NOISE WARS: A COMPARATIVE HISTORY OF GATHERING INFORMATION UNDER COLD WAR CONSTRAINTS

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ABSTRACT

The dissertation discusses the interrelationships between technology and politics during the Cold War. The work is primarily inspired by the monumental archival collection of the Radio Free Europe/Radio Liberty (RFE/RL) Research Institute. This key Cold War archive reflects the political constraints that formed an integral part of the broadcasting operation targeting communist states behind the Iron Curtain between 1950 and 1989-91. Broadcasting practitioners faced unexpected challenges at a time when radio was a well-established means of communication across borders. Before broadcasting news, RFE/RL collected unprecedented amounts of unreliable sources from communist countries. Pieces of questionable information entailed propaganda newspaper clippings, manipulated statistics from official party institutions, and extracts from non-representative interviews with refugees and travellers to the West. The RFE/RL research institute scrutinized available data to draw factual conclusions about political processes beyond ideologically imposed borders. In this context, the radio team paid special attention to gathering technical information associated with the practice of jamming. Introduced by the Soviet authorities in 1948, jamming's aim was to overwhelm "enemy" frequencies with mechanical sounds or repetitive music making unwanted content incomprehensible to listeners. Ubiquitous noise in the ether signaled the limits of wireless technology and, at the same time, evolved into an integral part of communication creating new media practices and meanings. In a response to the challenge of jamming, Western broadcasters supplemented inaudible radio frequencies with printed leaflets attached to weather balloons in the 1950s. Meteorological observations of favorable winds justified the

investment in a medium that temporarily embodied the dream of sending messages across the Iron Curtain. Available technologies were re-defined in the course of the conflict, while the natural environment was imagined as an active component of the ideological clash. Later, jamming became an integral part of Soviet military thought. In the 1970s, noise machines served as tools to paralyze technologically superior enemies in sea battles by blocking their access to naval electronic communications. Meanwhile, noise became an object of research. Technical monitors at RFE gathered information about signal strength. Across the Iron Curtain, jamming technicians supplied communist authorities with data on noise quality. Acoustic information served as a valuable political indicator when limited reliable information constituted a norm. Noise was endowed with meanings. While positioning the RFE/RL research institute as a fundamental resource to study the practices of jamming and information gathering, the dissertation engages a diversity of technical sources from both sides of the divide. The work uses insights from the fields of history of science and technology, media studies, sound studies, and military history. The historical analysis of noise wars invites parallels with contemporary concerns related to information warfare, surveillance, and software tools designed to filter online content.

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Table of Contents

List of Illustrations

Introduction

The Cold War was an ideological conflict that spilled over into the technological realm. Studying the history of radio communications from the era deepens our understanding of the ever growing contemporary concerns linked to conflicts unfolding in cyberspace. Since the early radio years of the 1920s-1930s and later in the course of the Cold War, the possibility to disseminate instantaneous information through invisible waves was embraced with excitement comparable with the enthusiasm surrounding the internet. Voices from distant places entered the rooms of millions of private listeners. An unprecedented global mass audience listened simultaneously to information sent from studios. In spite of all its positive transformative qualities, the wireless medium prepared the ground for clashes on the electromagnetic spectrum.

Soviet transmission equipment was re-designed to attack "enemy" stations in the early Cold War years. There was a simple logic behind the practice known as jamming. It consisted in deliberate transmission of mechanical noises to overwhelm unwanted "enemy" frequencies with meaningless content. Sending an abundance of sounds simultaneously could make the targeted program incomprehensible for the listener. Technology was not neutral in the ideological conflict.

Exploring technicalities of radio communications, this dissertation examines how the Cold War affected technology and how technology shaped the Cold War. Jamming noise is among the primary inspirations for this research of overlooked techno-political

links from the XX century with repercussions reaching the most advanced communication spaces today. Current authoritarian regimes possess technical means to intrude in digital online content. In China, the communist authorities embraced software tools to filter unwanted information from foreign news websites.[1] Likewise in the recent past, Soviet radio engineers received orders to interfere with selected parts of Western broadcasting.

Nowadays, IT engineers are deployed in information warfare. Software experts' involvement in authoritarian policies is increasingly visible in Russia. Russian software bots designed to perform repetitive actions could overwhelm social media with discrete propaganda noise-notions or conspiracy theories generating endless hash tags and hyperlinks leading to bulks of machine-generated data. This strategy was present during the 2016 US presidential elections,[2] and only intensified after the Russian invasion of Ukraine from 2022.[3]

A historical analysis on destructive technologies provides us with insights and questions to address cybernetic and information wars. History cultivates sensitivity to recognize old strategies adapted to new digital environments. As the French philosopher Paul Virilio explained: "[d]uring the Second World War, one could not listen to Allied

[1] The software dubbed the Great Chinese Firewall serves as filter to selectively block certain type of content. In practice, internet users are not allowed to access pieces of filtered information published on foreign websites. See James T. Griffiths, *The Great Firewall of China: How to Build and Control an Alternative Version of the Internet* (London: Zed Books, 2019).

[2] See Aaron F. Brantly, "A brief history of fake: Surveying Russian disinformation from the Russian Empire through the Cold War and to the present" in Christopher Whyte, A. Trevor Thrall, and Brian M. Mazanec, eds., *Information Warfare in the Age of Cyber Conflict*, Routledge Studies in Conflict, Security and Technology (London ; New York: Routledge/Taylor & Francis Group, 2021), 38.

[3] Tools for spreading machine generated information on social media were developed as part of a broader cyber-warfare strategy involving Russian software engineers. This aspect of contemporary information warfare was revealed by an international team of investigative journalists in March 2023. See Luke Harding, Stiliyana Simeonova, Manisha Ganguly and Dan Sabbagh, "'Vulkan files' leak reveals Putin's global and domestic cyberwarfare tactics," *The Guardian*, March 30, 2023, https://www.theguardian.com/technology/2023/mar/30/vulkan-files-leak-reveals-putins-global-and-domestic-cyberwarfare-tactics. Accessed May 8, 2023.

radio stations without experiencing a disturbing and ear-splitting noise. It was not a very sophisticated form of jamming. […] [N]owadays, it is on the Internet where jamming takes place. But the Internet does not jam in the same way that radio does. This is because, today, jamming takes the form of information confusion and the Internet is the premier site of such confusion."[4] According to Virilio there is a historical shift in censorship methods. Whereas XX century practices were associated with deleting or adding information to a source, censorship in the digital world means "the multiplication of information on a given subject."[5] "In this way, the multiplication of information jams any sensible interpretation. As the architect Mies van der Rohe said, 'Less is more.' However, in our case, we could say that more is less! That sums up the risks of the Internet," concluded Virilio.[6]

Considering the growing risks of new politicized methods of noise production, the Cold War archival heritage has become particularly valuable. Both sides of the decade-long ideological antagonism understood radio as a means to change worldviews within and across national borders. With this in mind, the technical clash in the ether is a rare opportunity to scrutinize long-lasting political uses of technology. Moreover, historians are fortunate to have unrestricted access to the archive of a radio that followed closely the practices and fluctuations of jamming. Launched in 1950, Radio Free Europe/Radio Liberty (RFE/RL) tried to overcome noise blankets covering its target countries: USSR, Poland, Czechoslovakia, Hungary, Romania, and Bulgaria. Since the clandestine radio broadcast voices of native émigrés, it quickly gained a reputation of being the most viciously jammed Western station. Not surprisingly, communist states did not welcome

[4] John Armitage, ed., *Virilio Live: Selected Interviews*, (London: SAGE, 2001), 180.
[5] Ibid.
[6] Ibid.

the constant presence of a medium that aspired to be the genuine voice of the local population. The freedom radios had a strong rationale. They put a special emphasis on giving air time to those people who chose a better life across the Iron Curtain. They reminded the listeners about local journalists who opposed the instalment of the communist regime in Eastern Europe. They offered critical native voices as an alternative to the ubiquitous state propaganda press and radio.

Thus, RFE/RL had a special perspective on jamming. Even when the Soviet authorities took easily reversible decision to cease jamming of The British Broadcasting Corporation (BBC) and the Voice of America (VOA), the Russian-language clandestine team was the last to experience the freedom of a completely clear signal. The archive is a witness. Up until 1988 when the Soviet authorities silenced the last remaining jammers targeting only RL, files associated with the topic never ceased to fill the radio's archival boxes labelled "glushenie." The box title literally meant "deafening." This was the Soviet metaphor for deliberate interference in the civilian spectrum. Certainly, the chronicles of deafening sounds preserved in the archive do not provide any direct answers for historians. The archival traces raise new questions.

Noise in the archive and the history of Cold War information

The monumental archive of the RFE/RL Research Institute stores what historians may metaphorically call "noise." For decades, Cold War archivists and information analysts working at the famous broadcasting service collected an overwhelming depository of files. Its aim was more than ambitious - keeping records about all aspects of

politics behind the Iron Curtain. Comprehensive information gathering was part of the regular activity at the institute created with the active involvement of the Central Intelligence Agency (CIA). Day after day, the ideal of knowing the ideological enemy sustained the accumulation of immense amounts of data.

However, the archival monument was founded on slippery ground - most of the documents there are unreliable. They contain useless "noise." One of the first thing to notice opening many of the radio's archival boxes is the industrial quantity of propaganda press clippings or detailed broadcast transcripts from the Soviet sphere. The archival boxes labelled "Radio Liberty" is a case in point. It keeps an abundance of communist newspaper articles from the perpetual propaganda campaign against their own station.

In an attempt to counterbalance the official party line, the research institute conducted regular interviews with émigrés and travellers to the West. Among other questions, Cold War researchers were interested in the practices of listening to foreign radios. The radio team was aware that first-hand accounts about life under communism shared abroad rarely overlap with the reality back home. The interviews were shaped by political and personal intentions. While émigrés tended to exaggerate time spent in secret listening hoping to receive a refugee status, those who travelled with the permission of the party did not want to get into trouble by admitting they listened to "capitalist" propaganda. Cold War researchers gaged typical respondent' bias and employed different methods to uncover grains of truth in the interviews. Just like historians today.

Such epistemological issues haunt Cold War students sensitive to the "noise" in the files. The more one studies the archive, the more one develops a habit to mistrust the evidential qualities of every single piece of paper copied and preserved by the radio archivists. But is it worth the risk of ignoring such a gigantic witness of the era?

In the 1990s, at the time when the former archive of the radios' headquarters in Munich moved to the Central European University in Budapest to become a site for history research, historian István Rév used the example of jamming to illustrate the significance of the archives:

> *In mendacio veritas*, in lies there lies the truth. […] If one wants to learn the truth about communism, the truth about the Cold War, the world of propaganda and appearances, and the most important reason for the Fall, an informed choice is to study this fake world, and the files and documents of which OSA [Open Society Archives] is the guardian. Communism was built on, and eventually ruined by, such metatruths: on noises that warned the listeners that the jamming agency, the Party was there –even in the air, controlling not only the propaganda of the enemy but the eager listeners as well. Yes, the Party was there but paralyzed; capable only of making a cacophony in the air, merely creating the appearance of being there.[7]

As Rév emphasizes, jamming was much more than sensory experience of private secret listeners. This work focuses on the historical moment when the acoustic soundscape of the noise wars became an object of research. Noise was endowed with meanings during the Cold War. A peculiar social and political phenomenon emerged from the attempts to register jamming's impact. Whenever the Party invested resources in "deafening" secret listeners, Western broadcasters endeavoured to study how their own station was affected. The paradox – noise did not have an audience. None of the real listeners focused on the intensity and variability of noise. From the perspective of the Party, noise created confusion and silenced foreign content. But it targeted *another* audience of listeners to "enemy" radios. How does one gather audience feedback about the effectiveness of destructive radio waves? To be sure, the RFE/RL team was affected

[7] István Rév, "The enemy-archives," in Iván Székely and Leszek Pudłowski, eds., *Open Society Archives* (Budapest: Open Society Archives at Central European University, 1999), 17.

too. Westerners faced similar uncertainties while following closely the dynamics of jamming.

Since policies reshaped and redefined available technologies, gathering technical information about communication tools was a real challenge. Based on technical documentation generated throughout the Cold War, this work explores both jamming and associated practices of knowledge production concerning the material means of the propaganda conflict. The first two chapters focus on jamming, while the practice of technical information gathering is the predominant concern of the second part of the dissertation.

Seeking the last available traces of noise, chapter 1 draws on field research at an abandoned transmission site used simultaneously for jamming and international broadcasting. I visited the station with its almost completely destroyed technical archive in Bulgaria in 2022. The installation was active from 1970 until 1989, when the communist regime in the country collapsed. This first chapter focuses on the technical constraints on jamming in the civilian spectrum, which informed decision-making in communist states.

Chapter 2 shifts the focus to military jamming. It analyses the Soviet military idea of waging wars in the electromagnetic spectrum. In this case, interference with the enemy's electronic maritime communications marked the intersection between politics, technology and military thought. The Soviet fleet's experience with jamming contributed to the creation of the military discipline called Radioelectronic combat in the 1970s. The language of electromagnetic wars then crossed the professional boundaries of radar and naval technicians to reach the high military and political echelon.

Introducing epistemological puzzles of Cold War knowledge production, the third chapter traces how the system of information gathering at RFE registered the tumultuous life of weather balloons re-designed to disperse leaflets behind the Iron Curtain in the 1950s. To a significant extent, jamming inspired this unusual replacement of radio waves with airborne objects used for meteorological research. Since RFE's transmission facilities faced significant difficulties to overcome jamming especially in the early Cold War years, balloons embodied the wireless dream to cross ideological borders.

The last chapter delves into the acoustic dimension of noise wars discussing the overlooked story about Cold War signal monitoring. Lacking geographical proximity and unrestricted access to actual listeners, the Western radios did not have reliable data on their own sound quality. A technical routine of juxtaposing audibility with jamming levels became meaningful information used far beyond the circles of radio engineers and technicians. During periods of political changes or unrest, broadcasting audibility served as an important political indicator when only limited sources were considered reliable.

While positioning the RFE/RL research institute as a fundamental resource to study the practices of jamming and information gathering, the dissertation engages a diversity of available technical sources. This includes technical documentation (on leaflet balloons, acoustic information gathering, and radio jamming), intelligence reports, encrypted correspondence at RFE/RL, archival collections of photographs created by the RFE/RL Public Affairs Department, audience research reports, media publications, meteorological reports on the conditions for shortwave propagation, publications in military journals, and technical instructions for the employees at Cold War jamming control rooms.

In all case studies, the RFE/RL archive serves as a backdrop to outline epistemological issues and paradoxes related to Cold War technology. The last chapter, for instance, identifies a metaphorical description of jamming by the Soviet dissident writer Alexander Solzhenitsyn. In an interview from Moscow in the 1970s, he told Western journalists that jamming "means daily spittle into your ears and eyes, it is an offence and degradation of man to a robot's level." Why did a RL researcher underline this poetic phrase placing the file among documents with technical information? The significance of the source lies in the fact that with his figurative language, Solzhenitsyn pinpointed geographical spots within the USSR with weak radio signal. The archive followed certain rules developed in tandem with Cold War politics, imagination, and concerns. As the chapter demonstrates, acoustic information about signal quality was especially valuable. It provided the most treasured quantitative data about the political "climate" behind the Iron Curtain.

Along with scholars who follow an ethnographic approach to archives, I scrutinize the political conditions involved in the production of archival documents. These documents are often obscured behind archival taxonomies that seem neutral and detached from their historical context. As Ann Laura Stoler suggests, an archive could be seen as "cultural artifacts of fact production, of taxonomies in the making." Stoler draws parallels between ethnography and archival research when the historian approaches the archive as a site of knowledge production: "[s]teeped as students of culture have been in treating ethnographies as texts, we are just now critically reflecting on the making of documents and how we choose to use them, on archives not as sites of knowledge retrieval but of

knowledge production, as monuments of states as well as sites of state ethnography."[8] During the propaganda war, folders were distributed in specific boxes labelled with politically loaded categories. Key folders titled "collectivization" or "dissent," for instance, reflect what was considered important knowledge back then. From this perspective, the Cold War archive itself becomes a primary object of research. Titles of archival boxes, underlined paragraphs in a copy of a newspaper article, unusual amounts of exchanged teletype messages on a particular date were all human traces that mirror conventional rules in the creation of this overwhelming collection of information.

Once we perceive the anthropological dimension of the archive, we can identify the historicity of information gathering. Throughout the dissertation, I examine the concern about scarcity of trustworthy information during the propaganda conflict. I will illustrate some historical nuances of Cold War information gathering with a comparison between two systems for storing unlimited amounts of useful knowledge: the radio archive and Wikipedia, the free online encyclopedia that anyone can edit today. A search for "dissident," for instance, contains the following Wikipedia statement: "The term *dissident* was used in the Eastern bloc, particularly in the Soviet Union, in the period following Joseph Stalin's death until the fall of communism. It was attached to citizens who criticized the practices or the authority of the communist party."[9] A photograph of Vaclav Havel illustrates the entry. I underlined the words with hyperlinks leading to other separate articles containing endless other hyperlinks. In a similar manner, Cold War researchers created their own archival categories of information labelling boxes with words like "dissent" and "communist party." They also synthesized files with background

[8] Ann Laura Stoler, 'Colonial Archives and the Arts of Governance', *Archival Science* 2, no. 1 (1 March 2002): 90–91, https://doi.org/10.1007/BF02435632.
[9] Wikipedia, "Dissident," https://en.wikipedia.org/wiki/Dissident Accessed 8 May 2023.

information based on available copious files about communism and dissent during the Cold War. In this case however, there were palpable historical dynamics linked to the practice of collecting and organizing information.

Unlike the clear-cut retrospective periodization proposed by the anonymous Wikipedia contributor, anonymous Cold War archivists had a rather fluctuating understanding about "the fall of communism." Until the mid-1950s, researchers and archivists shared the belief that the radio institute was a temporary occupation. From their perspective, it seemed highly improbable that the communist regimes installed in Eastern European "target" countries would last long. This explains the missing systematic archive from the early Cold War period. The accumulation of data in strictly arranged archival boxes about communism appeared only after "Stalin's death" and the suppression of the Hungarian and Polish uprisings from 1956 when the "the fall of communism" gradually disappeared from the horizon of expectations. [10] Only then, the radio archivists switched to systematic knowledge production about politics behind the Iron Curtain. Practices of information gathering changed over time. The dynamic accumulation of files (or hyperlinks today) may reflect historical changes, shifting worldviews, and new perceptions of technology.

This is the main focus of the third chapter which introduces one of the earliest instances when the system of gathering and evaluating information at RFE/RL was put into motion. The radio researchers accumulated data around a single topic in the 1950s

[10] Scholars of the RFE/RL archive paid special attention to the perception of time reflected in the organization of the files: "[a]fter the first few years the management of the archives became more and more professional. The experiences of the Hungarian and Polish uprisings in 1956 brought about the major changes in this respect. These historic events made clear both the importance and the responsibility of the Radios in the region, and also proved that this venture would not be merely a temporary one. It became clear that communism would stay in these countries, and the division of Europe was a long-term historical phenomenon." Székely and Pudłowski, *Open Society Archives*, 44–45.

when RFE returned to the older technology of leaflet balloons to supplement its jammed radio transmitters to Czechoslovakia, Hungary, and Poland. Not surprisingly, communist authorities did not embrace the idea. The local press reacted with a systematic propaganda campaign coloured with conspiracy theories and fantasies about balloons carrying spying equipment for air photographs. In turn, Western employees registered limited feedback about their humble technology composed largely of distorted information.

RFE/RL information analysts at the time were not moved by the possibilities of access to information created by the XX century mass media of press, radio, or television. Westerners had no illusions that they were flooded with pure propaganda stored at their headquarters in Munich. Thus, they were immune to the contemporary anxieties of information overload. They accumulated this huge archive being aware that it contains *limited* reliable information. In these historical circumstances, credibility of information was an issue of considerable concern.

Entanglements in Cold War technology

Although the present work is inspired by the RFE/RL experience during the Cold War, it focuses more on technology in the Soviet sphere. How did communist authorities imagine and use technology in the ideological conflict? How does one approach Cold War technology beyond the division of inferior (Soviet) – superior (Western)? How did communist radio infrastructure and related fantasies shape the ideological conflict? Raising such questions the dissertation contributes to the scholarship in the field of Cold War broadcasting with a comparative perspective enriching the Western view with sources originating from Eastern Europe.[11] I follow a dialogue across ideological borders using technical traces from both sides of the divide. At the same time, cross-border interrelations in the wars of noise entailed diverse technologies not limited to broadcasting. The emphasis of radio jamming in both the civilian and the military spectrum in Eastern Europe introduces the related stories about over-the-horizon radars,

[11] Steven Lovell's publication on radio technology based on Soviet archives is particularly important. Stephen Lovell, *Russia in the Microphone Age: A History of Soviet Radio, 1919-1970*, First edition (Oxford: Oxford University Press, 2015). Recent scholarship pays special attention to entanglements across the Iron Curtain. On this aspect see Melisa Feinberg's work discussing sources originating from RFE and archival documents from Czechoslovakia: Melissa Feinberg, *Curtain of Lies: The Battle over Truth in Stalinist Eastern Europe* (New York, NY: Oxford University Press, 2017). The present work also contributes to the voluminous scholarship consisting of personal recollections of former employees or research in RFE/RL archives. See: Allan A. Michie, *Voices through the Iron Curtain: The Radio Free Europe Story* (New York, NY: Dodd, Mead & Company, 1963). Sig Mickelson, *America's Other Voice: The Story of Radio Free Europe and Radio Liberty* (New York, NY: Praeger Publishers, 1983). Richard H. Cummings, *Cold War Radio: The Dangerous History of American Broadcasting in Europe, 1950-1989* (Jefferson, N.C: McFarland & Co, 2009). Arch Puddington, *Broadcasting Freedom: The Cold War Triumph of Radio Free Europe and Radio Liberty* (Lexington: University Press of Kentucky, 2000). A. Ross Johnson, *Radio Free Europe and Radio Liberty: The CIA Years and Beyond* (Washington, D.C: Woodrow Wilson Center Press, 2010). A. Ross Johnson and R. Eugene Parta, eds., *Cold War Broadcasting: Impact on the Soviet Union and Eastern Europe: A Collection of Studies and Documents* (Budapest ; New York: Central European University Press, 2010). Richard H. Cummings, *Radio Free Europe's 'Crusade for Freedom': Rallying Americans behind Cold War Broadcasting, 1950-1960* (Jefferson, N.C: McFarland & Company, Inc, 2010). Friederike Kind-Kovács, 'Voices, Letters, and Literature through the Iron Curtain: Exiles and the (Trans)Mission of Radio in the Cold War', *Cold War History* 13, no. 2 (1 May 2013): 193–219, https://doi.org/10.1080/14682745.2012.746666.

military weapons, monitoring equipment, and weather balloons as material components that enhance our understanding of the phrase "Cold War radio."

The second chapter, for instance, seeks the perspective of Soviet military engineers and commanders, published in a series of professional publications promoting deliberate interference to block electronic maritime communications. Such publications filled with technical vocabulary recall the context when the Soviet fleet challenged its superior American counterparts for the first time during the Cold War, a political development that reached its peak during the Cuban missile crisis of October 1962.

The rich RL archive also unintentionally kept fragments from Soviet military thought on radio technology. Western broadcasters collected all available annual publications dedicated to the Soviet Radio Day (7 May). Communist authorities then regularly shared valuable statistics about the production of radio sets. Interested only in available receivers for its potential audience, RL accidentally archived how the army celebrated and imagined advancement in radio communications. Army officers and party officials talked about future communication trunks uniting all electronic media subordinated to the communist state. In this political vision, the Party controlled both the content and the technical infrastructure for disseminating information.

In other case studies, I follow entanglements in the political uses of Cold War technology. For instance, technical monitoring of radio signal quality emerged simultaneously from both sides of the Iron Curtain. A comparative view of instructions for jamming monitoring in communist Bulgaria (chapter 1) with the methods used by RFE technical monitors (chapter 4), reveal how shared Cold War constraints shaped similar uses of monitoring equipment. In the case of Free Europe Balloons (chapter 3),

one observes how negative feedback from the communist authorities became essential for justifying the use of leaflet balloons in the West.

As implied in the chapters' outline, the historical analysis on radio interference and technical knowledge production simultaneously uses several key perspectives on technology. First, this is the semiotic approach which reflects on technical descriptions in the form of texts, charts, and numerical codes. The materiality of radio sound and technology seen in specific artifacts for transmission and monitoring is another key perspective. I stress the interaction between wave propagation and its natural environment of atmospheric phenomena. Last, but not least, the following work includes the perspective of invisible Cold War professional subcultures. In the following subsections, I will introduce each of these perspectives and define key notions that inform my methodological approach.

The invisible Cold War professionals

Cold War techno-political stories shed light onto the marginalized professional subcultures[12] which observed the dynamics of noise wars. Such groups did not directly participate in the process of decision-making, but inhabited an invaluable perspective on

[12] This approach is inspired by Peter Galison's concept of "trading zone" which denotes the space of contact between different professional subcultures in experimental science. Trading zones invites us to consider the contribution of technicians and engineers in the creation of vital scientific instruments. As Galison observes, there is a process of exchange between subcultures where parties involved "understand that the continuation of exchange is a prerequisite to the survival of the larger culture of which they are part." See: Peter Galison, "Trading zone: coordinating action and belief," in: Mario Biagioli, ed., *The Science Studies Reader* (New York: Routledge, 1999), 146. At the same time, the interest in invisible Cold War professionals is informed by feminist media history and Carolyn Birdsall and Elinor Carmi's argument that "media production has always been a result of the collective work of multiple workers and expertise rather than a single male auteur". Carolyn Birdsall and Elinor Carmi, 'Feminist Avenues for Listening in: Amplifying Silenced Histories of Media and Communication', *Women's History Review* 31, no. 4 (7 June 2022): 542–60, https://doi.org/10.1080/09612025.2021.1944345.

the social phenomena and cultural norms involved in destructive uses of radio technology. The so called technical monitors at RFE, for example, relied on their listening skills and technical equipment to generate the politically sensitive data on radio signal quality. Across the Iron Curtain, monitors of local jamming quality gave orders to transmission teams working behind the infamous noise generator devices. Since a description of the spaces for broadcasting technology is particularly important in this respect, I visited the ruins of a transmission site built in the 1970s. My guide and interlocutor was a former technician employed to fix technical failures by climbing the masts of gigantic Soviet transmitters installed in Bulgaria. This was the professional task of "machtoviks," originated from the word "mast." Lacking any political authority in the communist party, such technicians remember stories from all control rooms of Cold War broadcasting and jamming where technology met politics. Certainly, those who wore alpinist equipment exposing their bodies to the health risks of the electromagnetic fields did not spend their time in party offices.

Such rooms were reserved for men who used direct telephone lines connecting party headquarters to high-rank radio engineers. Such communication links were maintained in separate invisible rooms, where women monitored the quality of jamming and led diaries about telephone cables and relay links. Gender inequalities permeated Soviet radio communications, a sphere where the communist states allocated significant resources. These invisible Cold War participants lead this historical analysis, those whose voices were deliberately silenced and marginalized by rules of secrecy and security concerns.

While machtoviks fixed the shortcomings of civilian radio, politics entered another Soviet realm controlled by men - the military radio spectrum. Soviet naval

engineers started a dialogue with their counterparts across the Atlantic by regularly publishing strategies and weapons of radioelectronic combat in the 1970s. At first glance, discussions on radio skirmishes in oceans appear to be a technical topic within a closed professional group. However, shortly after the first publications in Soviet naval journals, the logic of radio warfare allured the top military echelon. Ultimately, all army branches studied radio warfare as a separate discipline characterized by prolific publications that are still visible in contemporary Russian military literature. By paying special attention to such Cold War technicians, I do not argue that they possessed a position of power or expert knowledge that influenced political decision-making. From their perspective, however, we have access to descriptions of available technology at a particular historical moment without omissions of power shortages, vulnerability, limitations, dilemmas, and controversies. Therefore, the following chapters contrast detailed technical accounts with political visions emerging around technology.

Technical texts and tools as historical traces

Technological tools and their descriptions on paper are equally important elements for this research. One of the earliest methodological insights uniting the semiotic and material dimension of technology was proposed by the French philosopher Bruno Latour. During the Cold War, in the late 1980s, he thought about science and technology as two spheres that are inseparable from politics. His controversial book *Science in Action*: *How to follow scientists and engineers through society*[13] from 1987 gives us a valuable

[13] Bruno Latour, *Science in Action: How to Follow Scientists and Engineers Through Society* (Cambridge, Mass: Harvard University Press, 1987). Latour's early publications would become a common reference

perspective on the interrelations between technology and politics during the propaganda war.

Latour begins his first chapter with an example from Cold War military technology and security policies. "New Soviet missiles aimed against Minutemen silos are accurate to 100 metres."[14] He uses this statement from a contemporaneous political debate to illustrate how its meanings change when one has access to the process of knowledge production behind this short sentence. Latour stresses that the credibility is determined by the source background. It mattered whether this piece of information was produced by a CIA agent or was intentionally fabricated and leaked by Soviet misinformation to influence targeted readers from the American security administration. With this example Latour insists on studying the rhetorical and semiotic aspects in the process of knowledge production that take the final shape of a text. The political intentions of the text and the intended reader or the "semiotic character,"[15] to use Latour's term, were imprinted in the statements expressed in matter-of-factual manner. In the 1980s, Latour was not able to provide more elaborate examples from the still classified papers on Cold War missiles, but he built upon the semiotic aspect of his approach. Not

point in the upcoming debates dubbed "science wars". To a significant extent, Science in Action was a methodological reflection on the benefits of observing the daily routines at scientific laboratories without ignoring but rather stressing scientific controversies and uncertainties. Together with Steve Woolgar as a co-author, Latour published the results of such a study earlier in 1979 in the book Laboratory Life: The Social Construction of Scientific Facts. Such works paved the way to the prolific field of Science and Technology Studies. Meanwhile, Latour was criticized for using a "social constructivist" approach to science and implicitly for undermining the trust in scientific facts. This critical stand became more pronounced in the context of growing climate change denial and anti-vaccine movements during the Covid-pandemic, for instance. Latour regularly published his own defense in the "science wars." See: "Do you believe in reality? News from the trenches of the science wars," in: Bruno Latour, *Pandora's Hope: Essays on the Reality of Science Studies* (Cambridge, Mass: Harvard University Press, 1999), 1–23.; Bruno Latour, "The Promises of Constructivism," in: Don Ihde and Evan Selinger, eds., *Chasing Technoscience: Matrix for Materiality*, Indiana Series in the Philosophy of Technology (Bloomington: Indiana University Press, 2003), 27–46.; Bruno Latour and Steve Woolgar, *Laboratory Life: The Construction of Scientific Facts* (Beverly Hills: Sage Publications, 1979).

[14] Latour, *Science in Action*, 22.

[15] Latour, 53.

all knowledge with political implications was produced in a form of a text. He uses examples of colonial cartography that "allow mobility, stability or combinability to improve, making domination at a distance feasible"[16] to introduce his notion of "immutable mobiles." Besides maps, travelling ships became early instruments of power equipped with "marine clocks, quadrants, sextants, experts, preprinted log books, and earlier maps."[17] Such instruments connected the metropolitan centers with faraway conquered colonies.

Such a view combining semiotics and instruments is relevant for studying the Cold War archive. Throughout the dissertation, I emphasize the intentional quality of documents describing technology. For example, the weather balloons re-designed to send leaflets were simultaneously described as an effective communication tool in RFE administrative documents and as subversive technology in communist propaganda. In another case study, gathering acoustic information on jamming and signal quality was an attempt to gain access to the sealed information space in the Soviet sphere, using tools to generate acoustic technical data. The Cold War left an archival heritage of charts, numerical codes, and photographs of monitoring equipment that testify to a combination of human listening skills and instruments mobilized for political ends. From the perspective of tools and technical texts, this study is a contribution to the political history of the Cold War.

[16] Latour, 223.
[17] Latour, 224.

Cold War politics and its constraints

By all means, technical documentation, data, and artifacts are always the starting point for understanding the sphere of political decision-making. The third chapter's thick description of technical spaces and internal rules of jamming provide a slow-motion view of the instances when communist states decided to temporarily cease the practice. Cold War historiography often explains technological phenomena with its historical context: silence in the ether equals political relaxation in Cold War antagonism. Following this logic, one may overlook the political dilemmas and internal dynamics within the Eastern bloc that informed such decisions. In fact, countries like Hungary and Bulgaria rented short wave jamming equipment installed on Soviet territory. They were regularly informed about the cost of the noise wars. However, the Soviet communist party did not impose a unified policy in this case. Paying for interference was not a long-tern solution for Hungary where the local politburo decided to cease jamming of VOA and BBC in 1963. At the same time, Bulgaria sustained its fiscal-technical links with the USSR and, simultaneously, invested in expensive infrastructure for transnational broadcasting. This was a typical Cold War dilemma: destroying enemy signals or entering the propaganda competition in the global ether. Shifting to the micro-scale space of the jamming control rooms, one observes other types of obstacles. As mentioned previously, assessing jamming quality implied constant uncertainties. Since jamming was broadcasting without any audience feedback, the only option for the party apparatus was to rely on the acoustic laboratory environment of monitoring stations, human monitors, and acoustic apparatus to assess effectiveness. This was a familiar constellation to RFE/RL technical employees

where signal effectiveness was a practice of knowledge production that correlated with data from listener's accounts.

Radio engineers and decision-makers shared common constraints. Political visions were not simply eliminated or fulfilled with technological tools. Moreover, the Cold War's norm of limited access to information deformed practices that were previously considered rather banal and straightforward. As the story of jamming shows, a routine check of radio sound quality was significantly limited by closed ideological borders and lack of access to the target territory and audience. Thus the category of "constraints" is particularly important for my approach. Tracing back the historiographical use of the notion to authors such as Fernand Braudel, Emile Durkheim, and Carlo Ginzburg, the historian of science Peter Galison looks specifically at constraints to identify the boundaries, contacts, and coordinated actions of diverse subcultures within a scientific community.[18] Constraint is not merely an abstract notion. As Galison insists, constraints have histories and invite a historical description.[19]

[18] See Peter Galison, "Context and Constraints," in Jed Z. Buchwald, *Scientific Practice: Theories and Stories of Doing Physics* (Chicago London: University of Chicago press, 1995): 13-41. The notion of constraints is discussed also in: Peter Galison, 'Multiple Constraints, Simultaneous Solutions,' *PSA: Proceedings of the Biennial Meeting of the Philosophy of Science Association* 1988 (1988): 157–63. and Peter Galison, *How Experiments End* (Chicago: University of Chicago Press, 2011).

[19] Peter Galison, "Context and Constraints," in Buchwald, *Scientific Practice*, 18–19.
In order to identify the constraints emerging around the use of technology, it is essential to understand and describe technology in its own terms. Peter Galison and Alexi Assmus use the example of the cloud chamber, a device dubbed the earliest particle detector, a machine retrospectively considered foundational for modern particle physics, of which a less-known emergence is associated with the romantic fascination around weather phenomena in the XIX century. An attempt to examine the history of elementary particles thus goes through understanding the often overlooked importance of studying clouds and lightening in attempts to reproduce natural phenomena in a laboratory. Galison and Assmus return to the historical moment of contact between meteorology and particle physics. See: Peter Galison and Alexi Assmus, "Artificial Clouds, Real. Particles," in David Gooding, ed., *The Uses of Experiment: Studies in the Natural Sciences*, (Cambridge: Cambridge Univ. Press, 1999):225-274.

The nature of Cold War technology

Putting an emphasis on the history of technology under social and political constraints, I approach Cold War politics through the prism of concrete objects. By politicized technology, I understand that abstract political visions are reflected in the use of material objects. This work demonstrates the two-directional influence between the two spheres. The focus on techno-political *interrelationships* is informed by an old dilemma in the history of science and technology. Was experimental science an independent activity moved only by *internal* values within the scientific community or did experiments merely reflect the demands of *external* cultural and political factors? In the 1980s, some scholars started to question the notions of "internal" and "external," the foundational categories of this debate. Focusing on the history of a scientific instrument, the air pump in their book *Leviathan and the Air Pump*, Steven Shapin and Simon Shaffer demonstrated the potential of the two-directional influence between laboratory practices and political values in the context of the Restoration in XVII century England. At the time, the problem of ensuring social order constituted a key concern for both the state and experimental philosophers.[20]

Following such insights from the history of science, I challenge the conventions of technology by questioning its self-evidential qualities. As Shapin and Shaffer scrutinize the political value of order in the XVII century reflected in the history of a technological tool, I explore the effectiveness of radio propagation in chapter 1 and 4. Reaching

[20] Intellectuals established and at the same time challenged boundaries that were set to maintain order in the process of knowledge-production within a scientific community. This process was illustrated by the controversy between Robert Boyle and Thomas Hobbes who entered a debate on the integrity and values of experimental practices, especially when the scientific apparatus of the air pump played a key role in knowledge production. See: Steven Shapin and Simon Schaffer, *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life* (Princenton, New Jersey: Princeton University Press, 1985).

effectiveness was a typical aspiration of engineers, adopted also by political authorities to justify further involvement in or withdrawal from the wars of noise. The abstract notion of effectiveness is reflected in the material objects for signal monitoring. In a similar vein, the second chapter problematizes the notion of vulnerability often used in Soviet military communications to justify the uses of jamming equipment against potential enemies.

In this respect, the following account on technology does not follow a narrative framework about innovations that determine social and political phenomena. This work is not concerned with new machinery invented in the period under observation to change the course of events. Instead, each chapter implies "the shock of the old," the phrase introduced by David Edgerton to advocate for writing the history of "technology-in-use."[21] It is not the innovative qualities of radio transmitters, receivers, jamming weapons, and weather balloons that make them important. Their significance lies in the process of re-defining available well-known technologies for political ends.

Focusing on radio jamming and information gathering as central concerns, I study the multiple layers of Cold War media. One layer consists of media content archived by the RFE/RL research institute. I follow the trajectories of technological objects and descriptions of sounds that reached the pages of newspapers archived by the RFE/RL research institute (chapter 3 and 4). Using insights from the field of sound studies, I argue that sonic information and noise, in particular, constituted an indispensible part of media content during the Cold War.

On another level, I analyze infrastructures that sustained the decades-long propaganda conflict. While vast infrastructures of transmission stations made possible radio communication or jamming across borders, infrastructures also outlined the space

[21] David Edgerton, *The Shock of the Old: Technology and Global History since 1900* (London: Profile Books, 2008).

from which to observe social organizations. Infrastructures are always "*socio*technical in nature,"[22] as historian Paul Edwards insists. Following Edwards, I examine shifting scales of infrastructures starting from the macro-scale view of cross-border entanglements between jamming and international broadcasting, moving towards the institutional level of political decisions about noise transmission and, ultimately, reaching the invisible technicians in jamming control rooms.

Ionosphere, winds, and seas are other examples of Cold War media. Inspired by the book *Marvelous Clouds* by John Durham Peters, this research approaches the medium of radio as a technological infrastructure embedded in its natural environment. As John Peters points out, the intellectual history of the concept of medium is intimately linked to nature: "[*m*]*edium* has always meant an element, environment, or vehicle in the middle of things."[23] Thus, I approach media "as ensembles of nature and culture, *physis* and *technē.*"[24]

As chapters 2 and 3 demonstrate, atmospheric phenomena were not merely the natural background of radio propagation. They were considered an active force in the conflict. A view from a military perspective in chapter 2 is particularly valuable in this respect. It came naturally for naval technicians to use the notion of medium talking about the world ocean and the ionosphere. On the one hand, this is because weather and the environment have always been a main consideration in battles. This aspect is particularly important for the history of military jamming because the vast seas made naval vessels

[22] Paul Edwards, "Infrastructure and modernity: Force, time, and social organization in the history of sociotechnical systems," in Thomas J. Misa, Philip Brey, and Andrew Feenberg, eds., *Modernity and Technology* (Cambridge, Mass: MIT Press, 2003), 188.
[23] John Durham Peters, *The Marvelous Clouds: Toward a Philosophy of Elemental Media* (Chicago ; London: the University of Chicago Press, 2015), 46.
[24] Peters, 49.

increasingly dependent on communication technology and thus targets of jamming attacks.

On the other hand, it is also important to keep in mind that "militaries have often turned toward the scientific and technological management of weather."[25] The Cold War also witnessed how weather phenomena became an object of research. The ionosphere inspired sunspot forecasts to predict the acoustic dynamics of the noise wars, while the radio's alternative in the form of weather balloons relied on calculations of wind currents across the Iron Curtain.

To sum up, the dissertation approaches Cold War technology from a perspective that unites semiotic and material dimensions of the propaganda war. In addition, the focus on material infrastructure embedded in their natural environment gives us insight into the intersection between technology, politics, and military thought. Throughout the present work, I stress the anthropological dimension of technology and the Cold War archive. As the opening chapter will show, the war of noise is still palpable in the ruins of radio control rooms and in the memory of those employed to fix failures of technology mobilized for political ends.

[25] Jeremy Packer and Joshua Reeves, *Killer Apps: War, Media, Machine* (Durham: Duke University Press, 2020), 67.

1. Technology and Politics at the Limits of Cold War Radio Jamming

Introduction

There was an invisible (yet audible) change in radio transmission technology that marked the beginning of the Cold War. In 1948, the USSR converted available radio transmitters into noise machines targeting the frequencies of the BBC and the Voice of America (VOA) with noise. Party authorities ordered the installation of jammers across main Soviet cities. Usually, only a limited circle of technicians and party officials knew exactly which mast interfered with ideological enemies. Nevertheless, there were places where the culture of secrecy was unable to cover noise with imposed silence. The solid metal jamming tower in the Ukrainian city of Lviv, competed visually with the domes of St. George Cathedral.[1] Jamming interfered with the centuries-old urban architecture. It was not a secret to locals that the new radio tower was there to "protect" them from free information. Even during the first two decades after the collapse of communism, the former noise generator proved to still be useful for regional broadcasting. Its familiar metal silhouette kept alive the shared memory of politicized technology.

