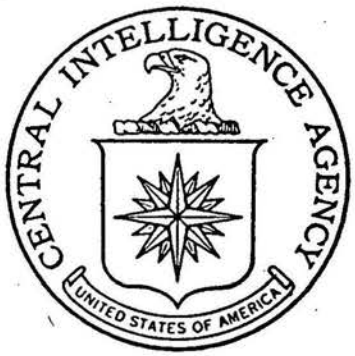
~~SECRET~~
~~SECURITY INFORMATION~~

COPY NO. [169]
[ASSISTANT DIRECTOR, ONE]
[5637]

C.7.
(H-1)

SPECIAL ESTIMATE

SOVIET BLOC CAPABILITIES AND PROBABLE COURSES OF ACTION IN ELECTROMAGNETIC WARFARE



SE-38

Published 24 April 1953

The following member organizations of the Intelligence Advisory Committee participated with the Central Intelligence Agency in the preparation of this estimate: The intelligence organizations of the Departments of State, the Army, the Navy, the Air Force, and the Joint Staff.

The Intelligence Advisory Committee concurred in this estimate on 21 April 1953. The FBI abstained, the subject being outside of its jurisdiction.

CENTRAL INTELLIGENCE AGENCY

SERIES _____

COPY _____ OF _____

~~SECRET~~

DISSEMINATION NOTICE

1. This copy of this publication is for the information and use of the recipient designated on the front cover and of individuals under the jurisdiction of the recipient's office who require the information for the performance of their official duties. Further dissemination elsewhere in the department to other offices which require the information for the performance of official duties may be authorized by the following:

a. Special Assistant to the Secretary of State for Intelligence, for the Department of State

b. Assistant Chief of Staff, G-2, for the Department of the Army

c. Director of Naval Intelligence, for the Department of the Navy

d. Director of Intelligence, USAF, for the Department of the Air Force

e. Deputy Director for Intelligence, Joint Staff, for the Joint Staff

f. Director of Intelligence, AEC, for the Atomic Energy Commission

g. Assistant to the Director, FBI, for the Federal Bureau of Investigation

h. Assistant Director for Collection and Dissemination, CIA, for any other Department or Agency

2. This copy may be either retained or destroyed by burning in accordance with applicable security regulations, or returned to the Central Intelligence Agency by arrangement with the Office of Collection and Dissemination, CIA.

WARNING

This material contains information affecting the National Defense of the United States within the meaning of the espionage laws, Title 18, USC, Secs. 793 and 794, the transmission or revelation of which in any manner to an unauthorized person is prohibited by law.

SOVIET BLOC CAPABILITIES AND PROBABLE COURSES OF ACTION IN ELECTROMAGNETIC WARFARE

THE PROBLEM

To assess the electromagnetic warfare [1] capabilities of the Bloc, the potential development of these capabilities through 1954, and probable Bloc courses of action through 1954 in employing and developing these capabilities.

SCOPE

This estimate considers Bloc electromagnetic warfare operations against international telecommunications and electronic navigation aids in the frequency range below 30 megacycles.

CONCLUSIONS

1. Bloc electromagnetic warfare activities have thus far been concentrated primarily on jamming of Western propaganda broadcasts beamed at the Bloc. This effort has been most effective in the European USSR. Penetration is virtually nil in Moscow and probably in other major urban areas of the European USSR.

2. The Bloc telecommunications system has a capacity substantially in excess of essential requirements. We estimate that under cold war conditions the Bloc could allocate the necessary facilities and technical competence for a large expansion of its present electromagnetic warfare, including large-scale operations against Western communications, navigation aids, and broadcast reception, without thereby significantly impairing essential Bloc communications. We also estimate that under conditions of general war the Bloc would retain a substantial part of its present capability for expanded electromagnetic warfare.

3. We estimate that the Bloc has the capability of disrupting most US high-frequency transoceanic circuits for a major proportion of the time. The Bloc could at the same time seriously interfere with US long-range mobile communications, including long-range VLF communications with US submarines as presently equipped. Under most conditions, the Bloc could also subject Western

[1] Electromagnetic warfare is defined as the contest for the control of all or parts of the radio spectrum or the denial of use by others through preclusive use, jamming, and related measures.

long-range navigation aids in the North Atlantic, North Pacific, and European areas to serious jamming and spoofing.[2]

4. We believe that during the period of this estimate the Bloc will continue to expand rapidly its telecommunications system and its output of electronic and other related equipment. This expansion will permit a further increase in Bloc capabilities for electromagnetic warfare.

