

## The Institute Nordhausen

In early 1946, with Ustinov's support, General Gaydukov managed to reach an agreement in the Party Central Committee in Moscow and in the Soviet Military Administration in Berlin for a significant expansion of operations in Germany. This had not been easy to do. A considerable portion of the Party and state apparatus involved with policy in Germany had demanded that the work in occupied Germany to restore German technology be curtailed and all Soviet specialists be called back to the Soviet Union no later than January or February 1946. Gaydukov and Ustinov, as well as Artillery Marshall Yakovlev, who supported them, did not agree—they insisted on expanding operations. At the same time, the Institute RABE was becoming the foundation for a significantly more powerful organization.

I should mention that the aircraft industry, using the Institute RABE as a model, had gathered German aircraft specialists in the Soviet occupation zone for work in Dessau, using the facilities of the Junkers factories.

Only the atomic experts immediately brought Professor Manfred von Ardenne and a small group of specialists to the Soviet Union. (The British had captured the primary developers of the German atomic bomb, headed by Nobel laureate Werner Heisenberg.)

The Institute RABE had a clearly pronounced emphasis in the field of electrical control systems because the institute management (Pilyugin and I from the Russian side and Rosenplänter and later Dr. Hermann and Gröttrup on the German side) consisted of specialists in electrical equipment and control. Korolev, who had taken charge of the *Vystrel* group; Glushko, who was directing the study and testing of engines in Lehesten; Kurilo, who was assembling missiles in Kleinbodungen; and other smaller groups were functioning more or less independently, often duplicating rather than complementing each other. Korolev accused Pilyugin and me of not paying proper attention to the general matters of missile construction—to its warhead and operation. Pilyugin replied harshly to Korolev.

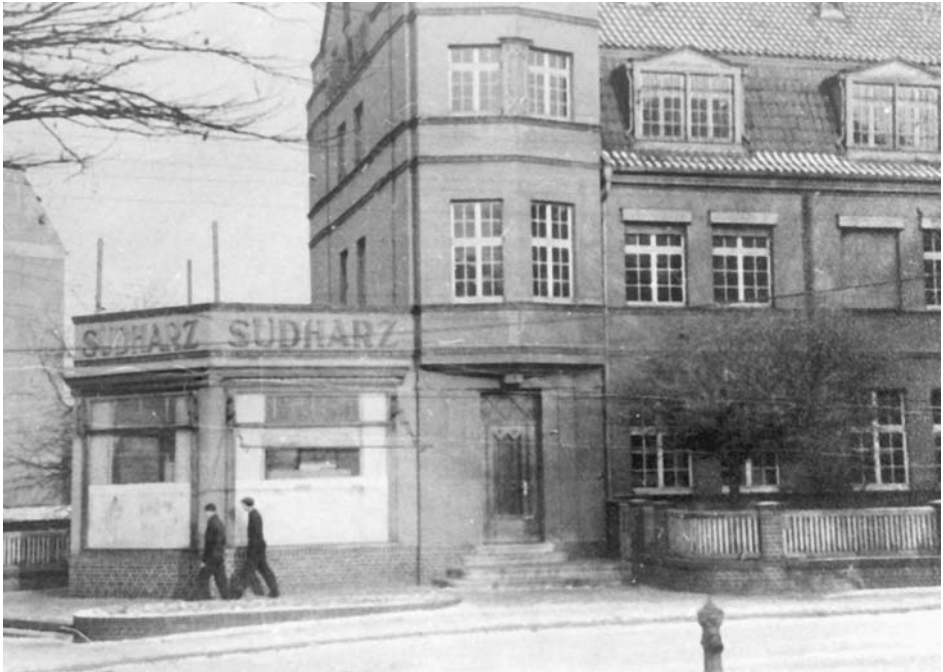
“Sergey Pavlovich, you don't know the first thing about the control system, so go ahead and organize the work for all the other systems. Any aircraft factory in the Soviet Union will rivet the hardware for the body just as well as the Germans,

but we still don't know how to make the instruments for the rocket. And even if we reproduce the instruments, we still have to learn how to control the flight so that the body and the tanks will fly where they are supposed to, instead of into the nearest garden. And as for which explosive to put in the warhead, it's better for you and the artillerymen to look into that without us." This skirmish had far-ranging consequences.

In February 1946, Korolev was summoned to Moscow. He returned in early March, cheerful, hale and hearty, radiating exuberant energy, and now a colonel. Thus, Korolev, if only outwardly in terms of military insignias, was now equal to Glushko, Pobedonostsev, Ryazanskiy, Pilyugin, and Kuznetsov, who had flown to Germany wearing colonels' shoulder boards. A day or two later, General Gaydukov arrived, also in an excellent, jubilant mood, and he asked me to assemble all the civilian specialists. He would be responsible for military specialists. At a large meeting of Soviet specialists, Gaydukov announced the decision to create a single organization based on the Institute RABE and all of the various and sundry functioning groups. It would be called the Institute Nordhausen.

Gaydukov was commissioned as director of the institute and Korolev was appointed his first deputy and chief designer. Next they reviewed and approved the general structure of the new institute.

Our Institute RABE became a part of the new conglomeration as an institute for control systems. Pilyugin, Ryazanskiy, Boguslavskiy, and I remained in charge,



From the author's archives.

**Entrance to the Institute Nordhausen directorate.**

but we were advised to prepare for a large number of new specialists who would be arriving from the Soviet Union shortly. They tasked me with helping to organize the Institute Nordhausen until the new staff was formed.

We agreed that RABE would make room—the new institute's headquarters and its management would also be located in Bleicherode. To do this we needed to commandeer some baron's private residence, which was located next door. This was no problem for the local authorities.

In addition to the Institute RABE, the following organizations became part of the Institute Nordhausen and were directly subordinate to Gaydukov and Korolev:

- The Montania factory in the vicinity of Nordhausen, which was used as a production base for engines and turbopump assemblies and a base for engine firing tests in Lehesten near Saalfeld. Glushko was put in charge of the general management of Montania and Lehesten, and Shabranskiy was appointed chief of Lehesten in place of Pallo, who had gone back to Moscow;
- The production facility in Kleinbodungen, which was officially named Factory No. 3 (*Werk Drei*). Kurilo was appointed director. The factory's objective was to restore the production process and assemble as many missiles as possible from everything that remained at *Mittelwerk*;
- The Olympia Design Bureau for the restoration of A-4 documentation and processing equipment that had been fabricated in Sömmerda at the Rheinmetall-Borsig factory. First Budnik was the head, and then Mishin. Mishin traveled with Bereznyak to Prague in search of technical documentation and got lucky. They found and brought back a large amount of design documentation which facilitated the beginning of work in Sömmerda;
- *Sparkasse* (savings bank), our term for the computational-theoretical group in Bleicherode. The team was established at a municipal savings bank which under the new authorities had been left without any monetary deposits. Colonel Tyulin, who had transferred to us from Berlin, headed the group. It included Lavrov, Mozzhorin, Appazov, and Gerasyuta. German theoreticians from RABE were transferred to the group, and more new specialists arrived, in particular, the chief ballistics expert from the firm Krupp, Dr. Waldemar Wolff, and aerodynamics specialist, Dr. Werner Albring, the former deputy director of the aerodynamics institute in Hannover.