Such local antenna equipment covered only the perimeter of cities with an acoustic blanket. Meanwhile, powerful short wave radio infrastructure of gigantic-scale exported noise to sustain the ideological fight in the states under the post-war Soviet

[1] I am grateful to Yuriy Koshulap for this observation.

sphere of influence. Bulgarian officials, for instance, signed contracts for Soviet noise, which was regularly updated and the rate of their electricity debts for kilowatts per hour were converted to rubles – the price of the Cold War. The emerging technical geography of jamming solidified the post-war political borders.

The practice of jamming was simultaneously present in the civilian and the military communication realm during the ideological conflict.[2] In both spheres, the destructive philosophy of mechanical noise could be approached through the notion of overload. As media philosopher John Peters explains, each communication channel has a limited capacity and "jamming (interference) is a problem when many senders use the same channel at the same time."[3] Cold War jamming was a deliberately created information overload.

This is a paradox of communication technologies that is ever more present today - immediate access to information implies the risk of information overload. Important or "breaking" news, for instance, could trigger an unprecedented abundance of online content, created on websites and social networks by humans as well as machines in the form of artificial intelligence or bots. Software tools could overwhelm digital spaces with repetitive politically designed content. The same logic applies in cases when too many machine-generated tools imitate real users who simultaneously send too many requests to a certain website leading to its collapse.

[2] The present chapter explores jamming in the civilian spectrum, while chapter 2 focuses on the interrelated history of military jamming during the Cold War.

[3] John Peters uses the example with AM and FM frequencies to stress that each communication channel has a certain capacity: "[f]rom information theory we know that frequency is a measure of channel capacity. One reason, for instance, why FM radio is better than AM for transmitting music, which requires a more complex signal than speech, is that FM deals in megahertz instead of kilohertz, the lowest FM frequency operating at about fifty times more cycles per second than the highest AM frequency." John Durham Peters, *The Marvelous Clouds: Toward a Philosophy of Elemental Media* (Chicago ; London: the University of Chicago Press, 2015), 92–93.

Usually, information overload is defined in terms of human interaction with a technological environment where exposure to too much information leads to confusion.[4] But this typical human challenge is far from being the only problem. Odd as it may sound, one needs to approach information overload from a machine's perspective to see the profound political implication of the issue. Machines could provide information overload as a solution to political problems. During the Cold War, jammers overwhelmed foreign radios with noise or repetitive music. It resulted in incomprehensible programs on a certain frequency. As such, Western broadcaster faced the limits of technology designed to disseminate free information across borders.

However, noise machines also operated within significant technical and political limits. Reflecting on the practices of radio jamming in the propaganda war, this chapter asserts that the dream to use available communication technology to destroy meaning was never completely fulfilled. My aim is to ground the description of jamming in its material and institutional setting by providing a thick description of tools and practices used for distorting communication. From this perspective, we can observe the specific constraints in this techno-political interaction.

This approach is important because jamming has not been studied systematically by Cold War historians, although its importance is generally acknowledged. Along with informative works written by technology experts[5] and contemporaneous observers who were familiar with the political implications of the issue,[6] recent works on jamming present a historical perspective on the larger Cold War context. Authors paid special

[4] Oxford English Dictionary, s.v. "information overload."
[5]George W. Woodard, "Cold War Radio Jamming" in A. Ross Johnson and R. Eugene Parta, eds., *Cold War Broadcasting: Impact on the Soviet Union and Eastern Europe: A Collection of Studies and Documents* (Budapest ; New York: CEU Press, 2010).; James Wood, Institution of Engineering and Technology, and Science Museum (Great Britain), *History of International Broadcasting. Volume 1*, 2008.; Rimantas Pleikys, *Jamming* (Vilnius: R. Pleikys, 1998).
[6] See the chapter "Frequency Wars" in Arch Puddington, *Broadcasting Freedom: The Cold War Triumph of Radio FreeEurope and Radio Liberty* (Lexington: University Press of Kentucky, 2000): 214-224.

attention to audience reaction to noise in western radios.[7] Party decisions concerning jamming in the Soviet Union,[8] and the security concerns in the United States[9] are other important research angles. This chapter contributes to the scholarship with a focus on the interrelations between technology and politics emphasizing the limitations and the internal rules governing jamming technology.

By looking explicitly at technical challenges, I question the self-evidence, neutrality, automaticity, and transparency of the technological world. Emphasizing failed attempts to sustain interference in Western radios, one grasps the relation between the political urge to silence foreign information and the limited possibilities to do that. Inversely, without knowing and defining the limits, either politics or technology seems all-encompassing and self-explanatory in the narratives about a historical period that we, for convenience, call the Cold War. There was a two-directional link of influence between politics and technology in the case of jamming. It would be misleading to claim that jamming depended solely on the will of politicians who remotely controlled vast technical infrastructure. It would be equally wrong to believe that radio technicians simply did their job leaving aside any political considerations.

This part of the research analyzes micro-areas of interaction between technology and politics, aiming at a closer description of the famous skirmish in the ether. The chapter outlines three main technological challenges around which political visions were

[7] Simo Mikkonen, 'Stealing the Monopoly of Knowledge?: Soviet Reactions to U.S. Cold War Broadcasting', *Kritika: Explorations in Russian and Eurasian History* 11, no. 4 (2010): 771–805, https://doi.org/10.1353/kri.2010.0012.; Friederike Kind-Kovács, 'Voices, Letters, and Literature through the Iron Curtain: Exiles and the (Trans)Mission of Radio in the Cold War', *Cold War History* 13, no. 2 (1 May 2013): 193–219, https://doi.org/10.1080/14682745.2012.746666. Kristin Roth-Ey, 'Listening Out, Listening For, Listening In: Cold War Radio Broadcasting and the Late Soviet Audience', *The Russian Review* 79, no. 4 (2020): 556–77, https://doi.org/10.1111/russ.12285.
[8] Stephen Lovell, *Russia in the Microphone Age: A History of Soviet Radio,1919-1970*, First edition, Oxford Studies in Modern European History (Oxford: Oxford University Press, 2015).
[9] Jonathan Reed Winkler, 'The Forgotten Menace of Electro-Magnetic Warfare in the Early Cold War', *Diplomatic History* 42, no. 2 (1 April 2018): 254–80, https://doi.org/10.1093/dh/dhx050.

created. First, jamming (and its limitations) was studied systematically from Western institutions and, vice versa, communist states adapted its investments in jamming considering the development of "enemy" radios' infrastructure. This dynamic led to cross-border interdependence of Cold War broadcasting and jamming. Second, jamming depended on international cooperation between communist states in Eastern Europe. Third, jamming existed within multiple spaces for "radio defense," which required complex coordination and strict rules for documenting human interaction with technology. A description of jamming convention from a cross-border view to micro-scale accounts from jamming stations testifies to the mutual influence between technology and politics during the long propaganda conflict.

Traces of these interactions are found in jamming chronicles of Western institutions engaged in technical information gathering; in particular, Radio Free Europe/Radio Liberty (RFE/RL) research institute and the CIA. I also examine instructions for jamming given to employees in communist Bulgaria and provide personal observations from an abandoned transmission station used for international broadcasting and jamming. Such sources give us a comprehensive perspective on Cold War technology entailing, cross-border, institutional, and micro-scale dimensions of jamming.

1.1 The cross-border discussion on "deafening" constraints

The alphabetical catalogue of the monumental archive of Radio Free Europe/Radio Liberty (RFE/RL) Research Institute resembles a dictionary of essential Cold War language. The archival categories, in turn, reflect a process of knowledge production in this ideological conflict.[10] Box labels include Soviet person, samizdat, detente, dissidents, personality cult, Marxism-Leninism[11] – arguably, the fundamental notions describing Soviet society as perceived from a geographical and existential distance.

Along with the mandatory, politically loaded, notions, the archive sketches the world of technology with seemingly neutral sounding terms; nevertheless, historians face a limited selection of what was considered relevant to the Soviet experience: agricultural technology, automatic controls and automation, hydroelectric power stations, mining, nuclear weapons, cybernetics and computers.[12] In the list of archival records dedicated to technology, jamming emerges as one of the issues deserving special attention. Jamming, the deliberate interference in the radio spectrum in an attempt to silence free information, affected directly the radio's team and its values. RFE/RL researchers put all relevant pieces of information on the topic in a box labelled "glushenie" - the Russian word meaning literally "deafening."

[10] Archivists at the famous Western radio (also known as an "enemy" radio in the Soviet sphere) collected pieces of media information about politics and everyday life behind the Iron Curtain. In turn, analysts drew conclusion on the reality exposing the lies behind propaganda materials or seeking additional factual information by cautiously interviewing refugees and privileged travellers to the West. Gathering information in Russian language, albeit biased, was considered vital for Cold War broadcasting.

[11] Catalogue of Folders/Items in: HU OSA 300-80-1, Soviet Red Archives, Old Code Subject Files, Vera and Donald Blinken Open Society Archives at Central European University, Budapest.

[12] Catalogue of Folders/Items in: HU OSA 300-80-1, Soviet Red Archives, Old Code Subject Files.

One of the last pieces of information preserved under "glushenie" from 1989 is a newspaper article about the faith of installations formerly used to obstruct enemy radios. Jammers would be either demolished or used for broadcasting Soviet radio, according to the article. [13] Since then, material traces of jamming gradually disappeared. However, the systematic Cold War archive records the decades-long destructive use of technology. The archive contains information about the persistent weaknesses of "deafening" attempts long before the noise-generators were deemed useless.

Throughout the Cold War, the limits of jamming were scrutinized by institutions representing the "enemies" in the ideological conflict; in particular, the analytical departments at Western radio stations where political analysts (with the help of archivists) studied jamming. The CIA, the institution that made secret knowledge accessible to decision makers in the US, also participated in knowledge production in the sphere of radio broadcasting.

Radio Liberty archived the drawbacks of jamming facilities as useful practical knowledge to be communicated to political analysts in the West and to its potential audience in the USSR. A report on the limitations of Soviet attempts to hinder RFE reception is kept in the RL archive. Zef Nisan, a 34-year-old electronics engineer from Leningrad, who emigrated to Israel in 1978, wrote a report for RL on his own initiative, explained Max Ralis, the Director of the RL's Soviet Area Audience and Opinion Research Department in an introductory note to the document.[14] RL researchers archived such introductory notes stressing the importance that information originates from Soviet citizens with intimate knowledge about life behind the Iron Curtain, a rule of attributing

[13] "Jamming Towers to be Demolished or Recycled," *Trud*, January 5, 1989 in HU OSA 300-80-1, box 764.
[14] "Suggestions on Counteracting Soviet Jamming," Soviet Area Audience and Opinion Research Department, March 2, 1979, HU OSA 300-80-1, box 763.

credibility to the source. The historian could only speculate about the extent to which the document was edited by RL's researchers. Thus it is safe to say that such files were designed and selected as useful sources of information and they conform to the rules for presenting information at the Western institution. The report on "Suggestions on Counteracting Soviet Jamming" was archived under the key category of "glushenie." "The Soviet authorities are aware that a huge number of citizens listen to RL, and they try to combat this phenomenon in two ways", begins the report in the hopes of overcoming jamming. It was not uncommon for contemporaneous accounts to describe ideology and technology as two linked domains:

a) Ideological: Discrediting Radio Liberty through Soviet mass media, and for example, by publishing biographies of RL employees which (Soviet ideologues feel) will sow mistrust in the minds of "Soviet" people.
b) Technical: Maintaining and expanding jamming stations (referred to in bureaucratese as "post boxes"). These stations are equipped with powerful transmitters which emit noise on frequencies used by Western broadcasters, including RL. The stations and their generators are generally located on the four sides of large cities, either in a cross pattern or a square shape.[15]

Immediately after defining radio interference with notions common to Cold War vocabulary as "minds of Soviet people" and "powerful transmitters," the report continues with a straightforward outline on measures to counteract the technical obstacles faced by RL. "Jamming stations are concentrated in major industrial centers, where there are a large number of blue-collar workers (Donbass, Krivoy Rog, and the important industrial cities in Siberia and the Urals); as well as in the Republican capitals and other large Soviet cities. However, from about 50 kilometers outside the city limits, RL's audibility is good. This means that, for instance, residents of Moscow and Leningrad who go out to their dachas in summer are able to hear RL almost without interference. On beaches in the

[15] Ibid., p.2.

Black Sea area one also sees young people listening openly to RL broadcasts. They didn't experience the terror of the period 1937-41, and are not afraid to listen to broadcasts from the West. On the contrary, they flaunt their listening."[16] Here, I do not challenge the historical accuracy of the statement or question the audience able to afford dachas in the Soviet Union. It is also not the aim of the chapter to evaluate to what extent the technical aspect of the claim is factual. It is enough at this point to identify and stress the technical statement common to many other sources of the time: jamming was not effective outside the large cities. This is the first limitation of jamming according to Western sources.

The second limitation implied by the source is that jamming operates according to a human-drawn schedule. It was not a constant automatic practice, which itself gave hope to Westerners that their radio always had free slots of broadcasting time. "Jamming stations work at full strength essentially in the evening from the time that people finish work up until midnight (Moscow time), that is, the period when people have the opportunity to listen. Certain RL broadcasts are subject to only partial jamming. Broadcasts which are jammed in their entirety are those which, for one reason or another, actively displease the authorities."[17] I will return later to the second part of the claim; in particular, that jamming followed the decisions of politicians. It is enough to identify two main claims here: jamming was never constant and its strength was different inside and outside urban centers. Human and geographical factors determine the work of "powerful jamming transmitters." Most importantly, those factors were well-known in the West.

While outlining the weaknesses of jamming, the report suggests several counter-measures. One suggestion was to construct a receiver with automatic frequency control,

[16] Ibid.
[17] Ibid.

something that only electronics specialists could do.[18] Another counter-jamming strategy proposed by the engineer was to "broadcast on frequencies close to those used by major Soviet stations"[19] which would result in jammers reducing the audibility of local stations. Although the suggestion may fit the fantasies of those who led the war in the ether, the author of the report admitted that the chances were low, considering international broadcast conventions. A third suggestion followed the logic of human factors in jamming and listening. According to the report, RL could benefit from using additional number of frequencies in the summer when potential listeners visit dachas where reception was considered better. Similar logic applies to the option to increase transmission early in the morning and after midnight when listeners could tape certain broadcasts.[20]

Most probably, most of the suggestions did not materialize although they followed the imagination typical of Cold War broadcasting practitioners. Historians do not have information on the extent to which such suggestions were indeed followed by RL, and the intention of this research is not to outline jamming counter measures. However, even the act of recording such fantastical ideas for overcoming jamming hints to the dynamic link between jamming and international broadcasting during the Cold War.

Western broadcasters and jammers did not exist as separate entities with separate rules, they constantly adapted to each other. Another archival document with predominantly pragmatic jamming counter-measures archived in 1978 reveals this reciprocal influence.[21] Judging by the chosen rhetorical form of addressing a potential

[18] Ibid., p.3.
[19] Ibid., p.4.
[20] Ibid.
[21] Jamming counter-measures, December 22, 1978 in HU OSA 300-80-1, box 763.

radio listener and using "we" to present the radio team, the content was probably broadcast on RL and later transcribed and archived because the information was particularly relevant for the category of "jamming." "Until the jammers are turned off, there is no way broadcasts from the West can reach listeners in the East with total clarity. But there are things that can be done – by us as broadcasters and by you as listeners – that will improve reception,"[22] begins the text. The transmission towers were imagined as a dynamic system that could be adjusted with creativity according to the dynamics of the war in the ether. "We often 'bunch' our transmitters so that a group of them are all carrying the same program at the same time. When we have 17 transmitters with a total power of about two million watts beamed at a single audience area we sometimes 'overload' the jammer who is using less power and fewer transmitters. And the program gets through to some of the listeners. Because broadcasts sometimes penetrate better from some transmitter sites than from others, we send out our broadcasts from several locations."[23]

In addition to counter-measures at the sending end, the radio team addressed listeners with practical advice to improve reception at home: "jamming becomes less effective as the frequency increases, so try tuning in the broadcasts on the highest frequency available,"[24] continues the report by suggesting technical specification of the most desirable radio sets. RL imagined Cold War radio listeners on the move:

> The location of the radio in your home could be important. Maybe it has always sat on the chest by the window. Try moving it to the table by the door. Pick the set up and carry it around the room. You may find reception is best in one particular spot. And try moving it from room to room. One room may be

[22] Ibid, p.1
[23] Ibid.
[24] Ibid.

> better than another. As you move the set around, move the antenna. If the antenna is a built-in type and not movable, you can get the same effect by tilting the whole receiver. Turn it on its back, on its face, on its side. Hold one side still and rotate the set slowly through a full circle. If you do have a movable antenna, move it: point it horizontally in all directions until you find the angle that gives the best reception. Remember that many towns and cities are jammed by transmitters located in or near the city and that these are often low-power stations whose signal does not reach far beyond the city limits. A short trip into the country with a portable radio will often be rewarded with sharply improved reception.[25]

Before addressing specifically the key notion of "effectiveness" that shaped the discourse of Cold War broadcasting, I will look at another example of the dynamic interaction between Western radio stations and jamming facilities reflected in intelligence gathering that underpinned the efforts to know "the enemy." A CIA report from 1964 titled "Jamming of American Broadcasts in Rumania; Technical Aspects and Popular Reaction"[26] encompasses the story of jamming in Romania from its beginning in 1952 until its end, marked by the precise date: "29 July 1963 when jamming of VOA ceased." The report quotes the communist government's official explanation that "the Communists' consciousness had reached such a level that there was no need to further jamming of the VOA Romanian broadcasts."[27] While it is not surprising that the CIA marked the jammers' silence, it is striking that the document contains the official explanation of the communist government. The CIA interpretation was clearly distanced from the official party line. But how then did Western broadcasters explain the cessation of jamming? The report does not provide an answer.

[25] Ibid.
[26] Jamming of American Broadcasters in Rumania, Technical Aspects and Popular Reaction, April 2, 1964. CIA-RDP80T00246A026801900001-4 online database, General CIA Records, https://www.cia.gov/readingroom/document/cia-rdp80t00246a026801900001-4 Accessed: September 16, 2022
[27] Ibid., p.4.

The document includes the last archived caption of jamming infrastructure in Romania represented in a map with key geographical points and locations of jamming facilities.[28] By the time the report reached CIA offices, the map lost its significance because the party decision practically dismantled the infrastructure archived by Western intelligence. Why did jamming cease in Romania? Historians explain the abrupt change with the period of détente. [29] Retrospectively, this fits the common historiographical explanation of Romania's closer ties with the West under Ceausescu and the country's emancipation from the Soviet Union and the Warsaw Pact. Without challenging this narrative, I will examine closer the rules and the technical language of jamming focusing only on this particular moment of technological flux, when both local and foreign contemporaries did not possess the retrospect available to the historian today. It would be safer to say that neither politicians nor radio engineers working at jamming stations knew with certainty that cessation of jamming would be irreversible. It is enough to point out that in the Soviet Union noise generators re-appeared in the ether after a period of silence during the détente.

"The radiated signal was a complex modulated tone which has a greater bandwidth than the normal broadcast signal and makes the broadcast signal entirely unrecognizable,"[30] reads further the CIA report pointing to the main preoccupation of western broadcasters: the "unrecognizable" signal. A detailed description of sound and noise follows, an acoustic description of jamming written in the midst of the Cold War:

[28] Ibid., p.6.
[29] See Dana Mustata, "Geographies of Power: The case of foreign broadcasting in dictatorial Romania," in Alexander Badenoch, Andreas Fickers, and Christian Henrich-Franke, *Airy Curtains in the European Ether: Broadcasting and the Cold War* (Baden-Baden: Nomos, 2013), 155.
[30] Jamming of American Broadcasters in Rumania, Technical Aspects and Popular Reaction, April 2, 1964, p.3

"A listener could not even distinguish between music and speech. The jamming signal was so broad that it often blanked adjacent frequencies in use by local stations. The jamming sounded like a rising and falling rushing noise. Usually, one could hear the beginning of the foreign program through most of the station identification. The one would hear the carrier of the jamming station being tuned to the foreign frequency. Then followed the jamming modulation, and a morse identification of the jamming station. This identification was repeated approximately every two minutes for the duration of the jamming activity."[31] Most probably, a professional monitor, a Cold War profession at stations like VOA and RFE, prepared this acoustic description.[32]

Ordinary listeners in communist states were not aware that certain sounds meant "jamming modulation" or "a morse identification of the jamming station." Based on intelligence gathered by the CIA, Western observers were able to infer some fragments from the everyday operation of a jamming station, and, most importantly, to partially re-construct the technical infrastructure and institutional spaces behind the noise. Along with a whole practice of studying noise, Cold War broadcasting practitioners analyzed the infrastructure mobilized for political purposes by their counterparts. The tuning of the transmitter (described with sounds above), for instance, was called "technical control" carried out at "measurement stations."[33]

Another key observation was that jamming transmitters had only a limited radius, but they were "located in such manner as to achieve maximum effectiveness within densely populated areas." "In order to cover the entire country, reciprocity agreements had been signed between Rumania and Poland, Rumania and Hungary, and Rumania and

[31] Ibid.
[32] On acoustic information gathering and signal monitoring see: Chapter 4.
[33] Ibid.

the Soviet Union. On the basis of these agreements, the entire Rumanian territory would be covered through powerful jamming transmitters, while at the same time, Rumania's powerful jamming transmitter did the same for its partners."[34] The CIA could not possibly have access to all details of the technical operation; nevertheless, Western observers knew two key aspects: in order to be "effective", jamming entailed a system of measurement stations and, moreover, international cooperation between communist states. The next subsection provides a more detailed description and examines the technical documentation for jamming station operators preserved from this period giving a more detailed description. At this point, it is important to identify politically loaded notion among technical words. "Effectiveness" was the key value in Cold War broadcasting.

[34] Ibid.

1.2. The limits and rules of jamming: a view from Eastern Europe

Both western broadcasters and their eastern counterparts, as we will see later, struggled to find solutions to the problem of effectiveness. Effectiveness delineated the intersection between technology and politics. Effectiveness of radio or jamming signal was a discursive statement sustained by the link between party officials and engineers; effectiveness was the overlap between the political requirement to send a clear propaganda message and the technical urge to eliminate noise in communication. In the case of jamming, noise was information, and information, coming from a Western enemy station was noise to be avoided. As Michel Foucault demonstrates in his approach to studying specific statements, in the analysis of a given concept like "effectiveness,"[35] historians could focus on the description of the normative uses of a particular statement in a specific historical period beyond the attempts to identify its origins or the precise moment in the past when a new concept emerged.[36]

I will describe thus the norms of Cold War broadcasting that sustained the discourse of "effectiveness." In particular, jamming is identified as a practice that implied

[35] One could associate the notion with the value of sending efficient signal at the turn of the XX century when early radio studios and sound films introduced the paramount importance of "efficiency," meaning to reach high sound clarity eliminating unnecessary noises. In this sense, jamming practitioners followed the rules of engineers set during the emergence of modern soundscapes; however, the repetitive use of the word "effectiveness", which has a slightly different meaning, implied the real political impact of the attempts to interfere in the ether. I discuss the notion of efficiency in political rhetoric across the Iron Curtain in Chapter 4 focused on sound quality. On the value of efficiency in technology see: Emily Ann Thompson, *The Soundscape of Modernity: Architectural Acoustics and the Culture of Listening in America, 1900-1933* (Cambridge, Mass.: MIT Press, 2002).

[36] In Foucault's words: "we must grasp the statement in the exact specificity of its occurrence; determine its conditions of existence, fix at least its limits, establish its correlations with other statements that may be connected with it, and show what other forms of statement it excludes." Michel Foucault, *Archaeology of Knowledge*, 1st publ., repr, Routledge Classics (London, New York, NY: Routledge, 2009), 30–31.

uncertainty, skills, complex machinery, various spaces and professions, a dynamic struggle to transmit noise, and a set of norms to make the operation "visible" to party officials.

1.2.1 Multiple spaces and international cooperation in interference

In the following paragraphs, I describe the spaces and the shared rules for employees who worked at jamming stations, paying special attention to the instances when "effectiveness" emerges as a requirement for workers. Challenging the administrative sources, I question the idea that the spaces for technical control and the requirement for international cooperation served as a means to reach "effectiveness." In those two aspects of the technical operation, presented in a positive light by the official party line, one can observe several key constraints of jamming.

"The radio defense system of Bulgaria is closely linked with the system of radio defense in the USSR. The mutual cooperation makes the radio defense system more efficient,"[37] reads the opening page of declassified "Instructions for organization and exploitation of the means for radio defense" issued in Bulgaria in 1975. The 14-pages long folder preserved in the archive of the Bulgarian Ministry of Information and Communications contains detailed descriptions of what was called "radio defense system," work obligations, and strict instructions for employees subordinated to the Bulgarian and Soviet communist parties.

[37] InstrukciJa za organizaciJa eksploataciJata na sredstvata za radio zashtita (1975), [Instructions for organization and use of the means for radio defense] Tsentralen durzhaven arkhiv (TsDA) (Central State Archive, Sofia) TsDA, f. 308 op. 6C a. e. 2

The mere fact that a defense system entailed four units: radio transmission stations, dispatching service, control and correction centers, and monitoring, decentralizes the view that jamming transmitters played a central role in Cold War broadcasting. A closer look at the working obligations at jamming stations shows that professionals employed closer to the radio towers followed instructions from their colleagues working remotely at the control and correction center. This occurred simply because the decision to direct a transmitter to a specific frequency of an "enemy" program implied a dynamic adjustment to a changing environment, as demonstrated in the previous section. "Personnel on duty are in charge of starting and stopping the transmitters by the clock in accordance with the program. (…) The personnel on duty during their shift must monitor constantly the quality of transmitters' operation and carry out instructions from the Control and Correction and the Dispatching centres to re-adjustment and switch transmitters."[38]

Unlike technical requirement to start and stop transmitters accordingly, the instructions to the Correction and Control centre begin with a more general and politically loaded description: "Personnel on duty at a Control Centre is in charge of the timing and reliable jamming of enemy radio stations."[39] Employees there struggled to reach the political ideal of effectiveness. "The personnel on duty must ensure the necessary distribution of radio transmitters to reach a maximal coverage effect,"[40] read the instructions. Dynamics of effectiveness are implied even in the name "Control and Correction centre" and explicitly written in the instructions that the personnel on shift determines the quality of jamming by correcting the frequencies of the noise transmitters

[38] Ibid., p.4
[39] Ibid.7.
[40] Ibid.

"depending on changes of frequencies in enemy radios." One must keep in mind that "coverage effect" and "frequencies of enemy radios" were constantly changing categories in Cold War broadcasting. Western radios usually used several radio frequencies to increase the chances for reaching listeners amid interference.

Besides this challenge created by the "enemies," there was a limitation inherited in the practice of international sky-wave broadcasting: local jamming transmitters could possibly cover only a limited territory, usually in urban areas. It was useless to invest in powerful transmitters to cover all national territory simply because shortwave transmission was intended to reach faraway places and beamed signal beyond the nearest perimeter. In order to ensure coverage of the larger territorial areas against Western transmitters, communist states had to mobilize support beyond their borders. The logic of sky-wave propagation put limits on the possible local political action because the most effective way to counteract Western radio transmission was to deploy an analogous system of distant transmitters from a "friendly" communist country. In other words, the ideal of effectiveness required the creation of international noise broadcasts in the countries within the Soviet sphere of influence. Remarks for Bulgarian jammers stated that all instructions for the Control and Correction centre are valid for the Bulgarian transmitters that support the Soviet jamming activities.

Bulgaria relied on Soviet controlled transmissions located in the USSR while Bulgarian facilities covered part of the Soviet territory. The ministry of communication's archives keeps documentation concerning contracts for mutual radio defense with the Soviet Union, Romania, and Poland.[41] Projects for transnational radio defense between

[41] „Protokol i Proekto-protokol za s"trudnichestvo v oblastta na s"obshteniJata i za izpolzvaneto na radiotehnicheski sredstva za specialni celi ot SSSR i NRB." (1976) [Protocol and a project-protocol for

USSR and Bulgaria, for instance, envisioned exchange of information on jamming effectiveness and enemy broadcasting schedules, regular meetings between radio engineers from both countries, and paying rent for foreign radio transmitters according to consumed kilowatts electricity per hour.[42] In the 1970s, the eight most powerful jamming transmitters of 80 kw in Bulgaria were ordered by the Soviet Union, installed using Soviet funding, and covered only Soviet territory. [43] As the technical justification goes, this guaranteed "effectiveness" for both Bulgarian and Soviet radio defense: "There is a constant and continuous interactive relationship between the operational directors of our [Bulgarian] and the Soviet radio systems. In fact, our radio-defense system is a sub-system of the common Bulgarian and Soviet radio-defense system."[44]

In 1974, after a regular meeting in Moscow, engineers at the Ministry of Information, reported that Bulgarian radio defense needs 30 new radio transmitters of 100 kw installed in three radio centers located in the USSR at 1000, 2000, and 4000 km distance from Bulgaria.[45] According to the engineers transmission power alone does not

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collaboration in the sphere of communication and the use of radio technical means for special purposes from USSR and People's Republic of Bulgaria (1976)] (TsDA) (Central State Archive, Sofia) TsDA, f. 308 op. 6C a. e. 3.; Dogovor - prepis otnosno razmJanata na radio zashtita mezhdu NR B"lgariJa i Polskata narodna republika (1956) [Copy of a contract concerning the mutual radio defense between People's Republic Bulgaria and the Polish People's Republic (1956)] TsDA, f. 308 op. 4AC a. e. 6.; Protokol v"v vr"zka s radio zashtitata ot vrazheska propaganda mezhdu NRB i Rum"niJa i JugoslaviJa (1958) [Protocol concerning the radio defense from enemy propaganda between People's Republic Bulgaria, Romania, and Yugoslavia (1958)] TsDA, f. 308 op. 4C a. e. 17.

[42] „Protokol i Proekto-protokol za s"trudnichestvo v oblastta na s"obshteniJata i za izpolzvaneto na radiotehnicheski sredstva za specialni celi ot SSSR i NRB." (1976) [Protocol and a project-protocol for collaboration in the sphere of communication and the use of radio technical means for special purposes from USSR and People's Republic of Bularia (1976)] (TsDA) (Central State Archive, Sofia) TsDA, f. 308 op. 6C a. e. 3.

[43] Georgi Andreev, Vrazheskata radiopropaganda na b"lgarski ezik i s"stojanieto i dejstvieto na sistemata za radiozashtita, 24.09.1974 [The enemy radio propaganda in Bulgarian language and the state and actions of the system of radio defense] Tsentralen durzhaven arkhiv (TsDA) (Central State Archive, Sofia) TsDA, f. 308 op. 6C a. e. 1, p.8

[44] Ibid, p. 8-9

[45] Janko Janev and Valentin Grozdanov, Doklad otnosno s"glasuvane s Ministerstvoto na s"obshteniJata na SSSR razraboteniJat tehniko-ikonomicheski doklad za razvitieto na sistemata za radiozashtite na NR B"lgaria. (1974) p. 2 [Report concerning the agreement with the Ministry of Communications USSR and

guarantee high effectiveness and natural factors were taken into consideration: "during certain periods of the day (morning and evening) the effectiveness of distant radio defense could drop dramatically."[46] Thus the radio experts recommended additional research of the radio spectrum to determine the seasonal dynamics of short wave propagation.[47] Listing objective constraints, such as the importance of the natural day cycle in international broadcasting, reveal limits of the political ideal of international cooperation. A fundamental synergy between transmission "power" and political "power" for international cooperation against a common "enemy" faced limitations. Long-distance facilities also required funding and constant technical maintenance.

Pragmatic considerations remained intact: international cooperation required constant investments. This limitation is apparent in Hungary where the local authorities decided to temporarily cease jamming in 1963. Where employees in charge of jamming saw a technical necessity in international cooperation, the local party authorities saw mainly financial debts. Like Western broadcasters and colleagues from communist Bulgaria, Gogolyák Gusztáv, the head of the Hungarian jamming operation explicitly described local interference as limited and international cooperation as essential. Gogolyák controlled all jamming stations in Budapest during the Hungarian uprising in 1956. Less than a decade later, he witnessed the gradual decline and disappearance of noise machinery in his country which he explained with the failed endeavor of mutual radio defense. "As far as the jamming of Hungarian-language broadcasts is concerned, it was essentially carried out from abroad," explained the head of jamming. "It was

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the prepared technical-economical report on the development of the system of radio defense of People's Republic Bulgaria (1974)]) TsDA, f. 308 op. 6C a. e. 1.

[46] Ibid, p.3

[47] Ibid, p.4

pointless to interfere in Hungarian territory on shortwave besides in big cities, with small, 1 kw local transmitters. But nationally, it was only worthwhile to work with foreign facilities, because it was effective. Thus, our shortwave transmitters did not primarily work domestically, but they also reciprocated externally the transmissions we received from the Czechs, Poles, and even the Soviets."[48] In Gogolyák's words, "you cannot be independent unless you put 1 kw transmitter on each roof."[49] At the same time he was aware about the limits of international interference. "I don't know how many transmitters the Soviets had abroad, maybe if they had used them all, they could have covered all Hungary. But there were few transmitters for this purpose, since they also worked for the Poles, the Czechs, and the Bulgarians,"[50] concludes the technical expert reflecting on the limitations of jamming.

The Hungarian party authorities grasped these realities in 1963. A report to the Politburo on Jamming of Western Radio from the same year puts an emphasis on the financial aspect of cooperation in the domain of radio interference. The report confirms that Hungary and the Soviet Union developed a system of mutual defense with almost equal transmission hours, but Hungary paid more for renting foreign equipment because the Soviet transmitters had bigger capacity.[51] Hungarian officials calculated the amount of 20 million HUF per year went to the "benefit of the USSR."[52] Among financial considerations, the issue of "not satisfactory" effectiveness emerges in the report presented in the following figures split according to the time of the day: "30% between

[48] Béla Révész' Interview with Gusztáv Gogolyák on 26 March, 1996. I am grateful to the Blinken Open Society Archives for providing access to the transcript of the interview.
[49] Ibid.
[50] Ibid.
[51]. Document No. 34: 1963. Report to Politburo on Jamming of Western Radio in Johnson and Parta, *Cold War Broadcasting*, 489–450.
[52] Ibid.

0500-0900, 80% between 0900-1500, and 10% from 1500-0100."[53] "The efficiency of jamming changes from region to region. It is most efficient in Budapest and Pecs. It is quite efficient in the center of Budapest, but much less so in the outer districts", reads a handwritten insertion on the geographical fluctuations of jamming power.[54] The report concludes pragmatically that "one hundred percent jamming is impossible" due to natural, political, and financial reasons. Therefore superior infrastructure run by capitalist countries and expensive jamming transmission were the factors quoted in favor of terminating interference in Hungary.

Eventually, practical considerations contributed to the disappearance of noise in the Western radio programs targeting Hungary. During the Politburo discussion that led to the final decision, local party officials already came up with suggestions for making use of the free equipment. Entering the realm of propaganda logic, politburo members discussed the fantasy of urging Western broadcasters to switch to a more "objective tone in their programs" after presenting the forthcoming absence of generated noise as purely political goodwill.[55] Parallel to propaganda imagination, another material possibility emerged: to re-direct the long-distance transmitters used to support Soviet jamming and invest in similar more powerful equipment to develop Hungary's own international radio programs.[56] The next sub-section will explore this emerging constraint of jamming linked to the way powerful radio transmission inspired political imagination. Increasingly investing in mass-scale international jamming, communist countries faced a dilemma:

[53] Ibid. p. 490.
[54] Ibid.
[55] Minutes of the meeting of the Politburo on October 8, 1963 in Johnson and Parta, *Cold War Broadcasting*, 497.
[56] Ibid. 496-497.

whether to keep investing in jamming cooperation or use the same resources for developing international radios.

1.2.2. Beyond noise: The coexistence of Jamming and International broadcasting during the Cold War

A closer look at the spaces of a former transmission sites shows that jamming and international broadcasting coexisted. Security concerns and the need of constant technical maintenance were among the factors that united both activities that took place behind closed doors. A detailed description of the spaces used for the transmission site is still possible because Cold War broadcasting left a heritage of deteriorated facilities. They were once cherished and protected by local governments only to be abandoned after the propaganda conflict came to an end. One such place was the transmission station in the Bulgarian village of Padarsko in the southern part of the country. It was used both for jamming and international radio transmission for Bulgarian programs abroad. Built in the 1970s, it was systematically demolished during the first two decades of the XXI century when all transmission facilities were recycled, a fate shared by the majority of similar transmission sites in Eastern Europe. In May 2022, I visited a ruined building where only technical documentation dispersed on the floors and the memories of former employees linked the space with its significant role during the Cold War.

A former technician who repaired transmission equipment guided me through the abandoned site, locating the former spaces used for jamming and international broadcasting. Hristo Hristev worked as “machtovik,” the name of a Cold War profession coming from the word “mast” (machta in Bulgarian and Russian). Using mountain

climbing equipment, machtoviks climbed high transmission towers to fix everyday accidents in radio transmission, such as changing a piece of burned electrical conductor **(Fig.1.1)**. "Courage" was the main skill he identified as crucial to his profession pointing to the fact that towers at the transmission site reached a 165 meter height.[57] When Hristev started work in 1980, he did not have a background as a technician. It was not a mandatory requirement for his job. He learned the skill to fix technical accidents from a team of Soviet instructors who explained the basic techniques to maintain the Soviet-made installations.

Figure 1.1. Technicians called *machtoviks* fixed equipment failures at extreme heights. Courtesy: Hristo Hristev's personal archive.

[57] In the paper, I use personal observations and notes taken during the conversation with Hristo Hristev about the former transmission station in Padarsko. I have Hristev's consent to use his personal recollections and digital copies of his personal archive of photographs in my research. The research trip at the former radio transmission station in Padarsko took place on 28 May 2022.

Investment in shortwave transmitters for broadcasting across borders during the Cold War created the demand for employees with skills in climbing extreme heights. Every morning machtoviks started their job routine by walking around the transmission site and checking with binoculars for technical failures. Once they noticed a problem somewhere in the facilities, the rule was to stop all broadcasting temporary and let the team climb a tower with ropes and belts to fix the issue. The whole team of machtoviks consisted of 5 to 8 men.

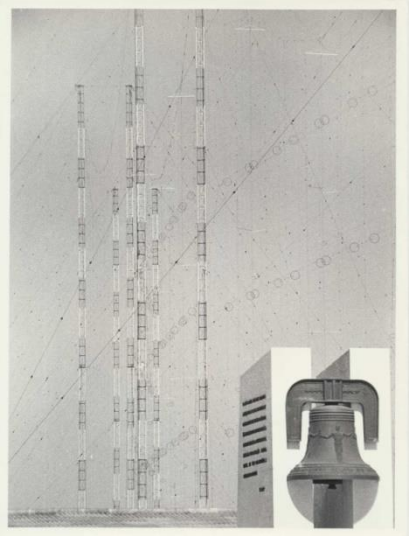

Figure 1.2 and Figure 1.3. The transmission towers used by RFE/RL (Fig.1.2) and equipment for international broadcasting in Bulgaria (Fig.1.3) used similar technologies available during the Cold War. Courtesy (1.2) RFE/RL Public Affairs Photographic Files, rfe_architecture_017. Ownership of and copyrights to the materials belong to RFE/RL, Inc., 1201 Connecticut Ave., N.W., Washington, DC 20036, USA. (1.3) Hristo Hristev's personal archive.

Since all transmission towers have long been recycled, and photographing of the secret facilities was forbidden during the Cold War, there are limited options for today's historians to describe the key components of the powerful transmitters that disappeared from the public space. In my conversation with Hristev, I used visual materials from the

RFE/RL's rare visual collection of archival photographs of transmission towers taken for the radios' public affairs department. I showed a close-up image of a RFE/RL transmitter **(Fig.1.2)** to the former technician asking about the key technical components that he had to maintain. Looking at the photograph, he explained that transmitters from both sides of the Iron Curtain consisted of similar basic technical components available at the time. He compared the RFE tower with a photograph from his personal archive **(Fig. 1.3)** and his own collection of technical artefacts from his workplace. He presented components called vibrators, used for a precise direction in long-distance radio signal.[58] Certainly, technical information did not travel freely across the Iron Curtain, Hristev had never seen infrastructure or even images of RFE/RL during the Cold War years, but the available technical equipment for radio broadcasting produced in the 1970s contained similarities to the way their ideological enemies imagined and used technology.

At the same time, international broadcasting practitioners experimented with available technologies. During the research visit at the abandoned transmission site, Hristev showed me the ruins of the control station of a sophisticated transmitter that used 360 degrees rotation for precise signal adjustment in international broadcasting. It was a copy of a Soviet equivalent installed with the help of Soviet experts who trained Bulgarian radio transmission operators. Hristev remembered that the rotating transmitter successfully sent signal to Australia, although the Bulgarian diaspora there was insignificant during and even after the Cold War. However, the memory of this experiment shows that international radio haunted the imagination of both technicians and

[58] On the main components of broadcasting also used for jamming such as jamming antennas and horizontal vibrators see Rimantas Pleikys, *Jamming* (Vilnius: R. Pleikys, 1998), 95.

of those in power. Engineers in the Soviet sphere were seeking solutions for sending signal to distant places and blocking signals from the West.

Figure 1.4 This photograph of the building of the control room for the jamming transmitter *Thunder* was taken on 28 May 2022. The control room was located in a separate space close to the facilities for international broadcasting. Photo by author

Operators in a separate control room directed a transmitter for local jamming called "Thunder" **(Fig. 1.4)**. It was the only mast that was christened; probably, due to the secret nature of the technical operation. According to the technician's account "Thunder" was installed in the 1980s and worked for several years before the fall of communism. During this time, access to the jamming station was strictly forbidden. Security concerns shaped the architecture of the station for international broadcasting and jamming. An underground space, located under the offices of the directors, was designed to protect all employees in case of nuclear bombing. Old gas masks, never used and spread across the floor of the abandoned transmission center embody the abundance and persistence of

Cold War fantasies **(Fig. 1.5)**. Radio transmission stations, especially those for international broadcasting and jamming that maintained closed communication between Bulgaria and the Soviet Union, were considered key targets in case of war, exemplifying the elevated status of these technologies. Security concerns never materialized there, but changing policies in communication after 1989 led to the destruction of an unnecessary station.

