CHAPTER 2

GRU Headquarters
Moscow, Russian Soviet Federative Socialist Republic
January 24, 1968

MIKHAIL LAVRINENKO COULD TELL that Sergei Egorov was nervous. That was not uncommon. Everyone was nervous when meeting with the director of the GRU, the main intelligence directorate of the general staff of the Soviet Armed Forces. Lavrinenko knew that his appearance added to the intimidation factor of his title. Even at this later stage in life he had maintained the hairline of his youth. His black and gray hair was in a battle that had reached a stalemate, though the GRU director knew that the army of gray would soon overtake its adversary. It was inevitable. He had never considered taming the rogue nose and ear hair that protruded from those appendages at excessive lengths, nor had he once trimmed his eyebrows, which sprouted hair in varying directions. His lack of refined grooming gave him the look of a wild animal. It also helped distract from his significant girth.

In certain circles, the GRU was more feared than their neighbors in the KGB, though the KGB certainly held the distinction of having more international recognition. The GRU was the intelligence arm of the Soviet military and therefore had no direct links to its counterpart in the KGB.

Two foreign intelligence services serving different masters led to a deep rivalry, with the GRU viewed as subordinate. That perceived standing did not bother Lavrinenko. It allowed the GRU the ability to maneuver in ways that the KGB could not, something that fit his current needs, though he planned to work his way back into the ranks of his former intelligence agency in due course. Perhaps the man before him could accelerate his transfer and promotion. It all depended on how this situation was handled.

Egorov had landed at Khodynka Airfield on the outskirts of Moscow earlier that morning on a flight from Schönefeld Airport in East Berlin. He was met by rough-looking Spetsnaz soldiers in ill-fitting dark suits and escorted through a special entrance that led directly from the airfield into the GRU headquarters campus, the centerpiece of which was a nine-story glass-encased tower called the Aquarium. It was bordered by a two-story structure that housed administration and support offices. An adjacent fifteen-story building that resembled a larger version of Moscow's concrete Khrushchevka communal housing facilities was located just beyond the GRU's gates. It housed the intelligence service's employees and their families.

Lavrinenko wondered if his guest was aware that the Aquarium sat atop a mass grave.

Despite the significance of the GRU's mission, its entire headquarters facility was deteriorating. The dilapidated structures stood in sharp contrast to the KGB's Lubyanka building in central Moscow just northeast of Red Square. Lubyanka's towering Neo-Baroque structure had once housed an insurance company and was built on the spot where Catherine the Great had headquartered her secret police. Lavrinenko thought it fitting that the building had returned to its roots following the Bolshevik Revolution. He had been proud to work in the yellow-and-red-brick building, walking underneath the hammer and sickle chiseled into the marble over the entrance each morning when he had been tasked with countering the largest and most secretive intelligence agency in the United States, the National

Security Agency in Fort Meade, Maryland. He had been entrusted to stand up a new Special Section of the Eighth Chief Directorate, a cryptanalysis department specifically dedicated to penetrating the NSA. He had done so with great success.

That was before the fall.

The Soviet leadership had made a habit of demoting KGB officers they saw as competition for new leadership. Lavrinenko knew that was part of the cycle. He had seen it before. Several GRU directors had come from the KGB and its predecessor organizations dating back to the Cheka—the All-Russian Emergency Commission for Combating Counter-Revolution and Sabotage—established in 1917 in the wake of the October Revolution. Lavrinenko had worked for KBG chairman Ivan Serov from 1954 to 1958. Nikita Khrushchev had demoted Serov and banished him to head the GRU, which he did until 1963. Serov had barely escaped the firing squad when it was discovered that his protégé was spying for both the British and the Americans.

Lavrinenko would not make the same mistakes.

The GRU director studied his visitor.

Lavrinenko discerned that Egorov was forcing himself not to chew on his already gnawed fingernails. He had instead settled for picking at a bit of stray skin on the cuticle of his left thumb. In an attempt to prevent further fidgeting, the portly engineer wiped a strand of unruly thick black hair from his sweaty forehead. The bitter cold of a Russian winter was kept at bay by a centralized steam heating system that, when it worked, made the Aquarium uncomfortably hot. He pushed his horn-rimmed glasses back into position on the bridge of his nose and squirmed in his uncomfortable chair. Lavrinenko knew the engineer was wondering why he had been so abruptly summoned to Moscow. Such summonses had a history of not ending well in Soviet Russia.