GRÖTTRUP'S BUREAU BECAME an independent subdivision of the Institute Nordhausen, but at Gaydukov's insistence I was tasked with monitoring its activity. Taking advantage of that responsibility, I instructed Gröttrup to go beyond describing the history of A-4 development at Peenemünde and begin concrete work on proposals for longer-range missiles and high-precision control systems. Ryazanskiy and Boguslavskiy participated directly in these operations in the radio-engineering sphere.

The *Vystrel* group had expanded considerably. Now Voskresenskiy headed it in place of Korolev. This same group included Rudnitskiy, who had been tasked with

## *Rockets and People*

searching for and restoring the ground-based filling, transporter-erector, and launch equipment. Here I should mention that at the same time the Institute Nordhausen was created, the Institute Berlin was established in Berlin, with the task of restoring anti-aircraft guided missile technology. Barmin was appointed chief engineer of the Institute Berlin. He had been the chief designer of the Kompressor factory where over eighty rocket projectile salvo-firing systems were developed during the war. Later Barmin was named chief designer of the entire complex for missile ground equipment while Rudnitskiy, who had worked with me at the Institutes RABE and Nordhausen, became his first deputy.



From the author's archives.

**Vladimir Pavlovich Barmin, chief engineer of the Institute Berlin from 1945–46 and future academician and chief designer of rocket launching systems.**

At the Institute Nordhausen, the Main Artillery Directorate set up its own representative office headed by Colonel Mrykin. He was a very demanding boss, who on first impression seemed extremely stern. He knew how to make sluggards and slovenly types tremble, but all the berating was in the interest of the issue at hand. The large body of cadre military specialists subordinate to him even suggested a unit of measurement to quantify the magnitude of his rebukes—the *mryk*. Leaving the office of Colonel Mrykin, officers would explain, “I received a one-*mryk* dressing down.” A two- to three-*mryk* dressing down might be cause for an officer to be detached to another place of service. Later, Mrykin and I developed a very good relationship. I was convinced that his outward sternness and his not-always-pleasant, exacting nature did not prevent him from being a

wise, objective, and keen manager who respected every honest specialist, both military and civilian. More than once I had the opportunity to witness Mrykin's indubitable decency.

The number of personnel at the Institute Nordhausen—composed of German specialists and Soviet military and civilian specialists—increased rapidly, requiring the creation of a new office to service the entire contingent. There was a shift from “quantity to quality” with regard to problems involving transport, accommodations, food, and receiving documentation and equipment and shipping them to the Soviet Union. At the Institute RABE, First Lieutenant Chizhikov, who had worked amicably with the services of the division, the commandant's office, and the German commercial director, coped with all of this excellently and single-handedly. I did not give up Chizhikov to Gaydukov's staff. To compensate, Gaydukov acquired a deputy for general work as well as a commercial unit and “rear services” that included a personnel department headed by Lieutenant Colonel Aleksandr Kaplun. Gaydukov asked that problems concerning light automobile transport be left to RABE and handled personally by Chizhikov.

As a rule, the stream of civilian specialists flying in from Moscow now without any sort of military uniform passed through Kaplun, whose responsibility it was to provide each of them with housing and food and direct them to the proper division of the institute. He asked for my assistance to accomplish the latter task. Thus, I became acquainted with many young specialists, still quite green, for whom fate had prepared the historic mission of humankind's breakthrough into space.

Among this stream of young people, my attention fell on the Kozlov family. Dmitriy Kozlov had gone through the war, lost an arm, graduated from the Leningrad Military-Mechanical Engineering Institute and married a coed. They showed up everywhere in tandem. I advised Kaplun to send Dmitriy and Zoya together to Sömmerda to work for Mishin. Fifty-six years later, at a meeting of the Russian Academy of Sciences, I met a corresponding member of the aforementioned institution, Dmitriy Ilyich Kozlov, two-time Hero of Socialist Labor, general designer and general director of the Central Specialized Design Bureau (TsSKB) and the Progress Factory in the city of Samara. He told me that he had been in Berlin at the aerospace exhibition, and he had taken a day trip to Bleicherode to recall the beginning of his career in Germany.<sup>1</sup>

“I was pleasantly surprised,” said Kozlov. “More than a half century had passed, and there in Bleicherode they still remembered Chertok, they pointed out the building of the Institute RABE and were proud that Korolev had lived and worked among them.”

Due to his new appointment, Korolev, as before, devoted a great deal of time to the subject matter of the *Vystrel* group and to organizing work on documentation in Sömmerda. There with Mishin and Budnik he began the first studies of a missile

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1. TsSKB—*Tsentralnoye Spetsialnoye Konstruktorskoye Byuro*.



From the author's archives.

**Evening gathering of Institute RABE officers at the Villa Franka. Sitting (from left to right): L. A. Voskresenskiy, unidentified person, V. A. Bakulin, V. I. Kharchev, V. P. Mishin, Yu. A. Pobedonostsev. Standing (from left to right): N. A. Pilyugin, A. G. Mrykin, S. G. Chizhikov, V. S. Budnik, S. P. Korolev—Bleicherode, Germany, 1946.**

variant with a range of up to 600 kilometers—the future R-2 missile. In place of the Opel-Olympia, which lacked prestige, he acquired a powerful, sporty, dark red Horch. This car clearly suited Korolev's taste, and he never missed a chance to praise it. He offered to take his friends out for a drive, but did not trust any of them behind the wheel. I didn't pass up the chance to go out for a drive in the Horch. I already had a driver's license and had coped well with the Mercedes and the Opel-Olympia. Korolev did not trust me behind the wheel of the Horch because he knew about the "loop the loop" that I had executed in the Olympia with three passengers in the car.

Korolev drove through the narrow streets of Bleicherode and the village of Kleinbodungen in a way that made me plead with him, "Sergey Pavlovich! Your Horch is beautiful, but it's not a fighter plane, and we are in a populated area, not the sky."

Korolev's fitting response to that statement was, "But I have both a driver's license and a pilot's license."

"But I don't want to end up in heaven before my time, even in a Horch."