Figure 1.5 Gas masks and telephones were among the last remaining objects from the former transmission station in Padarsko on 28 May 2022. Photo by author.

In spite of the decline of these gigantic facilities in Eastern Europe, nobody predicted their disappearance before the collapse of communism. The heyday of international radio in the Soviet sphere coincided with the deployment of transmitters targeted beyond the national borders of Bulgaria in the 1970s-1980s. This period marked a transfer of political energy and resources from jamming to international broadcasting, a

process also evident in the USSR. Ever since the early stages of the propaganda war, the Soviet authorities acknowledged technological limitations to their strategies of obstructing western influence through the ether. Based on evidence from Soviet archives, historian Stephen Lovell gives an example from the Soviet island of Sakhalin in 1954 when local party leaders mobilized technical language to explain how even excessive technological measures to cover the island's territory were insufficient: "in the face of hostile propaganda from the USA, England, and Japan, this remote border region had set up no fewer than thirty-eight jamming stations in three different centres on the island. But even this had proved insufficient: the BBC and VOA could be heard freely, especially on a wavelength of 16–19 metres."[59] By the late 1950s, the Central Committee already calculated that "although the power of jamming stations was three times that of the hostile stations broadcasting to the USSR, jamming was ineffective except for the centre of Moscow, Leningrad, Kiev, and Riga."[60]

As engineers and party officials brought such limitations to the fore during the first Cold War decades, constant comparisons in the technological domain led to the growing sentiment that Soviet radio propaganda lags behind Western stations on a global scale. As Lovell observes "Soviet broadcasters were operating in an unprecedentedly international media world: they were locked in a defining relationship of rivalry and grudging imitation with their counterparts on the other side of the Iron Curtain."[61] Entering the competition for audiences beyond local borders, foreign language emissions broadcast on Radio Moscow (the Soviet foreign broadcaster) "tripled from twenty-one at

[59] Lovell, *Russia in the Microphone Age*, 156.
[60] Lovell, 156.
[61] Lovell, 151.

the end of the war to sixty-five or more in the late 1960s"[62] reaching a peak of eighty languages in the 1980s.[63] Another fact that reflects significant investments in radio propaganda abroad is the growing number of transmission facilities for foreign broadcasting installed in key points closer to the Soviet borders like: Tallinn, Riga, Vilnius, Kiev, Baku, Khabarovsk, and Tashkent.[64]

The transmission centre for foreign radio programs in Bulgaria is part of this Cold War broadcasting geography. In relatively close proximity to the Southern state border, and, at the same time, linked through cables with the capital Sofia, where program content was created and party bosses took political decisions, the precise location of the transmitters in Padarsko was selected with the aim to reach target audiences in Turkey, the Middle East, and Africa. According to a memorandum from the archive of the Bulgarian Ministry of Information, the project for constructing the station including the precise location of the facilities, the control rooms, and the communication links was created by the Soviet State Specialized Design Institute (*Gosudarstvennyj specializirovannyj proektnyj institut*) in Moscow.[65]

Documents issued during the construction reveal how technical categories of transmission power entered Cold War rhetoric. They explain that the station responds to "[c]ontemporary trends for a large increase in power and the construction of highly effective antennas. Most of the countries in the world broadcast their emissions with a power of 250 and 500 kW, which ensures good audibility. With the modern workload of

[62] Lovell, 152.
[63] Lovell, 215.
[64] Lovell, 153–54.
[65] Doklad do Ministerstvoto na V"treshnite Raboti [Report to the Ministry of Internal Affairs]Dokladi, protokoli i korespondenciJa otnosno b"lgarski radiopredavaniJa za chuzhbina [Reports and correspondence on Bulgarian radio program abroad], 25 May 1974 in TsDA, f. 308 op. 6C a. e. 9.

the airwaves, international broadcasting with a power of 50-100 kW and unsuitable antennas is extremely inefficient."[66] Eventually, Soviet experts in engineering design deployed two transmitters of 500 kW and three with a power of 250 kW at this new station at the southern border of the Eastern bloc. As listed in official correspondence, the key geographical areas for broadcasting radio propaganda were Turkey, the Middle East, and Africa. "After commissioning the transmitters and making them available to Bulgarian Radio for broadcasts to Turkey and Arab countries, the effectiveness of these broadcasts has increased manifold, which is evidenced by the tremendous increase in listeners' letters from these countries,"[67] conclude the party officials at the Ministry of Communication in 1977.

To a certain extent, jamming existed in the shadow of foreign radio broadcasting. Besides the Western counterparts that played an important role in the dynamics of the war in the ether, communist countries in the Soviet sphere allocated resources from jamming for developing their own international broadcasting infrastructure competing with stations such as RFE/RL and Voice of America. Certainly, not all communist countries abandoned jamming to transmit programs abroad. Both technological practices were imagined as a response to Western broadcasters and depended on decisions to deploy technical infrastructure in key geographical zones as well as where to allocate resources to constantly monitor and maintain the ever growing number of towers. As seen in the case of the radio centre in Bulgaria, jamming and foreign broadcasting coexisted in the same

[66] Protokol mezhdu b"lgarskoto radio i Ministerstvoto na s"obshteniJata [Memorandum between the Bulgarian radio and the Ministry of Communications], 18 November 1977 in TsDA, f. 308 op. 6C a. e. 9, p.2.
[67] Ibid.

space designed to respond to increasing competition for the effective use of the common ether in the propaganda war.

Broadcasters from both sides of the Iron Curtain shared common concerns evident from the urge to construct equipment with adequate power and, respectively, receive evidence from listeners' accounts that their voices reached a target audience across borders. The final subchapter will focus on the issue of receiving feedback-evidence that the technical means reached the intended listeners. Letters from listeners across borders were the dream of Cold War broadcasting, because it was challenging to broadcast and communicate with a distant audience across the Iron Curtain. It was worth maintaining a vast infrastructure due to the possibility of receiving such rare letters from abroad at foreign radio offices.

1.2.3. Visual waves and diaries about noise

To a significant extent, radio jammers faced the challenges of Cold War broadcasting practitioners: similar equipment broadcast both news and noise. What was different though was the impossibility to communicate with radio listeners who were exposed to the disturbing sounds. Radio jamming did not have its own audience. Interference was aimed at "enemy" radio frequencies, but the listeners formed the audience of Western radios. Even when jamming experience and jamming quality was discussed by listeners, it was communicated with representatives of RFE/RL and not with Eastern bloc jamming technicians, as seen with the example of jamming counter-measures. Certainly jamming technicians did not rely on secret listeners to assess the

quality of their own work, but they did not imagine jamming as one-way communication either.

I will examine this paradox, which was familiar to early radio practitioners. One may argue that the Cold War introduced a regression in the world of media and technology obliterating some established practices in mass communication; in particular, it radically changed the methods of dialogue with the audience invented with the emergence of commercial radio in the 1920s-1930s. The media historian John Peters calls this process "compensatory dialogism."[68] "How to compensate for the fact that people could be in touch without appearing "in person"[69] was an early concern in the early radio years; the reason: a defining characteristic of broadcasting was the emergence of practically limitless radio audience that seemed enigmatic in the first decades of XX century. Listeners' letters, live studios, contests with listeners (associated with American commercial broadcasting) were among the first attempts to transform a one-way communication into a dialogue, a process that triggered an immediate response from intellectuals such as Theodor Adorno to cast doubts on the authenticity in mass communication.[70] Cold War constraints excluded such attempts to establish dialogues at commercial radios. Nevertheless, the fundamental issue of mass communication remained. The practice of industrial-scale jamming introduced different methods for solving the problems of one-way communication: by imposing a political discipline at the sending end of the transmission site.

[68] John Durham Peters, *Speaking into the Air: A History of the Idea of Communication* (Chicago: University of Chicago press, 2000), 214–17.
[69] Peters, 214.
[70] See Chapter 5 "The Quest for Authentic Connection, or Bridging the Chasm" in John Durham Peters, *Speaking into the Air: A History of the Idea of Communication*, 177-226.

An unusual documental and material heritage testifies to the communication in the closed environment between jamming stations' units. The ruins of the former transmission site in Bulgaria contain a dismantled Cold War archive. Technical books and documentation covered the floors of the former control rooms and administrative offices. After the metal technical facilities were recycled, paper, concrete, and plastic remained among the last materials to be destroyed. While concrete walls keep the architecture and delineate the spaces used for broadcasting control, technical documentation gives us some insights into the internal rules of broadcasting operations.

Not an easy task though: humidity, dust, and sunlight almost destroyed the archive, already lacking order. Nevertheless, the instructions for jamming operators written and preserved in the Communist party archive and recollections by former employees re-created the missing logic that once kept the folders arranged on shelves. At the same time, the last remaining books and technical documentation are invaluable in describing the materiality of technology and grasping the scale of the internal rules governing the whole operation. The mere presence of the piles of technical documentation among ruins gives substance precisely to those key parts of political documents where technology seems transparent and rules self-evident. The following is a closer reading of the instructions for jamming operators that help us to outline the multiple spaces for jamming and international cooperation described previously. This second reading identifies the conventions behind the closed doors of a jamming station.

"1. The operational and technical staff is responsible for the normal operation of the technical means (radio transmitters, antenna feeder devices, aggregates, etc.) for compliance with the rules of technical exploitation, the rules of safety technology and the

relevant instructions,"[71] reads the first paragraph of the instructions for the operators at jamming transmission stations. While "etc." inevitably obscures a whole variety of components which would be impossible to list, the first notion to be challenged is "normal operation," because the whole set of instructions prescribes rules to maintain the "normal" without explicitly explaining what it means. At the same time, the instructions entail a list of concrete examples of possible interruptions in the "normal operations": breakdowns in the equipment (separate components or electric circles), power outage, deterioration of the technical facilities' quality, delay in starting a transmitter. At first glance, the historian is facing a whole variety of technical facilities and possible failures, which in itself illustrates the complexity of the whole endeavour and the need to maintain equilibrium within the system which seemingly creates less space for political interference. However, it would be a mistake to use the technical complexity as an argument to demonstrate that technology shaped politics during the Cold War, because politics had its own ways to manoeuvre out of technical complexity.

Politics took full control when technology reached its limits. The key limitation was the inability to receive feedback from the audience and thus jamming transmission implied perfection at the sending end. Both technology and human discipline offered political solutions. According to the employees' rules "[t]he personnel on duty should keep an operational and technical log, where the time of turning on and off the transmitters, the frequencies at which they work, the readings of the built-in measuring instruments, as well as the remarks made by the Control and Correction Center and the

[71] InstrukciJa za organizaciJa eksploataciJata na sredstvata za radio zashtita (1975), [Instructions for organization and use of the means for radio defense] Tsentralen durzhaven arkhiv (TsDA) (Central State Archive, Sofia) TsDA, f. 308 op. 6C a. e. 2, p.2.

dispatch center are recorded."[72] Measuring instruments and technical diaries attempt to compensate for the limits of jamming during the Cold War.

Technical passports begun with detailed descriptions and users' instructions of all facilities installed at the former transmission station. The passport itself is a signed document proving that the technical set was received and installed. Logically, most documents of this type provided information about transmission facilities, but a book on "control" equipment appeared among the almost destroyed archive with technical documentation. Technical equipment for monitoring the quality of transmission ensured the possibility to write logs about "readings of the built-in measuring instruments." A technical passport and a book with technical descriptions titled „Control and measuring post for monitoring the work of broadcasting stations and centres"[73] illustrates the vital importance of technology to monitor transmission facilities during the Cold War. The technical passport shows that the Bulgarian transmission station received and installed the Soviet control post in 1971. The equipment measured electroacoustic data and consisted of several components including an oscillograph. It was a key component of the control station because oscillographs visualized electroacoustic information. It transformed information beyond human perception into graphic form. As the technical description explains "measurements and observations performed with an oscilloscope are distinguished by a high degree of clarity and make it possible to make a qualitative assessment of the operation of radio stations and the control post itself."[74]

[72] Ibid.
[73] Kontrol'no-izmeritel'naja stojka dlja kontrolja raboty radioveshhatel'nyh stancij i centrov tipa SK2-1 (KIS-2). Tehnicheskoe opisanie, Instrukcija po jekspluatacii i Pasport. [Control and measuring post for monitoring the work of broadcasting stations and centers. Technical description, Instructions for use, and Passport] USSR: 1970.
[74] Ibid.,p. 45.

Observation and assessment of noise generated by a radio transmitter and the control station itself, measurement of frequencies by comparison method, and measurement of modulation depths are listed as useful data to be visualized on the oscillograph screen.[75] The oscillograph was produced in the USSR and employees used Russian to implement the instructions. Photographs of all technical components were attached to technical books in order to visualize the respective equipment described in the instructions creating a visual archive of the equipment in use **(Fig.1.6)**. Photographing technology testifies to the limits of remembering all equipment components that installed and changed during the decades-long ideological conflict and, above all, catalogued the standardized equipment used beyond borders.

Figure 1.6. A technical photograph from the technical passport of a Soviet oscillograph installed at the transmission station in Padarsko in 1971 in Kontrol'no-izmeritel'naja stojka dlja kontrolja raboty radioveshhatel'nyh stancij i centrov tipa SK2-1 (KIS-2). Tehnicheskoe opisanie, Instrukcija po jekspluatacii i Pasport. [Control and measuring post for monitoring the work of broadcasting stations and centres. Technical description, Instructions for use, and Passport] USSR: 1970.

[75] Ibid.

Oscillographs, in particular, were recognized among technologies aimed at objective representations in monitoring acoustic information. Scholars in the field of sound studies trace the history of the device back to the First World War when oscillographs provided objective sound representation of noises in the battlefield.[76] Such devices were essential for identifying enemy artillery positions during the Great War when participants and scientists experienced and described trench warfare predominantly in acoustic terms. An iconic representation of the last artillery roars archived on oscillograph film reel show waves turning into straight lines on November 11 1918, an acoustic testimony of the moment of silence that marked the cease-fire.[77] Sound oscillographs remained firmly in the military realm, but by the end of the Second World War devices for electrical representations of acoustic energy had already been introduced in science by ornithologists who studied bird songs.[78] In a parallel development, Cold War broadcasting used oscillographs in the civilian spectrum, struggling to control a vast infrastructure while facing the challenge of limited access to actual radio listeners.

[76] See Chapter 3, "Science Goes to War: Warfare and the Industrialization of Acoustics" in Roland Wittje, *The Age of Electroacoustics: Transforming Science and Sound* (Cambridge, Massachusetts: MIT Press, 2016), 67–114.
[77] See Annegret Fauser and Michael A. Figueroa, eds., *Performing Commemoration: Musical Reenactment and the Politics of Trauma*, Music and Social Justice (Ann Arbor: University of Michigan Press, 2020), 26.
[78] See Joeri Bruyninckx, *Listening in the Field: Recording and the Science of Birdsong*, Inside Technology (Cambridge, MA: The MIT Press, 2018).

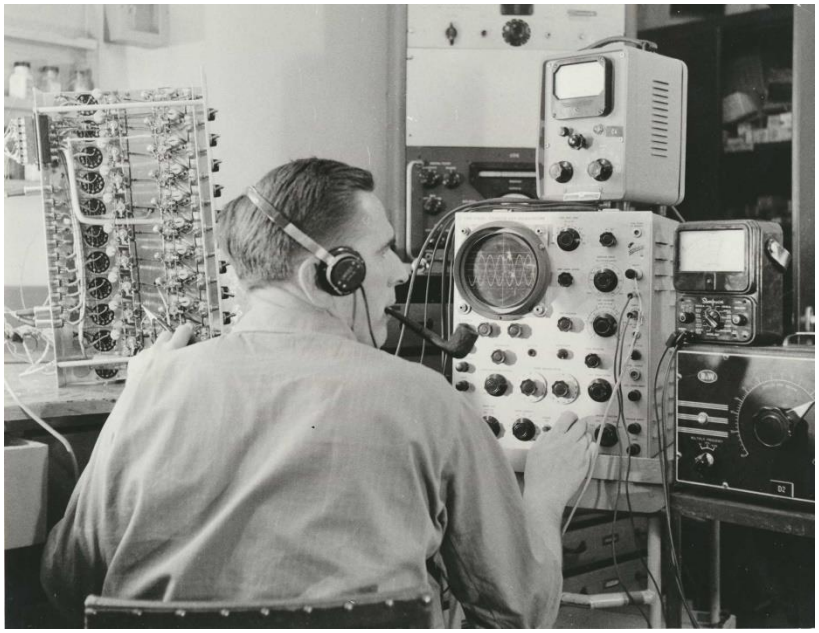

Figure 1.7. An oscillograph used at RFE/RL. Source: RFE/RL Public Affairs Photographic Files, rfe_workflow_002. Ownership of and copyrights to the materials belong to RFE/RL, Inc., 1201 Connecticut Ave., N.W., Washington, DC 20036, USA.

Similar constraints affected the way Western counterparts attempted to reach an objective assessment of the quality of their broadcasting operation. In order to understand the political hopes endowed to the monitoring equipment installed at the sending end of the Soviet technical infrastructure, it is useful to compare the jamming discourse with the one used at RFE/RL during the Cold War. Sharing the challenges of communist governments to gather information on jamming, RFE/RL did not have the option to conduct proper field research among listeners in their home countries. The central issue of the unknown audience of broadcasting technology remained a shared concern. A paradox remained in the domain of media technology: while closed borders eliminated audience and public opinion research as a potential solution, new modalities of political uses of technology emerged as shared solutions across borders. A paragraph from the abovementioned jamming counter-measures instructions archived at RFL/RL echoes the

limited options of jamming experts that contributed to the imagined perfection at the sending end:

> "[w]e at RFE/RL pay constant and close attention to audio quality. We make sure that the programs that come out of our studios are as close as possible to the standards of high fidelity. We watch the quality of the line that carries our program from first stage of its journey to the East. At the sending stations, we use highly sophisticated devices known as clippers, filters, and limiters to sharpen the quality of our voices and give them a better chance to penetrate the jamming. Much of this equipment was specially designed by our own engineers."[79]

It goes beyond the scope of this research to analyse the list of technical devices and evaluate the real technical potential of electroacoustic machinery, but the comparative view of technology at the sending end gives us insights into Cold War constraints. It is not a mere coincidence that one can see an oscillograph among the photographs taken inside the RFE/RL transmission control rooms **(Fig. 1.7)**. The image shows a man with headphones smoking a pipe sitting in front of a monitoring post with an oscillograph screen, a device inscribing graphically electroacoustic data in the form of waves. Certainly, the radio's public affairs department that created the visual collection had its own way of imagining a narrative around this particular photograph, but the photographed object "tells" its separate story about the politicized use of technology.

Technical artefacts emerging from the Cold War archive challenge the historian to find an answer to a key question: to what extent did technology substitute the human in the process of knowledge production? If technology produced data on jamming/broadcasting quality, was this the ultimate synergy between technology and politics? The answer cannot be straightforward because there was yet another level of interaction at the intersection of the two domains, an interaction that allowed space for

[79] Jamming counter-measures, 22 December 1978 in HU OSA 300-80-1, box 763, p.1.

human communication. Objects and standardized techniques for reporting technical data played an important role; nevertheless, employees at jamming stations ultimately inscribed information that the party institutions required. At first glance, technical diaries did not entail any link with political values. The abandoned archive of the transmission station analysed above hosts countless paper forms listing technical failures and changed spare parts. Where would be the space for politics among such technicalities?

The only instance where I saw the coded name of the Bulgarian jamming station "Thunder" written was in a so called "cable journal," a notebook by employees that kept track of all communication cables connected to all transmission stations' units and rooms. As Hristo Hristev explained when showing me the space of the administrative offices, predominantly female employees were in charge of describing the communication cables and telephone lines connecting all units: a gendered aspect of the work to which I will return. The employee who led the cable journal did not place "Thunder" in a special section. The jamming transmitter's control room occupied a long list of numerous cables linking all spaces within the stations and beyond: relay cables that carry the radio program to the transmitters, telephone cables linking diverse offices of administrative units, radio technicians, guards at the entrance or special cables that set the clocks simultaneously in all rooms and ensure emergency communication connection with the bomb shelter under the station, the local police, and the fire brigade.

Countless technical sheets covering the ruins of the transmission station, all handwritten notes, are another example of the human interaction with technology. This type of banal documentation contains records of the daily routines at the radio centre. At the beginning of each shift, for instance, technicians in charge wrote down "transmitter checked," adding the exact check-in time. Technical failures, changed equipment, and

instances when damaged transmitters had to be stopped also found place in these technical sheets.

Diversity of journals and technical sheets demonstrate how the human interaction with technology entailed a constellation of institutions and routine practices that sustained a working radio infrastructure **(Fig. 1.8)**. Superiors assessed the whole operation and ultimately ensured accountability of the interaction between humans and technology.

Figure 1.8. Technicians working at the transmission station described their interaction with technology in technical diaries and technical sheets. Photo courtesy: Hristo Hristev's personal archive

Let us look closely at this process of reporting technical data within a jamming station; in particular, at the Control and Correction Centre, the unit in charge of identifying and effectively silencing enemy radios. Practically, the centre was a listening post where monitors identified current frequencies used by Western radio stations, sent orders to jamming stations to turn on transmitters, and, finally, evaluated the quality of

jamming. Operators of transmission towers were required to write down all orders received by phone in special documents called "telephonograms." At the same time, jamming monitors kept a control diary describing transmitter number, duration and quality of jamming, and technical defects. According to the job instructions, information from the diary serves as an official report checked regularly by superiors.[80] The control centre aimed at precision. Mistakes in communicating the correct frequency, for instance, could result in jamming the wrong station; the job instructions highlighted this real possibility and thus the value of precision in jamming.[81]

All dynamic changes in jamming could be imagined only with the assistance of telephones. Direct telephone lines between all units and written reports constituted the links for control within the system. Telephones and strict requirements for reporting made political control possible.

A separate unit called Dispatch Centre established the link between technical specialists and the party administration at the National radio and the Ministry of Telecommunications. The centre coordinated the whole radio defence system; this included the work of all equipment, operators, and monitors that beamed noise on Western frequencies. Jamming dispatchers prepared jamming schedules in graphic form **(Fig. 1.9)** and all changes in schedule were inserted in yet another diary. They wrote down daily technical failures and human mistakes in the radio defence system identifying who should take responsibility for a specific problem.[82] This unit monitored each jamming transmission covering Bulgarian or Soviet territory. The dispatcher job

[80] InstrukciJa za organizaciJa eksploataciJata na sredstvata za radio zashtita (1975), [Instructions for organization and use of the means for radio defense] Tsentralen durzhaven arkhiv (TsDA) (Central State Archive, Sofia) TsDA, f. 308 op. 6C a. e. 2, p.9
[81] Ibid.
[82] Ibid, p. 10-11.

description explicitly states that the unit reported to the administration of the state radio and television, the institution that collected information on jamming for the whole party apparatus.

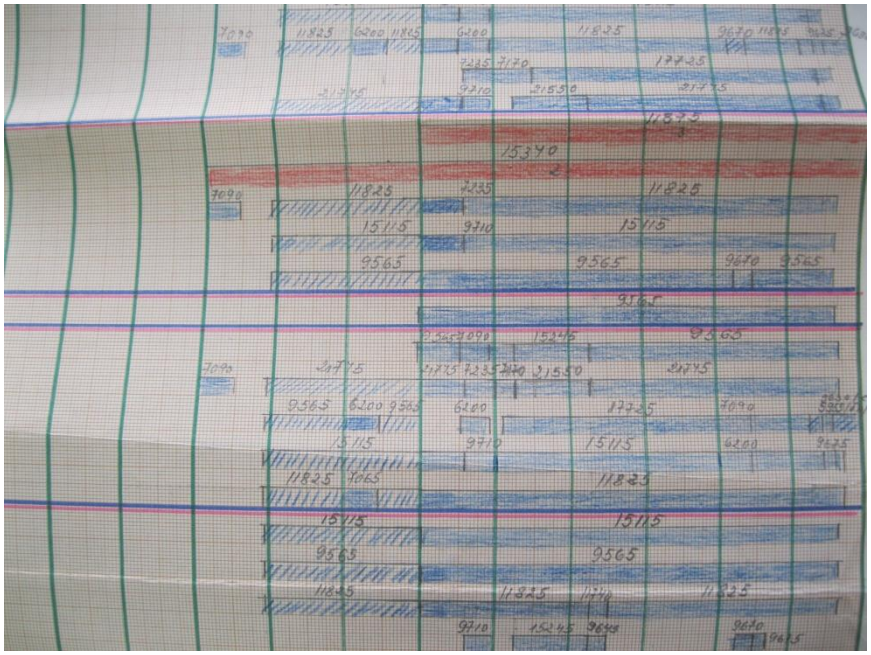

Figure 1.9. Jamming schedule was presented in graphic form entailing all technical facilities deployed and frequencies for interference. Source: Programa za radiopredavatelite, raboteshti za radio zashtita na NRB ot vrazheska propaganda [Schedule for radio transmitters for radio defence of Bulgaria from enemy propaganda], 1979. TsDA, f. 308 op. 6C a.e. 8.

Knowledge about jamming travelled from jamming station to the political administration in the form of standardized and verifiable information. Humans adjusted machines with precision and strictly reported figures. Precision was not an inherent aspect of radio technology. Transmitters beamed radio signal on a certain frequency. Jammers required excessive precision in a dynamic environment of changing frequencies and finding the right transmitter to silence enemy radios on particular territory. As inscriptions at jamming stations testify, precision was a political value among a chain of technical requirements. What technical logs obscure, however, is the gender aspect of work at technical facilities.

Precision combined with gendered work segregation defined the politics operating within a jamming station.[83] The history of media from the late XIX century when predominantly women were employed as telephone switchboard operators and typists reveals similar dynamics around the political value of high precision.[84] In this case, female employees were instructed to reach perfection in reporting the human interaction with technology at jamming stations. The gendered work provides the key to understanding the discipline governing the noise installations and the connection between technologies on the one hand and government administration in the communist state, on the other. That is to say that I challenge views of seemingly inherent aspects of technology and instead examine "the social constellation of speakers and hearers that became enforced as normative,"[85] as John Peters stresses.

At jamming stations predominantly women reported standardized technical knowledge to the hearers – in the absence of radio listeners' audience, this was the jamming "audience" of party officials. "Imagine four working positions: at each a desk, and on it a receiver, an oscillograph and a control panel. At the table sits a woman. In front of her a log-book in which are entered all the radio stations scattered across the frequencies," begins a rare description of the jamming operation emphasizing the gendered aspect of the work at a Soviet jamming station.[86] The description contains all

[83] On the methodological importance to study the "hidden" domains of gendered labor in media and technology see: Carolyn Birdsall and Elinor Carmi, 'Feminist Avenues for Listening in: Amplifying Silenced Histories of Media and Communication', *Women's History Review* 31, no. 4 (7 June 2022): 542–60, https://doi.org/10.1080/09612025.2021.1944345.

[84] The gender aspect of media technologies in the case of telephones and typewriters is discussed in Peters, *Speaking into the Air*, 195–96. and Friedrich A. Kittler, *Gramophone, Film, Typewriter*, Writing Science (Stanford, Calif: Stanford University Press, 1999).

[85] Peters, *Speaking into the Air*, 195.

[86] The account in Russian was from an émigré journal Posev published in Frankfurt, West Germany and preserved by RFE/RL research institute on the topic of "glushenie" in 1975. Generators of Interference. An account by a member of the staff of a Soviet city jamming center. [English translation of the original

requirements for reaching precision in reporting technical data. The gendered work segregation is explained with the fact that this invisible job did not require specific qualification and that while men were employed as technicians and engineers at transmission sites that imply certain skills, women with low education levels in the jamming control units "prized their job since they don't have any other qualification."[87] An explanation of the routine from a perspective of a female professional follows:

> During the change of shifts the transmitters must be switched off. The transmitting centre tunes (but does not manipulate) them on the orders of the receiving centre: the duty personnel at the receiving centre switch them on and off by remote control. According to the schedule a "session" is starting a couple of hours after coming on duty – at 1800 hrs there is a new Voice of America broadcast. The duty employee has a log-book giving the situation of the radio stations. She listens to the broadcasts and notes down their audibility, a numerical rating of the quality of the transmissions and of the quality of the jamming of other jamming centres in other cities.

Jamming monitors who sent orders to adjust the transmitters held a position in the intermediate zone between technological facilities and higher level administration that approved jamming schedules and later received the reports on jamming quality. According to the political logic, employees at jamming control units must reach precision beyond the limits of humans and machines; an ideal often challenged in practice by both humans and machines: "'technical stoppage' is when jamming should have been taking place but was not. However, it is practically impossible to prove a 'technical stoppage.' (…) A mistake may occur in the report. The shift leader forgets, for example, to note

publication in *Posev* December 1975]. in HU OSA 300-80-1, box 763. The description of the journal and the original issue in Russian can be found in the library of the RFE/RL research institute preserved at the OSA library: https://catalog.osaarchivum.org/catalog/jeGZD0YN.

[87] Ibid. p.2. The publication explains that young men also worked for short-term periods at jamming monitoring posts shortly after serving at the radio signal branch of the Soviet army, but the long-term employees were mostly women.

down a period of jamming in the telegraphed report. Then a message comes from Moscow concerning not a "defective transmission" but a "technical stoppage." This is a very serious business. There is a big row and somebody may be dismissed. But in practice this does not usually happen since the shift leader will write in the report that "jamming was provided" irrespective of whether it was provided or not."[88] Such rules of jamming emerged at the limits of technology and politics where both domains faced the daily reality of technical failures.

[88] Ibid, p.8-9.

2. Political visions around Soviet military communications and jamming

Introduction

Deployed in the Soviet Union, the massive-scale radio infrastructure transmitting noise in order to silence "enemy" frequencies marked the Cold War. It is less known that this destructive technology, widely associated with its effects on Western stations, had a parallel existence in the military realm during the ideological conflict and stories about radars and military ships could enhance the prominent phrase "Cold War radio."

Radio interference unites several research perspectives traditionally studied separately: military history, communication technology, engineering, and the history of Cold War radio broadcasting.[1] Such scholarly divisions obscure the interrelations

[1] Historians have recognized jamming as a key part of Cold War broadcasting scholarship. On the broader political and cultural implications of noise, particularly important for this chapter, see: István Rév, "Just Noise? Impact of Radio Free Europe in Hungary," in A. Ross Johnson and R. Eugene Parta, eds., *Cold War Broadcasting: Impact on the Soviet Union and Eastern Europe: A Collection of Studies and Documents* (Budapest ; New York: CEU Press, 2010), 239–57.On jamming as a Soviet political reaction against Western broadcasting see: Simo Mikkonen, 'Stealing the Monopoly of Knowledge?: Soviet Reactions to U.S. Cold War Broadcasting', *Kritika: Explorations in Russian and Eurasian History* 11, no. 4 (2010): 13–18, https://doi.org/10.1353/kri.2010.0012.; Friederike Kind-Kovács, 'Voices, Letters, and Literature through the Iron Curtain: Exiles and the (Trans)Mission of Radio in the Cold War', *Cold War History* 13, no. 2 (1 May 2013): 209–10, https://doi.org/10.1080/14682745.2012.746666.Historian Christoph Classen includes a particularly valuable technical dimension of jamming in East Germany see: Christoph Classen, "Jamming the RIAS. Technical Measures against Western broadcasting in East Germany (GDR) 1945–1989," in: Alexander Badenoch, Andreas Fickers, and Christian Henrich-Franke, *Airy Curtains in the European Ether: Broadcasting and the Cold War* (Baden-Baden: Nomos, 2013), 321–46. The history of jamming has been studied also from the perspective of the listeners' experience in Kristin Roth-Ey, 'Listening Out, Listening For, Listening In: Cold War Radio Broadcasting and the Late Soviet Audience', *The Russian Review* 79, no. 4 (2020): 556–77, https://doi.org/10.1111/russ.12285. On the technical aspects of jamming Western radio stations see: George Woodward, "Cold War Radio Jamming," in A. Ross Johnson and R. Eugene Parta, eds., *Cold War Broadcasting: Impact on the Soviet Union and Eastern Europe: A Collection of Studies and Documents* (Budapest ; New York: Central European University Press,

between technology, military thought, and politics that sustained this century-old practice. Avoiding the link between the three spheres, restrains any attempt to describe jamming in its historical depth and, therefore, study contemporary concerns linked to communication blackouts.

Today, new technologies for blocking access to communication proliferate rapidly and the study of their Cold War predecessors is growing more relevant. Most famously, the sophisticated internet technology for filtering "enemy" websites in today's China, dubbed the Great Chinese firewall, invites parallels with Soviet radio interference sustained by the communist party. Meanwhile, the destruction of local internet infrastructure after the Russian invasion of Ukraine in 2022 and the seemingly neutral and peaceful decision to restrict only Ukrainian military access to the vital satellite backup Starlink[2], sharpen the urgency to explore particularly the political implications of restricting military communications during the Cold War era. As this chapter will show, interfering with the "enemy's" access to superior communication technology was a textbook case of a strategic goal, according to Soviet military thought and its contemporary followers in the Russian army who tried jamming to restrict Ukrainian access to satellite internet. Jamming noise gives us the now much needed direction to

2010), 51–65.; Rimantas Pleikys, *Jamming* (Vilnius: R. Pleikys, 1998).; Jerome S. Berg, *Broadcasting on the Short Waves, 1945 to Today* (Jefferson, N.C: McFarland & Co, 2008).

[2] The decision was taken on February 8, 2023 by SpaceX, a private company controlling the Starling infrastructure owned by Elon Musk - almost one year after the Russian invasion of Ukraine. Starlink satellite communication was essential for Ukrainian drones targeting Russian tanks and artillery since the beginning of the war. SpaceX officials presented the policy stating that the service was "never never meant to be weaponized" and, at the same time, implying that the company has its own technological tools to restrict the Ukrainian army's access to communication: "There are things that we can do to limit their ability to do that. There are things that we can do, and have done," said Gwynne Shotwell, SpaceX's president and chief operating officer during a conference in Washington, D.C. On the official decision concerning the restriction and the initial Russian jamming against Starlink satellites see: Joey Roulette, "SpaceX curbed Ukraine's use of Starlink internet for drones -company president," *Reuters*, February 9, 2023, https://www.reuters.com/business/aerospace-defense/spacex-curbed-ukraines-use-starlink-internet-drones-company-president-2023-02-09/. Accessed: February 20, 2023.

navigate through the Soviet military archive, but how can historians access this famous domain of secrecy?

A wider perspective on media and technology helps us to identify available sources on jamming in the Soviet army. In this chapter, nature is a medium; in particular, I use the examples related to the ionosphere and the sea as media that actively shape the military uses of radio during the ideological conflict.[3] In military thought the relationship between communication infrastructure and content of communication was not hierarchical. From this perspective, communication links were vulnerable to enemy attacks and must be protected. This requires a historiographical sensitivity to the materiality of technology.[4] I use radar infrastructure and naval ships as two other examples of Cold War *media* interacting actively with the natural environment and Soviet politics. To borrow a radio metaphor, once we perceive media as nature and infrastructure, we tune in to the military view of radio technology.

The first part of the chapter situates military communications as an integral part of Soviet media and politics. I follow material traces of militarized language, artefacts, and natural phenomena to problematize the military logic of radio transmission. Military radio

[3] This approach is primarily inspired by media philosopher John Durham Peters. In his book, *The Marvelous Clouds: Toward a Philosophy of Elemental Media* (2015), John Peters proposes media theory that is "about environments and infrastructures as much as messages and content" paying special attention to the materiality of media and the relationship of media to nature in reflections on the historical development of media until the present day. On this expansion of the media concept and the way of understanding media as "both natural and cultural" see: Chapter 1 "Understanding Media" in: John Durham Peters, *The Marvelous Clouds: Toward a Philosophy of Elemental Media* (Chicago ; London: the University of Chicago Press, 2015), 13–52.

[4] Recent scholarship on Cold War broadcasting emphasized precisely "the material dimension, the technical infrastructure for broadcasting transmission" where "networks of relay stations, cables, and satellites" become an integral part of Cold War broadcasting historiography. See: Badenoch, Fickers, and Henrich-Franke, *Airy Curtains in the European Ether*, 17. Other recent works on Cold War media and radio broadcasting emphasizing infrastructure include: Alexander Badenoch and Andreas Fickers, eds., *Materializing Europe: Transnational Infrastructures and the Project of Europe* (New York, NY: Palgrave Macmillan, 2010). Yuliya Komska, 'RFE/RL Broadcasting and West German Society: Caught between Nature Protection Activism and Anti-Americanism' *Journal of Cold War Studies* 20, no. 3 (2018): 180–206.

gives us valuable insights into how natural phenomena were perceived as an integral part of Cold War politics. Stressing the materiality of radio communications, this research highlights the Soviet dream of controlling all emerging 20th century media through infrastructure - political imagination going far beyond ubiquitous censorship - a vision about future technologies that would require the support of the army.

The chapter concludes with the story about military jamming imagined as a weapon. I examine the emergence of the Soviet naval concept of Radioelectronic combat in a Cold War dialogue across borders in the 1970s. Within the Soviet navy and its media, the sea, jamming was imagined as a weapon to destroy the potential enemy and its highly technological equipment by blocking access to communication technology. This strategy was intimately associated with the view that even the most advanced technological weapons are vulnerable to communication blackouts, a military strategy with political overtones during the Cold War when the technologically inferior Soviet fleet openly challenged its American counterparts.

2.1. The forgotten military communications reflected in Soviet radar infrastructure and its natural environment

Since Western broadcasters were the main targets of Cold War interference, long chronicles of jamming remained in the archives of Radio Liberty (RL), the most viciously silenced Russian-language foreign station. RL researchers monitored the news flow, archiving each reference to the skirmish in the ether that regularly provoked political controversies.

In September 1979, an archivist copied strange news from the Washington Post: "ship-to-shore radio operators noticed a strange type of interference[…]. It wasn't like the type of jamming that sometimes appears on the Voice of America or Radio Free Europe. This signal blocked shortwave, maritime, aviation, amateur, military, business, government and other types of low-frequency radio communications – often simultaneously."[5] This was one of the numerous articles published in the Western press on the disturbing sound known as the Russian Woodpecker.[6] It turned out that a gigantic military radar system designed to detect missiles launched towards Soviet territory produced unwanted jamming. In this case, military machinery faced condemnation due to noise, its detested by-product, but the generator machinery remained covered with silence: "[t]he Russians are testing a form of 'over-the-horizon' radar, for use in detecting missile launches from the other side of the world. That would help to explain why the Russians are keeping quiet about the signals,"[7] concludes the only article dedicated to the Soviet Woodpecker that I could find in the heavy boxes labelled "glushenie," the Russian word for jamming, meaning literally "deafening."

The majority of the Cold War documents with reference to RL[8] implied the political act of silencing their own radio content, while in this specific piece of paper RL

[5] John Edwards, Silencing the Soviet Woodpecker. *Washington Post*, September 12, 1979. HU OSA 300-80-1 RFE/RL Research Institute. Soviet Red Archives. Old Code Subject Files. Radio Glushenie (Radio Jamming), box. 763. Vera and Donald Blinken Open Society Archives at Central European University, Budapest. The article, copied by the RL archivists is available online in the Washington Post archive: https://www.washingtonpost.com/archive/politics/1979/09/12/silencing-the-russian-woodpecker/2434d721-d7ad-4fe6-a94a-41ff37c77a78/ Accessed: February 9, 2023.

[6] Ibid. The article describes the sound as "a buzzing, hammering type of signal sounding like an electronic woodpecker."

[7] John Edwards, Silencing the Soviet Woodpecker. Washington Post, 12 September 1979. HU OSA 300-80-1, box 763.

[8] International law is another important context that shaped the Cold War archive on jamming. Most of the documents on jamming including the one on the Soviet Woodpecker entail an accusation that jamming violates international treaties. The Final Act of the Conference on Security and Cooperation in Europe signed by the USSR in 1975 bounded definitively the decades-old problem of political radio interference

was simply listed among many others affected by the deafening military "Woodpecker." Paradoxically, a story about radars and missile warnings, otherwise, a key theme in Cold War imagination, received comparatively little attention because it was not directly linked with broadcasting content. RL researchers and western journalists categorized the noisy machine as a completely different, "strange type of interference." The Woodpecker remained in the archival box by chance.

2.1.1. The missing languages of the radio war

The historian faces silence about military jamming from both sides of the Iron Curtain. Before proceeding with the customary Soviet military secrecy, I will reflect on the Western archival gap resulting in this split of the notion of jamming between the civilian and the military realm, which has its own history. A key Cold War shift was intimately connected with a US view on broadcasting, introduced initially by the Eisenhower administration. Since then, the "cold" war was imagined as a long psychological war for hearts and minds, which re-defined radio as a primarily persuasive

with "freedom of information." Any attempt of jamming violated this essential value (certainly, not shared by the Soviet authorities) because the key Basket III included texts on "Improvement of the Circulation of, Access to, and Exchange of Information" in the context of radio, communication technology beyond borders explicitly mentioned in the Final Act. The Helsinki accords signified the culmination of legal tradition against the attempts to hinder the free flow of information in the civilian spectrum starting from the Universal Declaration of Human Rights from 1948. Moreover, the Soviet Union had already been withdrawing jamming temporary in 1963, while Romania and Hungary then ceased the practice altogether. All these factors contributed to a consensual condemnation of jamming from the perspective of international law. Cessation of Soviet jamming was the only option to guarantee freedom of information across borders. On the discussion on jamming from a perspective of international law see: Michael Cotey Morgan, *The Final Act: The Helsinki Accords and the Transformation of the Cold War*, America in the World (Princeton: Princeton University Press, 2018), 169–206. Ranjan Borra, 'The Problem of Jamming in International Broadcasting', *Journal of Broadcasting* 11, no. 4 (1 September 1967): 355–68, https://doi.org/10.1080/08838156709363567.

tool.[9] This long-term link between radio, political messages, and psychology obscured the material infrastructural similarities between military radars, jamming, and broadcasting technology.

