromagnetic warfare activities. The total number of workers in the Bloc electronics and telecommunications manufacturing industries is estimated as 292,000 for 1951, with an increase to 372,000 by the

end of 1952. Personnel engaged in operating the communications facilities of the USSR, exclusive of military personnel, are estimated at 600,000. An additional source of trained manpower is available in the military services and in the radio amateur group.

## III. Bloc Capabilities for Expanded Electromagnetic Warfare.

### A. Diversion of Telecommunications Facilities from Normal Service.

26. Radio below 30,000 kilocycles is only one of the several media available for rapid communications; and even where it is the sole medium, it is not in every case indispensable. By use of reserve transmitters, rationalizing facilities and services, and diverting traffic to alternate media, it is believed that the Bloc could increase its current jamming effort (estimated to involve to date the variable use of some 900 different transmitters) now directed against reception of foreign broadcasts to Bloc audiences. While it is estimated that roughly 1,000 to 2,000 additional transmitters could be employed for jamming purposes without significantly impairing rapid communications services, the actual extent to which additional transmitters could be diverted to jamming depends on the number of hours of jamming operation; the time of day; the target area; and the location, power, and frequency of the transmitters available. In any case, transmitters would be drawn from the estimated 9,600 total significant transmitters distributed throughout the Bloc.

27. It is not possible to determine the precise diversion of transmitters which each of the methods discussed below might provide. Many of

the methods are based in part on analogical comparisons with worldwide operational standards. Also, some of the methods may already have been partially introduced in support of the current Soviet jamming operation.

a. Use of Reserve Transmitters.

Most countries provide reserve transmitters for their main radio stations in order to insure continuity of service. There are some 2,300 reported radio station locations in the Soviet Bloc, each of which probably has at least two transmitters. It is also likely that the Bloc has a considerable number of transmitters in strategic reserve. In addition, there are probably a number of transmitters actually in service which are potentially an additional reserve. These transmitters include units engaged in dummy traffic to conceal operational surges in traffic, other types of deception traffic, and use of live circuits for training radio operators.

b. Rationalization of Transmitter Facilities.

It is estimated that there are hundreds of lightly loaded services which do not require the use of their transmitters on a 24-hour stand-by basis and could consequently provide many hours of jamming service. An actual release of such transmitters might be obtained by reducing the number of transmitters at a single location operating in different services. Additional transmitter time also could be released by increasing within limits the speed of telegraphic transmission and/or the channel capacities served by a single transmitter.

c. Transmitters Released by Acceptance of Delayed Service.

The rationalization of transmitter facilities would be greatly assisted by flattening out the 24-hour traffic load curve and accepting other delays in service. For example, a substantial number of transmitters could be released by the reduction of the number of points involved in direct intercommunication.

d. Reduction of Nonessential Services and Use of Alternative Media.

Diversion of nonofficial private messages from point-to-point rapid communications services to the postal medium would constitute a significant direct saving in radio transmitters as well as an indirect saving by releasing wire lines for essential communications. In addition, the Bloc probably could divert a number of its 421 transmitters engaged in mass aural radiobroadcasting. Some of these transmitters are believed to participate in current jamming operations. The reduction of aural radiobroadcasting would be mitigated to some extent by the continued expansion of the extensive wire diffusion network developed for carrying programs to loudspeakers. This network is becoming increasingly less dependent on radio distribution of programs. Present dependence on radio for rebroadcasting to wire diffusion centers could be overcome by further extension of wire and by transporting program transcriptions by physical means.

e. Rescheduling of Residual Radio Services.

The services which the Bloc would continue to conduct, under extended electromagnetic warfare conditions, could be rescheduled as to time,

area, frequency band, and/or transmitter assignment in such a way as to provide optimum availability for jamming operations.

B. Diversion of Resources to Production of Electromagnetic Warfare Equipment.

28. It is believed that the Bloc electronics industry could provide for substantial increases in the production of transmitters for jamming by cutting back nonessential electronics production. For example, the cost of producing 1,000 standard communications voice transmitters of 10 kilowatt power, which are entirely adequate for jamming operation is estimated at approximately $22 million in US prices. This cost represents about 3 percent of the total and 12 percent of the nonmilitary production value of the Bloc electronics industry for 1952. The production of the first additional 1,000 transmitters possibly could be undertaken without serious displacement in the industry. Production of additional 1,000-unit increments naturally would entail more serious diversion of resources and electronic equipment production.

