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ROLF ENGEL VS. THE GERMAN ARMY: A NAZI CAREER IN ROCKETRY AND REPRESSION

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Summary: The history of German rocketry has been dominated by a master narrative emphasizing the Army Peenemünde project. An examination of the career of Rolf Engel (1912-1993), an SS officer and veteran of Weimar rocket groups, undermines that narrative. After his arrest in 1933, Engel became a bitter opponent of the Army and joined the Nazi student movement and SD, ending his wartime career as an SS rocket expert. Engel's life demonstrates that the traditional dichotomy between the rocket engineers and "the Nazis," similar to one used by other German scientists and engineers after 1945, is false. His career also illuminates some of the lesser rocket projects of the Third Reich.

Resumé. L'histoire des fusées allemandes a été dominée par un "récit standard" qui met au premier plan le projet militaire de Peenemünde. L'étude de la vie de Rolf Engel (1912-1993), un officier SS et un ancien membre du groupe qui concevait les fusées pendant l'époque de Weimar, invite à repenser ce récit. Après son arrestation en 1933, Engel est devenue un adversaire résolu de l'armée et a rejoint le mouvement des étudiants nazis et le service secret de la SS, terminant sa carrière comme un expert en fusées au sein de la SS. La vie d'Engel montre que la dichotomie traditionnelle établie entre les ingénieurs constructeurs de fusées et les "Nazis", similaire à celle utilisée après 1945 à propos d'autres scientifiques et ingénieurs allemands, est fautive. Sa carrière renseigne également sur certains projets de fusées du Troisième Reich moins importants.

For fifty years the history of rocket development in the Third Reich has been dominated by the German Army group that built the V-2 – both in the relative attention devoted to that group and in the way the history was written. Because of the revolutionary technological character of the V-2, the world's first ballistic missile, and because of the huge resources the Reich devoted to it, it is natural that historians have focused on that effort. However, this emphasis has led many to ignore the numerous smaller rocket projects that flourished in Nazi Germany. Moreover, a master narrative created by Dr. Wernher von Braun (1912-1977) and Gen. Walter Dornberger (1895-1980) – the V-2 project's technical and military chiefs – determined until recently the very way German rocket history was written. Their memoirs and interviews emphasized the spaceflight origins and ambitions of the military missile group that was based at Peenemünde on the Baltic coast. Von Braun in particular asserted that building missiles was really just a necessary "detour" on the road to space because only the military had the money for large-scale rocket development. Both underlined the supposedly apolitical, non-Nazi character of German rocket enthusiasts and experimenters. In so far as they were building weapons for Hitler's

Germany, they were allegedly only patriotic scientists and engineers doing their duty in wartime.¹

In the last decade or two, the fabric of this apologia and master narrative has begun to unravel. Revelations that von Braun and others were involved in the exploitation of concentration-camp labor for V-2 production have not helped. Neither has the publication of information about their membership in the National Socialist Party and its organizations, including the SS (*Schutzstaffel*).² Of course many, like von Braun, joined more out of opportunism than political commitment. Yet there were Nazi activists at Peenemünde and in the other rocket groups that sprang up despite the Army's attempt to monopolize the technology.

An examination of those activists – like the study of the non-Peenemünde projects – is thus important to the reconstruction of the history of German rocketry outside the traditional framework created by Dornberger, von Braun and their followers. Studies on these topics also contribute to the recent scholarship on science and technology in the Third Reich. That literature has examined the post-war/Cold War apologias, myths and master narratives of German engineers and scientists – most notably those of the physicists, who felt compelled after the war to justify their role in nuclear research for Hitler. Like the Peenemünde rocket engineers, they claimed to have been patriotic, apolitical servants of scientific progress who had been forced into unwanted battles with meddling and incompetent “Nazis.” In order to protect their post-war reputations, the physicists thus created a false dichotomy between “the Nazis” and themselves — just as did the rocket engineers and many other Germans.³ Examining the careers of engineers and scientists who were active in the National Socialist movement therefore can be a useful tool for dismantling this dichotomy, which can in turn aid the reformation of the history of science and technology in the Third Reich.