A contrast with the early radio years offers a different historical perspective. American journalists observing European media landscape in the late interwar period intuitively associated jamming with infrastructure and warfare strategies, while deciphering violence behind nuanced noises. US broadcasters fused military vocabulary and technical terms to describe early jamming in Nazi Germany where silencing of target enemy stations had been carried out before the USSR embraced the same strategy during the Cold War. According to contemporaneous accounts, German listeners could tune in to radio programs from Strasbourg and the Soviet Union in their native language, which was enough to justify the technical counter-measures.

American professionals with experience mainly with commercial radio, noticed the strange logic of using radio technology for jamming transmission and promptly called this a broadcasting war: "There has also been a good deal of attempted 'jamming' setting up a noisy oscillation on the wavelength of the offending foreign transmitter - but the effect of such interference is local and much less efficacious than supposed. In broadcasting war, offense is far more successful than defense."[10] According to the author of this early description, the American broadcaster Cesar Saerchinger, who talked about jamming when the term was not yet established, broadcasting tailored to the Soviet German Volga Republic was audible on German territory and thus regarded as anti-German propaganda.

[9] On radio broadcasting imagined as a persuasive tool across borders in US Cold War political campaigns see: Kenneth Alan Osgood, *Total Cold War: Eisenhower's Secret Propaganda Battle at Home and Abroad* (Lawrence: University of Kansas, 2006). Walter L. Hixson, *Parting the Curtain: Propaganda, Culture, and the Cold War* (New York: St. Martin's Press, 1996).

[10] César Saerchinger, 'Radio as a Political Instrument', *Foreign Affairs* 16, no. 2 (1938): 252, https://doi.org/10.2307/20028845.

The content was not the only issue in this case – "enemy" transmission technology reached unwanted potential audiences. Jamming constituted an early example on the interrelation between politics and technology that re-defined the possible uses of radio transmission. Jamming cast a shadow over the early fascination of radio in the interwar years.

Other contemporaneous accounts affirm that along with severe punishments for listening to communist stations, Nazi propaganda officials recorded monotonous sounds resembling sirens to cover foreign stations. This was a recognizable militarized sound used to denounce "subversive brethren":- "the noises issuing suddenly from the loudspeaker should in principle discover the unpatriotic listener to his neighbours and even to the police."[11] Studying the acoustic soundscapes and practices of listening in Nazi Germany, the media scholar Carolyn Birdsall pays special attention to the systematic use of sirens and alarm sound systems developed by air-force engineers immediately after the war started in November 1939. [12] The alarming soundscape targeted the major German cities in the attempt to impose "disciplined home front."[13]

On the opposite war front, scientists associated with the Allies developed antiaircraft radar technology as a response to Nazi aerial attacks. Above all, as Peter Galison argued, the history of radars was intimately linked with the military "ontology of the enemy."[14] Galison examines the case when a team led by the mathematician Norbert Wiener developed antiaircraft radar systems to destroy Nazi airplanes by predicting trajectories

[11] Thomas Grandin, *The Political Use of the Radio* (New York: Arno Press, 1971[1939]), 25. The study on which the re-printed book is based is conducted in 1939.
[12] See "Alarm Sounds as Acoustic Signals" in: Carolyn Birdsall, *Nazi Soundscapes: Sound, Technology and Urban Space in Germany, 1933-1945* (Amsterdam: Amsterdam University Press, 2012), 119–30.
[13] Birdsall, 120
[14] Peter Galison, 'The Ontology of the Enemy: Norbert Wiener and the Cybernetic Vision', *Critical Inquiry* 21, no. 1 (1994): 228–66.

set by enemy pilots. Radar equipment participated in the complex endeavour of gathering feedback information about behaviours of "man-machine enemies."[15]

At the same time, wartime scientists pondered on the possibilities to interfere with enemy radar equipment. Since Nazi air forces used radio signal location for aerial attacks at night or in bad weather, the British army responded with jamming enemy radar frequencies and tools to mislead enemy pilots with signalling to them false target coordinates.[16] In his memoir, the leading scientists in the "battles of the beams" the physicist Reginald Victor Jones, described the invention of radar jamming techniques as inspired by a synergy between military and civilian technology. The war blurred the lines between the two distinct spheres of radio communication. Jones explained the logic of air-force jamming using a comparison with a loudspeakers and microphones: "[t]he effect would be rather like that which occurs in public address systems where the noise from the loudspeakers impinges on the original microphone, and is therefore picked up and relayed back to the loudspeakers again. The effect on the ground station would be to make it think that the aircraft was at a false distance, because the returning waves would have travelled round an extra loop between the aircraft and our own station before getting back to their original base, and if we used a powerful transmitter ourselves the whole system would 'ring' just as a public address system squeals if the gain of the amplifier is made too high."[17] The powerful BBC television transmitter at Alexandra Palace was then deployed

[15] Galison, 251.
[16] See Alfred Price, *Instruments of Darkness: The History of Electronic Warfare, 1939-1945* (Yorkshire: Frontline Books, 2017), 21–50.
[17] R. V. Jones, *Most Secret War* (London: Michael Joseph, 2009), 176.

to serve as a part of the system for jamming enemy radio beams and protect London from Nazi bombers.[18]

Such wartime civil-military entanglements in the history of jamming disappeared from the public view in the 1970s. Besides, the Soviet noisy over-the-horizon radar equipment was embedded in a culture of Cold War secrecy. This fact perplexed contemporaneous American commentators trying to understand a strange machine locked behind closed doors. Needless to say, Soviet authorities strictly forbade the access to any radio technical facilities under army supervision. Scarce and/or classified Cold War archives remain the only source to inform historians' accounts today. Demolished Soviet radio masts after 1991 and employees unwilling to talk only prolong the dominant silence. However, the case with the Russian Woodpecker is an exception, because the noise came from an area near Chernobyl. The second that broke the silence is recorded by historians: 26 April 1986, 1:23:40 a.m.

*

Not long after the nuclear accident, it became apparent even for the Soviet politburo that it was useless to hide the real magnitude of the truth from the International Atomic Energy Agency. In a well calculated propaganda move targeted to the Western observers, the Soviet government invited foreign journalist to Kyiv and organized a special helicopter visit to the nuclear power plant for Hans Blix, the Agency's director, more than one week after the explosion.[19] The main concern before offering the trip was to avoid the immense top-secret radar infrastructure christened Duga (the Russian for

[18] Ibid.
[19] See Serhii Plochiy, *Chernobyl: History of a Tragedy* (London: Penguin Books, 2019).

"Arch") powered by a direct link with the nuclear plant and visible from the air.[20] Most probably, neither Blix nor the foreign journalists ever mentioned the secret facility while the world heeded the warnings of raising radiation levels emitted freely in the atmosphere, but radiation from the explosion unexpectedly "conserved" the gigantic metal antenna installation which is still visible today. Especially after the 2010s, when the radiation levels in the exclusion zone were considered less dangerous and local Ukrainian guides familiar with the contaminated area attracted tourists from all over the world, the abandoned radar became a popular tourist destination along with the famous power plant.

Something unimaginable for Soviet military technology took place: a secret facility entered generous online photo collections, while digitized old recordings of the famous Woodpecker jamming noise circulated freely online to supplement journalist reports, presentations from bloggers, and impressive drone footage. Aerial view and satellite images are still available on google maps. Radiation transformed Duga into a place of memory. By a rare coincidence, long after all similar radar infrastructure was deemed irrelevant, dismantled immediately after the collapse of the USSR, and almost forgotten, the strange afterlife of Duga and its Woodpecker noise, stand as a material witness that jamming noise once united the realm of military strategy, politics, and technology. Many years after the accident, Duga attracted unwanted witnesses to the huge expenses and fantasies that were invested in military antennas during the Cold War. When the Russian army invaded Ukraine on 24 February 2022, it immediately took control over the Chernobyl exclusion zone – one of the first targets of the invasion.

[20] Plochiy, 241–42.

2.1.2. The militarization of the ionosphere

In a documentary movie titled *The Russian Woodpecker* (2015), based on interviews with eyewitnesses and former employees at the military facility, director Chad Gracia and Ukrainian artist Fedor Alexandrovich challenge the secrecy, silence, lies, and half-truths surrounding the enormous artefact. Revisiting the abandoned military installation with actual footage of the preserved radar, the movie registers how the installation was imagined when still functional. **(Fig.2.1)** Describing the operational principles of the Chernobyl antenna system, the radar expert Fedir Dubrovka uses military language with a strong accent on the natural environment to explain what allowed the existence of the super powerful over-the-horizon radar: "It works because of the ionosphere. The ray bounces off the ionosphere to the earth and gathers information [about launched missiles] and then comes back. It is a curved gun."[21] While radar specialists associated information gathering with the ionosphere, it was precisely the natural factor which limited the radar's practical application.

The first factor was linked to interference. Since the ether was not endless, but a limited natural resource crowded by the waves of innumerable radio facilities, Soviet radar operators faced backwash, from predominantly Western protests against interference with other stations. Most probably, the powerful system obstructed Soviet communications as well. Seeking a way to make the radar both effective and inaudible, the Soviet employees faced another challenge: "our signal was unable to overcome the

[21] Interview with Fedir Dubrovka in *The Russian Woodpecker* (2015) by Chad Gracia and Fedor Alexandrovich

Northern Lights,"[22] explained Nikolai Shkurat, a former military commander at Duga during an interview for the documentary.[23] One could hardly wish for a more detailed explanation by a former employee trained to keep state secrets.

Figure 2.1 The Ukrainian artist Fedor Alexandrovich visited the colossal abandoned radar infrastructure Duga near Chernobyl while shooting actual footage for the documentary. Photo: The Russian Woodpecker (2015) official trailer.

Nevertheless, the story about the Northern Lights appeared in another context much earlier and historians have the luxury to read a more loquacious account about Duga. Not long after the collapse of the USSR, in 1996, Grigorii Kisunko, a veteran Soviet physicist involved in the construction of early Soviet anti-missile systems published his memoir on the Soviet Cold War radar program including reflections on the

[22] Interview Nikolai Shkurat in *The Russian Woodpecker* (2015) by Chad Gracia and Fedor Alexandrovich

[23] Unavoidably, such testimonies brought difficulties to the movie director Chad Gracia who reflected on the credibility of the interviews: "I think that a viewer has to pay very close attention to the face, the eyes, and the hands of people who are being interviewed because some of them are not telling the truth. Spectators have to be aware of what ulterior motives each person may have in speaking, and we tried to present enough evidence to allow the viewer to come to a conclusion. Some people do see this film and say, 'This guy is definitely lying and that guy is telling the truth,' but other people in the same audience have the reverse opinion. For some of the interviewees, we have a lot of evidence they're not telling us the truth, and we provide reasons why. We offer evidence in counter interviews." Chad Gracia, Dennis West, and Joan M. West, 'Chernobyl, Kiev's Maidan, and the Russian Woodpecker: An Interview with Chad Gracia', *Cinéaste* 41, no. 1 (2015): 42.

infamous abandoned antenna site near Chernobyl. Not involved in the construction himself, he openly criticized the large-scale secret facility as practically useless. His reasoning unites both Cold War geography and nature. According to Kisunko, the Chernobyl radar, along with another identical facility on Soviet territory, was aimed at detecting missile launches in the US[24]. Kisunko argued that due to the "angle towards the US, the ionosphere conditions were unfavourable"[25] and thus it was impossible for Duga to ever achieve its military aim. "Huge expenses, time, and labour of thousands of people naively believing that they work for the defence of the USSR, turned out to be spitting in the wind,"[26] concludes the former Soviet official. Other primary sources and historians of military technology confirm that the radar was not completely functional due to unstable ionospheric conditions in the polar zone.[27] In the case of Duga, the ionosphere was not merely a neutral background, it functioned as a dynamic medium to be deployed for or limit military and political aims.

Kisunko who was among the first to use the ionosphere as an argument against the construction of Duga had a particularly material view on radio and its environment shaped by his experience during the Second World War. He interrupted his career as a young scholar in theoretical physics in Leningrad to join the war with the Red Army as a volunteer. During the war he was in charge of and studied closely the equipment of a mobile radio unit (MRU-105), supplied by the British army.[28] In 1941, he witnessed the

[24] The Soviet military administration decided to install two identical Duga radar stations: one at the eastern Soviet border (Bolshaya Kartel in Khabarovsk Kray) and the one near Chernobyl. P. L. Podvig and Oleg Bukharin, eds., *Russian Strategic Nuclear Forces* (Cambridge, Mass: MIT Press, 2001), 428.
[25] G.V. Kisun'ko, *Sekretnaya zona: ispoved' general'nogo konstruktora* (Moscow: Sovremennik, 1996), chap. 20 http://militera.lib.ru/memo/russian/kisunko_gv/20.html Accessed: 15 Feb. 2023.
[26] Ibid.
[27] Podvig and Bukharin, *Russian Strategic Nuclear Forces*, 426–28.
[28] G.V. Kisun'ko, *Sekretnaya zona: ispoved' general'nogo konstruktora* (Moscow: Sovremennik, 1996), chap. 6 http://militera.lib.ru/memo/russian/kisunko_gv/06.html Accessed: 15 Feb. 2023.

vital transition from predominantly human observers of the sky to the early Soviet anti-aircraft mobile radars installed on trucks, essential technological equipment during the siege of Leningrad. Before the introduction of such radars, the Red army relied on the interaction between human skills, three media (telegraph, telephone, and radio), and Russian geography. Kisunko was among the last witnesses of how soldiers stationed in the border areas monitored the sky for approaching airplanes visually with binoculars or through acoustic equipment and ultimately reported updates by telegraph, telephone, or radio to military headquarters in Moscow. Since the Nazi army had been destroying observation posts in occupied territories and the frontline moved closer to Leningrad, such, in his words, "primitive methods" did not provide an effective air defence.[29]

Although radio and telegraph links remained an indispensable part of military communication throughout the war and beyond, the young physicist was fascinated by the "new radiolocation stations" which inspired his later interest in anti-missile radars during the Cold War. For Kisunko, theoretical questions dominated technical tools to reach effectiveness in detecting approaching enemy airplanes, the domain of his military fellows, the engineers. While working with the British equipment, he contributed with his background in physics to solve some problems emerging in the course of battle. "How did the terrain of the area affect the work of the station and therefore how to choose the optimal site for a battle position,"[30] was among the problems he reflected on during the war.

The physicist associated radio radar equipment with the natural environment in which it is embedded. After the war, he published his first monograph on theory of radio

[29] Ibid.
[30] G.V. Kisun'ko, *Sekretnaya zona: ispoved' general'nogo konstruktora* (Moscow: Sovremennik, 1996), chap. 7 http://militera.lib.ru/memo/russian/kisunko_gv/07.html Accessed: 15 Feb. 2023.

waves and electrodynamics, which is considered among the foundational works of Soviet radiolocation.[31] In the monographs' introduction, Kisunko pondered the historical development of radio technology. For him, the radio's fundamental breakthrough consists in the "conscious control of the electrodynamic wave processes."[32] "Radio technology uses the wave nature of electromagnetics not by simple adaptation to natural manifestations of electromagnetism, but actively creates from real physical bodies a peculiar 'artificial nature' in the form of apparatus, instruments and other devices, where electromagnetic phenomena are deliberately put in such consciously controlled conditions to cause the desired technical effect,"[33] concludes Kisunko. According to this view, radio technology itself imagined as "artificial nature" does not provide any solutions for communication. On a more fundamental scale, technology interacts actively with the natural phenomenon disseminating electromagnetic waves.

Thus radio received a much broader definition uniting technology and nature. This was not simply a peculiar view of a particular Soviet physicist. First, as the historian of media John Peters observes, the notion of "medium" has been associated with "a condition for the transmission of entities such as light, gravity, magnetism, and sound", especially in physics, ever since Isaac Newton.[34] Much later after the emergence of the XIX century telegraph and the XX century mass media, intellectuals begun to divide media contents according to its diverse technical embodiments such as telegraph, press,

[31] Il'inskij, A. S. "Razvitie jelektrodinamicheskoj teorii radiovolnovodov." *Radiotehnika i jelektronika* 64, no. 8 (2019): 735-740.
[32] G.V. Kisun'ko, Jelektrodinamika polyh sistem. (Leningrad: VKAS im. Budennogo, 1949), 3.
[33] Ibid.
[34] John Durham Peters, *The Marvelous Clouds: Toward a Philosophy of Elemental Media* (Chicago ; London: the University of Chicago Press, 2015), 47.

film, radio, and television; meanwhile, "the expansive (and ancient) notion of media ecology" has never completely disappeared from intellectual discussions.[35]

Second, this view was shared across borders. For instance, American and European pioneers of radionavigation systems, the predecessors of today's widely used Global Positioning System (GPS), were also preoccupied with the materiality of technology. They used metaphors of "aerial railways" and "air oceans" to describe early radio navigation technology marking the emergence of the political geographies of technology and space in the interwar period.[36]

Third, and most importantly for this case, Soviet propaganda and politics on the radio were not unfamiliar with this view. Soviet scientists interested in radio waves, discussed their works on regularly organized special forums dedicated to the Radio Day, celebrated each year on the 7th of May. Kisunko, for instance, published his first article on electrodynamics after a conference dedicated to the 50 years of the invention of radio by Popov, as it was considered in the Soviet Union. Uniting all workers in the sphere of communications, including the army signal forces, Radio Day was a politically loaded event.

[35] Peters, 47–48.

[36] On the interesting political distinctions implied in both metaphors to describe early radionavigation systems, see: "Railroads of the sky vs. the air ocean" in William Rankin, *After the Map: Cartography, Navigation, and the Transformation of Territory in the Twentieth Century* (Chicago: University of Chicago Press, 2016), 210–17.

2.1.3. Military communications in the Cold War dream to control all media

The Cold War archive at Radio Liberty gives us an unusual dialogical perspective around Radio Day. Western archivists collected annually press clippings from the 7th of May from all Soviet newspapers delivered to the headquarters in Munich. Without missing a single year, the archival boxes keep records from Radio Day 1961 to 1991 - an exceptional regularity in the archive, which is understandable from the perspective of the clandestine radio. Each year, the communist authorities published data about radiofication and the production of radio sets saluting meanwhile Soviet technological advancement. Western analysts promptly underlined this quantitative data, an essential indicator for the potential radio audience behind the Iron Curtain.

RL information analysts only scanned for those pieces of information linked with radio sets, following their own political mission to reach Soviet radio listeners. In this case, Cold War radio was associated with technical apparatus isolated from other media. Across the Iron Curtain, Soviet press editors predominantly used anniversaries to emphasize the link between radio and propaganda defined as education of the masses. "A powerful ideological weapon,"[37] reads an illustrative metaphorical title among the articles, introducing some popular radio programs on news and culture in an argument about "the powerful influence of radio and television."[38] In this case, RL archivists ignored propaganda arguments underlining only the dry, but still, state-tailored statistics: "32 million radio receivers and 33 million wired receiver points [radio loudspeakers

[37] M. Harlamov, "Moguchee Oruzhie Nashej Ideologii," *Pravda*, May 7, 1963, p.2. in HU OSA 300-80-1, box764
[38] Ibid.

known as tarelki, literally plates]" and 150 million radio audience "keeping in mind the 2-3 listeners" gathering around a single radio set.[39] While underlining the questionable arguments in this decades-long pattern, Western information analysts overlooked the emergence of a whole political vision of radio communication. Soviet imagination went far beyond radio sets or to propaganda content.

Through their systematic effort to collect information, the archivists at RL unintentionally created an unusual visual archive that testifies to heterogeneous perceptions of radio technology in the Soviet Union. The Radio Day archive accumulated a vast collection of propaganda photographs to illustrate the celebrated medium. Along with ubiquitous images of factory workers producing radio and TV sets or photos taken in studios during transmission, the Soviet press included visual representations of rather experimental equipment that embodied dreams about the future use of technology. One example comes from the journal *Ogoniok*: a photograph of the ship "Cosmonaut Vladimir Komarov" described laconically as "carrying contemporary radio communications systems."[40] Talking about communication satellites, a Soviet official from the Ministry of Communication attached the image to an article on advanced Soviet radio technology. But why did the unusual ship appear in the Radio Day archive? In contrast with radio studios, much easier to imagine and celebrate, this was a studio with equipment for space communication making experimental journeys in oceans, far away from the Soviet Union.

This propaganda photograph leads us to a story about how nature affected communications within the Soviet space program. The impressive antenna equipment in the photograph obscures failures and limitations of communication technology

[39] Ibid.
[40] The article is written by the deputy-minister of communications V. Lebedev. V. Lebedev, "Gazeta bez rasstojanij," *Ogonjok*, May 2, 1970, p. 21. in: HU OSA 300-80-1, box765.

contributed to the creation of the vessel. In an oral history interview with historian Slava Gerovitch, Felix Meschansky, the leading Soviet specialist in space radio communication returns to the origins of the problem: "In the late 1960s, we faced a problem. The most efficient location for space antennas is the Earth equator. The Soviet territory is much farther north, and this limits the area of the sky open to observation. After the Cuban Missile Crisis, we could not install our antennas on Cuba; our relations with China were not good, so we could not place the antennas there either. Then the decision was made to build special antenna-carrying ship. The first such ship was Cosmonaut Komarov."[41] Such natural disadvantages and geopolitical considerations led to Soviet funding of technologies for "deep space communication" through sea-based antenna complexes, which resulted in the first experimental onboard stations to control Soviet and, respectively, track American space probes.[42] Such Cold War stories that reflect security concerns about communication surveillance emerge around Soviet radio technology, once seen beyond studios and radio sets.

Following the visual traces about space communication and experimental radio technology, we could see imagined new spaces of power and ways to control diverse communication infrastructures. A telling example is a propaganda photograph with radio technical operators with headphones adjusting complex receiving equipment. **(Fig.2.2)** "This photograph is taken at one of the radio stations at the Ministry of Communication. Transmissions from spaceships of pilot-cosmonauts are received and recorded here."[43] Although space communication provoked propaganda imagination about advanced

[41] S. Gerovitch, *Voices of the Soviet Space Program* (Palgrave Macmillan, 2015), 103.
[42] Gerovitch, 104.
[43] Radio technical equipment at the Soviet Ministry of Communication. Photo: Pravda, 7 May 1963. in: HU OSA - 300 - 80 – 1, box. 764

technology, it would be misleading to consider that the state apparatus dreamed only about controlling signals from cosmonauts. The visual technical archive reveals higher aims: centralized control of *all* existing old and newly emerging communication channels, *including* those technologies located in space.

"The newest multi-channel communication station designed for radio, television, telegraph, telephone and phototelegraph,"[44] reads the explanation under another photograph of infrastructure equipment. **(Fig. 2.3)** This was an object that reflects not so much the real practical use of such experimental stations, but the desire to integrate the spread of media under political control through a common infrastructure. The Cold War archive keeps the political visions sustaining such artefacts expressed simultaneously by both military and state officials. The key to understanding this process is to include military communications in the Soviet media ecosystem.

Figure.2.2. Radio technical equipment at the Soviet Ministry of Communication. Photo: Pravda, 7 May 1963. in: HU OSA 300 - 80 – 1, box. 764

[44] An experimental multi-channel communication station designed for radio, television, telegraph, telephone and phototelegraph. *Sovetskaia Rossia*, May 6, 1968 in: HU OSA 300 - 80 – 1, box. 765

Although articles published in the official newspaper of the Red Army, *Krasnaia Zvezda* (Red Star) are part of the extensive Radio Day archive, Cold War researchers did not underline any excerpts from military articles. In the late 1960s, at the time of the first experimental Duga radar, high-rank officers defined radio in a much more inclusive way to stress the importance of military technology in Soviet society. In an article published on Radio Day in 1967, Alexei Leonov, marshal of the Soviet signal corps, lists radiolocation as one of the symbols of technical progress. He talks about specific markers of development in military radio technology, including automaticity and reliability in harsh climate.[45] While arguing that radio is "not just broadcasting", the military officer includes political overtones in his publications claiming that radio communication enhances "state governance."[46] "Over the past decades, main radio communication trunks have been built and put into operation to connect main administrative centers of our country, allowing for the simultaneous transmission and reception of information on tens and hundreds of channels,"[47] concludes the military comment with such reflections on state administration. Why did the officer emphasize state governance?

Military officers and state officials shared a common militarized view of emphasizing communication infrastructure and its defence. Simultaneously, the communist party also imagined "cable and air trunks" that unite all media. In 1966, the Soviet minister of communications, Nikolai Psurtsev, a former general in a Soviet signal division during the war who oversaw jamming of Western radio stations in the early Cold

[45] A.I. Leonov, „Nashe radio," *Krasnaja zvezda*, May 6, 1967, p.1.
[46] Ibid.
[47] Ibid.

War years[48], published an article in Pravda to present the Soviet view on the future of communications titled "Gazing into the Future:"

> At the 23 CPSU Congress, the task was set to 'intensify the work on the creation of a unified automated communication system that would ensure the uninterrupted and reliable transmission of all types of information.' We are talking about the creation of such communication systems, through which not only ordinary telephone and telegraph messages will be carried out, but also broadcasting and television programs, various kinds of photographs, diagrams, drawings, information flows for electronic computers. All cable, radio relay, air trunks must be connected. The process of connecting and switching subscribers will be carried out automatically, and the control of the entire communication network will be provided with the help of electronic computers.[49]

After describing the unified media system of the future, the party official emphasized that such communication networks must be newly created to resolve the problem with interference: "it is necessary to create equipment that increases the bandwidth of lines and protects them from various interferences."[50]

[48] On the role of the Minister of Communications Nikolai Psurtsev in Soviet jamming in the 1950s, see the collection of published primary sources on jamming in the USSR in: A. Ross Johnson and R. Eugene Parta, eds., *Cold War Broadcasting: Impact on the Soviet Union and Eastern Europe: A Collection of Studies and Documents* (Budapest ; New York: Central European University Press, 2010), 520–27.
[49] N.D. Psurcev, „Zagladyvaja v budushhee," *Pravda*, May 7, 1966. in: HU OSA 300-80-1, box 764
[50] Ibid.

Figure. 2.3. An experimental multi-channel communication station designed for radio, television, telegraph, telephone and phototelegraph. Sovetskaia Rossia 6 May 1968 in: HU OSA 300 - 80 – 1,box. 765

The Soviet perspective of the story about a militarized view of media as nature and infrastructure fits a vision that all forms of communication can be centralized under the communist state. In the 1960s, when this political view on technology emerged, the available tools were certainly limited, but it sounds closer to today's realities of internet communication in communist China, for instance. In this respect, it would be a mistake to overemphasize the Great Chinese firewall and the practice of selective censorship of websites without taking into consideration the dynamics of natural components of the spectrum and the infrastructure sustaining the 5G cellular networks. While the former is much more palpable for local users of information and foreign observers, the latter encompasses both politics and security considerations of broader global significance. The

next subsection deepens the focus on the military realm with a global dialogue about the technology of jamming between Soviet and American military experts, a Cold War conversation that left its mark on how future military battles were imagined.

2.2. Noise as a weapon: Soviet military views on the destructive power and vulnerability of technology

In 1992, in the light of the recently ended Gulf War, French philosopher Paul Virilio published an essay on the rapid changes of warfare technology demonstrated during the first "post-Cold War" military campaign.[51] Virilio proposed a long-list of recently introduced American military equipment among which were computerized weapons, real-time intelligence and monitoring, "pure weapons" designed to "paralyze the enemy" without extensive bombardment, and Patriot antimissile. It was "a weapons ecosystem" that "bears absolutely no relation to the environment in which the conflict unfolds."[52]

According to Virilio, technological changes in weapon systems shifted the military attention from geostrategy to the electromagnetic spectrum during battles, which, in turn, made some traditional notions like offensive-defensive and front-rear practically obsolete.[53] Surprisingly, he quoted a Soviet military commander to summarize the essence of the new American war strategy – a phrase ascribed to the former Soviet admiral Sergey Gorshkov: "the winner of the next war will be the side that made the most

[51] Paul Virilio, *A Landscape of Events*, Writing Architecture (Cambridge, Mass: MIT Press, 2000), 23–31.
[52] Virilio, 26.
[53] Virilio, 25.

of the electromagnetic spectrum."[54] "What can we say today of the winner of the post–Cold War, except that madly making the most of the airwaves involves the use of telecommunications and jamming not only in the military realm but also in the civilian,"[55] wrote Virilio right after the Gulf War and the collapse of the Soviet Union placing the obscure technology of jamming among famous "smart weapons." How did the Cold War solidify the view that a future war would heavily rely on jamming?

Jamming had a key place in Soviet military thought. Fascinated by the practices of Radioelectronic combat, a whole field was created and became especially popular during the Cold War. Noise was the common thread of a story about imagining a "next war" that oscillates between warfare strategies and technology embedded in its natural environments. This subchapter introduces the ocean as a key medium for the Soviet navy, the first military branch to coin the notion of Radioelectronic combat systematically cataloguing weapons for jamming in the 1970s in a dialogue with its American counterparts. While military jamming is widely used as supporting equipment in a variety of tools among different army branches, I examine only its Cold War historical emergence that entailed political repercussions.

The focus on the navy is important for three main reasons. The first motive is historiographical. The Soviet military notion initially appeared in naval military publications during the Cold War. Second, as military engineers and Soviet naval officers stressed, the fleet was the military unit most dependent on and thus more sensitive to communication technology. Third, the naval art was intimately connected with the sea as a medium for military operations. Studying the history of jamming within the Soviet navy

[54] Virilio, 28.
[55] Virilio, 29.

gives us valuable insights into the key intersection between politics, technology, and nature. A military ship in the ocean was imagined as a space to reflect Soviet social order amid imagined potential clashes against military and ideological enemies. Military officers and engineers equated maritime control with state management. This was not such a strange thought, if we see both the ship and nature as media. As media historian John Peters reminds us: "Nothing can be left implicit in ship design: all functions have to be converted to explicit systems of steering, navigation, and social order. On board, infrastructure comes out of hiding. The mix of a natural element (the sea), a craft (the ship), and skills (navigating, steering, prognosticating, disciplining) make this ensemble a cultural technique of the first rank. Each ship creates its own world afresh, a firmament to withstand the chaos of the waters."[56]

2.2.1. The emergence of radioelectronic combats during the Cold War

The Naval forces across the Iron Curtain sustained a dialogue on military jamming in the 1970s when the Soviet Union published extensively on Radioelectronic combat, a concept that encompasses all forms of military communications in the ether and radio jamming in particular. American military publications regularly summarized the latest news on the topic coming from behind the Iron Curtain. "A number of authors latterly have expressed proper concern about the readiness of the US Navy to conduct warfare in dimension other than the three conventional media: sea, air, and land. This additional dimension, the electromagnetic spectrum, is as vital a battlefield in wartime as any of the

[56] Peters, *The Marvelous Clouds*, 2015, 105.

other three, perhaps even more so,"[57] explains an article published in the American *Naval War College Review* from 1984 raising awareness about an already familiar Cold War concern. The aim of the US naval experts was to summarize the relevant Soviet publications available in the West.

At that time, the main source for such a dialogue beyond political borders and military secrecy was the official journal of the Soviet Navy, Morskoy Sbornik, which published a series of articles on Radioelectronic combat with particular references to NATO military equipment in the early 1970s, which US naval experts identified as the beginning of a new era in Soviet naval warfare. These early publications were written by co-authors among which were naval engineers intimately familiar with the technicalities of maritime weapons. "It is well known that the progress of modern society is inextricably linked with an increase in the flow of information [...] in modern warfare, with its decisiveness of its goals, huge spatial scope, high rates of action, and abrupt changes in battle situations, success will be achieved by those who collect and process the necessary information faster and make the correct decision,"[58] reads the opening of the first article from 1970 that introduces Radioelectronic combat, a new Sovietized concept coined as an explicit response to the Western notion of Electromagnetic warfare. Emphasizing "information gathering" and "decision-making", the Soviet authors cite a US book on military technology translated into Russian. Written almost a decade earlier by a team of military engineers at an American military corporation[59] the book titled *The*

[57] Floyd D. Kennedy, 'The Evolution of Soviet Thought On "Warfare In The Fourth Dimension"', *Naval War College Review* 37, no. 2 (1984): 41.
[58] V.S. Pirumov, A.B. Yemel'yanov and A. P. Il'ich, " Radiojelektronnaja bor'ba v vojne na more [Radioelectronic Combat in War at Sea]," *Morskoy Sbornik*, July 1970, p. 46.
[59] Robert J. Schlesinger et al., *The Principles of Electronic Warfare* (Englewood Cliffs, New Jersey: Prentice Hall, Inc., 1961).

Principles of Electronic Warfare (1961) discusses the "philosophy of jamming" as linked to Shannon's Mathematical Theory of Communication, a militarized theory where noise and signal are foundational to all communication systems and jamming was only one instance of noise among many others. For example, the original American source shows dynamic shifts from abstract theoretical postulates of "noise" and "signal" to specific weapons. This is how jamming noise was described in this paradigm:

> Noise exists to a greater or lesser extent in all electronic systems; it is therefore logical to consider the general problem first, and to treat the intentional introduction of noise (i.e., as by a hostile noise-jamming transmitter against radio or radar) as simply an extension of the general case. It will be seen that the presence of noise in a system introduces uncertainty as to the information content and thereby degrades system performance as measured in terms of accuracy, reliability, information-handling capacity, or some similar criterion. It is therefore obvious that the intent (and the effect) of jamming is to deprive the victim of the use of the full capabilities of his electronic system(s). (…) The so-called "noiseless channel" is seldom, if ever, encountered in physical reality. It is one of life's hard facts that where an information-bearing signal is found, it is always associated to some extent with an environment of competing "signals." [60]

In the military realm, such abstract notions linked to information theory were swiftly associated with concrete weapons: "data-gathering elements", as presented in the publication, entail "radar, sonar, radio receiver, eyes, ears" while "decision-making elements" could be "a computer or a field commander." Among "action elements" the engineers included "transmitters, missiles, and aircraft."[61] In their publication, the American technical experts explored how jamming, as an integral part of electronic warfare affects such weapon systems. Since the environment played a key role, the

[60] Ibid, 26-27.
[61] Ibid, 10-11.

authors dubbed "the conquest of space" as "the newest dimension for the conduct of warfare."[62]

Besides the fact that, in the early 1960s, satellite technology inspired the first speculations about future "space combats," military engineers recognized satellites as a potential solution to the two persistent problems of limited and unreliable high-frequency spectrum: atmospheric noises and jamming. In the field of electronic warfare, a burning question emerged: Is jamming of satellite communication possible? Beyond any practical experience in space interference yet, after discussing mathematical models of possible satellite configurations versus jammers, the authors drew a balanced conclusion: "Satellite communication systems are inherently capable of providing contact over paths that no other present radio system can accomplish. This ability results from the very nature of the altitude of satellite orbits. However, there seems to be nothing inherent in the satellite system that provides immunity from jamming."[63] Such cautious words remained tangential in the light of potential cutting-edge weapon systems.

But not for the Soviet navy which precisely took this aspect of the "enemy" reflections seriously: regardless of the advancement of sophisticated Western communication theory or technology, *any* form of military communication is "vulnerable." Long after the US weapon designers definitively turned their attention to space combats, Radioelectronic combat, a freshly Sovietized concept in the 1970s, emerged in service of the technologically inferior Soviet fleet.

Following *The Principles of Electronic Warfare* published in the US, the Soviet naval engineers re-confirmed the foreign view that "superiority in the field of military

[62] Ibid, 176.
[63] Ibid, 193.

radio electronics development becomes one of the indispensable conditions for military superiority over the enemy."[64] Radio technology then was not discussed as merely military communication. Radioelectronics was defined as "part of the most important weapon systems and their integral element."[65] After considering precisely the rapid technological development and weapons' automaticity, Soviet military thought elevated the importance of radio jamming and its potential destructive power: "While increasing the combat capabilities of forces and weapons, radio electronics at the same time makes systems and controls more vulnerable to enemy influence. The success of combat operations in modern conditions largely depends on the effectiveness of disrupting the functioning of the enemy's means of radio electronic and ensuring the reliable operation of their own radio electronic means."[66] The Soviet military thought stressed the inherent vulnerability of any system depending on electromagnetic waves, the foundational reasoning for promoting radioelectronic combat which was extensively developed in numerous books, articles, and became an integral part of military education.[67]

2.2.2. The Soviet commander of the future

Parallel with the emergence of the first technical literature with references to radioelectronic combat, the Soviet admiral Sergey Gorshkov expressed his views on maritime technology. In the 1970s, the admiral famously modernized the post-war Soviet fleet to challenge US naval supremacy. He published an English translation of a book

[64] V.S. Pirumov, A.B. Yemel'yanov and A. P. Il'ich,"*Radiojelektronnaja bor'ba v vojne na more* [Radioelectronic Combat in War at Sea,]" *Morskoy Sbornik*, July 1970, p. 46.
[65] Ibid.
[66] Ibid.
[67] On the scale of the extensive Soviet publications on the topic of Radioelectronic combat see: David G. Chizum, Soviet Radioelectronic Combat (New York: Routledge, 2019 [1985])

with a title suggestive of its political implications - *The Sea Power of the State*[68] where he discusses the development of future naval technologies. Intended for Western military audiences and openly polemical, Gorshkov's work demonstrates a characteristic fusion between state management and naval strategies revolving around the notion of "control."

The admiral echoes the key paradox highlighted earlier by army engineers that precisely due to technological development marine fleets grew more vulnerable to enemy interference, but adding to this a new dynamic of military control, which shifts from military commanders to machines:

> Tendencies towards the automation of the process of control of ship gear, weapon complexes, ships and formations testify to the growing role of radio electronics in the functioning of all control and arms systems. Therefore, superiority in the field of development of military radio electronics is becoming one of the essential conditions for military superiority over an enemy. However, while raising the combat potential of forces and weapons, radio electronics at the same time is making the systems of means of control more vulnerable to the action of the enemy.[69]

In a seemingly radical turn, Gorshkov's rhetoric switches from speaking about electronics in automatic weapon systems to a typical techno-political vision originated in the early 1960s about the "scientific organization of control" in the Soviet Union. This depended on "the creation of the material-technical base of communism" and, ultimately, would lead to the "formation of a new man—the man of communist society."[70]

This political language is hardly surprising once seen through the historical prism of Soviet military cybernetics, which reached its heyday at that time proposing "that computers and cybernetic algorithms of optimal control be applied not only to automated

[68] Sergeĭ Georgievich Gorshkov, *The Sea Power of the State*, 1st ed (Oxford [Oxfordshire]; New York: Pergamon Press, 1980 [1976]).
[69] Gorshkov, 207–8.
[70] Gorshkov, 209.

weapons but also military units."[71] The Western cybernetic visions adopted by Soviet military thought found a solid institutional support at the Ministry of Defence. The institution introduced three computation centres, among which, a special one for the Navy.[72] Soviet cyberneticians would later compare economic decision-making to military command and influence Soviet thought in the field of economic management. However, it became quickly apparent that available Soviet computer technology would not even partially sustain the dream of introducing automatic computation in decision-making in the heavy process of centralized planning, not to mention the ideological vulnerability faced by the idea of "automaticity".[73]

Overall, beyond all persistent constraints of applying cybernetics to Soviet society, the notion of "control" became overloaded with political implications and remained highly influential within the army in the 1960s-1970s. The strong link between cybernetics and military thought was apparent in the biography of the leading Soviet scientist in the field, the former Engineer Admiral Aksel Berg, who, after 1953, was shortly a Deputy Minister of Defence in charge of radioelectronics and radar before starting a remarkable career at the Academy of Sciences, He reformed Stalinist heritage in science administration while rehabilitating the field of cybernetics, formerly condemned as "pseudo-science."[74]

The notion of "control" then united Soviet science, military thought, and politics. In this context, Admiral Gorshkov imagined military vessels and their technological

[71] Slava Gerovitch, *From Newspeak to Cyberspeak: A History of Soviet Cybernetics* (Cambridge, Mass: MIT Press, 2002), 266.
[72] Ibid.139.
[73] On the dynamic trajectories of Soviet Cybernetics see: From "Military Cybernetics" to "Economic Cybernetics" and "Optimal Decision Making on a National Scale: Aspirations and Constraints" in Gerovitch, *From Newspeak to Cyberspeak*, 264–74.
[74] On the biography of Aksel Berg and the role of cybernetics in Soviet science after Stalin's death see: Chapter 5 "The "Cybernetization" of Soviet Science" in Gerovitch, 199–251.

weapons as the whole of Soviet society on a microscopic scale. According to Gorshkov, "the importance of control has now grown so much that it determines not only the degree of effectiveness and the outcome of the activity of society but the very possibility of this activity. In armed struggle at sea this is particularly and clearly manifested."[75] Without contrasting maritime command with state management, he stresses the importance of timely decision-making in battles "corresponding to the course of events in progress." Considering the automatic weapons and "the scope of combat operations and the growth of rapid operation of the means of combat", the marine battles of the future would be "incommensurate with the physical possibilities of man."[76] As Gorshkov explains, the wartime experience when a commander of a fleet could observe a sea battle and give orders remained irreversibly in the past. It was useless to observe the sea considering the existence of high-speed long-range missiles; instead, military commanders observed radar equipment, radio communications, and computer screens.