29. The Bloc would encounter difficulty in expanding significantly its short-term output of communications cable and wire. Supplies of raw copper already are tightly allocated. Also, the Bloc is dependent for some 30 percent of its raw copper and 20 percent of its cable and wire on external sources.

C. Diversion of Manpower.

30. The cost of diverting technically trained manpower for the enlargement of electromagnetic warfare would be relatively small. Most of the requirements could be met by the reallocation of personnel in the existing communications services and electronic equipment industry.

D. Increasing Present Capabilities Over the Next 2 Years.

31. The natural rate of growth of rapid communications facilities and of the production of the equipment and materials for these facilities would yield a sizable increase in the capability of the Soviet Bloc. The level of output for electron tubes, the best indicator of electronic capability, is expected to increase over 50 percent, measured in value terms, during the next 2 years (see Table 6). Rapid rates of expansion also are expected for the production of microwave radio equipment (see Table 7) for the extension of wire diffusion networks (see Table 5), and for the construction of wire lines and coaxial cables. Some increases also are expected in existing wire line capacities.

32. If the future potential for electromagnetic warfare were to receive greater emphasis in Soviet production planning and in the reduction of dependence on radio communication below 30,000 kilocycles, Soviet capabilities could be significantly increased. The extent and speed with which these future capabilities could be developed would depend, of course, on the priority which the Bloc placed on this program in relation to other production goals.

## IV. Vulnerability of the Bloc to Retaliatory Electromagnetic Warfare.

33. An assessment of the vulnerability of radio circuits must consider two factors: the strategic essentiality of the service and the technical susceptibility of the circuit to jamming.

34. The loss of government command communication channels in the Asiatic part of the Bloc and of radio navigational, radio control, and mobile radio communications services throughout the Bloc could be extremely serious in time of war or other emergencies. Under cold war conditions the loss of rapid radio communication would to some variable extent hamper the direction of Bloc affairs and would force the diversion of resources to the more rapid development of alternative means of communication. The Bloc is completely dependent on radio for the major portion of its rapid communications east of the Urals and in Communist China. The Bloc also is dependent on radio for long-range mobile operational communications, radio navigation, and radio control channels.

35. The present long-range civil radio network of the USSR handles 15 percent of the traffic volume between the major cities along the Trans-Siberian Railroad and 80 percent of traffic north of the railroad. The antenna parts of this system are equipped with numerous directional, high-gain antenna arrays which decrease susceptibility to jamming. Aeronautical and maritime networks are more vulnerable to jamming because of low power and less directional antennas.

36. One of the most important assets in readjusting to the loss of the civil high-frequency network would be the application of eight-channel microwave units as substitutes for many essential nonmobile radio circuits.

Table 1

Tabulation of Estimates on the Soviet Bloc Telecommunications System
(Radio, Telegraph, Telephone, Telephoto)
1946, 1950-52

| Basic System | USSR | European Satellites | Communist China |
|---|---|---|---|
| 1. Kilometers of Wire a/ (Thousands) | 3,000 (1952) | 30,000 (1952) | 600 (1952) |
| 2. Radio Transmitters (All Services) | 7,150 (1952) | 1,250 (1952) | 1,210 (1952) |
| 3. Radio Transmitters (Broadcasting Services) | 168 (1952) | 105 (1952) | 149 (1952) |
| 4. Radio Stations in Point-to-Point Service | 1,490 (1951) | 100 (1951) b/ | 328 (1950) b/ |
| 5. Radio Stations 1 - 9 kw 2 - 30 mc | N.A. | 63 (1951) | 41 (1951) |
| 6. Radio Stations 10 - 19 kw 2 - 30 mc | N.A. | 11 (1951) | 8 (1951) |
| 7. Radio Stations 20 kw & Over 2 - 30 mc | 425 (1951) c/ | 17 (1951) | 2 (1951) |
| 8. Telephone Conversations, Total All Types (Millions) | 132 (1951) | 144 (1951) | 6.5 (1951) |
| 9. Telegrams, Total All Types (Millions) | 283.5 (1951) | 51 (1951) | 14.3 (1946) |

a. Excluding wire lines devoted to wire diffusion.
b. Nine of the stations in the point-to-point service for the European Satellites and 277 for Communist China are below the 1-kilowatt (kw) minimum power covered for radios in lines 5, 6, and 7.
c. The USSR has submitted a total of 425 notifications to the International Telecommunications Union (ITU) for call letters for radio transmitters of 15-kw power or more in the frequency range from 6 to 13 megacycles (mc).