5. The Bloc is dependent on long-range radio (technically susceptible to jamming) for essential communication in Siberia and Communist China generally, and throughout the Bloc in respect to mobile operational communications and navigation aids. The Bloc is, however, reducing its dependence on jammable radio by developing alternative means of communication.

6. Under cold war conditions, the Bloc will almost certainly continue to restrict its electromagnetic warfare activity primarily to the jamming of Western broadcasts beamed at Bloc audiences. In pursuing its cold war objectives, the Kremlin will be restrained in the exercise of its full electromagnetic warfare capabilities by its desire to avoid (a) any substantial impairment of its own essential communications; (b) diversion of materials and manpower to increase the capacity and reduce the vulnerability of the Bloc communications system; (c) alerting Western nations to Bloc electromagnetic warfare capabilities and techniques; and (d) stimulating accelerated improvement of Western offensive and defensive capabilities in the field of electromagnetic warfare.

7. In the event of general war, the principal existing restraints on the Bloc's exercise of its electromagnetic warfare capabilities would disappear. The Bloc would attempt to disrupt Western military and other essential communications and navigation aids, and in this effort would not only employ jamming and spoofing techniques but probably would also undertake military and sabotage action against Western communications and navigation aid facilities.

DISCUSSION

BLOC ELECTROMAGNETIC WARFARE ACTIVITIES TO DATE

8. In general, Bloc electromagnetic warfare activity has been concentrated against the VOA and other Western propaganda broadcasts intended for reception within the Bloc. Systematic jamming of such programs began in 1948. Since April 1949, this jamming has been so extensive and so efficient as to demonstrate the existence of a large, well-equipped, and well-integrated organization. This organization uses about 900 transmitters, with associated control facilities, in its jamming operations. Cooperation between the USSR and Satellites, and among Satellites, is evidenced by the use of jammers in one Bloc country to cover programs directed to another Bloc country.

9. This jamming has been particularly intensive and effective against broadcasts directed to the USSR. Despite the fact that Russian-language VOA programs have at times been broadcast simultaneously on as many as 40 frequencies, these programs achieve only sporadic penetration in the European USSR. Penetration is virtually nil in Moscow and probably in other major urban areas of the European USSR. Programs

[2] Spoofing is the introduction of extraneous deceptive signals by a third party. As applied to navigation aids, spoofing can be used to give erroneous indications of position.

directed to the European Satellites are jammed less effectively; by simultaneously employing at times as many as 14 frequencies, the VOA can be heard adequately on some channel at least half the time. Far Eastern VOA programs, for which as many as 14 frequencies are sometimes used simultaneously, can be heard on some high-frequency channel nearly all the time, although medium-frequency broadcasts are received well only about half the time.

10. The Bloc has supplemented its jamming operations by various other measures designed to impair or prevent Bloc reception of Western broadcast programs. Owners of receivers are registered and there is extensive propaganda designed to discredit the sources of Western broadcasts and to intimidate potential listeners. However, the Bloc has not resorted to either mass confiscation of receivers or specific legal prohibition of listening to foreign broadcasts. The Bloc's extensive and rapidly increasing use of wire-diffusion systems and radio receivers for group listening also helps to reduce the potential Bloc audience for Western broadcasts.

11. At least in the USSR, the availability of short-wave receivers to individuals has been reduced, and the radio services available to medium and long-wave receivers and wire-diffusion speakers have been expanded. Although the number of individual owners of radio sets in the USSR is increasing, the number who can tune to Western short-wave stations is comparatively small and may be decreasing.

12. The Bloc has for about three years interfered with Western programs intended for West German and Austrian audiences by broadcasting on the same frequencies from nearby high-powered stations. There have also been at least two instances of deliberate Bloc jamming of Western broadcasts for other Western audiences in cases where the material could be deemed politically offensive to the Kremlin.