Egorov's eyes were drawn to the huge window at Lavrinenko's back, a window through which one could see the airfield, its thick concrete

wall, a maze of barbed wire, and the GRU's infamous crematorium. A conspicuous square chimney extended from its black asphalt roof. Today a light gray smoke billowed from it toward the heavens.

"Do not worry, Comrade Egorov," Lavrinenko said. "Only sensitive papers are being burned today. Humans make a darker, oilier smoke."

Every member of the GRU knew that they would one day leave the intelligence service through that chimney. All hoped it would be in a casket when they were old and gray, decades removed from the secret world. Each of them also knew there was another way to go. They had been required to view a film while in training, a black-and-white video of a man bound to a stretcher with wire, forced to watch caskets of better, loyal men fed into the furnace on guide rails. There was no sound in the video, which somehow made it all the more disconcerting for GRU recruits; the bound man screams, eyes wide with madness, drenched in sweat, the veins on his face and neck bulging to the point of bursting as he tries desperately to break free. The man is in a suit and the implication is clear—betray the GRU at your own peril. The recruits watch as men in gray or silver—it is hard to tell in the video—heat-resistant insulated suits pick up the stretcher, set it on the rails, and slowly insert the man into the flames. His shoes catch fire first, the hungry furnace devouring him at an excruciating slow pace. He can be seen writhing in agony as he is consumed by fire. His head and hair are the last things to combust before the furnace doors close. No GRU recruit ever forgets. The chimney and smoke of the crematorium at GRU headquarters are an ever-present reminder of the cost of betrayal.

It was not unintentional that Lavrinenko's office window offered the best view of the crematorium in the Aquarium. All who stepped through his office doors were on notice.

Tracking down the GRU's best cryptologist in the electronic communications department had fallen to his deputy director, Anatoly Penkovsky. He had found Egorov in East Berlin.

Lavrinenko turned his head to his second in command, who sat in an

overstuffed leather chair to the right. Thin and pale to the point of looking sickly, Penkovsky stood and handed the young engineer a file stamped in red with SPECIAL FOLDER: PARTICULARLY IMPORTANT, the highest Soviet classification. He then retook his seat without a word.

Penkovsky never said much during meetings. His primary job was to make people uneasy. In his tweed jacket and off-white shirt, he looked more like a downtrodden professor than an intelligence officer, though as many had learned, he was to be underestimated at one's own peril. He was the director's eyes and ears, a consummate strategist who listened and took copious notes, thoroughly documenting every issue and decision. Oftentimes people in the chair opposite Lavrinenko's desk would look to the professor for help, help that would not come. If Lavrinenko were to return to the KGB he would need a worthy replacement. Penkovsky was being groomed.

Like Lavrinenko, Penkovsky was a bachelor, though for different reasons than his boss. Lavrinenko had recently moved on from his fourth wife. To him, wives were temporary. Penkovsky's wife had left him following the death of their child, a boy stricken with tuberculosis. That had been fifteen years ago. Neither man had once brought it up. Lavrinenko had learned about it from his subordinate's file.

Lavrinenko dug into a glass jar of nearly room temperature black caviar with a mother-of-pearl spoon and shoveled it into his waiting mouth while Egorov flipped through the classified file. The director had picked up his caviar habit during the Nazi blockade of Leningrad, when it was sold in bulk, back before it had become an expensive delicacy. Exports of the popular black gold in the prewar years had allowed the Soviet Union to industrialize at an exponential pace. Rich in vitamins, minerals, fats, and proteins, the salted fish eggs were quickly added to military provisions at the outset of the war, though the tin rations were reserved for pilots and submariners. They were not wasted on the human fodder thrown against the Germans in a war of attrition in what the West called the Eastern Front. It intrigued the director that the wild sturgeon roe had a role in the Soviet

victory of the Great Patriotic War, that something so small and delicate could have such historical impact. Like any good Russian, Lavrinenko washed it down with vodka.