Soon thereafter, on the square in front of the Institute RABE, the Horch collided with an old Opel driven by a German driver who worked at our institute. The magnificent red Horch sustained a sizeable dent, but the small Opel was severely

smashed. Korolev flew into my office extremely upset and demanded that I immediately fire the German driver and send Chizhikov, who was in charge of the institute's transportation, into exile in Moscow for not keeping order in his motor pool. Poor Chizhikov and the German skilled workmen spent the night in the workshop, and by morning the Horch looked better than it had before the ill-fated collision.

This was probably Korolev's first meeting with Chizhikov. Korolev was convinced that the former foundry pattern maker really did have the magic touch. Three years later, Korolev managed to bring Chizhikov into his creative team, which had received the Stalin Prize for the development of instrumentation for temperature measurement during R-1 missile flight tests. Chizhikov, who had been the first to receive a multi-*mryk* rebuke from Korolev for vehicular disorderliness, loved to boast "I'm not afraid of anyone in the whole wide world." And then he would pause and add, "except Korolev."

In order to relieve the Soviet specialists of concerns about the hardships their families were suffering, the military command decided in March 1946 to send the families of the "trade union" and cadre officers to their service posts on a semi-compulsory basis. For some of the cadre officers this was not very convenient, since they had acquired girlfriends during the war years, or as was customary to say at



From the author's archives.

**S. P. Korolev, Institute Nordhausen's chief engineer, conferring with Ye. M. Kurilo—Bleicherode, 1946.**

the time, “field wives” or PPZh.<sup>2</sup> But we civilian specialists immediately organized a service for the “re-evacuation” of our families from Moscow, Leningrad, and other cities, this time not to the east on the far side of the Urals and beyond as was the case in 1941, but to the west—to Berlin and then to the places where the heads of households had been posted in occupied Germany.

In May in Berlin, Chizhikov and I met our wives and children who had flown in on an Li-2 military transport plane. The meeting with our wives in Germany



From the author's archives.

**In the vicinity of Bleicherode, Boris Chertok and Yekaterina Golubkina with son Valentin—Germany, 1946.**

was not without incident. Chizhikov and I arrived in Berlin in two automobiles and waited for the plane from Moscow to land at Schönefeld airfield. Evening was already approaching when they told us that they were expecting no more airplanes that day.

“How can that be? We have a message saying they departed from Moscow.”

“Maybe they had to make a stopover along the way,” suggested the dispatcher. “In any case, we’ll radio Adlershof although the service aerodrome is already closed.”

The dispatcher finally managed to get through to Adlershof and gladly reported that some women and children were there on the airfield. In the twilight we found our wives, who were exhausted by the difficult flight

and incensed by the many hours of waiting, and our hungry little boys on the grass of the airfield next to the catapult used to launch V-1 cruise missiles. Pobedonostsev gave up his apartment in Berlin for us. There, Katya managed for the first time in twenty-four hours to feed some farina to our sick, one-and-a-half-year-old son. After their arrival in Bleicherode, our wives, who had grown accustomed to the hardships of Moscow, were dumbfounded by the comfort of the Villa Franka. Nevertheless they demanded that we kick out the German maid: “We will cook and clean by ourselves.” The officers’ mess hall, our evening club at the Villa Franka, and also the German lessons all had to be closed down. Three meals a day and recreation were arranged for all the officers without families at *Japan*, the newly opened restaurant in Bleicherode.

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2. PPZh—*Polevaya pokhodnaya zhena* (field camp wives).



Providing living quarters and food for the large number of German specialists and workers enlisted to work at the Institute Nordhausen was also a serious problem. When the work to restore the documentation and fabricate missiles was in full swing in the summer of 1946, the Germans themselves estimated the total number of German personnel at six thousand. Taking into account the personnel that worked at subcontracting firms, the number exceeded seven thousand. The assessment of this period of our joint activity in Germany by contemporary German historians is interesting. I shall quote excerpts from Manfred Bornemann's book *Geheimprojekt Mittelbau: Die Geschichte der Deutschen V-Waffen-Werke* (The Secret Mittelbau Project: A History of the German V-Weapons Factory), published in Munich in 1971.

Material support for (German) specialists was on a level that had not existed in Germany for many years. Thus, for example, a degreed engineer received what were called Category-1 rations to last for fourteen days: sixty eggs, five pounds of butter, twelve pounds of meat, unlimited bread, plenty of vegetable oil, flour, cigarettes, and tobacco. For other categories of workers, these norms were lower, but for the situation at that time, still comparatively very high.

The German specialists were also paid relatively high salaries. Bornemann writes:

One should also mention the rapport between the Russians and Germans during the missile project. The atmosphere was exceptionally amicable. The Russians showed their best side. Nevertheless, a certain distrust developed on both sides. If the Soviet specialists sometimes displayed reserve during work, fearing secret sabotage on the part of the Germans, this depressed the German missile specialists, who were worried about their future. As the rocket undergoing restoration acquired a more distinct shape, the Russians strove to obtain more documentary data on rocket technology during the production process.

The Germans' fear for their future is evident in these citations. Indeed, if the Russians were to understand and master everything, then what would become of the German specialists? Some of them hoped that the Russians would at least entrust the Germans with a field of activity that had never been attempted in Nordhausen, such as the very process of launching the missiles. But it turned out that the Russians also had already envisioned that. And not only in their small *Vystrel* group.

The 13 May 1946 decree of the Party Central Committee and Soviet People's Commissariat called not only for the creation of a missile industry, but also for the creation of a special missile State Central Firing Range (GTsP) and specialized troop units. In parallel with our military-industrial organization, which encompassed the Institute Nordhausen, they created a purely military system that was tasked with mastering the field operation of rocket technology.



From the author's archives.

**L. A. Voskresenskiy (left), S. P. Korolev and V. K. Shitov (right) in Peenemünde, 1946.**



From the author's archives.

**General A. F. Tveretskiy and S. P. Korolev—Germany, 1946.**

Using Colonel Chernenko's Guards Mortar Unit, which was stationed in the village of Berga near the town of Sondershausen, they began to form the reserve Special Purpose Brigade (BON) of the Supreme Commander-in-Chief.<sup>3</sup> Combat General Aleksandr Fedorovich Tveretskiy was appointed brigade commander.

Along with Korolev, Voskresenskiy, and Pilyugin, we set out for Sondershausen, where the entire BON officer staff was located, to familiarize ourselves with the new military organization and its commander. Korolev was afraid that the new complex technology would fall into the hands of martinet commanders—our work might be discredited at the very last stage. But our fears were unfounded. General Tveretskiy proved to be an uncommonly intelligent, benevolent, and prepossessing individual. We were soon convinced of this, interacting not only in the line of duty, but also socializing with our families.

But in one aspect Tveretskiy displayed firmness right from the beginning. Military specialists visited BON every day. They were officers with a great deal of frontline experience from various branches of the armed services. Tveretskiy announced that he did not intend to take up their time with drill and physical and political training. He categorically insisted that we grant them access to work in the institute's laboratories and subdivisions and admit them to missile tests at the

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3. BON—*Brigada Osobogo Naznacheniya*.