13. There is no evidence of a systematic jamming effort against Western civilian or military communications. However, occasional jamming of Western military communications has occurred, and in some instances appears to have been deliberate. Interference with Western navigation aids (reported as jamming or spoofing) has apparently been unintentional in all instances thus far investigated.

PRESENT BLOC CAPABILITIES FOR ELECTROMAGNETIC WARFARE

14. Any radio transmitter is a potential jammer. However, the extent to which any particular Bloc transmitter could be useful in electromagnetic warfare depends on the power and other technical characteristics of the transmitter, its location relative to the circuit to be jammed, and fluctuating conditions of wave propagation. Thus, many of the Bloc transmitters now used to interfere with radio reception within the Bloc would not necessarily be useful for interference with reception outside the Bloc.

15. The Bloc's telecommunications resources are such, however, that the Bloc has a large capability, not merely for increasing the intensity of its present internal jamming effort but also for interfering with radio communications, navigation aids, and broadcast reception outside the Bloc. A substantial fraction of the estimated 10,000 long-range Bloc transmitters not now used in jamming could be diverted to an expansion of Bloc electromagnetic warfare simply by more intensive use of transmitter capacity, reduction of non-essential traffic, and diversion of some traffic from radio to alternative means of communication. Moreover, no serious technical difficulties would arise in extending the present system of jamming coordination to a greatly expanded effort.

16. Extension of Bloc electromagnetic warfare activities would compel the Bloc to take additional measures to minimize incidental jamming of its own communications and navigation aids. However, by using available alternative means of communication for essential traffic, and by advance scheduling of necessary long-range communications, the Bloc could probably avoid serious interfer-

ence of this type. We believe therefore that problems arising from self-jamming would probably not prevent a large extension of Bloc electromagnetic warfare.

17. We estimate, therefore, that under cold war conditions the Bloc could allocate the necessary facilities and technical competence for a large expansion of its present electromagnetic warfare, including large-scale operations against Western communications, navigation aids, and broadcast reception outside the Bloc, without thereby significantly impairing essential Bloc communications. Under conditions of general war, the Bloc's essential communications requirements would be significantly changed and in some fields markedly increased. We are unable to make a specific quantitative allowance for this factor, but believe that under conditions of general war the Bloc would retain a substantial part of its present capability for expanded electromagnetic warfare.

18. We estimate that the Bloc has the capability of disrupting most US high-frequency transoceanic circuits for a major proportion of the time.[3] The Bloc could at the same time seriously interfere with US long-range mobile communications, including long-range VLF communications with US submarines as presently equipped. Under most conditions, the Bloc could also subject Western long-range navigation aids in the North Atlantic, North Pacific, and European areas to serious jamming and spoofing.[4]

EXPANSION OF BLOC CAPABILITIES FOR ELECTROMAGNETIC WARFARE

19. The over-all development of Bloc communication facilities, including both radio and alternative media, automatically yields an increasing offensive and defensive electromagnetic warfare potential, since there is a wide latitude of interchangeability in facilities. Since World War II the Bloc has made good all war losses in communications facilities and has proceeded apace with expansion of facilities and improvement of techniques. The radio transmission network has been steadily expanding in terms of number and power of transmitters, traffic, and area covered. For the purposes of this estimate, comparable significance attaches also to the rapid development of alternative communications media not vulnerable to electromagnetic warfare. There has been a huge development of wire-diffusion systems for the wire line distribution of mass aural broadcasting programs. There is evidence that in the strategic Arctic area several new land lines and at least one submarine cable have been laid. Bloc production of radio communications equipment using frequencies above 30 megacycles suggests that some such systems are already in operation. While these systems have only line-of-sight range and require relay stations for longer distance transmission, they are essentially non-jammable.

20. On the evidence of recent growth, indications of planned expansion, and our estimates of Bloc industrial resources and capabilities, we believe that the Bloc telecommunications system and Bloc output of electronic and other related equipment will continue to expand rapidly during the period of this estimate.[5] For example, the output of electron tubes is expected to increase over 50 percent during the next two years. Further expansion is also expected in the production of radio equipment using frequencies above 30 megacycles, in the extension of wire-diffusion networks, in wire and coaxial line construction, and in the capacities of some existing wire lines.