Aside from his breakfast and dinner, which he took at his flat, Lavrinenko rarely left his desk at GRU headquarters. Instead, he preferred to summon subordinates to his office while sustaining himself on an incessant diet of Đerdap Fishery Kladovo caviar from eastern Serbia and his favored Stolichnaya vodka.

Kladovo caviar had a history dating back to the 1600s. There was none better. It was rumored to have been the caviar selected for the RMS *Titanic*'s maiden voyage, though that did not end well. Kladovo came from sturgeon that lived the majority of their lives in the Black Sea. At reproductive age they would journey from the salt water of the sea to the fresh waters of the Upper Danube, which offered ideal spawning conditions. The long migration allowed their eggs to reach the final stage of embryonic development. By that stage of the journey, the eggs contained all the nutrients needed for survival of the pending hatch. Roe harvested too early lacked those nutrients. Producing the highest quality roe required patience.

Patience was vital to survival in the secret world as well, which was why Lavrinenko had outlived many of his contemporaries. The large man swallowed another spoonful and thought of the dams planned for the Iron Gates Gorge section of the Danube River, which he knew would block the prized sturgeon from their spawning areas. Since the clock was ticking on his favorite caviar, Lavrinenko was determined to enjoy the Black Pearl of Kladovo while he still could. He recognized that there were some things even beyond the control of the Soviet Union's most ruthless intelligence organization.

Lavrinenko's dark eyes never left the engineer as he read, the older man evaluating his subordinate, searching for weaknesses to exploit.

Egorov closed the file and tapped the document with his index finger before looking up and shifting his gaze between his two superiors.

"So, it's true? We have them?" he asked.

"We do," Lavrinenko replied. "The U.S. spy ship, the USS *Pueblo*, and her crew, are in the custody of the Democratic People's Republic of Korea. The General Staff Department of the Korean People's Army's Reconnaissance Bureau has custody of the KW-7, KL-47, and KWR-37."

"But those are the American's most secure cipher machines."

"You are correct, Comrade."

The engineer took on an otherwise absent air of confidence. He was now in his element. Or perhaps he was relieved that he was not being sent to the crematorium.

"You built the rotor reader—a device that copies American keying material—did you not?" asked Lavrinenko.

"I did."

"How?"

"I was provided keying material and rotor diagrams. I built the reader around that."

"How does it work?"

"It fits in a coat pocket, about this big," Egorov said, holding up his hands. "It folds in half to the size of a pack of cigarettes. Once open, it can be mated with the key material; a rod is then pushed over the top to make an exact copy. It's really quite basic."

"Where did the key material come from?" Lavrinenko tested.

"I was never told."

The director nodded.

"How did you know it would work?"

"I didn't. I still don't. But if we physically acquire the equipment—the KW-7, KL-47, and KWR-37—from the Koreans, I can test it and I am confident I can reverse engineer complete systems."

"I see."

Egorov swallowed.

"I will need time with the systems."

"We will bring them to you."

"Here?"

"Or in Berlin."

"Berlin would be best. I have access to machinery with tighter tolerances in my lab there. What exactly do we have?"

"The KL-47 was slightly damaged, but we recovered a fully intact KWR-37 and KW-7, along with a KWQ-8 repair kit, additional cryptographic equipment, keying materials, maintenance manuals, and operating instructions. There may be more, as it is still early in the exploitation process."

Lavrinenko studied the smaller man.

"You seem troubled."

"As I am sure you are aware, Director, even with these devices that allow for real-time encryption, offline encryption, and receiving fleet transmissions, the Americans must have already changed the codes. They will discern that the Koreans have shared all intelligence from the *Pueblo* with us. The machines without updated keying material—the correct codes—will be useless. Kerckhoff's Principle."

"What?"

"Kerckhoff's Principle, formulated by Dutch cryptographer Auguste Kerckhoff. He found that the most secure cryptosystem was one that would not be compromised if it was known by the enemy."

"Explain."

"In other words, design the system under the assumption that your enemy will compromise it. Make that your given. If that is true, how do you make it unusable?"