Table 2

Tabulation of Reported Soviet Bloc International Telecommunications Circuits a/
1 January 1952

| Country | Number of Gateway Cities in Country Shown | Total Number of Countries Contacted | Total Number of Circuits | | Number of Circuits with Other Bloc Countries | | Number of Bloc Countries Contacted | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Radio | Wire | Radio | Wire | Radio & Wire | Radio Only | Wire Only |
| USSR | 12 | 30 | 35 | 32 | 11 | 9 | 4 | 3 | 1 |
| Albania | 2 | 5 | 3 | 4 | 2 | 1 | 0 | 2 | 1 |
| East Austria | 1 | 20 | 11 | 84 | 3 | 24 | 2 | 2 | 3 |
| Bulgaria | 1 | 16 | 13 | 26 | 6 | 5 | 1 | 1 | 5 |
| China | 28 | 30 | 73 | 42 | 15 | 14 | 2 | 2 | 1 |
| Czechoslovakia | 5 | 35 | 35 | 110 | 7 | 45 | 4 | 2 | 3 |
| East Germany | 3 | 16 | 11 | 7 | 7 | 2 | 0 | 7 | 1 |
| Hungary | 4 | 27 | 21 | 55 | 8 | 28 | 3 | 3 | 3 |
| Poland | 8 | 22 | 21 | 39 | 7 | 19 | 4 | 2 | 1 |
| Rumania | 6 | 17 | 19 | 30 | 8 | 19 | 4 | 1 | 2 |

a. Taken from EIC-R12, Appendix C. S.

## Table 3

### Estimated Number of Transmitters Used for Radiobroadcasting by the Soviet Bloc a/
(L = Low-Frequency; M = Medium-Frequency; H = High-Frequency)
15 January 1953

| Country | No. of Cities Having Transmitters | Frequency Band | Power (in Kilowatts) .01-4 | 5-19 | 20-99 | 100-199 | 200-499 | 500 & Over | Subtotals | Totals |
|---|---|---|---|---|---|---|---|---|---|---|
| USSR | 87 | L | 8 | 13 | 13 | 9 | | 1 | 44 | 167 |
| | | M | 15 | 20 | 12 | 10 | | | 57 | |
| | | H | 24 | 15 | 20 | 7 | | | 66 | |
| Albania | 6 | L | | | | | | | | 10 |
| | | M | 4 | | 1 | | | | 5 | |
| | | H | 5 | | | | | | 5 | |
| East Austria | 6 | L | | | | | | | | 11 |
| | | M | 6 | | 1 | | | | 7 | |
| | | H | 4 | | | | | | 4 | |
| Bulgaria | 3 | L | | | | | | | | 6 |
| | | M | | 1 | 2 | 1 | | | 4 | |
| | | H | | | 1 | 1 | | | 2 | |
| China | 60 | L | | | | | | | | 149 |
| | | M | 110 | 3 | 1 | | | | 114 | |
| | | H | 21 | 10 | 4 | | | | 35 | |
| Czechoslovakia | 14 | L | | | | | 1 | | 1 | 24 |
| | | M | 9 | 3 | 2 | 6 | 1 | | 21 | |
| | | H | | | 1 | 1 | | | 2 | |
| East Germany | 9 | L | | | 1 | | | | 1 | 18 |
| | | M | 4 | 3 | 5 | 1 | 1 | | 14 | |
| | | H | | 3 | | | | | 3 | |
| Hungary | 5 | L | | | | | | | | 10 |
| | | M | 1 | 3 | | 3 | | | 7 | |
| | | H | | 1 | | 2 | | | 3 | |
| Poland | 11 | L | | | | | 1 | | 1 | 16 |
| | | M | 2 | 2 | 6 | | | | 10 | |
| | | H | | 5 | | | | | 5 | |
| Rumania | 5 | L | | | | 1 | | | 1 | 10 |
| | | M | | 2 | 3 | 1 | | | 6 | |
| | | H | 2 | 1 | | | | | 3 | |
| Totals | | | 215 | 85 | 73 | 43 | 4 | 1 | | 421 |

a. Taken from EIC-R12, Appendix E. R.