From the author's archives.

**Standing (from right to left): Major B. Chertok, Major Musatov, Colonel N. Pilyugin, and officers of the Seventy-fifth Guards' Division—Bleicherode, Germany, 1945.**

facility in Kleinbodungen and to the *Vystrel* group's work. Korolev and Pilyugin were not enthusiastic because we were already thoroughly saturated with Soviet specialists, i.e. those engineers and military personnel who later were supposed to be transferred to the GAU central office to support the powerful military acceptance work forces.

We somehow fulfilled all of Tveretskiy's demands, and the officers, who in contrast to us were decorated with many combat medals, began to master their new field of work. Among the many BON officers who on orders from the army personnel department ended up serving in Sondershausen during those spring days of 1946, I must say some kind words about those whose subsequent work had a substantial impact on the development of our rocket, and later, space technology.

Nikolay Nikolayevich Smirnitkiy went from being assistant chief of the new formation's electrical firing group to very difficult service at the GTsP at Kapustin Yar. He eventually became a lieutenant general and headed the Main Directorate of the Rocket Armaments (GURVO) for nine years. Later, he was appointed deputy commander-in-chief of the Strategic Rocket Forces.<sup>4</sup>

Yakov Isayevich Tregub, a major of the special sapper troops, was in charge of the first launch team. Later, as a major general, he directed the testing of anti-

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4. GURVO—*Glavnoye Upravleniye Raketnogo Vóoruzheniya*.

aircraft guided missiles. He was the deputy to Chief Designer Mishin for the testing of spacecraft, and until recently he was working productively on new automatic space instruments for meteorology and to study Earth's natural resources.

After Sondershausen, Aleksandr Ivanovich Nosov served at Kapustin Yar and then was in charge of the directorate for testing the famous R-7 intercontinental missile at the firing range at Tyuratam (the Fifth Scientific-Research and Testing Range which would later become Baykonur). He did a great deal to optimize Korolev's rocket technology, but died tragically on the launch pad in the explosion of an R-16 intercontinental missile developed by Mikhail Yangel, another chief designer. This was not the only instance of tragic death among the first missile specialist officers.<sup>5</sup>

Boris Alekseyevich Komissarov arrived at BON with the rank of major. Later he specialized in testing automatic stabilization control instruments. He was in charge of military acceptance at missile factories and rose to a high governmental post: deputy chairman of the Commission on Military-Industrial Affairs under the Presidium of the USSR Council of Ministers. For departmental reasons, way back in 1946, Pilyugin and I had had to turn down Komissarov's requests to hand over gyroscopes, *mischgeräte*, and control surface actuators that we had gathered crumb by crumb and restored with difficulty. No, we could not foresee that many years later we would be coming to this unassuming major, petitioning for resolutions costing many millions of rubles.

I shall not list the many other military specialists with whom we worked jointly in Germany. Except for some random, minor exceptions, they all subsequently proved to be worthy fighters in the vanguard of the scientific-technical revolution in weapons technology and later in the peaceful field of cosmonautics.

I CANNOT SAY at whose personal initiative it took place—whether it was Korolev, Voskresenskiy, or one of the military specialists from the *Vystrel* group—but in early 1946 somebody came up with the idea of developing and constructing a special missile train using the workforces of German railroad car building firms and bringing in any other special rolling stock. The realization of this idea was beyond the capacity of the Institute RABE. With the creation of the Institute Nordhausen, however, the idea acquired many powerful advocates. The government allocated the necessary sizeable resources, the Soviet military administration drew up a top-priority order to railroad car and instrumentation firms, and the feverish activity began. The project called for the creation of a special train that could support the entire process of missile testing and launch preparation from any uninhabited location so that the only construction required would be railroad track.

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5. During pre-launch preparations for the first R-16 launch in 1960, the rocket exploded and killed more than a hundred soldiers, administrators, and engineers.

The train was to consist of at least twenty special freight cars and flatcars. Among them were laboratory cars for off-line tests of all the onboard instruments, cars for the *Messina* radio telemetric measurement service, photo laboratories with film development facilities, a car for tests on engine instrumentation and armature, electric power plant cars, compressor cars, workshop cars with machine tools, cars containing restaurants, bathing and shower facilities, conference rooms, and armored cars with electric launching equipment. The train would have the capability to launch a missile by controlling it from the armored car. The missile would be mounted on the launch platform, which along with the transporter-erector equipment would be part of a set of special flatcars. Five comfortable sleeping cars with two-bed compartments, two parlor cars for high-ranking authorities, and a hospital car would make it possible to live in any desert without tents or dugouts. In the heat of the construction of this marvel of railroad technology, Tveretskiy convinced his superiors to approve and fund the construction of a second special train, but not for industry, just for the military. The program's doubling resulted in numerous conflicts due to the shortage of special testing and general-purpose measurement equipment to outfit the railroad cars.

But these were probably the only conflicts between industry and the military at that time. It was absolutely miraculous that both special trains were constructed and completely fitted out by December 1946. During the first years of the rocket era we simply could not imagine living and working at the firing range at Kapustin Yar without the special train. Not until the early 1950s, when, through the diligence of GTsP chief Vasiliy Ivanovich Voznyuk, hotels, an assembly and testing facility with workshops, domestic services, and much more were built, did life in the trans-Volga steppe become possible without the special trains.

WORK AT THE INSTITUTE NORDHAUSEN and correspondingly at the Institute RABE reached its most arduous level in August 1946. At *Werk Drei* in Kleinbodungen, they had managed to gather a sufficient number of parts to assemble more than twenty missiles. They were all provided with engines that had undergone firing tests at Lehesten and with turbopump assemblies that had been completed and tested at the Montania factory.

But an absolutely disastrous situation developed when it came to obtaining the necessary number of onboard instruments and test equipment for off-line and integrated tests. Nikolay Pilyugin, Viktor Kuznetsov's deputy Zinoviy Tsetsior, and I, again with the assistance of the SVA in Thuringia, visited the Karl Zeiss factories in Jena. There our Soviet optics experts were already lording over it as customers. Nevertheless, we arranged to place an order for the basic gyroscopic systems Gorizont, Vertikant, and Integrator. Karl Zeiss was a world-renowned manufacturer of optical instruments. These included glasses, binoculars, microscopes, telescopes, periscopes, all sorts of optical sights, and many other devices that were manufactured in large quantities to fill orders from Moscow. The engineers

in Jena were not intimidated by the new orders and they claimed that, "Everything that Siemens did, we are capable of reproducing."