Where then was the space for human decision-making in the military and in the political realm? The question leads us to the second important political implication of the Soviet maritime imagination. Although naval warfare became highly technological and dependent on its equipment due to the "nature" of control and navigation, precisely the *nature* of the sea determines the space for human decision-making because it is impossible to completely eliminate the need for human skills in the sea as a medium. The key to understand his position is to expand the notion of media encompassing both the military equipment and the sea. In Gorshokov's view, the means of communication are vital for the fleet, more than for any other branch of the army because the navy "may be

[75] Gorshkov, *The Sea Power of the State*, 209.
[76] Gorshkov, 209.

virtually in every area of the World Ocean including the most distant."[77] Talking about water as a medium, he adds: "'[e]ach of the branches of the armed forces has a specific area of operations within which the control of its forces is brought about by the different means of communication used in a given medium. The fleet in this respect, too, significantly differs from all other branches of the armed forces. It needs such means of communication as will ensure the simultaneous control of its forces in different media: under water, above water, in the air and on land."[78]

Unlike aviation or land forces that act as "a compact structure," the naval logic of warfare presupposes "split-up combat order and even as single ships a very long way apart,"[79] which explains the importance of communication technology for maintaining control over the most diverse possibilities of employing force and using the sea as a dynamic medium in a battle. The link between the fleet constellations and the control base thus "must be fast-acting, constant, resistant to interference by the enemy and necessarily two-way,"[80] explains Gorshkov stressing enemy interference among the naval main threats.

Based on this military understanding of media and technology, he concludes by describing the ideal commander, who understands the new complex mechanisms of control and decision-making:

> The process of control including the sphere of the activity of the fleet is based on the work of the persons carrying out or ensuring this process. This most complex work can be reduced in all cases to two forms of mental activity of man—analysis and synthesis of the information or, as is commonly said in the armed forces, to appraisal of a situation and the preparation and adoption of a decision.[81]

[77] Gorshkov, 209.
[78] Gorshkov, *The Sea Power of the State*, 209.
[79] Gorshkov, 210.
[80] Gorshkov, 210.
[81] Gorshkov, 210.

Merging humans and machines delineated the ideal form of control in the navy characterized by "fullness, subtleness and accuracy of the analysis, on the one hand, and on the maximum soundness (faultlessness) of the synthesis of information on the other." In his dream about "the ships of the future," the admiral draws a progressive link between imagined Cold War threats and technological development:

> The fleet undoubtedly will continue to develop until the threat of attack by an aggressor on our country has disappeared. And if it is true that a fighting ship embodies the latest achievements of technical progress, then the ships of the future will reflect the level of development of science and industry of their country. It is now hard to say what peaks can be reached by human thought in twenty or twenty-five fast-moving years, but one thing is certain—ships will be quite dissimilar from present craft.[82]

The Cold War admiral concludes his vision about the future with a grim remark that beyond such perpetual investment in naval technologies, "the final goals of armed struggle at sea remain the same: crushing the enemy, destroying his life force and material resources."[83]

2.2.3. A Cold War dialogue on jamming weapons and their use

Beyond the visions about the future, the Cold War naval dialogue entailed a purely material dimension of jamming weapons too. Along with the politically shaped definitions about control and interference, Soviet naval engineers demonstrated intimate knowledge of specific Western technologies for electronic warfare - the materiality of US naval technology underpinned Soviet political views. Emphasizing that even partial interference could block weapons that rely on radio electronic equipment, an article titled

[82] Gorshkov, 211.
[83] Gorshkov, *The Sea Power of the State*, 211.

How the NATO fleet is preparing for a radioelectronic war[84], outlines some key weapons for military jamming tested by Western armies in the 1970s. All such machinery actively studied and mobilized noise in battles.

It was not a secret for the Soviet engineers that US naval research paid special attention to hydro-acoustics, a field that marked the early Cold War years. For instance, Soviet engineers quoted concrete technical equipment developed by a US military program called Jezebel in the field of hydro-acoustics designed to locate submarines through sonobuoy.[85] The official journal of the Soviet navy catalogued and described systems for electronic warfare used by NATO giving specific examples of noise weapons such as AN/SLQ 17, a jamming transmitter installed on ships to overload enemies' frequencies for useful communication. **(Fig.2.4)** More sophisticated technical tools were designed to distort the enemy's radar information gathering by returning inaccurate information about the real location, a naval device known as AN/ULQ-5.[86]

[84] A. Il'in, "Kak floty NATO gotovjatsja k Radiojelektronnoj vojne [How NATO Naval Forces are Preparing for Electronic Warfare]," *Morskoy Sbornik*, March 1973, pp. 75-77
[85] Ibid, 76.
[86] Ibid, 76.

Figure.2.4. The Cold War dialogue on electronic warfare entailed discussions on specific jamming weapons. This is an image of the AN/SLQ-17 electronic warfare system mentioned in a Soviet publication in the 1970s. Photograph 6403938; "A view of the AN/SLQ-17 electronic warfare system aboard the nuclear-powered aircraft carrier USS ENTERPRISE (CVN 65)," January 1, 1978; Records of the Office of the Secretary of Defense, Record Group 330; National Archives at College Park, College Park, MD.

Experts in radioelectronic combat also discussed the use of nuclear weapons in strategies for communication blackouts. In an army monographs on the topic re-published in 1989, the year widely associated with the end of the Cold War, one finds potential calculations about the destructive effect of a high-altitude nuclear blast used as an extreme jamming device. Soviet experts in the radio combat paid special attention and quoted publicly available information about the American nuclear test on Johnston Island; in particular, a nuclear explosion high in the atmosphere that produced severe communication blackouts. [87] However, the Soviet publication failed to mention similar secret Soviet tests or the real communication chaos amid nuclear contamination produced

[87] A.I Paliy, Radiojelektronnaja bor'ba, (Moscow: Voennoe izdatel'stvo, 1989), 92.

by such Cold War experiments, already banned in 1963. Succumbing to the Cold War illusion that the natural factors in nuclear weapons tests can be precisely calculated and predicted,[88] the publication simply added the long condemned high altitude nuclear blasts to an ever growing number of methods to influence communications. Besides nuclear explosions, other less radical military strategies for temporarily affecting electromagnetic phenomena entered the scope of the Soviet army which studied, for instance, the effect of aerosol clouds on radio waves transmission.[89]

In contrast with all imagined textbook cases, the Soviet navy had the unique real experience of testing radioelectronic combat with the United States army during one of the most decisive moments of the Cuban Missile Crisis in 1962. It is important to bear in mind that the crisis itself was the culmination of the Soviet leader Nikita Khrushchev's political strategy to deploy naval military bases abroad compensating for the Soviet strategic inferiority.[90] At that time, admiral Gorshkov played a crucial political role because this strategy fit perfectly his view of challenging US maritime supremacy. The synergy between Khrushchev's and Gorshkov's Cold War visions materialized for the first time in 1955 when Soviet military vessels docked in Egypt to build a naval base and establish a constant presence in the Mediterranean. [91]

[88] On the illusions of "control" shared by military personnel and scientists during American and Soviet nuclear tests see: Laura A. Bruno, 'The Bequest of the Nuclear Battlefield: Science, Nature, and the Atom during the First Decade of the Cold War', *Historical Studies in the Physical and Biological Sciences* 33, no. 2 (2003): 237–60, https://doi.org/10.1525/hsps.2003.33.2.237.

[89] See Chapter 5 on jamming by altering the natural environment in: A.I Paliy, Radiojelektronnaja bor'ba, 92-102.

[90] Vojtech Mastny, 'Soviet Foreign Policy, 1953–1962', in *The Cambridge History of the Cold War: Volume 1: Origins*, ed. Melvyn P. Leffler and Odd Arne Westad, vol. 1, The Cambridge History of the Cold War (Cambridge: Cambridge University Press, 2010), 312–33, https://doi.org/10.1017/CHOL9780521837194.016.

[91] Mastny, 331–33.

In a decisive turning point seven years later, after Khrushchev's decision to supply Cuba with more than fifty offensive medium and intermediate-range ballistic missiles with nuclear warheads that could hit almost unlimited targets in the US and submarines with nuclear torpedoes, the Soviet navy moved to the frontline of the most dangerous Cold War clash. In an essay about the conclusions historians could draw about "The Crisis", historian Tony Judt suggests that the wisdom to temporarily tame the discussion on the destructive potential of nuclear weapons while scrutinizing the limitations of available military technology and all technical unknowns underpinned decisions leading to a peaceful resolution.[92] For instance, the ever pressing possibility to immediately send air strikes to destroy the missiles in Cuba was eventually abandoned mainly because it implied the grave risk of missing *some* of the missile installations.[93] In the same vein, President John F. Kennedy and his advisors decided to establish a limited naval quarantine to restrict the delivery of Soviet weapons to Cuba. As Tony Judt points out, "Kennedy and his colleagues took special care to seek out a harmless (Panamanian-owned) freighter to intercept and allow through, thus making their point without running undue risks … Kennedy also reduced the quarantine zone from eight hundred miles, as initially announced, to five hundred miles, giving the Soviets more time to reflect and call back their ships."[94]

From the underwater perspective of the Soviet submarine with nuclear torpedoes trying to reach Cuba, the quarantine zone of interception was a radio electronic combat. More specifically, as technical details from available sources reveal, underwater

[92] See: "The Crisis: Kennedy, Khrushchev, and Cuba." In: Tony Judt, *Reappraisals: Reflections on the Forgotten Twentieth Century* (London: Vintage, 2009), 314–38.
[93] Judt, 317.
[94] Judt, 318.

information gathering[95] took place through anti-submarine helicopters on an aircraft carrier constantly testing sonar identification from air with the sonobuoy system *Jezebel*, the name that would later appear in Soviet naval publications on Radioelectronic combats in the 1970s while silencing the real Soviet experience in the field. Technical equipment for military radio communication framed the process of decision-making during the Crisis.

At the same time, Soviet technological equipment did not execute swiftly political instructions. Published after the collapse of communism, a memoir of a retired Soviet submarine captain who participated in the dangerous events reveals some technicalities in sharp contrast with the way Soviet authorities initially imagined their high-risk military and political mission. The commander who navigated a submarine loaded with nuclear missiles remembered the constant struggle to maintain communication links with the decision-making centres faraway in Moscow, escape US interception equipment, adapt to adverse climate conditions, deal with shortcomings of Soviet technology not properly designed for battles in the Atlantic ocean provoking spikes in temperature and humidity within the submarine, and, finally, in a desperate attempt to win time and escape the quarantine zone - jamming. [96] This was definitely not the textbook narrative about the radio combats of the future.

[95] Details about the technical process of interception of Soviet submarines closer to the quarantine zone are present in the records of President Kennedy's Executive Committee from Wednesday, October 24. Ernest R. May and Philip Zelikow, eds., *The Kennedy Tapes: Inside the White House during the Cuban Missile Crisis* (Cambridge, Mass: Belknap Press of Harvard University Press, 1997), 347–66. Robert F. Kennedy, *Thirteen Days: A Memoir of the Cuban Missile Crisis* (New York: Norton, 1969). Sheldon M. Stern, *The Week the World Stood Still: Inside the Secret Cuban Missile Crisis*, Stanford Nuclear Age Series (Stanford, Calif: Stanford University Press, 2005). Additional technical details about the functioning of the sonobuoy system Jezebel are included in: Ryurik A Ketov, 'The Cuban Missile Crisis as Seen Through a Periscope', *Journal of Strategic Studies* 28, no. 2 (1 April 2005): 217–31, https://doi.org/10.1080/01402390500088304.
[96] Ketov, 'The Cuban Missile Crisis as Seen Through a Periscope'.

Conclusion: Soviet destructive technology and its histories

Soviet military thought on radio combats did not experience a revolution after the collapse of communism in 1991. Until the end of the Cold War and beyond, military publications written in this tradition did not cease to appear and increased military knowledge on the potential role of noise in battles.[97] The early explicit references to the Cold War dialogue with the "enemy" gradually made space for Soviet/Russian military history of radio combat. A notion coined not so long ago, radio electronic combat received its proper military history. Soviet military historians found out that the practice was invented much earlier than any Western electromagnetic expert would have expected - by Russians during the Russo-Japanese war of 1904-1905,[98] which did not prevent the destruction of the imperial fleet, but, retrospectively, served as an example of the destructive use of technology against other "enemies."

The name of the forgotten admiral Ivan Rentgarten re-appeared in military publications because he published probably the earliest work on *Radio Communications in Military Art* (1920) that echoes later definitions of radio wars. Long ago, Rentgarten shared his intuition that: "[i]n wartime conditions, one should a priori expect that both sides, considering the paramount importance of radio communications, especially for ships at sea, will make attempts to disrupt the radio communications of their enemy."[99]

[97] A. V. Tatarchukov, "Radiojelektronnaja bor'ba v operacijah ob"edinenij Suhoputnyh vojsk: istorija i sovremennost'," *Voennaia mysl'*, No.8, August 2010: 34-40.; S.N, Osinin, *Radiojelektronnaja bor'ba v Voenno-Morskom Flote. Ot Port-Artura do nashih dnej* (Moskva: Oruzhie i tehnologii, 2004); N.A. Kolesov, I.G. Nasenkov, *Radiojelektronnaja bor'ba. Ot jeksperimentov proshlogo do reshajushhego fronta budushhego* (Moskva: Centr analiza strategij i tehnologij, 2015).

[98] V. Grankin, V.Zmievskij, "Iz istorii radiojelektronnoj bor'by," *Voenno-istoricheskij zhurnal*, March 1975, p. 82-83.

[99] I.I. Rengarten, O radiosvjazi v voennom flote. Ocherki, Morskoj sbornik, Nr. (1-3), 1920, p. 55.

He wrote this under a subtitle that would later sound familiar during the Cold War: "the Fight for Conquest of Space."

Rentgarten had rare experience with the pioneering use of early naval radio in real battles because he participated in the first military radio war between the Russian and the Japanese fleets. Later, he discussed jamming during the First World War remembering in detail the night of 13 August 1914 when a German ship remained stuck at sea after a technical accident. Then, the enemy navy massively jammed Russian communication to conceal the coordinates of their distressed fellows.[100] Jamming to avoid danger was part of real battles, but this aspect did not fit the imagined Radio electronic combats, embraced by the high military and political echelon of the Red Army during the Cold War.

It was not difficult to find instances of jamming during the Second World War too. Soviet military historians discussed jamming in positive terms stressing that the Red Army reached "perfection of interference" against the Nazi military equipment.[101] Naval technicalities, especially about shortcomings, vulnerability, and limitations of technology were not essential for this ideologically loaded genre. The future wars against potential enemies overshadowed the shared experience of naval officers that nature (or the medium, as they called the sea), military technology, and politics are inseparable. However, as at the times of a cold war of silence and lies, even the ideal political leader and military commander from Soviet dreams would face natural resistance and technical failures struggling to subordinate elements to a political vision, while ships and oceans leave records for future historians.

[100] Ibid. pp. 55-56.
[101] A. Palij, "Radiojelektronnaja bor'ba v hode vojny," *Voenno-istoricheskij zhurnal*, May 1977, p. 18

3. Cold War Atmosphere: Distorted Information and Facts in the Case of Free Europe Balloons*

Introduction

Radio Free Europe (RFE) used polyethylene and rubber balloons to drop leaflets in a strategy for supplementing jammed radio signal with printed words in the 1950s. Based on meteorological observations of favorable winds at the border areas of West Germany, this technology allowed western broadcasters to imagine unhindered air routes for sending information to Poland, Hungary, and Czechoslovakia during the Cold War. At the same time, flying objects coming from the West nourished fantasies in communist propaganda. In February 1956, press and radio in all RFE target countries[1] launched a campaign against the use of "enemy" balloons. In response to this sharp political reaction, the Voice of Free Czechoslovakia—the Czechoslovak section of RFE—broadcast a defensive message in which their view of the notion of the Iron Curtain dominated:

> The Iron Curtain can be pierced by letters. Against that there is a censorship. By travel. That is forbidden. By magazines and books from abroad. They are not circulated. By the mingling of the population with the citizens of other states. Against this there is intimidation. By broadcasting. Against that hundreds and thousands of jamming stations were built. And the Iron Curtain can be traversed by balloons. Against this, the government now wages a diplomatic campaign. ... The point of the balloons is not that they fly, but that they discharge the pamphlets. In recent weeks the regime has been describing matters as if the balloons were spying and killing ... it asserted that they dropped germs, counterfeit money, boxes that explode, pellets that ignite,

*The chapter is published in Georgi Georgiev, "Cold War atmosphere: Distorted information and facts in the case of Free Europe balloons." *Centaurus* 61.3 (2019): 153-177.

[1]The target countries of Radio Free Europe were Poland, Czechoslovakia, Hungary, Romania, and Bulgaria. The Russian language service, Radio Liberty broadcast to the Soviet Union.

> candy that poisons, fountain pens that cripple people. ...Understandably, the regime based on the existence of the Iron Curtain gets worked up over everything that unhinges its efficiency. It cannot be otherwise. For if the Iron Curtain is unhinged then not a foot and not a toe is affected, but the very spine of the system.[2]

In their protest message, RFE broadcasters admit that flying leaflets could "exist" only in a certain political reality and this, in their view, illustrated a "savage fact": "The balloons are the consequence of the Iron Curtain, a tame shadow of the savage fact. Were it not for the Iron Curtain, the balloons that fly ten thousand meters high over the frontier would not exist either."[3]As the words of the Cold War broadcasters suggest, political rhetoric and political constraints gave meaning to technological objects in a specific historical moment when closing borders, censoring press, jamming foreign radios, tapping telephone lines, and tracking letters from abroad created an almost hermetically sealed space without many options for exchanging information across the Iron Curtain.

In the early Cold War years, along with radio, balloons embodied the dream of sending information across seemingly solid political borders. Documents from political discussions around the creation of RFE testify that broadcasting was the most up to date and promising technology; however, radio was not the only tool for communicating across borders. In 1948, the US administration granted refugees who came from the target countries access to "radio equipment and printing facilities"[4] in West Germany for the purposes of disseminating information including "news of development within each

[2] "This is Radio Free Europe. The Voice of Free Czechoslovakia,"*News from behind the Iron Curtain*, April 1956, Vol. 5, No. 4, p. 28. HU OSA 300-8-24 Publications Department; Records of the Radio Free Europe / Radio Liberty Research Institute; Vera and Donald Blinken Open Society Archives at Central European University, Budapest.
[3] Ibid.
[4]"US Government Officials Discuss Émigré Broadcasts to Eastern Europe," August 26, 1948, History and Public Policy Program Digital Archive, Obtained and contributed to Cold War International History Project by A. Ross Johnson. Cited in his book Radio Free Europe and Radio Liberty, Ch1 p13, CIA mandatory declassification review document number C05458947.
http://digitalarchive.wilsoncenter.org/document/114321 [Accessed: February 11, 2019]

country, discussions of the internal problems of each country, and material designed to undermine support for the existing regimes."[5] Among the principal political goals of the time was to find countermeasures "to minimize the effects of Soviet jamming."[6]

In 1950, when RFE transmitted its first signals, jamming had already become a refined method of information warfare. RFE entered a propaganda battlefield as simply another jammed "enemy" foreign radio in the Soviet sphere, along with the BBC and the Voice of America.[7] The newly established station needed several years to create a working system of transmitters, so that radio engineers could persuade their employers that they were able to compete with jamming noise. During those first few years of infrastructural development, from 1951 to 1956, Free Europe Press (FEP) supplemented the radio's efforts to penetrate the Iron Curtain. FEP was a special branch of the Free Europe Committee responsible for printed materials. FEP is thought to have sent 350,000 balloons carrying over three hundred million leaflets to Poland, Czechoslovakia, and Hungary.[8]

Certainly, FEP did not invent this propaganda tool. Dropping brochures over enemy territory was a method that Voice of America had used during the Second World War (in this case, with low-flying bombers).[9] Military experts called such war propaganda efforts "psychological warfare"—a concept that emerged during the war, but

[5]Ibid.
[6]Ibid.
[7]On RFE's methods to counteract jamming see George Woodard, "Cold War Radio Jamming," in: A. Ross Johnson and R. Eugene Parta, eds., *Cold War Broadcasting: Impact on the Soviet Union and Eastern Europe: A Collection of Studies and Documents* (Budapest ; New York: Central European University Press, 2010), 51–63.
[8]Richard Cummings, 'The Intelligence Underpinnings of American Covert Radio Broadcasting in Germany During the Cold War', *Journal of Intelligence History* 1, no. 2 (2001): 187.
[9]Walter L. Hixson, *Parting the Curtain: Propaganda, Culture, and the Cold War* (New York: St. Martin's Press, 1996), 3.

remained firmly in political language during the early Cold War years.[10] Richard Cummings, who served as a Director of Security at RFE, traces the origins of RFE back to 1947, when the United States National Security Council ordered the CIA to "initiate and conduct covert psychological operations designed to counteract Soviet and Soviet-inspired activities which constitute a threat to world peace."[11]

US strategists envisioned surrogate radio stations and balloons as equally important tools in the psychological war.[12] By the time of the first FEP leaflet campaigns, balloons had already entered intellectual discussions for solving political problems. Along with transnational radio, balloons became a main source of hope for penetrating the Iron Curtain, according to US scientists who participated in a large-scale government sponsored project called TROY. Hosted by the Massachusetts Institute of Technology, this project's aim was to propose efficient methods for sending information to the communist world. In the early months of 1951, TROY participants calculated that, within a single balloon operation to a target communist country, "a man would have better than

[10] The wartime legacy and Cold War agendas of psychological warfare are explored in Ron Theodore Robin, *The Making of the Cold War Enemy: Culture and Politics in the Military-Intellectual Complex* (Princeton, N.J: Princeton University Press, 2001).

[11] Richard H. Cummings, 'The Ether War: Hostile Intelligence Activities Directed against Radio Free Europe, Radio Liberty, and the Émigré Community in Munich during the Cold War', *Journal of Transatlantic Studies* 6, no. 2 (August 2008): 169.

[12] At RFE, the greatest proponent of flying propaganda materials was C.D. Jackson, who participated in the creation of the station. He was an ideologue of psychological warfare during the Cold War. His propaganda experience dated back to the Second World War, when he worked with the future president General Dwight Eisenhower. On the role of C.D. Jackson in Radio Free Europe's history and his use of the notion of psychological warfare, see Dawn Spring, *Advertising in the Age of Persuasion: Building Brand America 1941-1961*, 1st ed (New York: Palgrave Macmillan, 2011), 103–4., John Allen Stern, *C.D. Jackson: Cold War Propagandist for Democracy and Globalism* (Lanham: University Press of America, 2012).. On the notion of psychological warfare in the 1950s see: Kenneth Alan Osgood, *Total Cold War: Eisenhower's Secret Propaganda Battle at Home and Abroad* (Lawrence: University of Kansas, 2006), 43.

an even chance of seeing at least one leaflet within 10 feet of his path while walking 1000 feet."[13]

At FEP, Czechoslovak, Polish, and Hungarian émigrés who broadcast news also composed the written content of flying leaflets.[14] The FEP team fought Communist propaganda through numerous operations: PROSPERO (1953), VETO (1954), FOCUS (1954–1955), SPOTLIGHT (1955). Each operation had a specific aim. Operation SPOTLIGHT, for example, started after one of the key colonels of the Polish secret police, Jozef Swiatlo, arrived in the United States to share publicly his experience of the communist secret services.[15] In this case, FEP called the leaflets *Behind the Scenes in the Secret Police and Party*. FEP sent many other additional printed materials to Poland, such as *I Choose the Truth* by Seweryn Bialer, Bolesław Piasecki's *The Real Issues*, and the famous *Animal Farm* by George Orwell.[16]

Rather than analyzing messages of propaganda leaflets, I explore the balloon as a material object which came into existence due to political requirements. In this Cold War story, politics and propaganda gave life and meaning to a specific medium. It was a short life though. The creators of this airborne experimental technology withdrew their own project at the end of 1956. Historians of Cold War broadcasting have already offered various possible explanations for this. One is that, soon after the Federal Republic of

[13]Allan A. Needell, "'Truth Is Our Weapon': Project TROY, Political Warfare, and Government-Academic Relations in the National Security State," *Diplomatic History* 17, no. 3 (July 1, 1993): 410

[14]On the role of printed leaflets in the history of RFE see: Arch Puddington, *Broadcasting Freedom: The Cold War Triumph of Radio Free Europe and Radio Liberty* (Lexington: University Press of Kentucky, 2000), 63.; Alfred A. Reisch, *Hot Books in the Cold War: The CIA-Funded Secret Westernbook Distribution Program behind the Iron Curtain* (Budapest ; New York: Central European University Press, 2013).; Allan A. Michie, *Voices through the Iron Curtain: The Radio Free Europe Story* (New York, NY: Dodd, Mead & Company, 1963).; Sig Mickelson, *America's Other Voice: The Story of Radio Free Europe and Radio Liberty* (New York, NY: Praeger Publishers, 1983).

[15]Cummings, 'The Intelligence Underpinnings of American Covert Radio Broadcasting in Germany During the Cold War', 191.

[16] Paweł Machcewicz, *Poland's War on Radio Free Europe, 1950-1989* (Washington, D.C. ; Stanford, Calif: Stanford UniversityPress, 2014), 64

Germany achieved the status of a sovereign republic in May 1955, the West German embassy in Washington requested (in early 1956) that the balloon-leaflet program be terminated.[17] The RFE researcher Alfred Reisch explains that the West German government "objected to the medium, not the message."[18] Providing a launching place for dangerous flying objects meant risking unnecessary international conflicts.

Another possible reason for the program's cessation is the publicity attracted by the technology on the international political stage when Czechoslovak journalists voiced suspicions that balloons had caused the fatal crash of a national airliner by floating near its traffic pattern in January 1956.[19] The Hungarian historical context is also relevant. As early as 1954, the Hungarian government sent a note to the US government with a request to stop all balloons flying over Hungarian territory. After the Hungarian Revolution in fall 1956, all methods of encouraging anti-communist resistance came under increasing scrutiny, a development that also contributed to the final political decision to stop leaflet operations.[20] All these political reactions appeared in a context of a hostile propaganda campaign against the use of balloons. Between February and April 1956, communist press and radio from Czechoslovakia, Poland, Hungary, Romania, and Bulgaria conducted an intensive common propaganda attack.

Why were balloons taken so seriously? Sending flying leaflets to distant cities behind the Iron Curtain meant reaching unknown recipients and uncertain destinations. How did the FEP employees convince themselves and their superiors that this peculiar

[17]Ross Johnson emphasizes that the history of RFE requires attention to the German context. See: A. Ross Johnson, *Radio Free Europe and Radio Liberty: The CIA Years and Beyond* (Washington, D.C: Woodrow Wilson Center Press, 2010), 67-73.
[18]Reisch, *Hot Books in the Cold War*, 10.
[19] Cummings, 'The Intelligence Underpinnings of American Covert Radio Broadcasting in Germany During the Cold War', 193.
[20] Reisch, *Hot Books in the Cold War*, 10.

method of conveying information was effective, despite the significant political constraints facing the operation? Who was able to say what exactly happened to balloons upon entering communist airspace? Studying information gathering, a key historical question emerges: what kinds of data from the East were considered valuable at a time when communist regimes were trying to operate in a hermetically sealed informational space? In communist press and radio, a persistent propaganda campaign against balloons gave rise to political reactions. Why did communist media become so obsessed by this rather strange means of communication, which only supplemented the famous "enemy" radio?

In order to explore these historical tensions, the chapter examines the circulation of distorted and limited information concerning FEP balloons. A specific case study traces how distorted information shaped propaganda and practices of information gathering during the Cold War. The political use of limited information is a key historical problem, as the propaganda balloon was not publicly visible. Unlike radio, balloons were not designed to gather crowds in squares or enter the intimate space of private homes. Moreover, the access to the launching sites was restricted. Propaganda strategists, politicians, advisors, diplomats, and journalists from both sides of the Iron Curtain had never seen a flying balloon with leaflets, except perhaps during rare public events. This was an object which meaning, use, and effectiveness was constantly negotiated and represented through persuasive language and images in a complex, entangled, transnational action.

Transnational broadcasting during the Cold War has stimulated scholarly attention in the last decade. Recent scholarly works make particular use of the RFE archives to challenge dominant narratives of the Cold War divide and to provide a nuanced view of

communication across borders.[21] RFE's archives inspire innovative historiographical approaches such as "ecohistory of Cold War broadcasting."[22] Cold War broadcasting is recently described in terms of "ping-pong" and "interactive" communication in which broadcasting was not simply a transfer from West to East, but circulation of information beyond ideological borders. [23]

This chapter enters the scholarly debate by analyzing an overlooked and forgotten technology which was designed to supplement radio. The focus on this specific material object and its representation is used to problematize the political language of factual and impartial information in the 1950s. This is a story about practicalities and paradoxes of the Cold War when fantasies coexisted with the political rhetoric of facts; information analysts tried to reach an objectively sounding voice while defending a political cause; political borders were perceived as both nonexistent and as obstacles to gathering genuine information; West and East were both political categories and wind directions.

[21] Alexander Badenoch, Andreas Fickers, and Christian Henrich-Franke, *Airy Curtains in the European Ether: Broadcasting and the Cold War* (Baden-Baden: Nomos, 2013). Melissa Feinberg, *Curtain of Lies: The Battle over Truth in Stalinist Eastern Europe* (New York, NY: Oxford University Press, 2017). Friederike Kind-Kovács, 'Voices, Letters, and Literature through the Iron Curtain: Exiles and the (Trans)Mission of Radio in the Cold War', *Cold War History* 13, no. 2 (1 May 2013): 193–219, https://doi.org/10.1080/14682745.2012.746666. Yuliya Komska, 'RFE/RL Broadcasting and West German Society: Caught between Nature Protection Activism and Anti-Americanism' 20, no. 3 (2018): 180–206. Simo Mikkonen, 'Stealing the Monopoly of Knowledge?: Soviet Reactions to U.S. Cold War Broadcasting', *Kritika: Explorations in Russian and Eurasian History* 11, no. 4 (2010): 771–805, https://doi.org/10.1353/kri.2010.0012.

[22] Yuliya Komska, 'RFE/RL Broadcasting and West German Society', 181.

[23] Badenoch, Fickers, and Henrich-Franke, *Airy Curtains in the European Ether*, 13.

3.1. Sending Information: The Rationality of Winds

Free Europe Press (FEP) operated from two symbolically different places, New York and Munich. Employees at the New York office took decisions about the content of political messages, whereas people of action worked in the Munich headquarters. Samuel Walker was a key figure on the US side, and "conceived the idea of delivering leaflets by helium-filled balloons."[24] His memoranda about leaflet campaigns used political terms. Alfred Reisch cites Walker's comment that FEP was a tool to"prevent absorption and preserve essential nationality, reduce reliability by strengthening the links with the West, and destroy isolation and apathy."[25] Summarizing its general impact after the cessation of balloon leaflet campaigns, Walker asserted that "our contribution was to introduce the notion of demands (not necessarily the specific demands which we formulated, but the concept that people could even think about making realistic demands upon a totalitarian regime – and sometimes succeed.)"[26]

Drawing any political conclusions would hardly have been appropriate unless US broadcasters believed that sending leaflets behind the Iron Curtain was a rational endeavor. This is where the employees in Munich came in—far from the political offices in the United States, a little closer to the reality of balloon flights. New York was the place where abstract "links with the West" fought a battle against "isolation," "apathy," and "totalitarian regimes", while West Germany provided New York with concrete arguments of prevailing westerly winds.

In 1958, after all balloon flights stopped, FEP published a retrospective report entitled *Balloon Leaflets: Technical Aspects of Balloon Leaflet Operations to Eastern Europe*. It summarized the practicalities of the operation. Howard Weaver, the head of the

[24]Reisch, *Hot Books in the Cold War*, 11. Walker followed the campaign from the beginning and resigned after its end in March 1959.
[25]Reisch, *Hot Books in the Cold War*, 16.
[26]Johnson, *Radio Free Europe and Radio Liberty*, 58.

FEP office in Munich, who was officially in charge of the print leaflet operations, was named as the author. The report was based on administrative documents mirroring routines of a heterogeneous team. We do not know how balloons actually crossed the Iron Curtain or to what extent the flights were really effective, but this report gives some insight into the construction of an ideal propaganda flight, made in an environment with restricted access in order to reach the imagined high level of effectiveness. In the following, I look at the data collected in the technical report and additional primary sources, emphasizing the role of people, sites, and objects.

3.1.1. People

Reading the technical report about balloon flights, one can see that uncertain factors were inherent in the operation: "certain factors are variable and unpredictable; turbulent air motion, especially up-and-down drafts; difference in heating of the balloon caused by cloudiness, time of day and character of underlying terrain; and amount of air, if any, which manages to enter the balloon."[27] Documents from the history of the Cold War balloons affirm discrepancies between daily reality of media and political visions.

Meteorologists were assigned to fulfill expectations of disseminating information across borders. According to RFE technical documentation, two meteorologists worked at the FEP office in Munich. Their task was "to assemble weather information, make flight forecasts and weather maps, and plot specific balloon flights."[28] Since the operation took place in Allied-occupied Germany, it is not surprising that the meteorologists used

[27]Howard S Weaver, *Balloon Leaflets: Technical Aspects of Balloon Leaflet Operations to Eastern Europe* (New York: Free Europe Press, 1958), 46.
[28] Weaver, 15.

military weather reports[29] from the US Air Force artillery training range at Grafenwohr which reported wind directions in that area.When the weather allowed, meteorologists in Munich were supposed to contact via teletype a "technical supervisor" at the launching site, who then launched the "production line." This was a chain of tasks distributed among twelve job descriptions designed especially for this Cold War campaign.

Non-scientists executed scientifically calculated flight plans which illustrated a typical situation during the early Cold War years, when amateurs were used to collaborate with scientists. There was no conflict between professional scientists and amateurs at that historical moment.[30] "Payload packers" employed at FEP had to weigh brochures accurately and place them on the balloon; the job of the "dry ice man"was to spray, weigh down, and pack dry ice that the team attached to the balloon in order to affect flight timing. "Inflation station operators" inflated balloons, while "balloon carriers" launched the assembled propaganda tools into the air. Humans working on the so called "production line" performed tasks according to meteorological charts and mathematical calculations of flight timing. During the Cold War, professional descriptions of workflows performed by non-scientists were used to support rhetorical claims that the launching of leaflets across the Iron Curtain was a rational endeavor.

Persuasive written descriptions and visual images of balloon launching became an integral part of historical sources of the period. The Cold War archive keeps a record of an informational one-day visit to RFE by NATO military officers in the midst of a

[29] The military value of weather forecasting is examined by Paul N. Edwards, *A Vast Machine: Computer Models, Climate Data, and the Politics of Global Warming* (Cambridge, Mass.: The MIT Press, 2010), 112–13.
[30]See W. Patrick McCray, 'Amateur Scientists, the International Geophysical Year, and the Ambitions of Fred Whipple', *Isis*, 2006.

conference on psychological warfare on September 15, 1955.[31] Judging by the program, preserved in the Cold War archive, the military visitors had a busy schedule including short briefings of 15-30 min. dedicated to key Free Europe operations. Directors from different departments presented: "programming", "information gathering", "technical facilities", "effectiveness of broadcasts and leaflets," and "FEP balloon operations."[32] The part dedicated to the balloon campaign was a 25 min. scheduled briefing led by Howard Weaver. The historian does not have access to the communication between Weaver and the NATO officers. The archival record from the visit keeps only a "fact sheet" from which the military visitors were supposed to learn that "millions of messages of truth are flown by balloon over the Iron Curtain. The effectiveness of the balloon campaign can be gauged by the more than four hundred radio-press attacks and official protests of the Communists."[33]

Another leaflet with information distributed to the visitors is titled "A NEW WEAPON. The spoken and printed word penetrate the Iron Curtain in combined operations."[34] The leaflet informs that: "delivery of printed materials to predetermined target areas behind the Iron Curtain requires scientific plotting of balloon flights on the prevailing winds blowing to the east. Technicians and working crews at the Free Europe Press launching sites remain on the alert to go into production when favorable winds are reported from seven different wind observation sources."[35]

[31]"Visit to Radio Free Europe by NATO Officers," September 15, 1955, History and Public Policy Program Digital Archive, Obtained and contributed to Cold War International History Project by A. Ross Johnson. UK National Archives, FO 1110-743. http://digitalarchive.wilsoncenter.org/document/134496 [Access date: February 11, 2019]
[32]Ibid.
[33]Ibid.
[34]Ibid.
[35]Ibid.

Besides reading descriptions, military visitors had the opportunity to see two photographs showing key actors in the operation described in a caption as "a meteorologist plots balloon flights to 'targets' behind the Iron Curtain" and "workers filling balloons with prescribed weight of leaflets for the computed rise through the moving air."[36] As the archival traces from this particular visit shows, words and phrases like "wind observations" "science", "predetermined areas" printed on "fact sheets" together with visual glimpses of the operation were all elements of a rhetorical strategy of defining the process of sending leaflets behind the Iron Curtain and convincing potential audiences of the operations' effectiveness.

Photographs played a key role in Cold War persuasive communication. Since expert visitors and top decision-makers had little direct experience of the distant "production line" in isolated border areas, the RFE Public Affairs Department created an archival collection of photographs targeted to those who wanted to see all steps of sending information through leaflets. Besides official visitors, potential publics include the CIA officials who regularly allocated funding for special operations, US journalists working in the 1950s, and historians who could explore remnants of a secret operation otherwise buried in the past. The pictures show key Cold War actors. Every picture in the archive is printed on Agfa Brovira photo paper. On the reverse, there is a small note with explanations, glued on probably in the 1950s, that directs the gaze toward a particular job description invented during the Cold War **(Fig.3.1)**.

[36]Ibid.

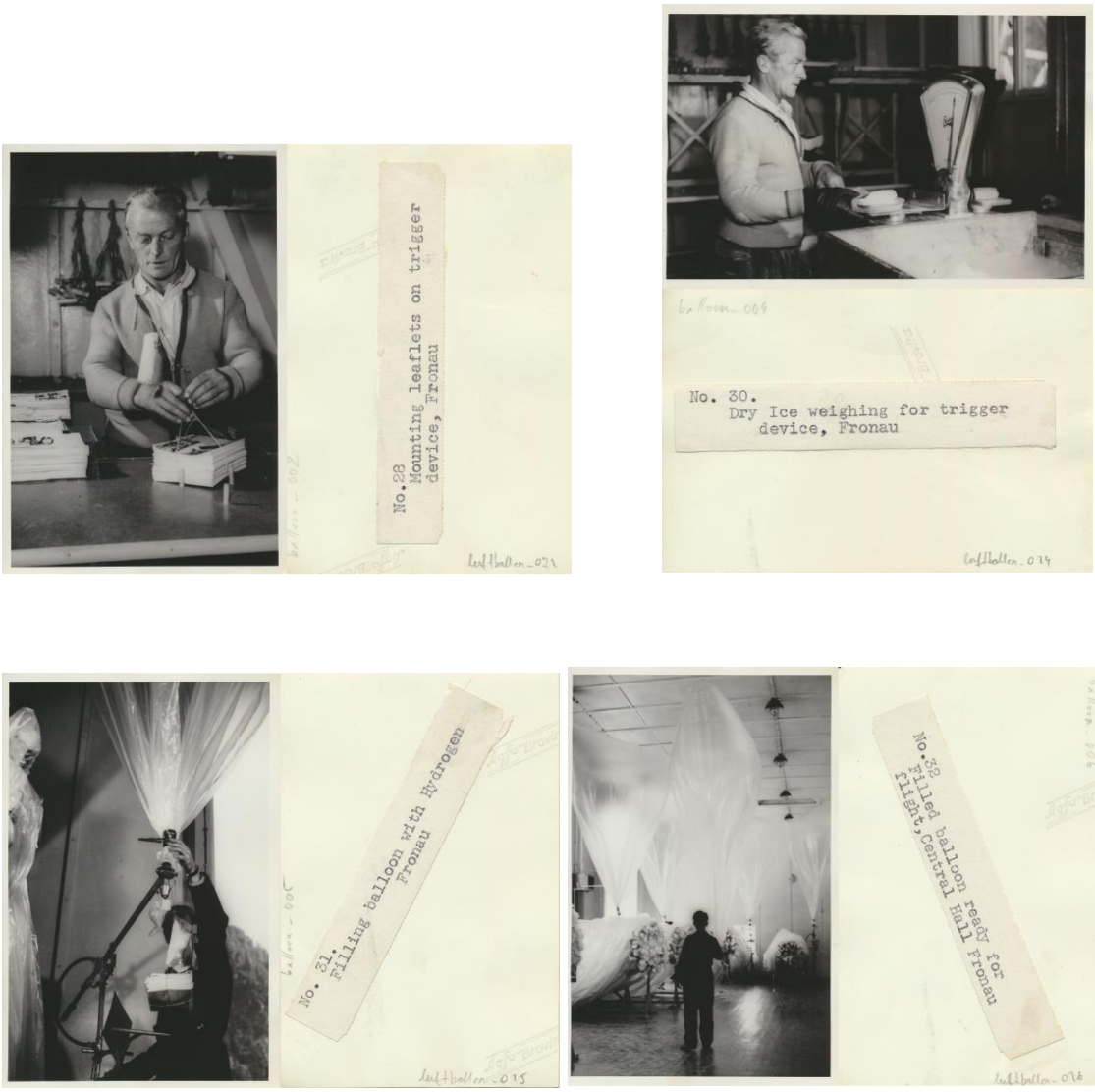

Figure 3.1 The pictures from the Public Affairs Department include some written instructions that describe specific tasks created during the Cold War: "mounting leaflets on trigger device," (3.1a) "filling balloon with hydrogen," (3.1b) "dry ice weighting for trigger device," (3.1c) "filled balloon ready for flight." (3.1d) HU OSA 300-1-8, RFE/RL Public Affairs Photographic Files, rfe_Luftballon_022,024,025,026. Ownership of and copyrights to the materials belong to RFE/RL, Inc., 1201 Connecticut Ave., N.W., Washington, DC 20036, USA.

3.1.2. Sites

In order to send balloons with leaflets from West Germany to Czechoslovakia, Poland, and Hungary, FEP planned its launching sites with natural requirements in mind. The sites were selected according to criteria such as "reasonably sheltered by terrain and wooded areas from excessive ground wind currents", "a slight depression with a fairly constant wind pattern", and "good visibility onto all open areas from the guard tower"[37]

Three launching sites **(Fig. 3.2)** met the ideal requirements: Hohenhard, Freyung, and Fronauin Bavaria. These sites were all close to the border, where it was possible to imagine air routes to Poland, Hungary, and Czechoslovakia. They were located near to farming villages—important because the operation required water and power supply, as well as access for the heavy trucks that delivered balloons, leaflets, and dry ice.[38] Mirroring the assembly-line separation of tasks between people, the interior space of the buildings included separate rooms named after each task: "inflation hall,""gas hall,""storage hall," "heating house," and some specific interior objects such as "balloon storage racks" and "dry ice tables."