"You change the key."

"That principle forms the foundation of all modern cryptographic innovation. We may have the American encryption machines, but if they change the key, which they invariably have, those machines are essentially useless."

Egorov looked from Lavrinenko to Penkovsky.

"We would need someone on the inside passing us new keying material for this exercise to be useful."

The director and his deputy remained silent.

Egorov swallowed again.

"I am sorry, Comrades. I forget myself."

Lavrinenko waved his hand in the air, sweeping the misstep aside.

"Continue," Lavrinenko ordered.

"The KW-7 and KL-47 machines were built adhering to the work of an American mathematician named Claude Shannon."

"Who is he?" Lavrinenko asked.

"One of the more brilliant minds of the twentieth century. If he was on our side, there would be no stopping us. He won the Nobel Prize in '39. Wrote a paper called 'A Mathematical Theory of Communication.' I have studied his work extensively."

"Why is he important?"

"He built on Kerckhoff's Principle. He counseled that 'one ought to design systems under the assumption that the enemy will immediately gain full familiarity with them.'"

"For situations just such as this," Lavrinenko said.

"That's correct, sir."

"Are the American crypto devices similar to the Fialka?" the director asked, using the code name for the Soviet M-125 cipher machine with which he was familiar.

"All modern cipher machines trace lineage back to Enigma even though they use different mathematical ciphering functions. Our Fialka uses ten rotating electrotechnical cipher rotors—wheels—while Enigma used three or four depending on the model. I have an Enigma in my lab in Berlin. As you know, Fialka has thirty contacts on each rotor in both Cyrillic and Latin, and the KGB has a model that uses rotors with the Russian alphabet. The American machines use eight rotors. The Swiss NEMA has ten. They are all similar in that a code is required to decipher the message traffic."

"We are obviously talking to the right person," Lavrinenko said. Praise could be as useful as fear when dealing with someone like Egorov. "Tell me more about the KW-7 and KL-47."

"Well," Egorov said, pushing his glasses back in place. "Both were developed by the NSA but built by private corporations. The KW-7 is built by Honeywell. The KL-47 is built by a company called the Teletype Corporation. They operate off the same principles. Think of the KW-7 as a tactical-level device sending coded messages via UHF—ultra high frequency radio waves. From the photos in this file, it looks like it connects to a Teletype Model 28 printer. The KL-47 uses the same cipher wheels and accepts the same keying material but is larger and has a built-in keyboard and printer. They both sync with machines on the receiving end, machines that also need the same message key. I'll know much more once I have disassembled them."

"I will expect a detailed report."

"You will have it, sir."

"I don't have to tell you the level of importance this has for the Party," Lavrinenko said.

"I understand."

"I know you do. Failure will not be tolerated."

The engineer attempted to swallow but found his throat too dry to complete the act.

"I can't believe the Americans did not scuttle their ship or destroy these machines," Egorov said, changing the direction of the conversation and again tapping the file in his hands.

"They tried, but upon inspection it appears that the ship had very little in the way of destructive devices. Most everything was still intact. As to why they did not scuttle their ship, perhaps the Americans are not the adversaries we thought?" Lavrinenko offered.

"And the sailors?"

"They will stay in the DPRK."

"For how long?"

"Let the politicians deal with that. We will get the interrogation reports and be able to tailor the questioning to meet our needs. Any queries you need answered by the captured American crypto technicians can be passed to our Sixth Directorate men in North Korea. Our goal is to decrypt American NSA communications without their knowledge. Any information you need from the prisoners should pass through Deputy Director Penkovsky," Lavrinenko said, pointing his caviar-heavy spoon at his second in command.

"How long will we have access to the Americans?" Egorov asked.

"Work as if you had weeks, but in all likelihood, you will have months. Our Sixth Directorate men in the DPRK are facilitating a transfer of the equipment as we speak. I will have it sent to you in Berlin."

"I will still need encryption keys."

"Excuse me?"

"Encryption keys. To decrypt communications, we will need the latest keying material."

"Concern yourself with getting the American machines running; learn everything about them. Reverse engineer them so we can build exact copies. Leave the keying material to me."