And they did! They received our instructions in March or April, and in September they returned the last of twenty sets of gyroscopic instruments. Our German specialists, Dr. Magnus and Dr. Hoch, grumbled that we wouldn't get the same precision with the Zeiss instruments that Siemens had guaranteed, but this didn't bother us very much at the time. The Germans' misgivings proved justified. But we did not understand this until we were performing flight tests after returning to the Soviet Union.

We tracked down the onboard electronic instruments—the *mischgerät* (mixing instrument), main distributor, time-domain current distributor, and the relays needed for their assembly and testing in the ruins of *Mittelwerk* and in trips made by the Germans over the border into the Western zones. But this proved to be clearly insufficient, and we had to open a special electronic instrument factory in Sangerhausen.

We also ran into a critical situation with the Askania control surface actuators and the graphite control surfaces. We did not have a single Soviet control surface actuator specialist at the Institute RABE until Georgiy Aleksandrovich Stepan appeared at my disposal, having first passed through Korolev. He was one of the young specialists whom Ustinov had ordered sent from various instrumentation factories to NII-88, which was being set up in Podlipki back in the Soviet Union. In the spring and summer of 1946, many of those who had not yet begun working in Podlipki departed immediately for Germany. They were no longer given military ranks. For that reason they got significantly less respect from the Germans than engineers with officers' ranks.

Under Pilyugin's direction and my supervision, Stepan, who had no prior knowledge of electrohydraulic control surface actuators, learned their structure and the minimum theory required to begin working independently in Podlipki. With his assistance, we managed to equip the missiles with control surface actuators and electromechanical trim motors to control the aerodynamic control surfaces. All of these drives were installed on a special load-bearing frame in the tail section and were tested for performance and correct polarity before the rocket was completely assembled.

The missile's electrical equipment consisted of a special 27-volt lead storage battery and two DC-to-AC converters to power the gyroscopic instruments, *mischgerät*, sequencing current distributor, and lateral correction radio system.

In late 1945, not far from Berlin, we met our electric machine specialists headed by NII-627 Director Andronik Gevondovich Iosifyan. They were busy with completely different business. Iosifyan was already a well-known specialist in the field of slaving systems and devices for electric synchronous communications. Nevertheless, he was included in our co-op, and soon thereafter we gained a powerful and loyal ally—not only in Germany but also for many years in the Soviet Union—in the solution of diverse electrical engineering problems of rocket and space technology.

Captain Kerimov was in charge in the well-lit, dry, and comfortable basements of the Institute RABE. He would later become the chief of the Main Directorate of the Ministry of General Machine Building and then the permanent chairman of the State Commission on Manned Flights. In 1946, he was responsible for restoring six onboard sets of extremely scarce Messina telemetry equipment and a ground receiving-recording station. G. I. Degtyarenko, a specialist from the Moscow radio institute NII-20, assisted him. Subsequently, fate separated these first telemetry experts. Kerimov made his career in a purely military and later, ministerial field. At NII-20, Degtyarenko attempted to restore and perfect the German Messina, but strong competition from the new work forces of Boguslavskiy at NII-885 and Bogomolov at MEI forced him to capitulate.

THE MAIN NUCLEUS OF SOVIET DIRECTORS of the Institutes Nordhausen and RABE consisted of a comparatively small group of specialists who first became intimately acquainted in Germany. With the arrival of their families, the business relationships were supplemented with familial relations and friendships between their wives. We tried to set aside time to take trips together to nearby towns. Tonya Pilyugina, Lesha Ryazanskaya (her name was Yelena, but we all called her Lesha as her husband did), and Katya, who had quickly become friends, were extremely active. It wasn't possible for us husbands to take part in all their sightseeing trips, but we tried to quench their thirst for knowledge of the Western world by making our service vehicles and German drivers available to them. After seeing points of interest in Weimar, Erfurt, and even Leipzig, our wives would report the expenses that the drivers had presented for the kilometers driven. We obtained gasoline, which was in short supply, from the military administration or illegally from the black market. Conventional filling stations were not in operation.

Family "receptions" were other forms of social mingling. We contrived anniversary dates for these. I organized the first such banquet-reception at the Villa Franka under the pretext of the first anniversary of the Institute RABE's founding. Its success encouraged a chain reaction of "comradely dinners" on the occasion of whomever's birthday it happened to be. The birthday boy or girl would arrange with one of the very modest local restaurants to provide service for these dinners. It was the responsibility of the hospitable host to provide all the requisite beverages and *hors d'oeuvres*, and the German staff provided the service, including the dishes, the table settings, and so on. We usually paid not in marks, but in kind—foodstuffs and schnapps. For our wives, these activities at first seemed sacrilegious in the face of the horrors of the war and of our relatives and friends who had perished. After five dreadful years they had grown unaccustomed to such revelry, but they quickly adapted.

Korolev's wife, Kseniya Vintsentini, and their eleven-year-old daughter Natasha arrived in Bleicherode after the other officers' families. Korolev tried very hard to show them all around Germany as much as possible. Perhaps because Korolev's wife and daughter left Bleicherode almost immediately and for a long period of time,

they did not fit in with the “club” of officers’ wives, who exchanged information almost daily about where and what to buy, what to see during the day if they didn’t have a car, and what was playing in the evening at the town’s movie theater. Korolev never told any of my close comrades at work anything about his family. We only learned from Pobedonostsev that his wife Kseniya Maksimilianovna Vintsentini was a leading surgeon at the renowned Botkinsk hospital. His daughter Natasha had not seen her father for the last six of her eleven years. Kseniya Vintsentini was the only wife of a former “enemy of the people” in Bleicherode. Katya met her for the first time at the children’s swimming pool. It turned out that Natasha Koroleva and Nadya Pilyugina, who had already learned to swim, helped my seven-year-old Valentin master the technique. That evening when she was telling me about her encounter at the pool she said, “She’s an amazing woman. We talked as if we had already known each other for years. It’s too bad that she and her daughter are getting ready to leave soon. She said that she is needed at work and Natasha must be back in time for the beginning of the school year.”

Late one evening in the first week in August, the field telephone rang in the bedroom. “Something’s happened again at your institute,” said Katya anxiously. Korolev had telephoned, and to my surprise, he excused himself for calling so late and asked me to hand the phone to Yekaterina Semenovna. At the end of the conversation Katya explained that the Korolevs had invited us to their fifteenth wedding anniversary party on 6 August. The next day I found out that the entire officer elite of the Soviet colony of the Institute Nordhausen and the military administration had been invited.

At the anniversary party there were many traditional toasts “to the health of the newlyweds” and long speeches about what an uncommon gathering the “renowned *dzhigit* Sergey and his beautiful Ksana” were holding “in the land of the conquered enemy.”<sup>6</sup>

Korolev began his toast with the words, “Do you all know what it means to live fifteen years with Korolev? No, you cannot imagine such a thing. But my Ksana has endured this heroically. And for that I drink this toast to the last drop!”