[37] Weaver, *Balloon Leaflets*, 83.
[38] Weaver, 83–95.

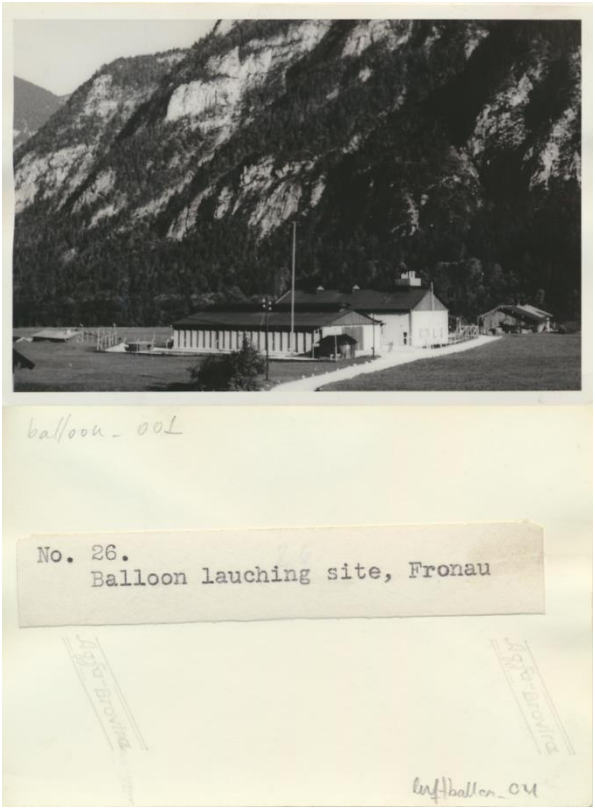

Figure 3.2 According to the description attached to the photograph, this is the Balloon Launching Site at Fronau. This is one of the rare images that show the location of a secret operation. The natural surroundings played an important role in choosing the site. HU OSA 300-1-8, RFE/RL Public Affairs Photographic Files, rfe_Luftballon_021. Ownership of and copyrights to the materials belong to RFE/RL, Inc., 1201 Connecticut Ave., N.W., Washington, DC 20036, USA.

Cold War strategies valued the importance of geographical proximity and natural environment. Imagined geography of launching sites influenced contemporaneous accounts. An illustrative example is a report from a visit of a BBC team to RFE facilities in July 1955. The report was written by the famous British diplomat, Sir Robert Bruce Lockhart, who in the 1950s served as an expert at BBC. In the report after his visit he praises the FEP meteorological section that, in his view, "had all the latest charts and gadgets for transmitting to the balloon sites the latest information about the vagaries of

the wind."[39] Concerning the launching sites, one cannot easily define these words as an eyewitness account because the author of the report was not able to visit a balloon launching site due to bad weather at the beginning of the summer 1955 when "approximately fifty per cent of the operations had to be abandoned on account of unfavorable weather."[40]

However, the conclusion of the Lockhart report to the BBC adopts persuasive arguments of geographical proximity used by the FEP team: "the output of Radio Free Europe both benefits and suffers from its geographical situation", reads the Lockhart's report, "Although its emissions are heavily jammed, it benefits from its proximity to its audience. Proximity also facilitates its balloon operations and enables its information bureau to have early access to the latest refugee from behind the Iron Curtain"[41] What Lockhart reported as a disadvantage was not capricious westerly winds that closed the access to the leaflet launching sites during his visit, but a different kind of geographical disadvantage; in particular, isolation from "the West" because "unlike the BBC, it [RFE] has no contacts with Western opinion beyond its daily telegram from the United States."[42]

Geographical sites and proximity to target countries were elements of the imagined effectiveness. Secrecy was another parallel story used to persuade potential audiences. Among the requirements for the launching sites were a fence and a guard tower to ensure continuous surveillance against the entry of unauthorized persons. Since

[39]"Report by Sir Bruce Robert Lockhart on Radio Free Europe," June 24, 1955, p.3. History and Public Policy Program Digital Archive, Obtained and contributed to Cold War International History Project by A. Ross Johnson. UK National Archives, FO 1110-743
http://digitalarchive.wilsoncenter.org/document/134495 [Access date: February 11, 2019]
[40]Ibid. p. 2.
[41]Ibid, p. 3
[42]Ibid. p. 3

it was a secret operation, specifically one using explosive substances, possible explosions and sabotage provoked strict security measures.

It is instructive to compare different perspectives on secrecy. Neither Westerners nor Cold War participants from Eastern Europe had access to American facilities in West Germany. Without such access, how did people charged with sabotaging Western propaganda imagine these particular balloon launching sites? Recently published documents from the Bulgarian state security archives, for instance, reveal the fantasies of intelligence experts who worked at a special department for combating enemy propaganda. One such administrative document describes balloon launching sites from the perspective of those for whom access was strictly forbidden:

> It is known that such a station is located in Mühldorf, a few kilometers southwest from the highway to Salzburg. It is similar to military barracks used during Hitler's time consisting of a room used as an office and a dormitory (for 20 people) with a small transmitter/receiver … These balloons are the same as the US Air Force use for meteorological observations and research. In balloon baskets propaganda materials are placed instead of meteorological devices. …The barracks were surrounded by an iron fence, which was electrified, especially at night. Guards patrol around the fence. According to unverified information, the head of this office is a woman who was a member of the White army.[43]

Some details here do not coincide with those provided by FEP, but this is hardly surprising in the context of the Cold War, when scarce information provoked a supplementary effort of imagination that could effortlessly encompass Hitler and the White Army in one passage about weather balloons. However, meteorology remained a shared linguistic code between "guards" and "saboteurs."

[43] On Monitoring Bulgaria and the Socialist Camp under the Cover of Radio Free Europe, Possibilities to Expose and Cut Diversion and Intelligence Channels, Sofia, March 20, 1959. in The Committee for Disclosing the Documents and Announcing Affiliation of Bulgarian Citizens to the State Security and the Intelligence Services of the Bulgarian National Armed Forces (CDDAABCSSIBNAF), *State Security and the Hostile Radio Stations.* (Sofia: CDDAABCSSIBNAF, 2014), 375.

In documents from the 1950s, secrecy, fences, and guards became a visual metaphor for the whole operation and for Cold War political relations in general. Secret visual information from the West rarely crossed the Iron Curtain. Pictures of RFE guards and broadcasters behind the guarded fences created a sensation in 1957 when the East German weekly *Neue Berliner Illustrierte* (*NBI*) published a series of reports with numerous photos showing the internal workflow at RFE's offices. These were similar to the internal images from the Public Affairs department, which could only be taken by a photographer with special permission.

Once the pictures arrived in communist territory, their interpretation changed. The *NBI* quotes as an internal source of secret information a former employee in the Polish section of RFE who, allegedly, was one of the few émigrés who had returned to Poland from West Germany, this time crossing the Iron Curtain eastwards. This secret source said that among his tasks as a Western broadcaster had been "to confuse listeners using false reports [*Falschmeldungen*] and scaremongering [*Panikmacherei*]."[44] The East German magazine also mentions balloons, reminding readers about the famous leaflet operation that had recently been banned, in late 1956, and claiming that FEP sometimes released leaflets from the Austrian border.[45] The opening page of this sensational series of revelations features a large picture of a guard with a rifle and a dog. The title reads: "Guarded by dogs, but the *NBI* nevertheless shows the work of the poisonous spider."[46]

[44]"Ein Mann packt aus!," *Neue Berliner Illustrierte*, May 1957, 4.
[45]"Seltsame Programme des Mr. Ted Bell," *Neue Berliner Illustrierte*, April 1957, 17.
[46]"Von Hunden bewacht: NBI zeigt trotzdem Giftspinnenam Werk," *Neue Berliner Illustrierte*, April 1957, 4–5.

According to the text, an operation guarded by people wearing "steel helmets" with the initials RFE was "not innocent."[47]

On the other side of the Iron Curtain, The Public Affairs department at RFE kept several archival pictures showing similar RFE security guards (with their rifles, helmets, dogs, fences, and security towers). In this case, the visual rhetorical aim was to illustrate how well secrecy was assured. A small note attached to one of the photos gives a positive interpretation of secrecy, showing how similar visual codes may receive conflicting political interpretations depending on the context: "A German guard stands watch on his side of the border with Czechoslovakia. Building in background is in Communist territory. In a zone several miles wide, extending the entire length of the Iron Curtain, the Reds have removed all inhabitants, destroyed buildings, laid barbed wire and electrified fences, in addition to maintaining large forces of ruthless and heavily armed guards" **(Fig. 3.3)**.

[47] Ibid.

Crusade for Freedom Photo

A German guard stands watch on his side of the border with Czechoslovakia. Building in background is in Communist territory. In a zone several miles wide extending the entire length of the Iron Curtain, the Reds have removed all inhabitants, destroyed buildings, laid barbed wire and electrified fences in addition to maintaining large forces of ruthless and heavily armed guards.

Fig. 3.3a

Fig.3.3b

Figure 3.3 An archival picture from the Public Affairs Department at RFE (HU OSA 300-1-8, RFE/RL Public Affairs Photographic Files, rfe_architecture_019. Ownership of and copyrights to the materials belong to RFE/RL, Inc., 1201 Connecticut Ave., N.W., Washington, DC 20036, USA.) and pictures published behind the Iron Curtain (*NBI*). Guards are in the center of each visual strategy. The language register changes according to the political context.

3.1.3. Objects

Sites of balloon flights were not always fixed to the border areas of Germany because the Cold War imagination of the perfect propaganda flight was associated with simulations. Creating efficient propaganda technology required work in an isolated environment of test conducted in the US with specific Cold War goals in mind. Since "the political demands of the leaflet program called for balloons to fly above 20,000 feet,"[48] test flights were made "assuming a standard US atmosphere, assuming hydrogen lifting gas, and assuming the maximum balloon volume to reach 220 cubic feet before releasing the cargo."[49] Flight tests created graphs that permit determination of gross load and free lift requirements to reach a particular height with the consideration that any simulation of a flight does not recreate a real propaganda flight. "It was realized that 100% accuracy or efficiency in the method could not be expected because … a) the assumption of a standard atmosphere and b) the manner, in which the bottom of the balloon is rigged cannot be rigidly uniform for each balloon. Therefore, success of the method was defined to be plus or minus 10 percent,"[50] reads a description of a balloon flight simulation that was successful in the US atmosphere and the test results answered political requirements of efficient performance in the atmosphere at the German border areas.

The making of precise calculations for sending information behind the Iron Curtain was not an isolated phenomenon, but part of a culture of "Cold War rationality" [51] in which algorithms, efficient calculations, and theories of rational behavior created an

[48] Weaver, *Balloon Leaflets*, 61.
[49] Ibid.
[50] Ibid.
[51] In their book How Reason Almost Lost Its Mind: The Strange Career of Cold War Rationality, a collective of authors (Erickson, Klein, Daston, Lemov, Sturm, and Gordin) cite the Berlin airlift to support

amalgam of emerging applied sciences to be used for resolving tense political situations. Strategists in search for the most efficient way to send leaflets across the Iron Curtain thus entered into dialogue with already existing policies.

A key aspect of the notion of efficiency was that leaflets should fly only when meteorological calculations from the plotting center in Munich allowed. Meteorologists launched the "production line" by sending a special document called a flight plan. The flight plan served as an important mediator between scientific and propaganda practice, revealing the blurring of lines between political decision-making and meteorology. In principle, meteorologists could alter decisions taken by political directors at FEP, because the principle of efficiency was valued as highly as that of political content. Based on mathematical calculations, the flight plan provided essential information about the type and weight of leaflet load and the optimal time to start and stop launching. On days with appropriate weather, all important variables were sent to the relevant launching site via teletype, as a technical document giving precise inscriptions of factors such as floating level, gross weight, ascent time, mean ascent wind speed, descent time for paper, mean descent wind speed, distance to target, floating distance, wind speed at floating level, duration to paper drop, ballast weight, and leaflet load.[52] In the 1950s, balloons were well-known meteorological instruments for tracing wind directions.

This was the historical moment when meteorology became intimately linked to politics. One illustrative instance is that weather service airplanes equipped with air filters

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their notion of "Cold War rationality." During the Berlin airlift in 1948–49, the US Air Force's Operation Vittles provided the army with methods to calculate the optimal time for flying supplies to the Western zones of Berlin, blocked by Soviet troops. Later, with the development of computers, the emblematic airlift inspired other operations aiming to resolve future imagined conflicts with even greater efficiency. See Paul Erickson et al., *How Reason Almost Lost Its Mind: The Strange Career of Cold War Rationality* (Chicago: University of Chicago Press, 2013), 51–80.

[52] Weaver, *Balloon Leaflets*, 23.

detected the radioactive particles released from the first successful Soviet atomic bomb test on September 3, 1949, only a few days after the test took place.[53] Meteorologists played an important political role here, because "the rapid detection of the test by the West shocked the Soviets, who had hoped to keep it secret."[54] The second political role assigned to meteorology in the 1950s was linked to the emergence of the first computers: numerical weather predictions used for military planning (along with the famous hydrogen bomb simulation) became the main practical contribution of the ENIAC and EDVAC computers.[55] And once politics required printed propaganda behind the Iron Curtain, weather balloons evolved into propaganda machines.

Creating a propaganda machine included trial and error and using materials which did not fit any idealized visions of cutting-edge technologies. Burtsting rubber and dry ice were among the unavoidable materials in the process of disseminating leaflets. FEP used neoprene balloons—rubber meteorological balloons—filled with leaflets. FEP technicians reported that such instruments flew mainly to closer targets in Poland from the Hohenhard launching site, on the principle that "a balloon expands as it rises until it bursts out leaflets from high altitude."[56] In this case, the main worry was explosion or flash fire, which led to further modification in a search for safer and more efficient

[53]The historian Michael Gordin writes that political decision during the Cold War was problematic at every stage of examining nuclear surveillance: "Americans had very little information (and even less *reliable* information) about what was happening beyond what Winston Churchill had already in 1946 dubbed the Iron Curtain ... the very circuitry of decision making was problematic, and problematic at every stage." Gordin gives an example of information gathering, describing the history of aerial intelligence for atomic weapons in the years when America still had an atomic monopoly, but was able to learn when the Soviet Union made its first successful atomic test in 1949 using a B-29 aircraft. Normally, the US Air Force used such airplanes for weather reconnaissance, but in this sensitive political issue, planes carried special filters for nuclear sampling. Michael D. Gordin, *Red Cloud at Dawn: Truman, Stalin, and the End of the Atomic Monopoly*, 1st ed (New York: Farrar, Straus and Giroux, 2009), 66..

[54] James Rodger Fleming, *Inventing Atmospheric Science* (Cambridge: Mit Press, 2016), 142.

[55] Paul N. Edwards, *A Vast Machine: Computer Models, Climate Data, and the Politics of Global Warming* (Cambridge, Mass: MIT Press, 2010), 111–38.

[56] Weaver, *Balloon Leaflets*, 53.

material. Throughout the whole operation, nine different experimental types of balloons crossed the border, until a "standard balloon" was identified as the optimal tool. "Standard balloons" were polyethylene balloons. The material allowed an exhausted balloon to descend to earth in parachute effect after releasing the load of leaflets.[57] Thus, polyethylene balloons were considered safer and more efficient than the initially used bursting rubber meteorological balloons. Polyethylene was a material with a political function.

The standard balloon was an instrument with numerous micro-modifications that made unpredictable winds act according to political plans. Dry ice was attached to a "standard balloon" because the duration of a sublimation process in the air gave engineers a sense of predictability for a flight with numerous unknown factors such as turbulent air motion, up- and down-drafts, and differences in the heating of the balloon caused by cloud cover, time of day, and the terrain below. Dry ice underwent the process of sublimation and thus lost mass, resulting in a gradual imbalance of the weight.[58] The team introduced some other micro-modifications, the "plastic hook holder" and the "piano-wire type bottom fitting," which they hoped would guarantee a timely and effective release of leaflets.

Tracing practical considerations underpinning the idea of using balloons with leaflets as a medium, one may encounter job characteristics of people, technical details of material objects, and descriptions of natural surroundings which constitute a possible historical narrative. We could approach Cold War broadcasting from the perspective of the materiality of media and observe a complex media environment operating in parallel

[57] Weaver, 46–47.
[58] Weaver, 51.

with radio. Focusing only on Cold War radio as the most powerful tool would be merely an idealized story of progress. Recent scholarly debates stimulate analysis of forgotten media and technological objects in a cross-disciplinary "media archeology" that discusses both discursive and material aspects of culture.[59] From this perspective, the story of balloons shows that institutionalized propaganda use of media did not always embrace up to date forms of communication.

We have also seen that atmospheric sciences and meteorological forecasting cannot be ignored if one pursues a study of the propaganda war. Science and nature had a tangible role in the story of Free Europe balloons. However, observing materiality and complexity is insufficient. Crafting my own historical narrative, I was attentive to a political narrative that mobilized material objects and wind calculations as rhetorical figures. As Charles Bazerman demonstrates with his notion of "symbolic engineering", even the most famous inventions did not simply emerge as a ubiquitous reality shared among millions of users. Inventors enter a complex communication with numerous discursive systems in order to gain trust from heterogeneous audiences and to gain financial support from investors.[60] Bazerman uses the story of Thomas Edison who became a public figure because his first major invention, the phonograph in 1877, coincided with the development of the cheap mass produced newspaper in the second half of the XIX century.[61] Edison's inventions symbolically fit the ideal front page-story of the time which also involved a deliberate act of public communication.

Symbolic and mediated communication is a key issue in the story of Cold War balloons since all technologies after the emergence of the mass press in the XIX century

[59] On the history and the recent use of "media archeology", see Erkki Huhtamo, ed., *Media Archaeology: Approaches, Applications, and Implications* (Berkeley, Calif.: University of California Press, 2011), 1–25.
[60] Charles Bazerman, *The Languages of Edison's Light*, Inside Technology (Cambridge, MA, USA: MIT Press, 1999).
[61] Bazerman, 9–38.

are necessarily represented in the language of a specific media environment. Balloons epitomize the propaganda requirement of crossing the Iron Curtain. Balloons fulfilled the dreams of sending information through leaflets at a time when western radios were jammed. Balloons' materiality is shaped by the words of propaganda practitioners. As Bazerman claims, "the material promise and the material production emerge out of the symbolic representations. In an important sence, the material bottom line warrants the meaning of the words. But the meaning, location, and form of the material are, in an equally important sense, mediated by the words."[62] People, sites, and tools involved in the balloon operation were described with words and represented in images as part of a strategy to organize uncertain environmental factors into a cohesive persuasive political narrative of the ideal balloon flight for sending information behind the Iron Curtain. My analysis of Cold War constraints will shift perspectives and focus on a similarly uncertain process, gathering information about the political impact of Free Europe leaflets.

3.2. Gathering Information: Fantasies and Facts in the Cold War Archive

FEP published a journal called *News from behind the Iron Curtain*. Contributing their native knowledge, émigrés from Eastern Europe wrote most of its articles, which addressed a limited audience of US readers interested in learning more about politics in communist countries. An article of 1953 called "West Wind over Prague" explains that radio and printed leaflets operated together to "communicate events distorted by the communist press." The anonymous author borrows technical language from experts in

[62] Bazerman, 159.

balloon launching: "borne by strong winds blowing from the west, the balloons reached as far as Central Slovakia, with Ostrava, Prague, Pilsen and Most as primary targets."[63]The author distinguishes between "a rubber sphere bursting at high altitude" and "a plastic balloon descending on the target." Photographs of balloons, similar to those archived at the Public Affairs Department, accompany the text **(Fig. 3.4)**.

Figure 3.4. A picture of balloons, published in *News from Behind the Iron Curtain* (July 1954, p.34). Ownership of and copyrights to the materials belong to RFE/RL, Inc., 1201 Connecticut Ave., N.W., Washington, DC 20036, USA.

Reading the article, I once again encounter the chain of arguments described in the previous sections: locations, calculations, wind, and photos of a secret campaign. But suddenly, the article switches to another language register. It embarks on long quotations from the Czechoslovak daily *Rude Pravo* of July 18, 1953, that characterize the balloon operation as an "audacious act surpassing even Hitler's hate campaign against Czechoslovakia."[64] Superlative praise for a scientifically justified campaign vanishes, to be replaced by words like "gangsters," "fascists," "criminals,"and"cutthroats" in the

[63] "West Wind over Prague,"*News from behind the Iron Curtain*, August 1953, Vol. 2, No. 8, p. 24. HU OSA 300-8-24.
[64] Ibid., 24.

embedded text. *Rude Pravo* criticizes FEP's attempts to send leaflets with pictures of the East German uprising of summer 1953. Images become a tool of propaganda attack: "these pictures 'honorably' join the ranks of those pictures by which the Nazi cutthroats preserved the memories of their murder and arson in occupied countries."[65]

Why did these vehement attacks find a place in the FEP's own journal? This was a propaganda skirmish with its own rules. After the East German uprising, a US National Security Council (NSC) report in December 1953 mentions balloons among possible technical means "to promote anti-communist sentiment against the possible inroads of the communist monopoly over the various media of information."[66] Balloon propaganda operated mainly after Stalin's death in 1953. In light of possible political turmoil in the Soviet sphere, and after the East German uprising that year, one of the main political tasks in the United States was to "vigilantly follow the developing situation in each satellite and be prepared to take advantage of any opportunity to further the emergence of regimes *not* subservient to the USSR," reads the NSC strategy, emphasizing the importance of information gathering.[67]

We have seen that out of political and natural uncertainties, meteorologists and skillful workers, through a complex common effort, were sending information behind the Iron Curtain. Now, I will trace the opposite direction of the same process—collecting information. The balloons intended audience was beyond the reach of Cold War broadcasters. Reading American propaganda leaflets in the target countries was forbidden

[65] Ibid.
[66] NSC Report No. 174, "United States Policy Toward the Soviet Satellites in Eastern Europe," December 11, 1953, cited in Christian F. Ostermann, ed., *Uprising in East Germany 1953: The Cold War, the German Question, and the First Major Upheaval behind the Iron Curtain*, National Security Archive Cold War Readers (Budapest: CEU Press, 2001), 402.
[67] Ibid., 406.

and happened only secretly. Meteorological arguments were used to convince decision-makers that information was entering communist airspace, but how was feedback information received from a secret audience? The political effect of even the most effective balloon flight was a mystery to those who worked at FEP. They had to reconstruct the political situation based on scarce information coming in from behind the Iron Curtain. The famous western broadcasters acted as a system of *gathering* information while simultaneously *sending* other information.

For information-gathering, the main medium was paper, in the form of documents accumulated in a huge archive according to politically shaped categories. Such documents preserved pieces of categorized, analyzed, and processed information. What did this information look like when it concerned balloons? In 1956, communist propaganda created an unprecedented amount of news dedicated to balloons as propaganda weapons coming from the West. 293 critical propaganda articles or radio broadcasts targeted the topic of leaflet balloons in February 1956 alone, the month when "all monthly records of regime attacks were broken" according to the statistics of the analysts at Radio Free Europe Research Institute (RFERI).[68] Hosted by the Vera and Donald Blinken Open Society Archives in Budapest, the records of the RFERI mirror decades of research, administrative, and archival work carried out by a team of analysts from the 1950s until the fall of communism.

Analysts at the RFERI collected propaganda, forged statistics, rumors, tailored political biographies circulating across communist countries in order to find pieces of truth among the distorted information. The historian faces a challenging task in search for

[68] Audience Analysis Monthly Report, February 1956, in HU OSA 300-20-1, box 176 Bulgarian Unit, Subject Files.

meaning there. I suggest an ethnographic approach to this particular part of the Cold War archive, which means being aware of how archival categories shape my own narrative while carefully examining the lines between imagination and reality, lines that are certainly blurred.

Nevertheless, pieces of paper accumulated during the Cold War lead us to the historical specificity of an actual state of politics of information gathering because, writes István Rév, "what had the weird aura of propaganda for the critical reader in the 1950s, came true for the historian after 1989, when documents of the clandestine services became declassified. It is futile to try to distinguish between allegedly empty propaganda slogans, promises of deterrence, phantasy, prophesy, and night-terror, on the one hand, and covert or factual description of the state of the world, on the other. There is no distinction: the fact is that things were made by words—sometimes, quite often, by imagined words."[69] Propaganda articles thus give us insights into strategies of representing and giving symbolical meanings to balloons coming from the west which shaped the story of the object. To a significant extent, propaganda attacks against balloons justified the existence of this particular Cold War technology. Visual representations of FEP balloons circulating in communist press were more meaningful for the analysts at RFERI than the object itself.

Once crossing the Iron Curtain and spreading leaflets, balloons remained useless pieces of rubber or polyethylene. In the process of gathering information, images of balloon printed on paper became the main object of interest for the Free Europe team. I will analyze some propaganda representations of balloons. I should note that in the process of selecting visual sources related to the case study, my gaze was directed both by

[69] Istvan Rev, 'The Suggestion', *Representations* 80, no. 1 (Fall 2002): 81.

my own interests and limitations and by RFE's researchers,who gave me specific instructions (with dates and page numbers) for finding the messages about balloons among the tons of papers accumulated by the propaganda presses of five countries. I will return to this point later, in order to show how the Cold War archive shapes any historical research. The following sections discuss visual information about balloons in the historical context of Bulgaria, Hungary, Poland, Czechoslovakia, and Romania.

The main Communist Party newspapers in Bulgaria reported debates about the state annual budget during the first week of February 1956. Long, almost fully transcribed, speeches of high-ranking party members recorded various political achievements during the previous year. Parallel with the main news of communist planning, pictures of Free Europe balloons appear in the pages of the party-controlled press. *Otechestven Front* describes the balloons as "an explosive balloon with leaflets sent by the US organization Free Europe."[70] Reprinting information from the Soviet news agency TASS, the Bulgarian newspaper explains that "the balloons were of great size … with radio equipment for long-range landscape photography … dangerous for airplanes."[71] *Rabotnichesko delo* showed a photo of a special exhibition for journalists in Czechoslovakia aiming "to expose the terrorist activity of the American radio station Free Europe."[72] The newspaper complements the photo with technical data claiming that balloons had a diameter of 12–15 meters and were filled with about 1,700 cubic meters of hydrogen. Using the same accusations of "terrorist activity," another Bulgarian newspaper, *Zemedelsko Zname*, published "Facts about American Balloons in

[70]"Obezvredeni amerikanski baloni na teritoriyata na GDR," *Otechestven Front*, February 3, 1956, 4.
[71] Ibid.
[72]"Izlozhba v Praga na materiali za provokatsionnata deynost na radiostantsia 'Svobodna Evropa,'" *Rabotnichesko Delo*, February 4, 1956, 5.

Czechoslovakia."[73] The article has an image of a mechanism that "releases leaflets using a timing device,"and adds: "many documentary photographs prove that balloons are dangerous."

Bulgaria was located far from favorable wind trajectories. Balloons with leaflets did not land there, but communist propaganda arrived in Bulgaria along a political path, the transnational exchange of ideological information. The Bulgarian campaign was not an exception, but a small fragment of the uniform visual information circulating among communist countries. On February 26 and 27, 1956, the Czechoslovak newspaper *Pravda* published photographs from an exhibition of "captured" balloons that took place in Bratislava. Balloons appear between pages containing abundant information about the historically significant (as it turned out later) 20th Congress of the Communist Party of the Soviet Union, which had been held between February 14 and 25. Publishing pictures from the exhibition "Balloons of Hate" did not simply stop at the end of the news cycle, but continued long after the winter of 1956.[74] The exhibition went on tour. In April, the Czechoslovak newspaper *Rovnost* included in its main news a picture of people staring at balloons at the exhibition, which had by then moved to Brno.[75]

Meanwhile, the Hungarian newspaper, *Esti Budapest,* copied a photograph from the American magazine, *Life*. Below the image of balloons coming from the West, *Esti Budapest* claims that "in fact, soldiers are filling them at a West-German military base."[76]As with photographs, communist newspapers illustrated balloons with cartoons. In a Czechoslovak satirical image, a giant man is flying with a balloon. He holds a camera

[73]"Fakti za posleditsite na amerikanskite baloni nad Chehoslovakia," *Zemedelsko Zname*, February 4, 1956, 5.
[74]"V Bratislave otvorili vystavu 'Balony nenavisty,'" *Pravda*, February 26, 1956, 2.
[75]*Rovnost*, April 21, 1956, 3 and *Rovnost*, April 28 1956, 3.
[76]*Esti Budapest*, April 2, 1956, 2.

in his hand while a net releases leaflets **(Fig. 3.5a)**.[77] In Poland, a caricaturist at *Trybuna Ludu* depicted an old man holding five black balloons inscribed "Made in USA," "Spying," "Diversion," "Free Europe," and a balloon with a skull and crossbones, presumably symbolizing danger or death **(Fig. 3.5b)**.[78] Another Polish satirical image represents miscalculations of flying leaflets: "Propaganda Leaflets Landed in Pakistan. Hungarians! To whom is this speech directed?," reads the text of a cartoon depicting balloons spreading Hungarian leaflets over Pakistan **(Fig. 3.5c)**.[79] An article entitled "Meteorology? No, Espionage!" appeared in the Romanian newspaper *Scinteia Tineretului*. The caricaturist, named Adrian Lucaci, illustrated the text with a caricature of a man blowingair from a pen to produce an air bubble, captioned "for cloud research."[80] Joking with espionage was the main satirical strategy of another illustration, "Cloud Photographer," which appeared in the Romanian *Munca*. A balloon carrying a camera flies over a city saying "Smile, please!" **(Fig. 3.5d)**.[81]

[77]"V Bratislave otvorili vystavu 'Balony Nenavisty,'" 2.
[78]*Trybuna Ludu*, February 10, 1956, 4.
[79]*Trybuna Ludu*, February 19, 1956, 2
[80]Adrian Lucaci, "Meteorologie? Nu, spionaj!," *Scinteia Tineretului*, February 12, 1956, 3.
[81]"Fotograful norilor," *Munca*, March 29, 1956, 4.

Fig. 3.5a

Fig. 3.5b

Fig. 3.5c

Fig. 3.5d

Figure 3.5 Caricatures attacking balloons from the West.
Fig. 3.5a Pravda - Czechoslovakia (February 26, 1956, p.2)
Fig. 3.5b Trybuna Ludu - Poland (February 10, 1956, p.4)
Fig. 3.5c Trybuna Ludu - Poland (February 19, 1956, p.2)
Fig. 3.5d Munca - Romania (March 29, 1956 p.4)

A predominantly visual propaganda strategy using similar visual codes traveled through propaganda newspapers from five countries. Imagination crossed geographical borders. Visual attacks against Western balloons reflect the scarcity of information during the Cold War. It was hardly possible, in the 1950s, to find images of American objects on

the pages of official party newspapers. Showing pictures of anything American (cars, houses,or clothes) was unthinkable. In a context of thirst for information, balloons were a rare tangible object that stimulated the imagination of propaganda practitioners charged with registering, defining on their own terms, and, eventually, exposing "the enemy" in a controlled media environment.

Accusations of terrorist activities and spying from the air accompanied these visual objects: given the lack of sufficient data, propaganda practitioners added imagined evil qualities to balloons and considered fantasies worth publishing. It is hardly surprising that fantasies permeated propaganda. One could say that a fertile imagination was a necessary professional characteristic for the authors of satirical images. What is striking in this example is the effort to create a predominantly visual representation of an object that did not exist for the general public, as the balloons were designed to be destroyed after releasing printed leaflets. Propaganda, however, followed its own logic in making balloons visible: the mere existence of the word "fact" around pictures of balloons, the inclusion of technical data, shows of actual balloons in exhibition halls—all these were elements of a propaganda strategy that embraced the rhetoric of factual knowledge concerning elusive enemy objects beyond the control of the party apparatus. Fantasies evolved into an object of public interest through a language of facts.

The rhetoric of facts adopted by the Eastern European media had its own institutional logic. Comparing Radio Free Europe and the Polish Radio, media historian Joanna Walewska-Choptiany observes that in 1955 the Polish radio committee adopted some tropes used by the Free Europe employees: "We were ordered to cobble things together and write untruths, which resulted in bitterness and disgust … we want to write

the truth and do not want to conceal the signs of negligence that we find in the field,"[82] asserted a member of the Polish Radio committee. While tracing the rhetoric on both sides of the Iron Curtain, Walewska writes that "in order to convey the desired message to Polish listeners in a convincing way, both RFE and Polish Radio had to create a well-defined image of their opponents and build their own images as absolute opposites. Both broadcasters believed that they had a monopoly on the truth and presented the information provided by the opponent as false."[83] In the case of balloon campaigns, a similar logic of the propaganda skirmish created a transnational dialogue of facts about balloons.

Another part of the story from the Polish context is that, as Walewska observes, prior to 1955, Polish radio did not even criticize Free Europe balloon campaigns because of the fear that "any critical comments concerning the activities of the Committee for a Free Europe could be taken over by the Western broadcasters."[84] A document from the RFE archive from the same period shows that such fears were justified. RFE analysts measured their effectiveness by following the intensity of hostile propaganda attacks against their own station: "A cardinal rule of psychological warfare is not to dignify or advertise hostile propaganda by replying to it. The Communist regimes (and Moscow as well) have constantly broken this rule in regard to RFE. In doing so, they have become RFE's best public agents."[85] According to RFE's analysts of psychological warfare Czechoslovakia was the leading producer of propaganda attacks against RFE in 1955

[82] Quoted in: Joanna Walewska-Choptiany, 'Listening through the Iron Curtain: RFE and Polish Radio in the "Fog of War"', *Centaurus* 61, no. 3 (2019): 200–231, https://doi.org/10.1111/1600-0498.12227.
[83] Ibid.
[84] Ibid.
[85] "Visit to Radio Free Europe by NATO Officers", September 15, 1955, History and Public Policy Program Digital Archive, Obtained and contributed to Cold War International History Project by A. Ross Johnson. UK National Archives, FO 1110-743. http://digitalarchive.wilsoncenter.org/document/134496 [Access date: 11 February 2019]

because the Czechoslovak regime quoted programs in substance and in depth trying to refute them in an effort to minimize their impact.[86]

RFERI thus made use of communist propaganda fantasies described as facts. Information collected from the communist world was accumulated in the form of documents following precise paths set by the RFERI, an institution whose main task was to find pieces of truth among flows of distorted information. I register how specific obstacles to gathering information shaped official documentation and discuss practices of knowledge production related to a specific event, through which historians may be able to reconstruct the conditions of Cold War communication for other political problems.

As seen in the example of the propaganda attack against balloons, it is impossible for a single historian to gather such an amount of data from five countries. To study the dynamics of visual messages, I narrowed my search to particular coordinates (country, newspaper, date, page) from files accumulated at the RFERI. Cross-checking with the archives of the newspapers themselves, I found no discrepancies—every single attempt to locate a picture of a balloon among thousands of pages of communist media via the RFERI pointers was successful.

In order to find and select pictures of balloons that seemed interesting to me, I checked where a picture had been published while reading a collection of documents called "information items."[87] Employees from Poland, Czechoslovakia, Hungary, Bulgaria, and Romania contributed to the creation of these files, which were translated and archived using the common language at RFERI, English. The first inscription in an

[86] Ibid.

[87] Studying this particular collection, I am using digitized data with search engines developed by the OSA Archive. Available at: http://www.osaarchivum.org/digital-repository/osa:484d852e-1334-4570-a2be-e41230b9e36a.

"information item" is a code for the subject and category. Categories are written in capital letters and highlighted. An additional code points to the administrative folder where information was accumulated according to a specific topic. Linking information to specific issues resulted in a separate bulk of archival data of thematic clippings called "subject files." "As a random archival check shows, the topics of the subject files encompass a huge range of political issues concerning communist countries, from the general, such as Collectivization or Hygiene, to the specific, such as Stakhanovism.

Information concerning the topic of balloons alone appears mainly under the category PROPAGANDA 2600 and subcategory Anti-Western 2601a. Balloons are also mentioned in category EXILE 1200 with the subcategory Veto 1207 or EXILE 1200 Balloon Action 1207f. These categories were introduced by more than just clerks. Archivists who created the RFERI archive assembled sensitive political topics using easily reachable collections of documents. The archive mirrors a complex practice of accumulating information for further political use.

The information items were a product of processing information. Information items synthesize selected extracts from two collections of documents with raw data. One of those collections is "media monitoring," which contains transcribed radio programs and press clippings from newspapers and news agencies, collected daily at the RFE monitoring department.[88] The other mass of raw data consists of interviews with immigrants and travelers in the West.

[88]Monitoring activity was one of the main political tasks of Cold War broadcasting, executed from both sides of the Iron Curtain. Daily, the "monitors" provided high-ranking political decision-makers with information about political developments in "enemy" countries. See Istvan Rév, "Just noise? Impact of Radio Free Europe in Hungary," in: Johnson and Parta, *Cold War Broadcasting*, 239–257.

Both types of raw data had to be validated before further use and transformed into useful "information items." Propaganda from monitoring files and interviews was transformed into what RFE considered useful knowledge through evaluative comments. Each "information item" has two columns for comments: Audience Analysis Section Comment and Evaluation Comment. Sometimes those areas of the page remained blank, but more often, researchers at RFERI provided additional information from their own experience. The files keep messages left by Cold War researchers specialized in distorted information.

We can assess the voices of the researchers in a selected by me document from the Romanian Radio Section which registered an attack in the newspaper *Agricultura Noua* with the following

EVALUATION COMMENT:

> Speaking of leaflets, it is common knowledge that one of the principal aims of the Crusade balloons is to carry into the oppressed East-European countries the truth withheld from these unfortunate peoples by the Soviet controlled puppet regimes. Since the author of the article under reference started speaking about reciprocal actions, it would be indicated to note that neither Western nations nor refugees living in the West would object to any exchange of genuine and detailed information about living conditions in East and West.[89]

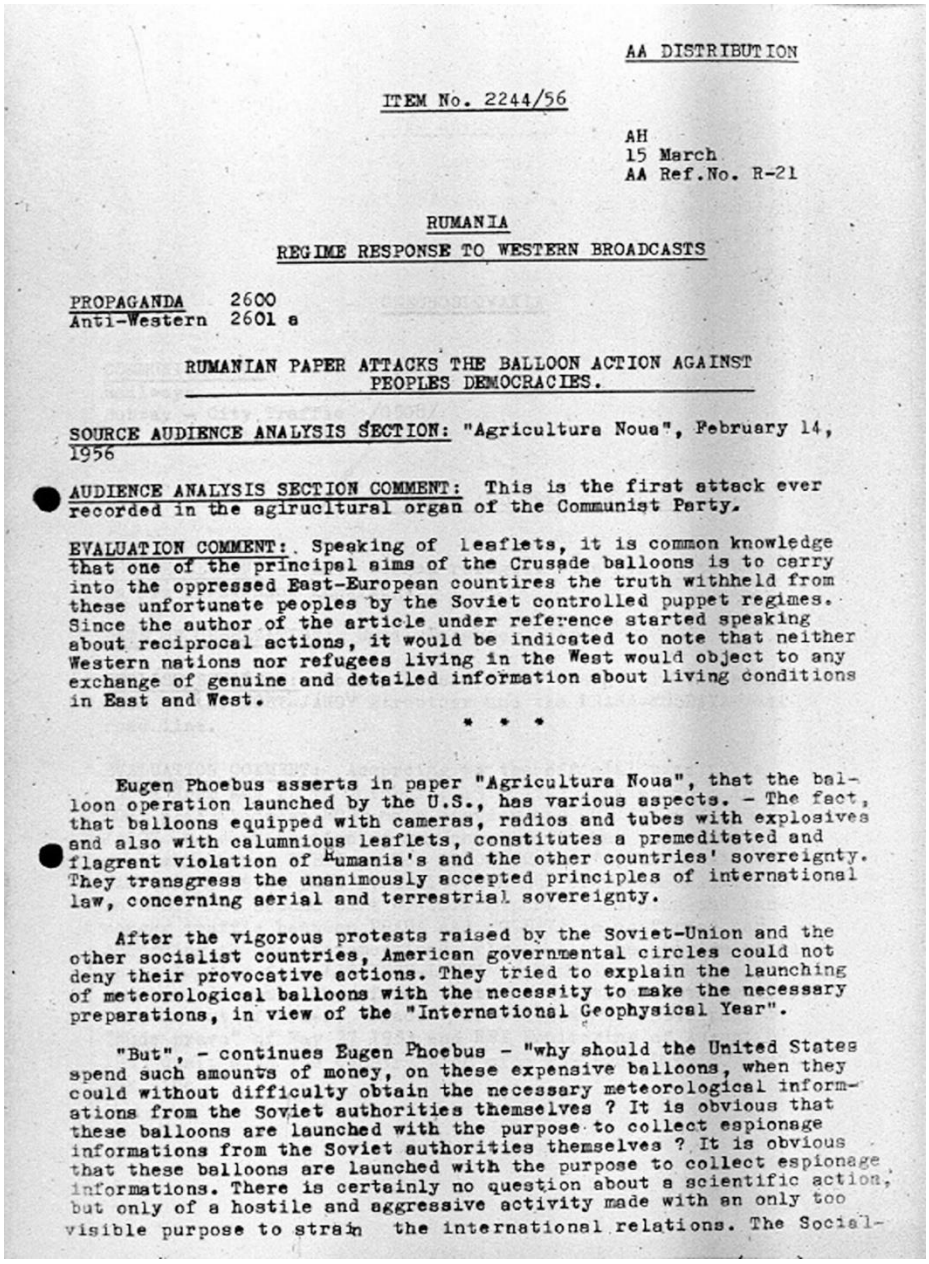
Typically, such comments were short. The commentator's voice was trying to counterbalance distorted information. But what did they use as a counterweight? The example from the Romanian section illustrates a paradox of trying to achieve an

[89] "Romanian Paper Attacks the Balloon Action against Peoples Democracies," 15 March 1956. HU OSA 300-1-2-68306. HU OSA 300-1-2-68306; Records of Radio Free Europe/Radio Liberty Research Institute: General Records: Information Items; Open Society Archives at Central European University, Budapest.

objective-sounding voice while pursuing a political cause. On the one hand, commentators had to tell the truth, providing dispassionate, "genuine information." On the other, comments keep a tone of political activism, using notions of "puppet regimes" and "oppressed countries."