Table 4

Tabulation of Data on Soviet Bloc
International Aural Radiobroadcasting Services a/
1 January 1953

| Country | No. of Cities Broadcasting in Country Shown | Average Number of Programs per Day | Average Daily Program (Hours) | No. of Different Languages Used | Frequency Band Used | | |
|---|---|---|---|---|---|---|---|
| | | | | | Low | Medium | High |
| USSR | 4 | 229 | 102 | 35 | x | x | x |
| Albania | 1 | 26 | 8 | 11 | | x | x |
| East Austria | 1 | | | | | x | x |
| Bulgaria | 1 | 30 | 18 | 11 | x | x | x |
| China | 2 | 47 | 22 | 14 | | x | x |
| Czechoslovakia | 1 | 55 | 29 | 14 | | x | x |
| East Germany | 1 | | | 2 | | x | x |
| Hungary | 1 | 46 | 27 | 12 | x | x | x |
| Poland | 1 | 78 | 45 | 13 | x | x | x |
| Rumania | 2 | 16 | 10 | 9 | | x | x |
| Totals | 15 | 527 | 261 | | | | |

a. Taken from EIC-R12, Appendix G. R.

Table 5

Estimate of the Number and Character of Soviet Bloc
Aural Radiobroadcasting Reception Facilities
1952-53

Units

| Country | 1952 a/ | | | 1953 b/ | | |
|---|---|---|---|---|---|---|
| | Wire-Diffusion Systems | | | Wire-Diffusion Systems | | |
| | Exchanges | Loudspeakers | Radio Receivers | Exchanges | Loudspeakers | Radio Receivers |
| USSR | 36,500 | 10,000,000 | 4,500,000 | 40,000 | 10,500,000 | 5,000,000 |
| Albania | 100 | N.A. | 19,000 | 100 | N.A. | 20,000 |
| Bulgaria | 891 | 114,595 | 250,000 | 1,100 | 143,000 | 260,000 |
| China | (Thousands) | N.A. | 1,000,000 | (Thousands) | N.A. | 1,000,000 |
| Czechoslovakia | N.A. | 500,000 | 2,600,000 | N.A. | 500,000 | 2,730,000 |
| East Austria | N.A. | N.A. c/ | 900,000 | N.A. | N.A. | 950,000 |
| East Germany | N.A. | N.A. c/ | 4,000,000 | N.A. | N.A. | 4,100,000 |
| Hungary | N.A. | 160,000 | 627,000 | N.A. | 190,000 | 635,000 |
| Poland | 7,450 | 725,000 | 1,250,000 | 8,000 | 785,000 | 1,330,000 |
| Rumania | 200 | 100,000 | 300,000 | 300 | 150,000 | 310,000 |
| Total Bloc | | | 15,446,000 | | | 16,335,000 |

a. The 1952 estimates are from EIC-R12, Appendix J. S.
b. The 1953 estimates are projected from ORR estimates for previous years.
c. Fragmentary reports indicate that wire-diffusion systems are also under development in these countries.

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Table 6

Total Estimated Output of Electron Tubes
in the Soviet Bloc a/
(Rate of Output at End of Year)
1951-52, 1955

| | All Types | | Transmitting and Special Tubes |
|---|---|---|---|
| Year | Number of Tubes (Millions) | Dollar Value (Million $) | Number (Millions) |
| 1951 | 50 | 62 | 2.4 |
| 1952 | 64 | 82 | 2.9 |
| 1955 | 115 | 170 | 5.5 |

a. Output and capacity frequently differ because of manufacturing variables. These figures are based on a forthcoming supplement to CIA/RR 7, The Electron Tube Industry in the Soviet Bloc, 29 August 1952. S, US OFFICIALS ONLY. They were adopted on the basis of the analysis of plant output rather than analysis of plant capacity.