We all stood up at once and drained our glasses. Having refilled my glass, I began with difficulty to elbow my way over to the happy couple. When I had finally managed to squeeze into an empty space among those who wanted to clink glasses with the Korolevs and had begun to utter something, Kseniya Maksimilianovna interrupted me, saying that she knew about me as the discoverer of this town, that she was acquainted with my wonderful wife, and that if we were going to drink, let’s drink to our friendship. I expected to see a radiant, almost sainted woman, who after many long agonizing years was reveling in domestic bliss. But her face did not have a happy smile. She looked at me with dark, sorrowful eyes. Korolev was not next to his wife, and I went out into the garden to light up a cigarette.

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6. A *dzhigit* is a Caucasian horseman.



Our hussars, as we jokingly referred to the three bachelor lieutenant colonels Boguslavskiy, Voskresenskiy, and Rudnitskiy, were already out there smoking. The three of them lived amicably in a single residence, the Villa Margaret, and shared a tiny Fiat. The hussars were surprised and concerned by Korolev's unexpected conduct. Voskresenskiy explained, "Somebody really set Sergey off. He needed to unwind. While you were paying court to Ksana he invited your Katya into his Horch and then tore off into the night." About ten minutes later Korolev's Horch illuminated us with its powerful headlights and screeched to a halt. Korolev jumped out of the car and like a true gentleman, throwing open the door on the passenger's side, he gave Katya his hand, led her over to me, and—wobbling slightly—returned to the festive, noisy banquet hall. At home during our post-party "flight analysis" Katya said that Korolev suddenly approached her and offered to demonstrate the performance of his sports car. "When we took off, he apologized, saying that he needed to unwind and that speed was the only thing that let him unwind. By some miracle we avoided hitting a bicyclist. Somewhere we struck what was probably a milk can but we didn't stop. He thanked me and said that if he had been alone, he might have crashed the car." And that was that.

IN AUGUST 1946, after traveling around many towns and enterprises in the Soviet zone, a high-level government commission headed by Artillery Marshall Nikolay Yakovlev arrived in Bleicherode.

The following individuals were members of the commission: Minister of Armaments Colonel General Dmitriy Fedorovich Ustinov; Major General of the Artillery Lev Robertovich Gonor, who had already been appointed director of head missile institute NII-88; Chief of the Main Directorate of the Ministry of Armaments Colonel Sergey Ivanovich Vetoshkin; Director of the *Gosplan* Department of the Defense Industry Georgiy Nikolayevich Pashkov; and Deputy Minister of the Communications Systems Industry Vorontsov. The only old acquaintance on the commission was Pobedonostsev. Officially he—like Pilyugin, Mishin, several others, and me—was still considered to be affiliated with NII-1 of the Ministry of the Aviation Industry.

We immediately understood that all of the commission's primary decisions actually came from Ustinov and Pashkov. This duo had to decide how to distribute the cadre of specialists gathered at the Institute Nordhausen among the ministries and agencies, along with the material and intellectual wealth that had been accumulated. Despite the fact that the distribution of duties in rocket technology had been stipulated in principle by the governmental decree dated 13 May, many design and production issues, and especially personnel issues, had not yet been resolved. Ustinov informed us that his ministry was officially in charge and that he had already arranged, with Korolev for Korolev to transfer to NII-88, the new head institute, as a chief designer. Pobedonostsev would be the chief engineer at the new institute. Ustinov then acknowledged Gonor and announced that he would be the future director of NII-88.

Ustinov felt that he needed to dwell on a subject that appeared to greatly disturb him, and on which a firm position had not been reached in the commission or at some higher level.

“Very great and vital work has been done here. Our industry will have to begin not from square one, not from a void, but by first learning what was done in Germany. We must accurately reproduce the German technology before we begin to make our own. I know that some of you don’t like this. You also found many deficiencies in the German missile and you are burning with the desire to go your own way. Initially we will forbid that. To begin with, prove that you can do as well. And to anyone who alludes to our experience and history, my response is that we have every right to this, we paid for it with a great deal of blood!

“But we will not force anyone. Whoever doesn’t want to do this can look for other work.”

Ustinov continued, “We cannot take it upon ourselves to develop and manufacture engines, and therefore Glushko will transfer with this problem to the aircraft industry, which will allocate a special factory for him in Khimki. As far as the control systems are concerned, except for control surface actuators, basically this has been entrusted to the Ministry of the Communications Systems Industry (MPSS), and Ryazanskiy has already agreed to be in charge there, but under the condition that Pilyugin and Chertok transfer with him as his deputies.”<sup>7</sup>

Apropos of that, Ustinov decided that one of us would be enough for Ryazanskiy because a leading specialist on the whole complex of control problems would also be needed at the NII-88 head institute. This specialist would also be responsible for starting up the production of control surface actuators, which MPSS had rejected.

Thus, Pilyugin and I were going to have to part company and decide who went where. One way or the other, we both would be leaving our old home in the aircraft industry. Soon thereafter I understood that our respective assignments had already been decided in Moscow in the Party and state offices, and they had been approved at all security and cadre levels. That explained why Nikolay Dmitrievich Yakovlev, a Marshal with the outward appearance of a typical simple-minded peasant, had been smiling slyly while looking at Pilyugin and me when Ustinov was giving his impassioned speeches regarding who needed to go where to work. It was clear that it was all a show—the decisions had already been made.

For purposes of decorum, we were given twenty-four hours to think it over. After many hours of debate in the commission, Pobedonostsev divulged to me that he had already made an agreement with Ustinov. Under this agreement, Pilyugin would go with Ryazanskiy as his deputy, and I must transfer to NII-88 as deputy to Pobedonostsev, the chief engineer. Pobedonostsev felt it necessary for persua-

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7. MPSS—*Ministerstvo Promyshlennosti Sredstv Svyazi*.



From the author's archives.

**S. P. Korolev, last photos at Bleicherode, 1947.**

siveness to add that he knew Ustinov a lot better than I did. “Believe me. He is a very powerful man. One can work with him. I don’t know Gonor, but I have been told that, in any case, he is a decent man and we will be able to get along with him, especially since he is Ustinov’s man. It will be difficult for Sergey of course, but we will help. Give your consent!”

And I did. I must confess that I liked the young, energetic Ustinov. And I wasn’t the only one. Ryazanskiy said, “You know, I regret this assignment for only one reason—instead of having a smart, energetic minister such as Ustinov, I will have some spineless windbag or some indifferent bureaucrat over me.” It remained for me to meet with Pilyugin. He waved it off and came to the following conclusion: “We’re not getting a divorce. We’re still going to be in the same field. The main thing and the saddest thing is that we’re both leaving the aircraft industry. They didn’t want to take on the problems of missile technology. Ustinov is taking that on. That means we have to help him.”