Though working beyond the borders of their target countries, employees at RFERI in this case tried to convince themselves and their superiors that they were not simply a foreign radio, but an authentic voice of a local institution. The employees at the radio "identified fully with the interests, culture, and the history of the represented country" and "played the role of a 'home' service speaking from abroad."[90] Thus, the paradox of trying to present dispassionate reports while not losing sight of the political task was part of the historical specificity of the radio station and the practices of gathering information, in this case.

[90] Ruxandra Petrinca, 'Radio Waves, Memories, and the Politics of Everyday Life in Socialist Romania: The Case of Radio Free Europe', *Centaurus* 61, no. 3 (2019): 178–99, https://doi.org/10.1111/1600-0498.12232.



AA DISTRIBUTION

ITEM No. 2244/56

AH
15 March
AA Ref.No. R-21

RUMANIA

REGIME RESPONSE TO WESTERN BROADCASTS

PROPAGANDA 2600
Anti-Western 2601 a

RUMANIAN PAPER ATTACKS THE BALLOON ACTION AGAINST PEOPLES DEMOCRACIES.

SOURCE AUDIENCE ANALYSIS SECTION: "Agricultura Noua", February 14, 1956

AUDIENCE ANALYSIS SECTION COMMENT: This is the first attack ever recorded in the agricultural organ of the Communist Party.

EVALUATION COMMENT: Speaking of leaflets, it is common knowledge that one of the principal aims of the Crusade balloons is to carry into the oppressed East-European countires the truth withheld from these unfortunate peoples by the Soviet controlled puppet regimes. Since the author of the article under reference started speaking about reciprocal actions, it would be indicated to note that neither Western nations nor refugees living in the West would object to any exchange of genuine and detailed information about living conditions in East and West.

* * *

Eugen Phoebus asserts in paper "Agricultura Noua", that the balloon operation launched by the U.S., has various aspects. - The fact, that balloons equipped with cameras, radios and tubes with explosives and also with calumnious leaflets, constitutes a premeditated and flagrant violation of Rumania's and the other countries' sovereignty. They transgress the unanimously accepted principles of international law, concerning aerial and terrestrial sovereignty.

After the vigorous protests raised by the Soviet-Union and the other socialist countries, American governmental circles could not deny their provocative actions. They tried to explain the launching of meteorological balloons with the necessity to make the necessary preparations, in view of the "International Geophysical Year".

"But", - continues Eugen Phoebus - "why should the United States spend such amounts of money, on these expensive balloons, when they could without difficulty obtain the necessary meteorological informations from the Soviet authorities themselves ? It is obvious that these balloons are launched with the purpose to collect espionage informations from the Soviet authorities themselves ? It is obvious that these balloons are launched with the purpose to collect espionage informations. There is certainly no question about a scientific action, but only of a hostile and aggressive activity made with an only too visible purpose to strain the international relations. The Social-

Figure 3.6 An information item with propaganda news about balloons and an evaluation comment from RFERI. "Romanian Paper Attacks the Balloon Action against Peoples Democracies", March 15, 1956. HU OSA 300-1-2-68306. Ownership of and copyrights to the materials belong to RFE/RL, Inc., 1201 Connecticut Ave., N.W., Washington, DC 20036, USA.

This paradox is also visible in the process of information gathering from the other bulk of raw materials: interviews with refugees and travelers to the West. Before validating them as "information items," the research staff critically examined the

testimonies of escapees who crossed the Iron Curtain in the hope of receiving refugee status or travelers who (at least in the 1950s) could afford to travel to the West, often with the permission of the upper party echelon. In an interview situation, the answers of those two main groups of respondents were not representative and were permeated with fantasies. Reading hundreds of information items, I encountered dubious eyewitness accounts, such as the words of a Hungarian asylum seeker in Austria, who claimed that leaflets fell precisely on Buda hill in Budapest near the former Royal Palace, and that close to the famous Lake Balaton there had been a "real shower of leaflets."[91] Another respondent, a Swedish businessman who had traveled to Prague said, in a "casual conversation," that "nobody cared about leaflets and people just looked at them once and then threw them away laughingly." According to a comment in the file, this businessman was "of dubious political opinions."[92] The archive keeps an account of a twenty-two-year-old female refugee who had reportedly said that people "who managed to find a leaflet from the West can sell it for 50 Czechoslovak koruns." Immediately, the section EVALUATION COMMENT warns that this story is UNCONFIRMED.[93]

RFE researchers evaluated such suspicious feedback with a sense of distance. Dealing with distorted information, they referred to its low factual value, yet nevertheless tried to mobilize some stories for RFE's political cause. A document called "'The Balloons Came' … Great Excitement Among the Czech Population" reveals a blurred line between interview and interrogation:

[91] Opinions on the Focus Operation, 4 February 1955. HU OSA 300-1-2-55120
[92] Current Reaction to Balloons, 8 February 1956. HU OSA 300-1-2-67348
[93] Reaction to Western Balloons, 8 August 1953. HU OSA 300-1-2-37564

> The six escapees from the Ceske Budejovice area were all interviewed separately and their stories confirmed each other. The man from Pardubice is more difficult to check on and, unfortunately, his information is the most sensational. Still, he seemed reliable, if a bit loquacious.[94]

The researchers'comment refers to the following account:

> the people were jumping for the balloons like frogs. There was tremendous excitement in the whole area. People came running out of their houses and gathered the leaflets openly without fear of the police.[95]

Even such archived uncertainties and claims with the lowest probability rate, however, existed on paper and were accumulated in the process of administrative storage of information items. The accumulation of information items led to the third level of information processing: an attempt to extract factual information from the information items collected. A department called News and Information Service: Evaluation Section was in charge of selecting the essential elements out of all the processed information from the communist world. The department published a short printed pamphlet called *Weekly Information Letters*, which most likely had a limited circulation and was mainly designed for internal use. Through this publication, radio staff and their directors received a selection of only the most important events from the target countries: Czechoslovakia, Poland, Hungary, Bulgaria, and Romania.

On January 25, 1956 , the editor, Karl Richter,wrote a brief editorial note. Again, the voice between objectivity and political activism emerges among notions of "enslaved nations" and "dispassionate reporting":

[94] The Balloons Came… Great Excitement among the Czech Population, 30 July 1953. HU OSA 300-1-2-37194
[95] Ibid.

> They [Weekly Information Letters] have recorded a good deal of the history of the enslaved nations, of the sort which finds little coverage in Western press and magazines. Restrained to an unavoidable minimum of slanting, editorializing and speculation, and dedicated to a maximum of dispassionate reporting, they yet could not fail to present a heart-rending account of ruthless Soviet domination and world-wide duplicity, of Communist venality and intrigue, and of the brave, dogged and silent resistance of the people who refuse to become slaves.[96]

Typically, RFE analysts selected five or six important news items from each "target country." Before the detailed analysis of events, the editors list short headlines. On January 25, the Czechoslovak information section looks like this:

CZECHOSLOVAKIA

1. Regime Campaign Against FEP Balloons.
2. "Textile Affair" in BRNO (Continued.)
3. Visit of the Chinese Government Delegation.
4. New Soviet Ambassador to Prague.
5. WARSAW Pact—First Session of its Political Committee.

Point 1 came from media monitoring of Radio Prague. According to the newsletter, the communist radio blames FEP that one of their balloons exploded, "causing serious bodily harm to a boy of 14." The radio went on to report on an airplane crash near the Slovak village of Torysky. Before the cause was clear, party newspapers already labeled balloons as potential cause of the fatal incident.[97]

One week later, on February 1, 1956, the Czechoslovak news selection noted a "strengthening of the campaign against FEP balloons."[98] This time, visual argument dominated, the Czechoslovak news agency CETEKA having reported on traveling

[96] Weekly Information Letter No. 157, January 25 1956, p.1. HU OSA 300-8-52, box. 1.
[97] Ibid., 2.
[98] Weekly Information Letter No. 158, February 1 1956, p. 1. HU OSA 300-8-52, box 1.

exhibitions in Prague and Zvolen "showing FEP balloons and pictures of injured people."[99]

On February 8, FEP balloons were yet again in the focus of selected news, but this time with stronger political implications. Czechoslovak propaganda reported the highlights of the Warsaw Pact's Political Consultative Committee, which took place on January 27 and 28, 1956, in Prague. This was a top-level meeting with representatives of the highest party and governing elite of the Soviet Union and its Eastern European allies. As a rule, communist countries were represented by defense ministers and foreign ministers.The meeting in Prague was attended by the Soviet Minister of Foreign Affairs, Vyacheslav Molotov, and the Minister of Defense, Marshall of the Soviet Union Georgy Zhukov.

The original declaration by the signatories to the Warsaw Treaty, the main document issued at the end of the consultative session, sets up an opposition between "peace loving states" (members of the pact) and "certain circles in the West striving to maintain war psychosis and continue the cold war,"[100] which is vague enough to include all possible "enemies." Propaganda interpretations of the event in the Eastern European press included more specific notions derived from the military meeting, such as "atomic and hydrogen bombs" and "rocket weapons" in the case of a possible military conflict. [101] According to the *Weekly Information Letters* of February 8, the Czechoslovak propaganda allegedly created a space to include recent news about Western "balloons with

[99] Ibid.
[100]Declaration by the Signatories to the Warsaw Treaty, January 28, 1956 in Boris Meissner, *Der Warschauer Pakt Dokumentensammlung.* (Köln: Verlag Wissenschaft und Politik, 1962), 105–10. Additional sources from the meeting are available at Parallel History Project on Cooperative Security https://phpisn.ethz.ch/lory1.ethz.ch/collections/colltopicbc1c.html?lng=en&id=17526&navinfo=14465 Access date: October 23, 2017.
[101] Weekly Information Letter No. 159, February 8 1956, p.2. HU OSA 300-8-52, box 1.

explosives" while reporting about the results of the Warsaw Pact meeting.[102] This was enough for the RFE employees to classify the news as "increased and massive attacks." One week after the high level political meeting, the headlines of Weekly Information Letters recorded propaganda attacks already moving from Czechoslovakia to Poland, Hungary, Romania, and Bulgaria while RFERI continued with transforming distorted information into facts.[103]

Conclusion

The chapter demonstrated that the story of propaganda balloons is useful for studying the history of Cold War technology, media, and politics. Balloons with leaflets were considered an efficient technology for communication across borders in the 1950s. Focusing on seemingly anachronistic methods of sending information during the heyday of radio as a medium, one can approach the history of political uses of technology as not simply a story of progress. As the case study shows, the political imagination did not embrace only cutting-edge achievements: at a certain historical moment, the propaganda war required technologies that lagged behind the wireless media environment of the 1950s.

The Free Europe balloon emerged as a response to political demands in the 1950s and was surrounded by heterogeneous rhetorical symbols of precise meteorological calculations and effectiveness of propaganda planning. Visual codes presented balloons as part of a complex system of people, sites, and objects of sending information across the

[102] Ibid.
[103] Weekly Information Letter No. 160, February 15, pp. 7-20 HU OSA 300-8-52, box. 1.

Iron Curtain while conflicting propaganda imagination coming from the communist press depicted balloons as aggressive and dangerous propaganda tools.

On the one hand, a detailed reading of the archival traces concerning the case study shows that this Cold War technology was not always efficient and that uncertain environmental factors were an inherent part of the propaganda flights. On the other hand, it would be a mistake to dismiss persuasive rhetoric (supportive or hostile) as merely words and images that were alien to the technological object. Propaganda language led to the emergence and modifications of leaflet balloons, while propaganda attacks and hostile representations of balloons archived on pieces of paper were considered more important than the object itself because communist propaganda attacks were indicators of political effectiveness of the medium in the process of information gathering.

The path of balloons flying from West to East and reactions from East to West reveals much about the nature of Cold War information in which distorted information, secrecy, missing eyewitness accounts mutated into persuasive political rhetoric. Technical accounts proving efficiency of communication compensated the lack of wide practical use of technology. By the same token, the propaganda uses of rare visual glimpses of information indicate the problems of restricted access to information. Cold War analysts practiced dispassionate reporting while registering obstacles to gathering representative data. In the story of Free Europe balloons, distortion was not an exception but the norm of communication which stimulated the political use of fantasies described as facts.

4. Rationality of Noise: Acoustic Information Gathering during the Cold War

Introduction

In the summer of 1973, Alexander Solzhenitsyn, already well-known at that time as the Nobel Prize novelist whose works were banned in the Soviet Union, gave an interview to the Moscow correspondents of Associated Press and Le Monde. Speaking about threats against his life, the dissident drew the attention of the Western press. The Times published a front-page headline article[1] and an editorial comment: "[h]arassment and intimidation of this sort would be entirely in keeping with the present atmosphere in the Soviet Union." [2]

Radio Free Europe/Radio Liberty (RFE/RL) Research Institute archived the publication. Since this was an institution that gathered information about the political "atmosphere" in the USSR[3], it is hardly surprising that references to Solzhenitsyn's interview can be found in the archive's boxes. For the historian, however, the precise location of the document is unexpected - a folder titled "jamming" with predominantly technical information.[4] A Cold War researcher of press information underlined the writer's view on jamming, the deliberate disruption of Western radios' signal on Soviet

[1] Crepeau, Frank. "Solzhenitsyn speaks of threats against his life." Times, August 29, 1973, p. 1. The Times Digital Archive, http://tinyurl.galegroup.com/tinyurl/9YkRb0. Accessed: March 22, 2019.
[2] "Mr Solzhenitsyn Threatened," Times, August 29, 1973, p. 15. The Times Digital Archive, http://tinyurl.galegroup.com/tinyurl/A4W4y2. Accessed May 17, 2019.
[3] RFE's target countries were Hungary, Poland, Czechoslovakia, Romania, and Bulgaria. RL was the Russian language radio targeted to the Soviet Union.
[4] HU OSA 300-80-1, RFE/RL Research Institute. Soviet Red Archives. Old Code Subject Files. Radio Glushenie (Radio Jamming), box. 763

territory: "[w]hat jamming of radio broadcasts means is impossible to explain to those who haven't experienced it themselves, who haven't lived under it for years. It means daily spittle into your ears and eyes, it is an offence and degradation of man to a robot's level. […] Moscow and Leningrad have paradoxically become the most uninformed big cities in the world. The inhabitants ask people who come in from the countryside about news. There, because of cost (our population has to pay very dearly for these jamming services) the jamming is weaker."[5] What did influence the decision to weigh the famous interview in favor of noise perception? During the Cold War, radio sound was not simply a technical issue. In the 1950s, the industrial scale jamming of foreign radio stations in the USSR transformed noise into an object of research. Once archived, Solzhenitsyn's words contributed to a complex endeavor to create knowledge based on sound.

This chapter traces the process of "translating" sounds into words and numerical codes. Writing about sound is a challenge in itself, but the Cold War archive is surprisingly rich due to the fact that employees at the clandestine radio were interested in the quality of the station's own signal behind the Iron Curtain. Not an easy task: gathering information on radio audibility then reached the limits of available technology. Installing any facilities to monitor and evaluate sound quality within the target communist countries was unimaginable. The so called monitors registered data on radio signal from Western points such as Vienna and Berlin. This politically charged job consisted of distant reception in an attempt to simulate the real listeners' experience and evaluate to what extent RL programs overcame deliberate interference of jamming facilities. Regardless of

[5] Interview with Alexander Solzhenitsyn published in Times, 29 Aug. 1973. HU OSA 300-80-1, RFE/RL Research Institute. Soviet Red Archives. Old Code Subject Files. Radio Glushenie (Radio Jamming), box. 763

such efforts, the radio acoustic soundscape often remained incomplete. Listening across borders provided reliable data mainly from the peripheral regions behind the Iron Curtain.

Sound quality studies on all target territories had persisted as a puzzle throughout the decades-long ideological conflict. Moreover, jamming was not the only unwanted sound among atmospherics and ubiquitous noises in the process of transmission. Discerning noises implied constant uncertainty. Thus limited data on sound quality was complemented with additional sources such as audience analysis interviews with (yet again, non-representative of the whole society) accounts of refugees and travelers to the West. Cold War political constraints hindered accurate acoustic data. Technical facilities far from the field, subjective evaluation of sound perception reported by monitors, and stories of radio listening told by émigrés did not always testify reality. However, political strategies for gathering information valued even problematic data.

This chapter contributes to a recent trend in Cold War broadcasting historiography which puts a special emphasis on technological infrastructure.[6] Sound descriptions stemming from the interaction between monitors and their equipment thus provide a space for exploring the mutual influences between technology and politics. My approach for studying Cold War technology from the perspective of archived acoustic information is inspired by the scholarship in the field of sound studies.[7]

[6] Alexander Badenoch, Andreas Fickers, and Christian Henrich-Franke, *Airy Curtains in the European Ether: Broadcasting and the Cold War* (Baden-Baden: Nomos, 2013). Yuliya Komska, 'RFE/RL Broadcasting and West German Society: Caught between Nature Protection Activism and Anti-Americanism', *Journal of Cold War Studies* 20, no. 3 (4 October 2018): 180–206.

[7] The most important works in the field which influenced my approach include: Jonathan Sterne, *The Audible Past: Cultural Origins of Sound Reproduction* (Durham: Duke University Press, 2002). Emily Ann Thompson, *The Soundscape of Modernity: Architectural Acoustics and the Culture of Listening in America, 1900-1933* (Cambridge, Mass.: MIT Press, 2002). Carolyn Birdsall, *Nazi Soundscapes : Sound, Technology and Urban Space in Germany, 1933-1945* (Amsterdam University Press, 2012). Karin Bijsterveld, *Mechanical Sound: Technology, Culture, and Public Problems of Noise in the Twentieth Century* (Cambridge, MA: MIT Press, 2008).

I argue that a technical routine of evaluating sound quality was endowed with meanings far beyond the domain of technology. Data on radio sounds provided a basis for evaluating effectiveness of propaganda strategies and tackling national security concerns. Especially during periods of crises or unrest, broadcasting audibility served as an important political indicator when only limited sources were considered reliable. Studying the archival heritage of RFE/RL thus is particularly valuable. Since the clandestine radios tried to situate themselves as equivalents of home broadcasting stations, employing émigré intellectuals with a political mission and, at the same time, supplied their superiors at CIA offices with factual information,[8] the broadcasters were particularly sensitive to the constraint of operating from geographical and ideological distance.[9]

Historicizing the link between technical data and politics sheds light on contemporary practices of surveillance; in particular, the phenomenon of gathering metadata in which technical details obtained by heterogeneous institutions serve as important indicators in surveillance and decision-making. I argue that gathering technical data with ascribed political meanings was intimately linked with the problem of seeking impartial information when lack of access to reliable sources was a norm. In this regard, the initial act of creating standardized categories that later could be potentially processed by computers is another central theme. Acoustic data such as jamming strength and signal audibility was translated into standardized language, a practice adopted simultaneously by Western monitors and their counterparts behind the Iron Curtain. Through persistent

[8] In the 1950s, when the practice was established, the Central Intelligence Agency (CIA) used technical monitoring information generated by RFE/RL monitoring stations.
[9] On this paradox see: István Rév, 'Neither Objective nor Subjective', *Centaurus* 61, no. 3 (2019): 143–52, https://doi.org/10.1111/1600-0498.12235.

efforts to limit uncertainty of human sound perception, sonic descriptions and evaluations were considered valuable information during the ideological conflict.

Such conclusions are reached through an ethnographical approach of studying the language of noise in the archive[10] relying on two key assumptions. First, a story about noise during the Cold War can be told only through the prism of heterogeneous documents from different spheres including: security, nature, media, technology, and social science research. Second, this story cannot be contained solely by the framework of Cold War historiography because, above all, historians have been studying similar practices from the more distant past with repercussions reaching the present day. At the same time, this story transcends delineated research areas, which has an important implication. What we call a "cold war" was more pervasive than the metaphor suggests.

4.1. Technologies and language of Cold War acoustic monitoring

"Without a usable signal, the finest radio staff in the world would be voiceless,"[11] wrote bluntly Wilbur Schramm, the media theoretician and participant in government-

[10] Such approach is useful due to the fact that the research object of acoustic information gathering did not generate a specific set of archival categories. Crafting a historical narrative about sound, I read documents beyond consensual Cold War taxonomies like "dissent." Researchers could find easily archival boxes with this label created during the Cold War and study the phenomenon of dissent and key intellectuals such as Alexander Solzhenitsyn, for instance. In contrast, the Cold War archive does not provide direct clues related to radio sound quality and only certain ethnographical sensitivity could create the space for studying this seemingly tangential information which ultimately leads us to the key intersection between technology and politics.

[11] "Radio Liberty's Effectiveness Appraised," September 01, 1955, History and Public Policy Program Digital Archive, Obtained and contributed to CWIHP by A. Ross Johnson. Referenced Ch2 n89 in his book Radio Free Europe and Radio Liberty, CIA mandatory declassification review document number C05459013 https://digitalarchive.wilsoncenter.org/document/114489

sponsored projects[12] for evaluating the effectiveness of US Cold War broadcasting, in one of his reports on RL's effectiveness in 1955. Particularly valuable for our understanding on how political constraints shaped acoustic data, Schramm's report was part of regular efforts to reconstruct feedback information about US international broadcasting and thus assess Cold War dynamics.

Schramm starts his report with caution regarding the sources on which one could draw any scientific conclusions: "[t]he nature and amount of evidence available do not permit us to say with any scientific confidence that Radio Liberation is or is not being effective in the Soviet Union."[13] After consulting reports from technical monitoring stations in Berlin, Vienna, Helsinki, and Turkey, he wrote "[i]t is reported that during the summer months, an "intelligible" signal is delivered there about 80 per cent of the time, and about 60 per cent of the time in the winter. However, during the spring months of 1955, several new Russian skywave jammers caught up with Radio Liberation, and there was a sharp decrease in the percentage of intelligible signals."[14] According to the report, such data reflects monitoring at the peripheral areas of USSR and audibility levels from inside the USSR were lower.[15] "The general picture, then, so far as signal goes, is of a station which is weak in power, poorly situated to beam short wave to its chief target, severely jammed, and with jamming increasing in severity. Some signals are undoubtedly

[12] On projects related to communication research during the Cold War see: Christopher Simpson, *Science of Coercion: Communication Research and Psychological Warfare, 1945-1960* (New York: Oxford University Press, 1994).
[13] Ibid.
[14] Ibid.
[15] As inside accounts the report refers to diplomatic sources reporting reception conditions at the American embassy in Moscow and while travelling in the USSR.

getting through, but it must not be easy to hear Radio Liberation in many parts of Russia,"[16] concludes Schramm.

It is challenging to use such typical Cold War documents as a historical source. The author was aware of all limitations linked to the use of acoustic information for reaching scientific conclusions. Rather than examining whether the figures of receptions reflect reality, I am focusing on the way discourse about sound was created. Reading Cold War sources, the historian faces challenging questions; in particular, why and how was reception described in linguistic and numerical codes? What were the sources of information about sound? Why did reports on reception consider seasonal fluctuations? The overarching question reflecting Cold War concerns is: how did technical details about sound ultimately lead to information useful for Cold War politics?

Recently declassified archival sources introduce an overlooked context for studying the RL archives - the radio was created during a period of an unprecedented fear that the Soviet Union would launch a mass scale electro-magnetic war. In the early 1950s, US security experts gave the idea of a war in the ether careful consideration, parallel to the concerns of a potential nuclear war. The historian Jonathan Reed Winkler points out that intensified jamming of VOA and BBC in 1948 led to the assumption that Soviet jamming could escalate disrupting other forms of US communication. As Winkler observes, "because of the U.S. government's dependence on high frequency (HF) radio for handling international governmental and military traffic, the implications of such an attack would have been catastrophic."[17] The infamous practice of jamming implied major

[16] Ibid.

[17] According to archival sources from the 1953, quoted by Winkler, "75 percent of U.S. military traffic to Europe and 100 percent of military traffic to East Asia went by HF radio. U.S. intelligence estimated, and the administrations operated from the idea that, a Soviet attack would result in a 90–95 percent collapse of

security issues and international broadcasting provided laboratory environment to study the effects and the limitations on deliberate interference in the civilian spectrum.

A general strategy of protecting US communications resulted in a series of security reports, government-sponsored projects, and strategies aiming at counteracting communication blackouts. [18] A crucial element of all security measures was establishing a system of radio technical monitoring that could evaluate radio jamming levels instantaneously.

The Central Intelligence Agency (CIA), allocating the funding for RFE/RL, was in charge of the radio technical monitoring in the 1950s. Then, the Office of Scientific Intelligence at CIA issued the first progress report revealing practical issues of evaluating radio reception amid jamming noise. Discussing explicitly the shortcomings of the newly institutionalized practice of technical monitoring, the document testifies to the discrepancies between reality and expectations. "The problem of determining technical (signal) effectiveness of broadcasting within areas to which access is generally denied or at least limited and against which broadcast jamming and related activities are directed is unprecedented. Methods and techniques used in making such evaluations of commercial broadcasting are entirely inapplicable to this problem. New methods and new approaches have had to be evolved and are still in the process of evolution" [19], reads the report's

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all existing electrical communications (not just military) with Europe and a total severance of transpacific communications for as long as the Soviets wished to continue the jamming." See Jonathan Reed Winkler, 'The Forgotten Menace of Electro-Magnetic Warfare in the Early Cold War', *Diplomatic History* 42, no. 2 (April 2018): 255, https://doi.org/10.1093/dh/dhx050.

[18] Only three months before RFE aired its first broadcast, on April 4 1950, the US National Security Council issued one of the first papers expressing concerns related to radio jamming; in particular, paper number 66 titled "Support for the Voice of America in the Fields of Intelligence and of Research and Development." See: Winkler, 257.

[19] First Progress Report to Operations Coordinating Board by Broadcasting Evaluation Section established under paragraph 8A of NSC-169, September 1, 1955, p.1. CIA-RDP78-01634R000300070051-6 CIA CREST online database, General CIA Records. https://www.cia.gov/library/readingroom/document/cia-rdp78-01634r000300070051-6 Access date: October 15, 2019.

opening based on the first results of technical monitoring at VOA and RFE/RL.[20] The novelty consisted in the issue that noise in the ether was not merely a technical problem anymore - measuring signal quality (a prosaic technicality at commercial radios) mutated into a research endeavor with political and security implications.

Though loaded with high expectations, the practice faced considerable obstacles. Intelligence experts and linguists took on the challenge of translating sound into standardized language accessible to intelligence and security experts. "The first problem encountered in evaluating the technical effectiveness of the three broadcasting organizations [VOA, RFE, and RL] was standardization of reporting methods", reads the report. "Agreement was reached on the definitions of good, fair, poor, and nil intelligibility."[21] Monitors used a scale of four notions:

Good – good intelligibility is defined as easily understood.

Fair – fair intelligibility is defined as understandable, but with difficulty because of interference or other causes.

Poor – poor intelligibility is defined as not being understandable because of interference or other causes.

Nil – nil means no reception at all because of interference or other causes.[22]

Intelligence experts acknowledged that the problem of translating sound into words was not merely a matter of precision. The main challenge then was to transform subjective perception into standardized categories: "[s]ince the judgment of intelligibility

[20] RFE/RL recorded actual jamming noise in the process of technical monitoring. See "Jamming signals," The Hoover Institution's channel on YouTube, https://www.youtube.com/watch?v=315U4d_GhGA&ab_channel=HooverInstitution Accessed: May 30, 2023.
[21] Ibid. p.2
[22] Ibid. p. 11 According to the document, these notions and their definitions were based on a "consensus of a panel of linguists."

by a monitor is largely subjective, what is 'good' to one man may sometimes be 'poor' to another. To what extent this variable factor affects the final evaluation is not known at this time."[23] Experiments showed that "two persons listening to the same program and provided with the same definitions of grades of intelligibility would frequently disagree, particularly when the program is partly degraded and not certainly "good" or "nil."[24] Trainings[25] for technical monitors aimed ultimately at "reducing the range of operator judgment and thereby getting more objective data."[26]

Finding suitable geographical locations for monitoring stations caused additional difficulties. Proximity to the Iron Curtain did not guarantee accurate acoustic accounts: "perhaps the most significant problem not yet satisfactorily answered is the determination of how far from the monitoring post the observations may be considered representative of reception conditions."[27] Regular technical monitoring by engineers trained in the US inside the target country was unimaginable. Under these conditions, areas closer to the border areas proved to be a reasonable compromise. However, engineers outside of the target country were able to determine reception quality mainly in peripheral zones. It was impossible to monitor the so called "local jamming" which took place inside Eastern Europe's major cities. In practice, this meant that monitoring reports did not represent listening conditions of the intelligentsia.

[23] Ibid. p.3
[24] Ibid. p.12
[25] Besides the subjective experience, another more practical limitation addressed in training technical monitors was that a monitor was not supposed to listen to a whole program from beginning to end. Perhaps it was not feasible to cover monitoring shifts around the clock. Another reason was that, typically, Cold War radios broadcast on several frequencies to hamper jamming. Thus monitors checked the same program on a number of frequencies simultaneously. Since choosing the optimum monitoring time for a certain program had important statistical consequences, technical experts were assigned to study the optimal time necessary for a monitor to evaluate the quality of sound.
[26] Ibid. p. 3
[27] Ibid. p.4

Introducing standardized receiving equipment formed another essential aim. The variables of design, state of adjustment, type of antenna, etc., "introduced wide variables."[28] The solution was to use only receivers whose characteristics and sensitivity were precisely known, a technical detail which leads us to the warfare heritage. According to the CIA report, technical monitors typically used a communications receiver Collins 51J3 manufactured in the US.[29] Monitors needed a reliable radio set for listening across borders. Communication receivers emerged in the 1930s meeting demands of amateur operators; later, during the Second World War, the equipment provided excellent military signal reception under difficult conditions.[30] In the post-war years, it sustained technical monitoring during the propaganda conflict dominated by jamming noise.

A rare visual archive of RFE/RL technical facilities preserves key monitoring artifacts among them communication receivers and antennas. Throughout the Cold War, the radio's Public Affairs department administered such images to promote the radio's mission, especially during fundraising initiatives. [31] It was not self-evident that the war in the ether required investments in a vast technical infrastructure and the department illustrated the complexity of Cold War broadcasting through simplified visual representations intended for the wider audience, journalists, and the US government.

[28] Ibid. p.3
[29] Ibid. p.13
[30] Jerome S Berg, *Listening on the Short Waves, 1945 to Today* (Jefferson, N.C.: McFarland & Company, 2008), 270–72.
[31] Inscriptions attached to some photographs reveal that the archival collection was used in the 1950s-1960s during the Crusade for Freedom Campaign aiming to convince a wider American audience to raise funds for broadcasting to the communist world. See: Arch Puddington, *Broadcasting Freedom: The Cold War Triumph of Radio FreeEurope and Radio Liberty* (Lexington: University Press of Kentucky, 2000). Richard H. Cummings, *Cold War Radio: The Dangerous History of American Broadcasting in Europe, 1950-1989* (Jefferson, N.C: McFarland & Co, 2009). Richard H. Cummings, *Radio Free Europe's 'Crusade for Freedom': Rallying Americans behind Cold War Broadcasting, 1950-1960* (Jefferson, N.C: McFarland & Company, Inc, 2010).

One example is a monochrome map of Europe in which countries from Eastern Europe are marked in black, gray, and white according to reception quality of western radio.[32] "No jamming", "light jamming", "medium jamming", "heavy jamming", and "very heavy local jamming" are the categories of noise experience that divide the countries in the map. The level of jamming intensity was used as a rhetorical tool to illustrate Cold War political divides. Represented in white, Romania and Hungary (where in the late 1960s jamming was considered "light" or "no jamming") looked closer to the countries in the West, while Bulgaria, Czechoslovakia, and some areas of the USSR were illustrated in darker nuances due to persistent government attempts to silence western broadcasters.

Not all archived photographs, however, were dubbed relevant for press publications or public campaigns. Most of the materials had never seen the light of day. Miscellaneous visual traces prove invaluable for studying Cold War technology; in particular, those images of technical equipment. Among the photographs, one could find complex antenna facilities installed on the top of a building used for monitoring, as a hand-written inscription on a photograph indicates. Inside RFE/RL's technical facilities, a photographer captured a communication receiver Collins in front of a monitor equipped with headphones. "Security police watching from Monitoring tower at Oberwiesenfeld," reads an inscription from January 1964 suggesting that a former airport close to the radio's headquarters in Munich joined the locations suitable for radio monitoring.[33]

[32] HU OSA 3-1-8, RFE/RL Public Affairs Photographic Files, rfe_structure_003
[33] RFE/RL Public Affairs Photographic Files, rfe_architecture_078.

It is also significant that one could find images of computer equipment installed at a "data processing center" at the radio headquarters in Munich,[34] although the visual archive does not contain any evidence about the link between computers and acoustic information gathering. Nevertheless, one could draw parallels with other Cold War institutions since historians of technology had been emphasizing the crucial importance of data processing machines for intelligence information gathering and surveillance. As Friedrich Kittler points out, computers took over the process of evaluating intercepted radio signal at the US National Security Agency since 1957.[35] Focusing on the issue of automaticity, Kittler followed a book by James Bamford who (against the stream of the Cold War culture of secrecy) published detailed descriptions of the largest surveillance institution in 1982.[36] In retrospect, the emergence of data processing machines in the late 1950s, marks the most significant step in the history of surveillance up to the present day rise of digital communication.

Such a narrative, however, would have two flaws. First, the computers did not entirely obliterate the whole complex technological machinery used for radio monitoring. As the book by James Bamford testifies[37], and the RFE/RL archive corroborates, a ubiquitous technical set of antennas, radio receivers, and headphones constituted the most basic equipment for technical monitoring. Installed at specific geographical locations operated by human employees, such technologies provided the raw data to be statistically

[34] HU OSA 300-1-8, RFE/RL Public Affairs Photographic Files, rfe_workflow_005. An image of a computer Digital Equipment Corporation Model PDP 11 series used at the headquarters in Munich. According to the archival description attached to the photograph, the computers were assigned to the Central Newsroom word processing system and were used to "handle financial and administrative data."
[35] Friedrich Kittler, Observations on Public Reception in: Daina Augaitis et al., eds., *Radio Rethink: Art, Sound, and Transmission* (Banff, Alta., Canada: Walter Phillips Gallery, 1994), 76.
[36] James Bamford, *The Puzzle Palace: A Report on America's Most Secret Agency* (Boston: Houghton Mifflin, 1982).
[37] On the whole technological chain of radio intelligence data processing from antennas and receivers to computers see: Bamford, 210–31.

analyzed by computers and, from a historiographical perspective, it would be idle to prove a complete automaticity of Cold War radio monitoring technology. Second, while acknowledging the importance of computers, technology alone does not explain the issues that sustained the link between politics and technology throughout the Cold War. Thus, technical accounts in the Cold War archive could serve only as a mirror for understanding the politically conditioned thirst for objective data in a context of limited information and deliberate radio interference. **(Fig.4.1. and Fig 4.1b).**

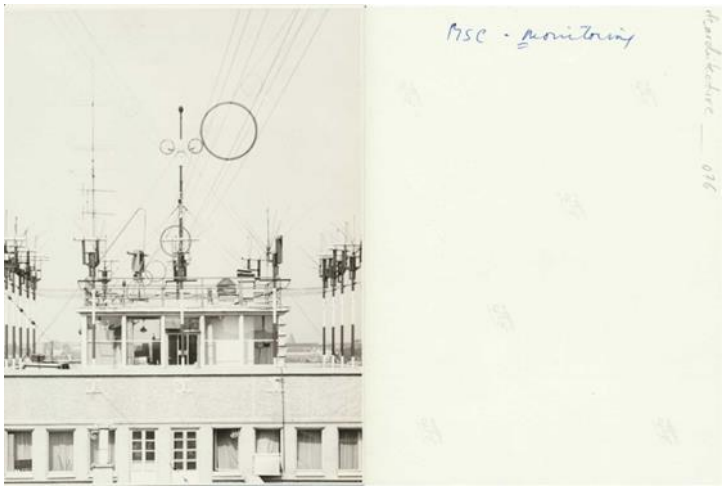

Figure 4.1a and 4.1b Antennas at technical monitoring stations, headphones, and communication receivers constituted the basic technological equipment for acoustic information gathering at RFE/RL. HU OSA 300-1-8, RFE/RL Public Affairs Photographic Files, rfe_architecture_078 and rfe_workflow_005. Ownership and copyright to the materials belong to RFE/RL, Inc., 1201 Connecticut Ave., N.W., Washington, DC 20036, USA.

Besides the practical aspects that reception depended on the interaction between technological tools and human listening skills at specific places, there was an ideal that lead us to the historical significance of the practice; in particular, the requirement to minimize the subjective perception of human listeners. A diachronic comparison of practices to reach objective indicators based on noise leads us back to the First World War when the roar of the battlefield became an object of scientific observation. Military sound observers then took the key task to distinguish particular artillery guns amid the roar of the battlefield. Analyzing the military contribution of physicists in the field of acoustics, Roland Wittje writes that "the objective of all sound location – whether in the air, underground, or in the ocean – was to gather information about the enemy. The sound of artillery shells, aircraft and ships could reveal information about their precise location and activities."[38]

Scientists involved in the Great War expressed for the first time the concern that would later re-appear in a different context during the Cold War: crucial information about the enemy depended on subjective human perception of sound. "Scientists on both sides worked feverishly on automating sound detection in order to eliminate the need for human observers and all the problems they posed for precision sound measurement," concludes Roland Wittje studying the phenomenon in the wartime context. "Sound detection by human observers was, by definition, a subjective method that depended on the hearing, sound perception, and reaction time of the individual."[39] Wartime technologies to record acoustic information such as stop watches, microphones, string galvanometers, oscillographs, and photographic paper often failed to provide accurate

[38] Roland Wittje, *The Age of Electroacoustics: Transforming Science and Sound* (Cambridge, Massachusetts: MIT Press, 2016), 70.
[39] Wittje, 72.

information and did not completely eliminate the practical need of subjective listening skills until the end of the war. [40]

Translating noises into standardized vocabulary was another road to objectivity emerging again at the intersection between science and the military. Historians of acoustic knowledge have identified the transition from sounds to linguistic codes as an important step in the process of knowledge production based on sound. Karin Bijsterveld follows trajectories of listening for knowledge characterized by verbal description of sounds, standardization, and classification of acoustic information. She focuses on an example from the 1950s when sonar operators monitored underwater sounds in submarines, which surprisingly inspired psychologists Lawrence Solomon and his mentor Charles Osgood to link acoustic knowledge with the "semantic differential", a widely used technique for measuring meaning, attitudes, and opinions.[41] While monitoring underwater sounds provided information about approaching enemy submarines and ships, acoustic indicators captured the attention of psychologists who were "intrigued by the informal 'sonar vocabulary' the operators had developed to distinguish between and communicate about the sounds that they heard. The sonar men described sonic signs with words such as "heavy," "light," "bright," "dull," "hard," and "soft".[42]

Radio technical monitoring provides another example of how wartime military practices shifted to the civilian realm with the beginning of the Cold War. While naval forces' nuanced classification made underwater sound intelligible, technical monitoring in the 1950s produced sonic data to inform policies in the sphere of international

[40] Wittje, 72.
[41] Karin Bijsterveld, *Sonic Skills: Listening for Knowledge in Science, Medicine and Engineering (1920s-Present)* (London: Palgrave Macmillan UK, 2019), 29, http://proxy.uqar.ca/login?url=https://doi.org/10.1057/978-1-137-59829-5.
[42] Bijsterveld, 30.

broadcasting and security. Verbalization of sounds (seemingly informal and closed in the frames of one professional group) allowed transfers of knowledge for wider potential users. The next subsection focuses on the stage when acoustic data collected and described by monitors entered the realm of politics – a process with global significance that connected information from ideologically divided places during the Cold War.