"Yes, sir."

"And leave the file. I will have a copy made available to you. Send daily reports to Deputy Director Penkovsky. You are dismissed."

Egorov stood, carefully set the file on Lavrinenko's desk, and made his way to the door on unsteady legs.

When it shut behind him, Lavrinenko helped himself to another heaping spoonful of caviar before turning to his deputy.

"What do you think?"

Penkovsky folded his hands in his lap.

"It is possible the Americans intended for us to acquire their cipher machines," he said, his voice slow and calm, almost detached.

"I have considered that. But to give up their crew? That seems unlikely.

We will soon know more from interrogations. How could they not have destroyed all the sensitive material? From the reports it would seem they had the time," Lavrinenko observed.

"Let us not underestimate their propensity to deceive," Penkovsky replied.

"Let us not give them too much credit either."

"Perhaps they have a new encryption device that is unknown to us, and they plan to feed us disinformation through the KW-7 and KL-47?" Penkovsky offered.

"If that is the case, they would have had to identify our spies in their intelligence services and military and be working them back as doubles. And they would have to be sure they had *all* our spies. If not, there is too high a likelihood that we would find out from an asset in their midst."

"True."

"Everything points to *Pueblo*'s capture being a complete surprise to the Americans."

"Had the Koreans consulted us, I have to think we would have advised against taking it," Penkovsky said.

"I believe so. It is an act of war, and we have a mutual defense agreement in place with the Koreans. As it is, the Americans practically gave it to them, but, now that we have it almost wholly intact and have access to the surviving crew, this may turn out to be one of the greatest intelligence coups of the decade," Lavrinenko said, resting his hands on his protruding midsection.

"Egorov will learn those machines front to back. This triumph may be on par with the Poles cracking Enigma prior to the Great Patriotic War," said Penkovsky.

"If he does, and if the keying material from our spies in the West allows us to decrypt NSA communications, we then have a new problem."

"Yes," Penkovsky granted. "The difficulty of acting on information from deciphered encrypted communications. If we do, they know we've broken the code. An age-old problem in intelligence circles."

"But a good problem to have," Lavrinenko replied. "One of the main reasons for our existence."

"Quite."

"What is your assessment of John Walker?" the director asked, referring to a new source.

"I have my reservations."

"What are they?"

"Who would have thought a U.S. Navy warrant officer 'walk in' to our embassy in Washington, D.C., would ever be so useful? And for a few thousand dollars he gave us top-secret keying material that allowed us to build the rotor reader. He could be an American plant to give us the ability to decrypt communications. It would give the NSA the ability to tailor their communications to influence our decisions knowing we are intercepting them."

"Quite elaborate. And why would they use so obvious a target for exploitation? Walker has marriage and alcohol problems, and, from the assessments, he does not seem to be among their best and brightest."

"Maybe that is why they chose him?" Penkovsky opined.

"Perhaps, if he is in fact a plant. We will get a new set of keying material from Warrant Officer Walker and compare it to what we are getting from a disassociated asset, one who might prove more valuable than the navy man. But there are complexities, Deputy Penkovsky. Do you have his file?"

"Here, sir," Penkovsky said, handing the director a brown folder.

Lavrinenko opened it to refamiliarize himself with the new asset.

"Desmond. Allister Desmond," he read aloud. "I remember. Though not a Philby by any means, it appears that Desmond has an attraction to the lies, the performance art necessary to deceive not just his work colleagues with but also his family and friends."

"Thus far he has passed all his verification tasks."

"He seems drawn to living a fabrication, as was Philby," Lavrinenko said, referring to one of the Cambridge Five. "He's never asked for payment. His compensation is the thrill of living the fantasy of the spy's double life."

"It appears so."

"Philby," Lavrinenko continued, almost spitting out the name. "He lives not far from here. I had lunch with him once, you know. He's been in the Soviet Union since '63. Useless to us now for anything other than a propaganda tool."

"I agree."

"This American, Desmond, at the NSA, he was recruited by the Stasi, correct?" Lavrinenko asked, referring to East Germany's Ministry for State Security.

"Yes."

"Recruitment?" Lavrinenko asked, continuing to flip through the file.