After the commission had dealt with personnel allocation and distribution, the division of laboratories and production property went rather smoothly. Ustinov demanded that we increase documentation so that no one would be denied the necessary number of sets. But the originals, copies, and “copies from copies” had to be stored in the NII-88 central archives.

Gaydukov and Korolev were ordered to prepare detailed reports concerning the work conducted at the Institute Nordhausen, bearing in mind (this was the first time this was said officially) that operations in Germany would be curtailed no

later than the end of that year. They did not name a specific date. Gonor felt the need to clarify that he would insist that Pobedonostsev, as well as Korolev's deputy for technical documentation and several other leading specialists, arrive in Podlipki no later than September. To fulfill this completely legitimate demand as early as August and September, we began to gradually send our specialists to Moscow and "its environs," as the military used to joke, alluding to Podlipki, Bolshevo, and to the as yet unknown site of the missile test range.

After the relatively peaceful division of the laboratories, problems once again arose. Who would get what in terms of the technical wealth that had been accumulated over the course of more than a year? The two special trains were equipped in large part with the laboratories' apparatus and testing equipment. The institutes in Moscow must have their own laboratories, but it would be impossible to outfit them there.

After all of the emotional experiences, to the surprise of the Germans, we began a hectic, redoubled effort to manufacture two more sets of special laboratory equipment. Each set included the massive test benches for the control surface actuators; the so-called "Häuserman pendulums," the first primitive electromechanical simulator for the adjustment of *mischgeräte*; all sorts of panels for testing gyroscopic instruments; a central distributor; a time-domain current distributor; and finally, panels for the integrated tests of the entire missile.

The reviving German industry fulfilled our orders readily and rapidly. The directors of the enterprises which contracted with the Institute Nordhausen were already accustomed to impossible deadlines and they joked, "This again. 'Let's go, let's go.'"

We paid them generously, almost without haggling, and by October we had turned out and procured a sufficient amount of equipment for the initial period.

By October we had also manufactured twelve missiles and had completed their horizontal integrated testing. The horizontal tests proved to be the most complicated technological process. From the first try, something always went counter to the procedure and instructions. Display lights lit up, stayed illuminated, and went out regardless of the instructions. We had to develop a good understanding of the operating logic behind the the general "ground-to-air" circuit in order to quickly figure out the causes for the malfunctions. As a rule, the malfunctions were caused either by the inexperience of the operator/tester or by equipment failures.

The horizontal test process provided us with a graphic demonstration of the low degree of reliability of the A-4's electrical system as a whole. Out of the twelve missiles, not one underwent testing without receiving ten negative remarks for such reasons as "no contact when there should have been one" or "contact present where it shouldn't have been." The latter cases were due to a short circuit—smoke came out of the missile and all of the power supply sources shut down. A technical council began to ask the eternal questions: "Who is to blame?" and "What is to be done?"

In addition to these twelve missiles, we put together other assemblies and put the final touches on them for the purposes of rocket assembly training at the factory in Podlipki. The factory accumulated enough assemblies and performed off-line tests for ten missiles.

IN EARLY OCTOBER, all the main directors of the Institute Nordhausen were assembled for a closed meeting in Gaydukov's office. Here we saw Colonel General Ivan Aleksandrovich Serov for the first time. All we knew about him was that he was Lavrentiy Beriya's deputy for counterintelligence and an authorized representative in that field in Germany who purportedly had no direct relation to the NKVD office of internal repression.

Addressing all of us, Serov asked us to give some thought to making a list with brief descriptions of those German specialists who in our opinion might be of use working in the Soviet Union. To whatever extent possible, we would not take superfluous specialists. We were to hand over our lists to Gaydukov. The German specialists that we selected would be taken to the Soviet Union regardless of their own wishes. The Americans had designated the German specialists whom they needed "prisoners of war." We would not act like that. We would allow the specialists to bring along their families and all of their household effects. We would know the precise date very soon. There was already a resolution to that effect. All that was required from us were fully-verified lists without errors. Specially trained operations officers would carry out the operation. They would each have a military interpreter and soldiers to help load the personal effects. The German specialists would be told that they were being taken by decision of the military command to continue the same work in the Soviet Union because it was no longer safe to work in Germany.

"We will allow the Germans to take all their things with them," said Serov, "even furniture. We don't have much of that. As far as family members, they can go if they wish. If a wife and children wish to stay, then by all means. If the head of the family demands that they go, we will take them. No action is required of you except for a farewell banquet. Get them good and drunk—it will be easier to endure the trauma. Don't tell anyone about this decision so that a brain drain won't begin! A similar action will be underway simultaneously in Berlin and Dessau."

We left this meeting with mixed feelings. It was difficult to meet and work with the Germans and to seriously discuss future projects knowing that one night soon they and their families would be "seized."

Three days later the date was announced—from the late night to early morning hours of 22–23 October. On the evening of 22 October we held a banquet at the *Japan* restaurant with a completely open bar for the Germans and a strict prohibition against drinking for all Soviet specialists who were acting as hosts. The banquet had been supposedly organized to commemorate the successful completion of the assembly and testing of the first dozen missiles. In all, around two hundred people were "enjoying themselves." This, of course, meant only the

Germans—the Russians were in a gloomy mood in light of the ban on drinking in the presence such a beautiful spread of *hors d'oeuvres*. The party broke up at about one o'clock in the morning. After returning home, I informed Katya for the first time about the operation that would be staged that night and asked that she wake me up at three o'clock.

At four o'clock in the morning, hundreds of military Studebakers began to rumble through the streets of the quiet, soundly sleeping town. Each operations officer had previously located the home that he was supposed to pull up to, so that there would be no confusion and needless fuss. At each home, the interpreter rang, woke up the head of the household, and explained that she had an urgent order from the Supreme Commander-in-Chief of the Soviet Army. The dazed, half asleep Germans didn't immediately grasp why they needed to go to work in the Soviet Union at four o'clock in the morning, much less with their families and all their possessions. But the discipline, order, and the unquestioning subordination to authority that had been drilled into them and under which the entire German people had lived for many decades did the trick. An order is an order. They proved to be much more quick on the uptake, obedient, and submissive than we had assumed. There were no serious incidents or hysterics—with one minor exception.

At five o'clock, Pilyugin called me and, stuttering from emotion, said that operations officers had come for him and asked him to drive over to Dr. Rule, who had poisoned himself to make a point, and on his deathbed was requesting to see Pilyugin. I told him, "Go—just request a doctor to render first aid." When Pilyugin entered Rule's apartment, Rule was lying there with a military doctor bustling about him trying to determine how many pills he had taken. The doctor told Pilyugin that the pills were harmless, that they were not life threatening, and that there was nothing here for her to do. Pilyugin asked Rule what he wanted from him. Slurring his words, he demanded a guarantee that in the Soviet Union he would be offered work in his specialty together with Pilyugin—whom up until now he had trusted—and not be sent to Siberia. Pilyugin gave his word, and with that the incident was settled. Pilyugin really did appreciate Dr. Rule, and unbeknownst to the other German specialists, the two of them were designing a longitudinal acceleration integrator using new principles.