21. We believe that the supply of trained personnel in the Bloc will be adequate to support the projected rate of expansion of the communications system. In some, though not all, fields of communications technology,

[3] Recent sample tests and studies have demonstrated the vulnerability of US transoceanic circuits to Bloc jamming (see Appendix B: "Evaluation of Technical Factors"). The vulnerability of other long-range Western point-to-point radio circuits has not been investigated.

[4] The relative vulnerability of the various types of long-range navigation aids is discussed in Appendix B: "Evaluation of Technical Factors."

[5] For further details of the projected expansion and indications of probable limiting factors, see Appendix A: "Evaluation of Economic Factors."

Bloc competence appears to be as advanced as that of the US.

22. Present Bloc telecommunications resources, as noted earlier, are sufficiently in excess of essential communication requirements to leave a substantial fraction of radio facilities free for actual or potential electromagnetic warfare use. The estimated expansion of the Bloc telecommunications system and Bloc production of equipment will probably increase this margin. The Bloc could increase its jamming facilities at the expense of only a small fraction of the resources allocated to the telecommunications or electronics expansion generally. For example, the building of a thousand 10-KW transmitters, capable of both internal and external jamming, would absorb electronic equipment to the amount of about 3 percent of the estimated value of the Bloc's 1952 production of such equipment. Use of these thousand transmitters as jammers could more than double the Bloc's present jamming activity.

23. Increased production of electronic equipment for either communications or jamming would be at the expense of production for important other uses such as navigation aids, military radar, fire control and missiles control devices. But the fact that the Bloc has already built up its telecommunications and jamming facilities in excess of likely peacetime or cold war requirements suggests that the strengthening of Bloc capabilities in telecommunications, with a correlative increase in electromagnetic warfare capability, is regarded by the Kremlin as an important part of its preparation for possible war.

VULNERABILITY OF THE BLOC TO RETALIATORY ELECTROMAGNETIC WARFARE [6]

24. The strategic effect of possible retaliatory electromagnetic warfare operations on the Bloc would be limited by the extent to which the Bloc could resort to alternative means of communication immune to such warfare. In the European Bloc, extensive alternative telecommunications are available, and further expansion is under way. However, the Bloc is still dependent on long-range radio (technically susceptible to jamming) for essential communication in Siberia and Communist China generally, and throughout the Bloc in respect to mobile operational communications and navigation aids.

25. Disruption of Bloc long-range radio communication could impair (a) the efficient operation of government controls, (b) the readiness of its armed forces, and (c) the performance of the Bloc economy. It could also necessitate a diversion of scarce resources for the accelerated expansion of substitute communications facilities. Bloc capabilities for air and naval action and for coordination of military operations could be impaired by electromagnetic warfare.

PROBABLE BLOC COURSES OF ACTION

Basic Objectives

26. Under cold war conditions, the Kremlin's primary objective in regard to electromagnetic warfare will almost certainly continue to be that of minimizing the penetration of Western propaganda broadcasts beamed at Bloc audiences. Concomitantly it will also almost certainly seek further expansion of Bloc capabilities for a possible extension of electromagnetic warfare to other types of Western transmissions, and further reduction of the Bloc's vulnerability to electromagnetic warfare (including self-jamming).

27. There is little conflict among these objectives. The continued expansion of both long-range radio and alternative telecommunications media, the development of improved techniques, and the training of personnel serve all three basic objectives, and the relative emphasis put on the several objectives could rapidly be shifted without necessitating serious economic or other adjustments.

28. In the event of general war, the Kremlin would almost certainly seek to achieve maximum disruption of Western military commu-

[6] The extent to which the US and its allies now possess or may develop the capability of exploiting the Bloc's vulnerability to electromagnetic warfare is beyond the scope of this estimate.

nications and navigation aids. At the same time, the Kremlin would continue to seek to insulate its peoples from Western radio contacts.