"The oldest kind."

Lavrinenko looked through photos of Desmond taken at a distance; one at a café, another at a bar, one getting into a Peugeot taxi in what looked like Paris. He was struck by how ordinary the man looked.

"Who is his handler?"

"Right now, it's her," Penkovsky said, handing over another file.

Lavrinenko glanced at the name: Clara Müller. He opened it to a photo of a stunning, young, red-haired woman who looked more like a model than an intelligence officer.

"A swallow?"

"Yes, she's dyed her hair and wears glasses to tone down her looks. Keeps her hair much less stylish than in that file photo from the academy. She's a brunette now," Penkovsky said.

Lavrinenko ran a finger down the file's bio as his deputy continued.

"As you can see, she is a graduate of our State School 4. Easier to infiltrate West Germany with an actual German. She met Desmond in Paris."

Lavrinenko looked back at the photo. Her thin nose, light skin, and perfectly proportioned and pronounced cheekbones and chin made her seem more Danish than German.

"Was she specifically targeting him for the Germans?"

"No. She had a different target, a Brit, but when he turned out to be uninterested in women, she took advantage of another man. She used initiative."

"A rare trait," Lavrinenko noted.

"Like all Stasi trained in the Soviet Union, she retained her ties to us."

Lavrinenko turned a page in the file.

"First contact, 1966?"

"Yes. In Paris at the International Conference on Information Processing. Desmond was attending at the behest of the NSA. Ironically, they met at the hotel Le Meurice."

"The bar frequented by Mata Hari before her execution for spying for Germany," Lavrinenko recalled.

"Precisely. It appears Desmond is enthralled with the history of espionage. Müller was lunching with her previous mark when she spotted Desmond and made her approach. Over drinks, she played to his ego. He does not seem to be socially aware enough to keep climbing the ladder. He's topped out. He's gone as high as he will go in the NSA, which could work to our advantage."

"If he has the access we need and stays in place, he could be a most valuable asset. Do we know when she will see him next?" the director asked.

"They meet at science and technology conferences. Desmond is married, which plays into his discretion and acceptance of agent Müller's precautionary measures."

"She can travel freely?"

"Yes, it's in the file. She was an orphan. Her mother was a prostitute who gave her up for adoption. She's been a ward of the state since birth. She was identified early on via intelligence tests and then later for her physical characteristics. At sixteen she was taken from polytechnic secondary school and sent here for training. She finished State School 4 at eighteen and returned to East Germany. She had an aptitude for the technical sciences, so the Stasi inserted her into France as a student at

Université Toulouse III Paul Sabatier to study information and computer sciences. She joined Française de Calcul to solidify her academic bona fides while continuing to employ and refine her tradecraft in a relatively permissive environment. She applied for a job in West Germany after university and was hired by Nixdorf Computer Corporation in Paderborn. She's now a mid-level programmer, which allows her to travel internationally to computer science conferences under the auspices of her job, the same conferences attended by Allister Desmond of the NSA."

"Interesting."

"She cultivated him. He fancies himself something of a spy novel aficionado, which she then exploited to further the relationship sexually."

"Does he know who he's spying for?" Lavrinenko asked.

"That is unclear. According to the file, he thinks he's helping agent Müller with her job at Nixdorf, and as long as he delivers, her hotel room door is open to him. She assesses that he sees it as industrial espionage. As you know, our swallows can be very persuasive."

"Does the Stasi know she is working for us?"

"No, but they must suspect that any agents they send through our training will be recruited. And in agent Müller's case, we have a place for her if the wall should ever come down. She's an orphan. She needs a home."

"What keeps her from going to the West Germans, the Brits, or the Americans?"

"It's in the file as well. First, she was saved by the East Germans. They offered her a sanctuary. Then so did we. And after State School 4, she knows the price of betrayal."

"Quite," Lavrinenko said, swiveling his chair to look through the window at his back. Smoke still poured from the chimney of the crematorium.

He turned back to his deputy.

"Now is time for the real test," Lavrinenko said. "Get her to America. We can't wait for the next computer conference. It's time to find out just how much this Allister Desmond will do for her."