4.2. Politics of noise and silence

Following verbalization of acoustic information as a key for reading the Cold War archive, one could register similar processes across ideological borders. An example from communist Bulgaria shows similar strategies for technical monitoring; this time, monitors evaluated jamming noise in positive terms. Unlike other governments from the region who took decisions to cease jamming much earlier,[43] Bulgaria persistently tried to maintain an electromagnetic curtain over its territory almost until the end of the Cold War.[44]

The communist party elevated jamming of Western broadcasting to a matter of national security with a decision of the Politburo from 1966 titled "On the further

[43] Romania ended all jamming in 1963, Hungary ended all jamming in 1964. See George Woodard. "Cold War Radio Jamming." In A. Ross Johnson and R. Eugene Parta (Eds.), Cold War Broadcasting: Impact on the Soviet Union and Eastern Europe: A Collection of Studies and Documents (pp.51-63). (Budapest: Central European University Press, 2010)

[44] Only in 1989 the Central Committee of the Bulgarian Communist Party decided to cease the jamming of all western radio stations that transmit programs in Bulgarian language. Reshenie # 9 ot 23 mart 1989 g. ot zasedanie na Sekretariata na CK na BKP za spirane zaglushavaneto na chuzhdite radiostancii, izl"chvashti na b"lgarski ezik, s izkljuchenie na radio "Ankara". (Decision № 9, 23 March 1989 from a meeting of the Secretariat of the Central Committee of the BCP for cessation of jamming of foreign radio stations transmitting in Bulgarian language, except radio "Ankara") f. 1 B, op. 64, a.e. 909 available at Archives State Agency, Digitized Reports of Politburo and the Central Committee of the BCP, http://politburo.archives.bg/bg/2013-04-24-11-12-48/sekretnidokumenti/1980-1989/2354--9-23-1989- (Access date: October 28, 2019)

strengthening of the fight against the ideological diversion of imperialism."[45] Justifying jamming, the party officials then characterized Western broadcasters in the typical Cold War phraseology as tools of "psychological warfare" and "ideological diversion." [46] The political decision to combat enemy "diversion" entailed a vast amount of measures mobilizing several party institutions among which the Ministry of Communications, overseeing all technological aspects of radio defense.[47] In 1974, the Ministry sent a report to the Central Committee of the Communist Party that encapsulates the transfer of acoustic information from a technical monitoring post to the upper party echelon.[48] Regular technical monitoring brought to the fore the issue of growing "effectiveness" of enemy radio propagation.[49] Bulgarian engineers highlighted the "colossal potential of the major capitalist radios" characterized by "increasingly powerful radio transmitters reaching up to 500 kW and effective antennas with more than 200 times amplification." [50] The radio engineers duly "translated" this example in ideological terms: "capitalist countries regard short-wave radio broadcasting as an appropriate weapon for the purpose

[45] Protokol # 311 ot 18 oktomvri 1966 g. ot zasedanie na Politbjuro (PB) na CK na BKP. (Protocol № 311, 18 October 1966, Meeting of Politburo at the Central Committee of the BCP, f 1B, op. 6, a.e. 6419 available at Archives State Agency, Digitized Reports of Politburo and the Central Committee of the BCP, http://politburo.archives.bg/bg/2013-04-24-11-12-48/dokumenti/1960-1969/1326---311--18--1966- (Access date: October 28, 2019)

[46] Ibid, p. 11

[47] Ibid, p. 18 Assigned with the task "to neutralize the modern technical means of propaganda that the imperialist states use," the ministry then gained a significant role for the national security and throughout the Cold War was in charge of the vast infrastructure of jammers and radio monitoring posts. On the place of the ministry within the state security apparatus see also: Memorandum on the quality control of jamming operations against hostile radio stations, Sofia, August 7, 1956. in The Committee for Disclosing the Documents and Announcing Affiliation of Bulgarian Citizens to the State Security and the Intelligence Services of the Bulgarian National Armed Forces (CDDAABCSSIBNAF), State Security and the Hostile Radio Stations. (Sofia: CDDAABCSSIBNAF, 2014), 375

[48] Georgi Andreev, Vrazheskata radiopropaganda na b"lgarski ezik i s"stojanieto i dejstvieto na sistemata za radiozashtita, 24.09.1974 [The enemy radio propaganda in Bulgarian language and the state and actions of the system of radio defense] Tsentralen durzhaven arkhiv (TsDA) (Central State Archive, Sofia) TsDA, f. 308 op. 6C a. e. 1.

[49] "Effectiveness" was imagined as a complex effort including several technological components: "growing number of radio transmitters due to development of material-technical facilities of the opponents' side; more efficient use of the most appropriate frequencies according to time and season; wide opportunities for simultaneous broadcasting of multiple programs and frequencies, especially by deliberately synchronized agreement between our opponents." Ibid, p.3

[50] Ibid,p.4

of their ideological penetration and therefore pay utmost attention both to the development of foreign programs and to the technical coverage of their reception quality."[51]

Similar to western practices, paying attention to reception quality formed the basis of jamming. The service of radio defense consisted of interlinked transmission facilities and monitoring posts that reported regularly on the effectiveness of deliberate interference in the ether. Bulgarian radio defense used three words to describe noise: "excellent", "average", and "poor" - a mirror reflection of the language used by their Western counterparts:

Excellent – if we assess the efficiency of radio defense as "excellent" then the foreign radio station is not audible.

Average – when certain phrases or passages of the enemy radio program are intelligible

Poor – when almost everything in the program is intelligible.[52]

After being verbalized, noise became calculable. According to technical monitoring statistics from 1974, the overall Bulgarian radio defense against RFE was "excellent" in 76% of the period monitored, "average" in 18%, and "poor" in 6% of the time when engineers listened to slots of jammed radio.[53] Paralleled with scrutinizing sound quality, radio engineers studied foreign propaganda "volume" referring to the power of technical facilities to ensure more audible time in the ether. The Bulgarian authorities considered RFE the enemy radio with "the largest share" because it reportedly reached programs of around 9 hours per day in 1974. Radio engineers hired by the

[51] Ibid, p 6
[52] Ibid, p. 9
[53] Ibid, p. 10

communist party observed that the "volume" of enemy propaganda dramatically grows and reaches twenty-four hour programs during periods of political tensions. The report refers to the events of Hungary 1956 and Czechoslovakia 1968 as cases when foreign radios extended their audible time in the past, in order to classify the Turkish invasion of Cyprus in 1974 as a contemporaneous example of growing propaganda volume.[54]

Throughout the Cold War, acoustic information served as an indicator for interpreting political events and processes. Especially in times of conflicts and crises, technical monitoring generated immediate quantifiable data possessing an aura of objectivity – most cherished elements when enemies dubbed their opponent's propaganda untrustworthy and dangerous. Signal monitoring, a monotonous Cold War job, entered the spotlight of politics at a historical period marked by limited reliable knowledge and thirst for information.

Moving back to the western radio's archive, I will trace how acoustic information reached the public sphere during political changes. The press monitoring archive at RL contains examples of sound descriptions adopted by Western journalists seeking immediate access to reliable information about particular events in the USSR. A New York Times' article, published on August 22 1968 announces that "the Soviet Union began jamming Russian-language broadcasts from the Voice of America and other Western stations today for the first time in more than five years. The jamming began about two hours after it was announced here that troops of the Soviet Union, Poland, East Germany, Hungary and Bulgaria had invaded Czechoslovakia."[55] Jamming alarmed the

[54] Ibid, p. 3

[55] Nan Robertson, "Soviet Resumes Jamming of the Voice of America," *New York Times*, August 22, 1968, p.20. This and all following articles were kept in the RFE/RL archive due to reference to their own radio; in particular, the article contained information about radio signal quality amid jamming.

Western observers because regular monitoring recorded immediately the shift in propaganda tactics. The newspaper included descriptions of sound intensity from technical monitoring services at VOA: "jamming detected last night, became severe and continuous today […] there could be no precise estimate yet of the extent of the radio blackout."[56]

International observers recognized the political meaning of intensive jamming because it was preceded by more than five years of silence interpreted as a temporary relaxation of political tension. Noise and silence marked the two extremes in this Cold War dynamic. In 1963, when Soviet jamming ceased temporarily, an analytical comment titled "Open Air?" published in *The Economist* gave political meanings to silence. "The huge and costly system of jamming stations that Russia uses to prevent its people hearing American and British broadcasts has fallen silent, for the time being"[57], reads the opening. The commentary goes on: "[i]n general, the volume of jamming has varied according to Moscow's view of its current relations with the West. On the face of it, the total suspension that has now occurred for the first time implies that Mr Khrushchev feels happier than ever about these relations. Unfortunately, one cannot assume that the present venture into 'open air' will last, still less that it portends a more general relaxing of Soviet control over the Russian people's access to the news and views of the outside world."[58] Media publications combined acoustic descriptions with assumed political leaders' views, a rhetorical move to compensate for the typical ambiguity surrounding what Western observers would call reforms.

[56] Ibid.
[57] "Open Air?" *Economist*, 29 June 1963, p. 1344. The Economist Historical Archive, http://tinyurl.gale.com/tinyurl/C6KyY5. Accessed 31 Oct 2019.
[58] Ibid.

The fusion of technical and political vocabulary was not limited to media or state administration. I will trace how everyday language of radio technicians incorporated some key political phrases in the correspondence between RFE/RL engineers and their superiors at New York and Munich offices - an archive of encrypted messages.[59] Radio technicians were the first to witness a major withdrawal of jamming when the Soviet Union, Hungary, and Romania stopped temporarily their noise generators in 1963-64. Such political decisions were taken secretly by the high-level party leaders and never announced publicly. Despite the secrecy surrounding the issue, westerners learned promptly that jamming had ceased.

In June 1963, unusually long periods of clear reception invited speculations on the political reason behind the silence. One of the first encrypted messages concerning the Soviet lifting of jamming starts with calculating transmission power input and gradually introduces vocabulary of international relations:

[59] Thousands of encrypted short messages show an immediate exchange of information concerning heterogeneous issues related to the broadcasting operation. Reading tem, one can see that numerous messages contain brief communication that is either difficult to contextualize or impossible to use as a historical source; for instance, randomly selected messages show fragments of dialogues or short encrypted sentences meaningful only to the RFE employees who relied on everyday telex communication such as "shipped today forty encode" or "Purchased blond node German marks value Wednesday January 6." In this case study, it was particularly valuable to follow the telex correspondence created in 1963-1964 when jamming decreased and radio engineers wrote messages based on technical monitoring. During my research I used the digital collection and the search engine for focused research developed by the OSA archive. The curated digital collection Radio Free Europe/Free Europe Committee - Encrypted Telex Communication is available online: https://fec.osaarchivum.org/ Accessed: December 3, 2022. In this subsection, I am focusing only on the periods of political changes as reflected by shifts in jamming intensity. However, the archive provides instances when technical monitoring was used as a routine practice; in particular, during key political speeches broadcast live such as Eisenhower's address to the UN on 22 September 1960 or President John F. Kennedy's inaugural address on 20 January 1961. See the following archived messages: "NYC-90 September Crypto Message", 22 September 1960. HU OSA 298-1-2-35-0553c; 23 September 1960. HU OSA 298-1-2-32-2458; "MUN-102 January Crypto Message", 20 January 1961. HU OSA 298-1-2-43-0564; 21 January 1961. HU OSA 298-1-2-43-0570 in Records of Free Europe Committee: President's Office: Encrypted Telex Communication between FEC New York and RFE Munich; Open Society Archives at Central European University, Budapest.

> VOA is reducing its output from the Munich transmitter to 50 kW in response to the Soviet lifting of jamming. As you know, this transmitter has been operating on and interfering with Moscow frequencies. There is a rumor, entirely unconfirmed, that Hungarian jamming against VOA will be lifted this weekend. I have no information as to what use the Soviets are making or may make of the transmitters they now have freed up. … The most logical explanation on the Soviet side is that this is a dramatic and easily reversible way to indicate to the West that Moscow desires to proceed further along the road of accommodation. This would follow the precedent on the occasion of Khrushchev's visit to Eisenhower. I suppose another element might be a legitimate desire on the part of the Soviets to cut jamming costs and or to make facilities available for increased jamming against the Chinese and Radio Liberty and RFE.[60]

Amid speculations about the political reasons behind ceasing the skirmish in the ether, the burning question, from RFE's perspective, was whether the freed jamming transmitters formerly targeted to VOA and BBC would be used against RFE/RL.

Testing this possibility, RFE requested a comparison of sound quality behind the Iron Curtain before and after jamming ceased. According to the results, the possibility of directing more jamming facilities against RFE was not excluded: "An analysis of available technical monitoring reports for June indicates that jamming directed against RFE programs during the last week in June was greater than that observed during the first week in June, before Russian jammers discontinued their activity against BBC and VOA. […] It appears possible, at this point, that some of the jammers taken out of service have been reassigned to RFE."[61] This conclusion was drawn based on routine statistical reports of reception quality. According to the technical data, collected by monitors in Vienna, for

[60] "NYC-148 June Crypto Message", 27 June 1963. HU OSA 298-1-2-36-1047
[61] "NYC-32 July Crypto Message", 9 July 1963. [Electronic record] HU OSA 298-1-2-36-1101. Permanent URI: http://hdl.handle.net/10891/osa:77118198-0865-4902-850f-86bf650d482e [Accessed June 12, 2019]

instance, the channel effectiveness of the Czech program dropped from 43% during first week of June 1963 to 35% during the last week of the same month.[62]

Despite the precise data, engineers at RFE pointed to another reason for the loss of effectiveness. Jamming was in the focus of political discussions, but far from the only factor for noise in the ether. Soon after the report was published, an RFE employee voiced the opinion that changes in sound quality were due to propagation conditions: "This condition is a repeat of that experienced last summer wherein jammer effectiveness increased because of their ability to utilize ES on their short range operation … We must penetrate the E and ES to reach the F layer on our longer path, especially over 2000 km. This condition was also observed last summer when there was no change in VOA jamming. As a matter of fact, our total channel effectiveness is 5 per cent higher this year than last."[63] ES, the widely-used professional abbreviations in radio communication for sporadic-E clouds, illustrates that numerous environmental factors distorted sound. Parallel with jamming levels correlated with the political "atmosphere", Cold War practitioners measured the acoustic effects produced by changes in the ionosphere.

4.3. Noise in surveillance: multiplication of technical data in the Cold War archive

Supplementing technical monitoring with more precise data, the practice of evaluating sounds brought together two poles of knowledge production based on examining natural factors and radio audiences. While the former practice traced the

[62] Ibid.
[63] "MUN-38 July Crypto Message", 10 July 1963. [Electronic record] HU OSA 298-1-2-45-0617 Permanent URI: http://hdl.handle.net/10891/osa:d74ab2fe-a7f9-4a5c-910a-74fbc05a37cd [Accessed June 12, 2019]

changes in the ionosphere, the latter was associated with rare accounts from actual listeners to assess sound at the receiving end. The last subsection describes how those practices of knowledge production enriched the variety of technical data linked to Cold War broadcasting.

RFE/RL, the clandestine radios with its political mission to propagate freedom within the communist world by ceaselessly studying its societies, joined a constellation of institutions for information gathering during the Cold War – a space with significant implications for surveillance history. Radio acoustic monitoring, in particular, gives us insights into the rules of using technical data for observing populations. Today, this process is associated with the notion of "metadata" with its potential to inform governments through large archives of peripheral information. The earliest uses of the term according to the Oxford English Dictionary date back to the late 1960s when programming language defined metadata as "[a] second data element represents data 'about' the first data element."[64] If the first element contains communication *content*, each consecutive element keeps information about the communication *context*. With the proliferation of metadata surrounding today's digital world, technical information related to trajectory of movement, time, or place accumulate archival data for surveillance of social patterns. Communication's context with its statistical significance provided precious information for governments across borders. The significance and the novelty of the practice emerges once compared with the major watershed in surveillance history during the Great War when belligerent countries introduced unprecedented systematic letter censorship and reported (with precise categories) on the public mood based on

[64] Oxford English Dictionary, s.v. "metadata."

correspondence content.[65] Above all the implications linked to privacy, the urge to access a potential all-encompassing knowledge about whole societies would characterize surveillance ever since.

Radio signal monitoring enhanced the ever growing desire for information introducing technical data thus opening a new territory of knowledge production beyond the human categories that traditionally delineated the management of populations such as public mood, demography, wealth, labor, and epidemics.[66] Analyzing acoustic information gathering against the backdrop of surveillance history demonstrates the expansion of spaces for surveillance during the Cold War. At the same time, it is important to keep in mind that Cold War practitioners questioned the reliability of acoustic data, which leads us to another fundamental aspect: the spread of technical information in heterogeneous archival units and the rule of correlating such units to prove its validity. That is, politically loaded technical data metastasized expanding further the technological sphere of surveillance.

The RFE/RL archive provides examples of interrelated data elements with technical information used for studying the dynamics of politics and dissent behind the Iron Curtain. Meteorological data and audience surveys complemented monitoring which

[65] On the significance of mass censorship and reports on public mood based on extensive postal monitoring introduced during the First World War see: Peter Holquist, '"Information Is the Alpha and Omega of Our Work": Bolshevik Surveillance in Its Pan-European Context', *The Journal of Modern History* 69, no. 3 (1997): 415–50. Peter Galison, 'Blacked-out Spaces: Freud, Censorship and the Re-Territorialization of Mind', *The British Journal for the History of Science* 45, no. 2 (June 2012): 235–66, https://doi.org/10.1017/S000708741200009X.

[66] The paper considers the emergence of statistical and demographic categories used to inform government of "the population", as conceptualized after the mid-XVIII century, as another key turning point in the history of surveillance. On the history of the management of populations and the urge to act on the population see: Michel Foucault et al., eds., *The Foucault Effect: Studies in Governmentality: With Two Lectures by and an Interview with Michel Foucault* (Chicago: University of Chicago Press, 1991), 87–104.

illustrates how heterogeneous indicators were collated to draw conclusions with political significance.

Throughout the Cold War, RFE followed how nature affected broadcasting. Stanley Leinwoll, a leading RFE engineer, studied extensively conditions of radio reception during the Cold War. [67] Leinwoll served as a Radio Frequency and Propagation Manager at RFE in the 1960s. While working at RFE, he published regularly a column of short-wave forecasts in the American popular technology magazine Radio Electronics. He published time schedules for the best possible listening reception of international broadcasting and brief comments concerning monthly conditions of short wave reception.[68] For both professional technicians and amateur listeners beyond borders, the culture of international broadcasting entailed forecasts.

One year before Soviet jamming withdrawal triggered political predictions, Stanley Leinwoll published his regular forecast for broadcasting reception for June-July 1962 explaining how sporadic-E clouds affect reception: "During the summer there is a significant increase in the formation of sporadic -E (ES) clouds in the ionosphere. These clouds, or patches of extremely high ionization density, permit reflection from the ionosphere of frequencies much higher than those normally reflected by the F- layers of the ionosphere. There is evidence this summer will be just as bad; recent studies indicate sporadic –E occurrence may be more frequent during years of minimum sunspot activity."[69] Leinwoll's description of natural phenomena in 1962 explains why RFE's

[67] Leinwoll was a widely-recognized expert in short wave broadcasting and an author of books on theory and history of radio communication. His presence among RFE engineers illustrates the need for profound understanding of sonic disruptions, only partially created by jamming. His main publications include: Stanley Leinwoll, *Shortwave Propagation.* (John F. Rider Publisher: New York, 1959). Stanley Leinwoll, *From Spark to Satellite: A History of Radio Communication* (New York: Scribner, 1979).
[68] Radio Electronics, July 1961, p. 38
[69] Radio Electronics, July 1962, p. 41

engineers cast doubts about precision of noise evaluation at the moment when jamming stopped in the summer of 1963.

In Cold War broadcasting practice, changes in the ionosphere, especially regular seasonal changes that can be predicted, constituted a separate object of research. Technicians followed meteorological data about solar radiation. Solar activity forecasts appeared regularly in the RFE engineering department's archives where sound quality was measured in varying temporal frameworks of days, months, or years. The archived communication marked 1957 as a year with predictable sound disruptions. A memorandum provides the reason with a vivid description of sunspots, a key index for FM forecasts: "The sun appears to be in the constant state of eruption with enormous geysers of luminous gas shot from the interior like fire from a flame thrower."[70] According to the forecast, the highest sunspot number of 189 was recorded in 1778 and 1957 would witness even higher levels.[71] Engineers translated such data to their superiors in the consensual acoustic category of poor signal.

Studying atmospheric phenomena in detail, radio engineers predicted days with poor signal quality contributing to an accurate acoustic assessment of Cold War broadcasting. Judging by monthly meteorological information memorandums in the technical archive, RFE relied on Monthly Long Range Forecasts in the 1950s. A separate forecast for each day of the month was given for daytime and nighttime propagation.

[70] Claude Harris, "What are sunspots and why are they important to RFE?," April 30, 1957, in HU OSA Archive, Funds 298, unprocessed collection of archival documents. Although this technical correspondence is part of an unprocessed collection, I am grateful that the Open Society Archives provides access to all available documents from the engineering department. The significance of this particular archival collection is discussed in Georgi Georgiev, *Cold War Engineering: Technical Infrastructure, Noise, and Geography in Radio Free Europe's Operation in the 1950s and the 1960s*, CEU History Department Master Theses 2015/9 (Budapest: Central European University, 2015).
[71] Ibid.

Each day was evaluated as "poor", "fair to poor", "fair", "fair to good", or "good"[72], referring to both the state of the ionosphere and the prospects of accomplishing the political mission of delivering signal to the target countries. The sun and the ionosphere were perceived not merely as neutral or unavoidable, but analyzed as active participants in the Cold War dynamics.

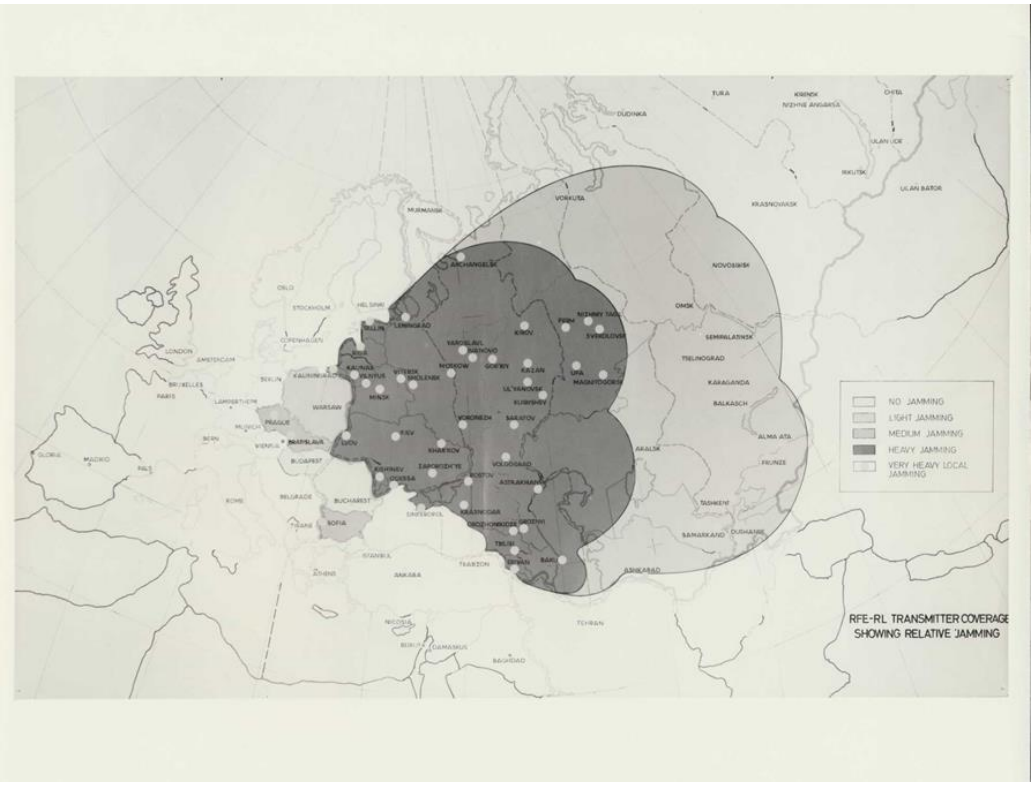

Figure 4.2 A map of Europe based on the intensity of radio jamming. HU OSA 300-1-8, RFE/RL Public Affairs Photographic Files, rfe_architecture_078 and rfe_workflow_005. Ownership and copyright to the materials belong to RFE/RL, Inc., 1201 Connecticut Ave., N.W., Washington, DC 20036, USA.

Another archival set of documents with acoustic information leads us back to the issue of subjective listening perception, which inspired audience surveys providing alternative statistics about jamming intensity based on actual listeners' accounts. **(Fig.4.2)** Max Ralis, a manager of the Media and Opinion Research Department at RL in the 1950s,

[72] Radio Free Europe, Memorandum, Long range forecasts, January–December 1956, in HU OSA Archive, Funds 298, unprocessed collection of archival documents quoted in Georgiev, *Cold War Engineering*.

was one of the most experienced sociologists who studied Soviet radio audiences of Cold War broadcasting.[73] In the first years of RL's operation, his department created numerous reports revealing practices of western radio listening in the USSR. [74] A report with a special section titled "The Dilemma"[75] provides reflections on conflicting data on reception conditions coming from monitoring reports from the US embassy in Moscow and audience surveys. "Soviet citizens claim to listen to Russian-language broadcasts by Western stations. Then, monitoring reports by Americans in the USSR say receptivity of these broadcasts is "nil.", begins the report emphasizing discrepancies of subjective acoustic perception. The author of the report tries to assess the "actual situation" explaining why reports from Soviet citizens should be taken into consideration:

> What is the actual situation? … How can it be explained that in districts where reception is reported as "nil", some Soviet citizens claim to have heard VOA and RL? Is it conceivable that so many Soviet citizens were only boasting that they had listened to the "forbidden fruit"? Is it possible that the above-mentioned U.S. monitors operate under especially unfavorable listening conditions? Can other aspects in monitoring offer a clue to the "nil" reception of RL signals? These and other related questions require replies[76]

For sociologists like Max Ralis who conducted surveys under unfavorable conditions the prospect of collecting unreliable data was a central issue in his professional domain. A significant part of RL's interviews with Soviet citizens, for instance, took place in refugee camps where escapees from communist countries tailored their biographical

[73] Graham Mytton, 'Audience Research at the BBC External Services during the Cold War: A View from the Inside', *Cold War History* 11, no. 1 (1 February 2011): 49–67, https://doi.org/10.1080/14682745.2011.545597.
[74] The majority of these early reports were written or approved by Ralis as a department manager and carried a typical professional ethos of avoiding biases in gathering information while acknowledging the limitations that Cold War politics imposed on researchers.
[75] Analysis Report, 10-58. "Some notes on the contradictory data on RL reception in target areas", December 8 1958, p.2 in HU-OSA 300-6-1, box.1
[76] Ibid, p.2

stories to suit the desired status of a political refugee. Listening to a forbidden clandestine radio suited narratives about political repression and persecutions, but did not always correspond to the real situation in the Soviet Union where often tuning in to western stations required painstaking struggle to listen through jamming noise.

Audience researchers at RL distinguished between two types of responses about radio listening: "those who give ample proof of actual listening" and "those who just claim they have listened."[77] In order to classify a response as reliable RL researchers developed a set of "internal checks which validate listening claims."[78] Among the internal checks were: remembering specific program parts, describing the time and place of listening, and describing the conditions of reception of the broadcasts. The third example of an internal check implies that a sincere description of sound perception was an indication of speaking the truth about radio listening.

How were listeners' evaluations of reception quality described, standardized, and used? RL conducted one of its first systematic audience surveys during the Brussels world fair in 1958. The opportunity to collect "first-hand" accounts from a large group of Soviet citizens at the Soviet pavilion was rather an exceptional case. As the final report from the field research emphasizes, this was a "special occasion for Soviet citizens to wander about in large numbers with relatively little supervision."[79] "It was the first time in history that several thousand Soviet civilians could be expected to visit a single area outside the USSR within a six month period."[80] RL audience interviewers received instructions to expect biased data and be attentive to the spontaneity of responses: "information on radio

[77] Ibid.
[78] Ibid.
[79] Analysis Report, 8-58. "Journey to Brussels Study," November 14, 1958, p.2 in HU-OSA 300-6-1, box.1
[80] Ibid, p. 2

listening was not solicited but was imparted in a spontaneous way in the course of general conversation."[81]

According to the Brussels' study final results "only a small section of RL listeners seem to enjoy clear reception of RL programs."[82] Based on description of noise levels in listeners' accounts, RL researchers classified all responses in five categories: "heavy jamming", "some jamming", "partly jammed", "mostly intelligible", and "clear." The majority of the respondents reported jamming. Based on this result audience researchers at RL concluded that half of the Soviet visitors in Brussels who claimed foreign radio listening were not "serious listeners"[83] which they defined as "listening frequently under conditions of reasonably clear reception."[84] During its first decade, the department collected numerous accounts on broadcast intelligibility heard in the USSR. The following contain details of reception conditions considered credible:

> A girl delegate mentioned that RL was heavily jammed in Voronezh, but that it was possible to listen to it and other Western stations between 2 and 3 am. Reception of RL, however, had been good in the Barnaul area in 1957 and 1958, while she was working on the virgin lands there.
>
> A maintenance engineer from Kamenskaya mentioned that reception of RL broadcasts varied; sometimes VOA came through better, and sometimes RL. He personally listens in the evening after his supper. [85]

Audience researchers implied that only experienced listeners of jammed radio at home could possibly reflect the interaction between radio technology and audience during the Cold War. According to the audience research experts who aspired to correct the

[81] Ibid, p.22
[82] Ibid, p.32
[83] Ibid, p.33
[84] Ibid, p.33
[85] Those listeners' accounts are recorded in a report from RL audience survey conducted during the World Youth Festival in Vienna in 1959 attended by around 800 Soviet citizens represented limited part of the society: students, sportsmen, artist, musicians, and ballet dancers. Analysis Report, 5-1959. "Seventh World Youth Festival, Vienna 1959 as seen by Audience Research and Evaluation Department, Radio Liberty," September 22, 1959, p.22 in HU-OSA 300-6-1, box.1

defects of radio technical monitoring, "[t]he thirst for news from the West drives many Soviet listeners to spend many hours ascertaining the optimum times of listening, profiting by holes in Soviet jamming, becoming expert at tuning in to a known wave length irrespective of monthly "Broadcast schedules" (on which monitors seem to lean.)"[86] "Special attention should be given to technical and human factors in the monitoring process in order to simulate the listening conditions under which Soviet citizens tune in and hear Western Russian-language broadcasts,"[87] concludes the audience research department that introduced its own methods to reach precise knowledge beyond all human, natural, and political factors during the Cold War.

Conclusion

The story about noise transformed into calculable categories is embedded in the Cold War archive and cannot be told and understood detached from the archive as a medium and context. Precise timing of registered noise or silence, geographical places linked to jamming intensity, environmental factors affecting FM broadcasting, and listeners' reports on acoustic perception – these were all technical indicators observed and duly archived in the process of studying radio sound quality during the Cold War.

While technical notions also created a space for research and assessment beyond any media content during the propaganda war, technology served as an objective basis for knowledge production when the world was ideologically split and limited access to factual information constituted a norm. Acoustic data obtained from radio environment created a much needed and immediately accessible factual language that stripped away omnipresent propaganda misinformation. However, as Cold War researchers often noticed

[86] Ibid.
[87] Ibid, p.5

and explained in their own words, technology operating at its limits never reached such an ideal of objectivity. Complete automatism then was impossible. Those familiar with the everyday landscape of this techno-political reality, created simultaneous spaces for human skills, uncertainties, doubts, and debates linked to precise data.

All these aspects are recorded in the archive of acoustic technology, which could be approached as a monumental reference to study contemporary issues related to surveillance. While the Cold War period is widely associated with eavesdropping, this case study demonstrated that history of sound could be told from a completely different perspective when practices of acoustic information gathering envisioned a massive audience of radio listeners. Similar with the excitement of the limitless FM radio audiences in the post-war years, expansion of digital content generated by users in a networked internet environment marked the first decade of the XXI century. Not long after the new interactive audiences of internet users emerged, the widely shared concern about practically limitless surveillance cast a shadow on the initial fascination by the modalities of communication in the digital world.

From a historical perspective, personal privacy was not the only central issue. The emergence of a parallel focus of information gathering shifted the attention from communication content to all possible technical data that could be generated around the message. Technical monitoring testifies to the growing expansion of institutions and practices that could generate data on interrelated categories of place and time of noise, atmospheric conditions, and sound perception of media users. Technology operating at its limits during the Cold War made possible to imagine and ascribe political meanings to unlimited technical categories, once archived.

Conclusions on new and old techno-political fantasies

The story about Cold War technology is a story about materialized fantasies. Soviet naval officers day-dreamed about attacking vulnerable enemy communications in disregard of their own technical weakness. Communist propagandists imagined the dangers of spy equipment and terrorist activities with exploding balloons. Thirsty for reliable sources, western monitors produced quantitative data on signal quality, while jamming technicians received party instructions to reach the ultimate effectiveness of noise. What is the use of knowing such Cold War stories?

The first thing to remember is that fantasy contains nuanced meaning. Besides "fiction," it denotes a "visionary notion or speculation," "a product of imagination," or "a day-dream arising from conscious or unconscious wishes."[1] Thus, one could argue that Cold War fantasies are not simply false or misleading historical accounts. Instead, they are imprints of the imaginative visions and conscious wishes of the politics of the era. During the Cold War, political constraints stimulated technological day-dreaming. One needed solutions for persistent problems of crossing sealed borders, silencing ideological enemies, and obtaining reliable information. From this perspective, fantasies contain evidence about political issues and available technological solutions.

Historians have proven the importance of exploring such archival territories beyond the polar categories of fiction and reality. In his essay "Terror and Dream: Methodological Remarks on the Experience of Time during the Third Reich," Reinhard Koselleck explained the historical value of archived narratives about dreams. He gives the example of a dream recalled by a Jewish

[1] Oxford English Dictionary, s.v. "fantasy."

doctor in 1934. It testifies to the terror and anti-Semitic legislation in Nazi Germany: "[w]hile I am peacefully lying on the sofa after surgery, around nine in the evening, reading a book on Mathias Grunewald, suddenly the walls of my room and apartment disappear. Appalled, I look around: all apartments, as far as the eye can see, no longer have any walls. I hear a loudspeaker bellowing: 'in accordance with the decree of the seventeenth of the month on the abolition of walls.'" The technological object is not an insignificant detail in the dream - loudspeakers served as politicized technology of terror in Nazi Germany. As Koselleck explains, "[t]he political meaning of the dreams, even if socially conditioned and concealing a private fate, remains directly evident."[2] He introduced the metaphor of the "X-ray" to describe how the external manifestations of politics are analysed in the contrasting backdrop of the personal narratives.[3] Similarly, the technical archive of fantasies provides X-ray images to broader political issues of the period under observation.

Today, the digital environment generates copious examples of techno-political fantasies informing decision-making. Because information and misinformation multiplies instantaneously online, journalists and government officials in democracies feel a constant pressure to provide immediate and meaningful comments on sensitive issues in the technological realm. Knowledge about Cold War technology could inform deliberate responses.

A case in point is the accident from February 2023 when US military airplanes shot down three Chinese balloons flying over American territory. According to some media publications, the old technology carried sophisticated devices for electronic signal intelligence in real time.[4]

[2] Reinhart Koselleck, *Futures Past: On the Semantics of Historical Time*, Studies in Contemporary German Social Thought (Cambridge, Mass: MIT Press, 1985), 220.
[3] Koselleck, 226. Koselleck uses the example to describe personal manifestations of terror.
[4] Mike Wendling, "Spy balloon sent data to China in real time – report,"*BBC News*, April 3, 2023. https://www.bbc.com/news/world-us-canada-65169855 Accessed: May 6, 2023.

This was a typical Cold War security concern. As the last chapter shows, gathering technical information on electronic communication was considered normal in the US since the early Cold War years. If we ignore this aspect, a potential threat from China would seem too alarming for US officials. Besides relevant concerns about intelligence gathering, the incident provoked the spread of online conspiracy theories misinforming that Chinese balloons were designed to carry biological or nuclear weapons.[5]

In light of the history of Cold War fantasies, none of the abovementioned elements sounds surprising. As in the case study about Free Europe balloons, the contemporary example proves that forgotten technologies re-emerge to embody the dream of crossing sealed information spaces. We have to keep in mind that such cases imply limited knowledge about technology and information gathering across borders.

President Joe Biden's address after the balloon accident confirmed it. First, he emphasized that North American Aerospace Defense Command radars closely scrutinize the US airspace. Due to technical improvements the radars are able to "pick up more slow-moving objects."[6] "We could not rule out the surveillance risk of sensitive facilities," said Biden addressing the relevant concern that balloons could provide signal intelligence. At the same time, he was mindful about the limits of available information: "[w]e don't know exactly what these three objects were, but nothing right now suggest they were related to Chinese spy balloon program (…) We don't have any evidence that there has been sudden increase in the number of objects in the sky," said Joe Biden a week after the Chinese airborne objects were destroyed.

[5] David Klepper, "Rumors swirl about balloons, UFOs as officials stay mum," *Associated Press*, February 14, 2023. https://apnews.com/article/technology-politics-united-states-government-district-of-columbia-china-8a04a3fc52516fefcbeae5492ffb25c4 Accessed: May 6, 2023.

[6] Remarks by President Biden on the United States' Response to Recent Aerial Objects, February 16, 2023. https://www.whitehouse.gov/briefing-room/speeches-remarks/2023/02/16/remarks-by-president-biden-on-the-united-states-response-to-recent-aerial-objects/ Accessed: May 8, 2023.

Such words of uncertainty expressed by US authorities were an immediate antidote for the language of conspiracy theories which often imitates straightforward facts.

It would be naïve to believe that such familiar accidents from the old propaganda conflict would cease to appear. But it will also be challenging for future generations of journalists, political leaders or historians to draw parallels between new and old techno-political fantasies. The post-Cold War generations are at risk of ignoring continuities in the political uses of technology. Tony Judt was among the historians who recognized the global aspects of the culture of amnesia after the end of the Cold War. "With too much confidence and too little reflection we put the twentieth century behind us and strode boldly into its successor swaddled in self-serving half-truths: the triumph of the West, the end of History, the unipolar American moment, the ineluctable march of globalization and the free market,"[7] pointed out Judt in the introduction of his collection "Reappraisals. Reflections on the forgotten twentieth century" written between 1994 and 2006. He continued: "[w]e have become stridently insistent – in our economic calculations, our political practices, our international strategies, even our educational priorities – that *the past has nothing of interest to teach us*. Ours, we insist, is a new world; its risks and opportunities are without precedent."[8] Judt did not underestimate the contribution of rapid technological changes to this process. He contrasted the sense of limited available information in the past with the infinite online knowledge of today. The latter implies an absence of shared knowledge and a common culture. "[I]n the absence of any common culture beyond a small elite, and not always even there, the particular information and ideas that people select or encounter are determined by a multiplicity of tastes, affinities, and interests. As the years pass,

[7] Tony Judt, *Reappraisals: Reflections on the Forgotten Twentieth Century* (London: Vintage, 2009), 2.
[8] Ibid. Emphasis in the original text.

each one of us has less in common with the fast multiplying worlds of our contemporaries, not to speak of the world of our forebears,"[9] concluded Judt.

With this in mind, the present work emphasizes the absence of any revolutionary change in Soviet military thought since the end of the Cold War - another reason to explore continuities and re-emergence of Cold War fantasies in future research endeavours. The present historical moment provides us with other relevant examples for studying techno-political interrelationships in the military realm. Let us consider another example when an unmanned aerial vehicle became a main political protagonist. On May 3 2023, video footage of two drones attacking the Kremlin appeared on Russian social media. A video shows a drone exploding a second before hitting the dome of the Senate Palace in Kremlin.[10] The Russian news agency RIA Novosti published a brief message in the social media platform Telegram immediately after the event. According to the official source, the military and special services "timely" destroyed the drone using "a system for radiolocation combat."[11] It is important to bear in mind that the accident happened on the eve of a grandiose propaganda event in the former Soviet Union – the Victory Day military parade planned for May 9.

In this case, it would be idle to try to prove the authenticity of this particular footage or assess the reliability of information provided by Kremlin officials who instantly claimed Ukraine and the US were responsible for the accident. This will be challenging even for future historians. However, one can immediately recognize the Cold War fantasies imprinted in technology. One notices the typical Soviet military story about radiolocation technology designed to protect the

[9] Judt, 5.
[10] "Russian video circulates after Kremlin drone attack claims," *BBC news*, https://www.bbc.com/news/av/world-65466372 Accessed: May 6, 2023.
[11] The message was published by RIA Novosti in the Telegram channel of the news agency. "Dva bespilotnyh letatel'nyh apparata byli naceleny na Kreml'," *RIA Novosti,* https://t.me/rian_ru/201567 Accessed: May 6, 2023.

local authorities and provide information about ideological enemies. From this perspective, the immediate decisions in the aftermath of the accident are not surprising. They entailed jamming of GPS signals in Moscow[12] and probably other still secret measures to identify and attack potential enemies through technical means.

By all means, future historians should expect imposed silence on the political involvement in technical matters. The Cold War culture of secrecy marginalized the voices of those possessing intimate knowledge of the vast infrastructure that sustained the war in the ether. In this respect, technical documentation used in the analysis of Cold War technology was not among the typical set of sources in the study of political history. Engineers and technicians did not explicitly speak about the process of offering solutions for political problems.

This uncomfortable starting point is not so uncommon for medieval historians, for instance, who often have even fewer options to interrogate scarce available sources. In a comment on Marc Bloch's profound work on method, *The Historian's Craft*, Carlo Ginzburg emphasized Bloch's contribution to encourage historians to re-visit overlooked archival testimonies. Carlo Ginzburg observed that *The Historian's Craft* often evokes the example of the lives of early medieval saints to propose an oblique approach to archives. Often invented, the biographical details of saints' lives constitute an invaluable testimony about thought and way of life in the epoch. This is an example of involuntary evidence within such types of sources.[13] "Against the positivist skepticism that cast doubt on the believability of one document or

[12] Pjotr Sauer, "A 'nervousness never seen before' hits Moscow before Victory Day parades," *The Guardian*, May 7, 2023. https://www.theguardian.com/world/2023/may/07/a-nervousness-never-seen-before-hits-moscow-before-victory-day-parades Accessed: May 8 2023.

[13] In Marc Bloch's words, "[a]t least three fourths of the lives of the saints of the high Middle Ages can teach us nothing concrete about those pious personages whose careers they pretend to describe. If, on the other hand, we consult them as to the way of life or thought peculiar to the epoch in which they were written (all things which the biographer of the saint had not the least intention of revealing), we shall find them invaluable" See: Marc Bloch, *The Historian's Craft* (Princeton, N.J.: Recording for the Blind & Dyslexic, 2007), 63.

another, Bloch offered, on the one hand, involuntary testimonies, and on the other, the possibility of isolating within voluntary testimonies an involuntary, hence deeper, core. Against the radically antipositivist skepticism which attacks the reliability of texts as such, one can use a line of argument that is in some way analogous to Bloch's. By digging into the texts, against the intentions of whoever produced them, uncontrolled voices can be made to emerge,"[14] explains Ginzburg.

Reading freely accessible technical traces against the intentions of those who produced them during the Cold War, this work implies that a deliberate critical stand against contemporary destructive uses of communication technology can be based on evidence stemming from available sources. Even dreams and noises are traces of the truth which, for the historian, as Carlo Ginzburg reminds us, is not a point of departure, but a point of arrival.[15] Once technology is deployed for wars of noise, nobody can silence the remaining technical archives of fantasies.

[14] Carlo Ginzburg, *Threads and Traces: True, False, Fictive* (Berkeley: University of California Press, 2012), 3.
[15] Ibid., 6.

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