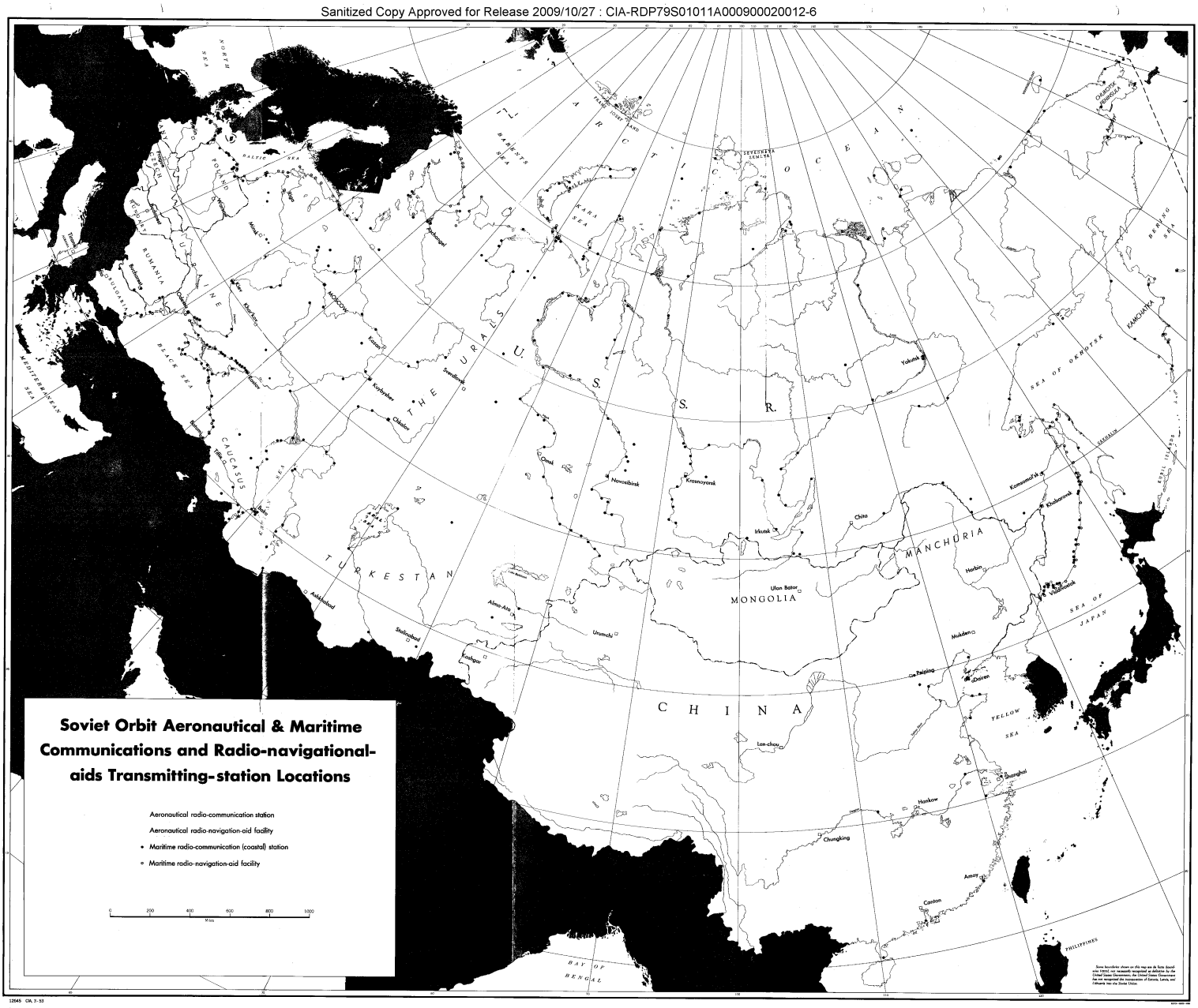
Table 7

Estimated Production of Microwave Radio Equipment
in East Germany
1949-55

Units

| Year | Amount a/ |
|---|---|
| 1949-50 | 500 |
| 1951 | 500 |
| 1952 | 750 |
| 1953 | 1,000 |
| 1954 | 1,500 |
| 1955 | 1,800 |

a. Production is expressed in equipment units. Each unit includes a transmitter and receiver.

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