Estimated Bloc Courses of Action Under Cold War Conditions

29. In pursuing its cold war objectives, the Bloc will almost certainly not employ its full capabilities for electromagnetic warfare. The Kremlin will be restrained in the exercise of those capabilities by its desire to avoid (a) any substantial impairment of its own essential communications, either by interference or by diversion of transmitters to electromagnetic warfare, or (b) the diversion of greatly increased amounts of materials and manpower from other uses in order to increase the capacity and reduce the vulnerability of the Bloc communications system. The Kremlin will accordingly seek to avoid disclosing Bloc electromagnetic warfare capabilities and techniques by premature use, in order to preserve the advantage of surprise and to avoid stimulating accelerated development of Western defensive and offensive capabilities in the field of electromagnetic warfare. A further consideration which may restrain the Bloc from systematic interference with Western communications and navigation aids is that such clearly illegal activities would worsen the Bloc's diplomatic position. The restraining effect of this consideration would depend on the Kremlin's general policy in regard to relaxing or tightening tensions between the Bloc and the West.

30. The Kremlin will almost certainly continue to concentrate its electromagnetic warfare activities primarily on restricting the penetration of Western propaganda broadcasts beamed at Bloc audiences. This primary objective can be served by three types of preventive internal action, as at present: (a) jamming of Western broadcasts beamed at the Bloc, (b) reducing the availability to Bloc citizens of those types of radio receivers capable of receiving Western broadcasts, and (c) exercising pressures and controls on Bloc listeners. We believe the Kremlin will continue to use all three of these types of action. Primary reliance will almost certainly continue to rest on jamming. It is also probable that further efforts will be made to restrict the number of radio receivers in the Bloc capable of receiving Western broadcasts, but mass confiscation of such receivers is unlikely.

31. The Bloc will also continue to seek to impede the expansion of Western capabilities for beaming propaganda broadcasts at Bloc populations. Under cold war conditions, it will employ only propaganda and diplomatic measures, aimed primarily at nearby Western countries where actual or proposed Western broadcasting sites are located. The relative emphasis upon threats as against conciliatory gestures will reflect the Kremlin's general policy in regard to relaxing or tightening tensions between the Bloc and the West.

32. The Bloc will probably continue deliberate interference with Western broadcasts directed to German and Austrian audiences. We believe, however, that it will probably not extend this interference on a large scale to Western broadcast reception outside Germany and Austria, since the Kremlin almost certainly estimates that such extension of electromagnetic warfare would worsen the Bloc's diplomatic position without affording compensating advantage to the Bloc.

33. The Bloc will almost certainly continue, and may expand, its use of radio facilities such as existing quasi-clandestine stations for the dissemination of "black" or "gray" propaganda,[7] possibly to the extent of occasional use of Western frequencies for such purposes. The principal limiting factor on this activity would probably be the risk of political backfire in the event of actual exposure of such means, or of too frequent and obvious use.

34. The Bloc will almost certainly not resort to all-out electromagnetic warfare, including

[7] "Black" propaganda is propaganda deliberately mis-identified as to source, e.g., a broadcast purporting to originate in France but actually from a Bloc station. "Gray" propaganda is propaganda with the source unidentified, e.g., a broadcast in French from a Bloc station with no identification given, so that listeners might infer that it originated in France.

wholesale interference with Western communications and navigation aids. Interference with Western navigation aids may occasionally be used to create incidents of actual or alleged trespass of Bloc territory by Western (particularly US) aircraft. Such incidents could be used, as in the past, to sow dissension among the Western nations by fostering an impression of US recklessness or aggressive intent.

35. The Bloc will continue to expand its long-range radio transmission system and the output and capacity of its electronic equipment industry. It will continue to promote the development of facilities and techniques for rendering its essential military and civilian communications less susceptible to interference arising either from Bloc or from outside sources.

Estimated Bloc Courses of Action Under Conditions of General War

36. In the event of general war the principal existing restraints on the Bloc's exercise of its electromagnetic warfare capabilities would disappear. The Bloc would attempt to disrupt Western military and other essential communications and navigation aids, and in this effort would not only employ jamming and spoofing techniques but probably would also undertake military and sabotage action against Western communications and navigation aid facilities. At the same time the Bloc would probably intensify its effort to prevent reception of Western program broadcasts in the Bloc. In addition to jamming of such broadcasts it would also almost certainly adopt more drastic measures, including direct police action against listeners and probably the mass confiscation of some types of radio receivers.