The second hitch took place at the Villa Franka. Frau Gröttrup announced that she could not starve her children. Here she had two beautiful cows, and if she were not allowed to take them with her, she would refuse to go. Helmut Gröttrup declared that he would not go without his family. A communication with the operational leadership ensued. They sent an immediate response: we guarantee that we will hitch a goods wagon for the two cows to the special train and fill it with hay. Only who would milk them? Frau Gröttrup thanked them and announced that she was prepared to milk them herself.

Now this incident was also settled. The owners supervised as the soldiers loaded their possessions—everything that they possibly could have wanted—into the Studebakers. There wasn't much furniture because almost all of the German

specialists lived in strangers' apartments and the furniture did not belong to them. The cars loaded with people and possessions headed for the Kleinbodungen train station. There on a sidetrack stood a special train made up of sixty cars. The people found places in the sleeping cars, and their possessions were loaded into the freight cars under their supervision.

In the morning as I walked along the now quiet streets to the institute, solitary Studebakers and military Jeeps were still scurrying about the town. Someone forgot something; someone wanted to say one last farewell to his beloved. Without complaint, Serov's staff complied with these requests.

When I appeared in my office, the institute's most beautiful woman, Frau Schäfer, who managed our archives and our Photostat, came flying in. She was indignant because she had not been arrested and was not being taken to work in the Soviet Union. Her husband was a prisoner of war there and if she were in the Soviet Union she would certainly find him. "Why haven't they taken me?" I explained that they had taken only engineers and scientists and that Russia had enough archivists, Photostat operators, and typists.

But she did not give in and demanded that I report to Gaydukov. Instead of Gaydukov, I telephoned the commandant's office where the temporary operational headquarters was located. There, after some brief confusion, they made the following decision: "Give this Frau a car and let her go home immediately, gather her things, and set off for the special train."

Thus, Frau Schäfer turned out to be, perhaps, the only one who left on that special train for Russia as a complete volunteer.

The fuss continued around the special train for another entire day until everyone was arranged, everything that had been forgotten in the nighttime confusion was fetched, all the abundant rations were passed out, and the two Gröttrup cows were loaded. The Institutes RABE and Nordhausen switched over into liquidation mode.

All of the technical and maintenance personnel remained, the commercial office did not move, and having received assurance that none of them would be taken away, they set about the work of settling debts. We still had the big job ahead of us of copying and collating sets of documentation, disassembling and packing up the laboratory and production gear, and collecting the orders that remained unfulfilled from subcontractor enterprises. The BON officers who also remained in Germany for the time being were very helpful during this time.

Wrapping up operations on this scale took almost three months, and it was not until January 1947 that the entire primary staff of the Institute Nordhausen arrived with their families in Moscow at the Byelorusskiy train station. The assembled missiles, missile parts, machine tools, instruments, equipment, and automobiles that we had acquired as personal property, including Korolev's Horch, arrived in Podlipki ahead of us, and by the time we arrived, they had already been partially "distributed." The BON personnel and the hardware that had been transferred to them—several A-4 missiles and ground equipment—did not depart Thuringia for the State Central Firing Range that was under



From the author's archives.

**By the entrance of the Villa Franka: German journalist Karl Heinz, Ursula Gröttrup (Helmut Gröttrup's daughter), and B. Ye. Chertok—Bleicherode, Germany, 1992.**

construction until the summer of 1947. And that was the end of our almost two years of activity in Germany.

To this day the debate continues as to what significance the German achievements during World War II had in the development of our domestic missile building industry.

I will attempt to briefly formulate my responses to that question. First, we and the Americans, British, and French, who had worked on the new types of weaponry, were convinced that long-range automatically guided missiles were not a thing of the distant future, not fantasy, but a reality. There was a shared belief that in the future this type of weapon would certainly be used on much broader scales than the Germans had been capable of achieving.

Second, we had the capability, based not on literature but on our own experience, to study the shortcomings and weak points of the German technology and think about substantially improving it while we were still in Germany.

Third, missile technology attracted the attention of the all-powerful hierarchy of the Party, state, and military leadership. The resolution dated 13 May 1946 was the direct reaction to our activity in Germany, and of course also to a certain extent a response to the work being conducted in the United States on the basis of the same German technology.

Fourth, we acted correctly, having organized the study and restoration of the technology on German soil and taking advantage of the Germans' still powerful



technical potential, with the participation of German specialists. It would have been impossible to provide similar working conditions on that scale during the first two postwar years in our own country.

Fifth, and this is perhaps one of the most crucial results, our work in Germany produced more than a reconstruction of German technology. Korolev once gave a very sound assessment of the work of the Soviet specialists in Germany: “The most valuable thing that we achieved there was forming the basis of a solid creative team of like-minded individuals.”



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## About the Author

Boris Yevseyevich Chertok was born in 1912 in Poland and his family moved to Moscow when he was three years old. In 1930, he began work as an electrician in the Fili suburb of Moscow. In 1934, he joined the design bureau of Viktor Bolkhovitinov, a noted designer of bombers. Under Bolkhovitinov, Chertok contributed to the development of the DB-A long-range bomber and the first Soviet rocket-plane launched under its own power, the “BI.” In 1945–46, Chertok played a key role in organizing and reconstructing plans to reproduce the German V-2 using Soviet materials.

In 1946, by a joint order of two ministries, Chertok was transferred from the aviation industry to the newly created head institute for rocket technology, the NII-88, where he was the deputy chief engineer and chief of the department of control systems. Chertok became one of Korolev’s closest aides in developing control systems for ballistic missiles and spacecraft, eventually becoming Deputy Chief Designer of the famous OKB-1, the design organization that spun off from NII-88 in 1956. Chertok participated in every major project at OKB-1 (now the Energiya Rocket-Space Corporation, RKK Energiya) until the dissolution of the Soviet Union in 1991. In 1992 (at the age of 80) he moved from the position of Deputy General Designer of RKK Energiya to become the Chief Scientific Consultant.

At the present time, Academician Chertok lives in Moscow, and continues active work as the Chief Scientific Consultant for RKK Energiya, the dean of the Faculty for “Control Motion” at the Moscow Physical-Technical Institute and also serves as Professor of MGTU and head of the Program on the History of Cosmonautics in the Russian Academy of Sciences. His four-volume memoirs *Rakety i lyudi* (Rockets and People) were published in Moscow between 1994 and 1999.

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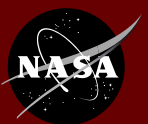
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