One of those engineer-activists was Rolf Engel (1912–1993), a pioneer member of the spaceflight movement of the late Weimar Republic. As an SS officer, he set up a solid-propellant rocket firm in 1943 and quickly rose in prominence at a time when Heinrich Himmler's organization was expanding its role in the war economy. After the war, Engel worked on missile development and rocketry in France, Egypt, Italy and Germany, before retiring in 1971/72 as head of the space division of the firm Messerschmitt-Bölkow-Blohm. His career in the Third Reich is instructive because he is an example of the committed Nazi rocket engineer whose existence was scarcely admitted in the traditional master narrative. Moreover, Engel was a friend of Wernher von Braun who nonetheless carried out a personal war against the Army's dominance in that field throughout the Third Reich. As a result of this campaign, for seven years he was barred from rocketry; he made his living as a Nazi student official and agent of the SS intelligence service – the SD (*Sicherheitsdienst*). His career was in fact so unsavory that he completely falsified parts of his past after the war – making even the reconstruction of his biography a challenge.⁴

ENGEL'S EARLY ROCKET ACTIVITIES AND CONFLICT WITH THE ARMY

Engel got his start in the rocket business as a teenage amateur astronomer caught up in the late Weimar enthusiasm for spaceflight. After the publication of Hermann Oberth's seminal study *Die Rakete zu den Planetenräumen* (The Rocket into Interplanetary Space) in 1923, which showed that the liquid-fuel rocket could



Figure 1 Rolf Engel (left) and Hermann Oberth (right) are Peenemünde rocket engineers. Photo by Rolf Engel, Aerospace AG



Figure 1 Rolf Engel (far left, in rear) at the Rakettenflugplatz Berlin's engine test stand, c. 1931. With him (left to right) are Paul Ehmayr, Rudolf Nebel, Klaus Riedel and Kurt Heinisch. *Courtesy of Daimler-Benz Aerospace AG*

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potentially carry humans to the planets, there arose a small band of advocates for the concept. A Society for Space Travel (*Verein für Raumschiffahrt* or VfR) was founded in mid-1927. The following year, spectacular stunts with rocket cars and other vehicles unleashed a popular fad in the media.⁵

In late 1928, Rolf Engel, whose father had been a Prussian schoolteacher killed on the Western Front, attended a VfR meeting in Berlin. There he met a fellow sixteen-year-old, Wernher von Braun. One year later, Engel assisted Oberth, who was in Berlin as scientific advisor to the famous director Fritz Lang. Oberth had started an ill-fated project to build a liquid-fuel rocket, in part to promote Lang's movie, *Frau im Mond* (The Woman in the Moon, 1929). Out of Engel's minor role as a helper on that project arose his involvement with the pioneering group *Raketenflugplatz* (Rocketport) Berlin, founded in September 1930 by Rudolf Nebel, Oberth's chief assistant. A hidden hand behind Nebel's efforts was Army Ordnance's ballistics and munitions section, led by Lt. Col. Dr.-Ing. Karl Becker (1879–1940), an artillery expert. However, he and Nebel soon had a falling-out because Nebel was more con-man than engineer; he alienated the Army with his publicity-seeking methods. Unperturbed by this lack of support, Nebel raised funds and equipment for his group by pestering foundations and corporations and he secured workers by giving free accommodation to unemployed enthusiasts like Rolf Engel. Engel's mother could not afford to send him to university, especially after the onset of the Great Depression, so he subsisted on 7.50 marks per week unemployment insurance while contributing to *Raketenflugplatz's* experiments with liquid-fuel rockets.⁶

In late 1931, allegedly disgruntled with Nebel's dishonesty and carelessness with money, Engel became the chief assistant to Johannes Winkler, the first leader of the VfR. Winkler had been independently pursuing liquid-fuel rocketry, first with financing from famed aircraft designer Prof. Hugo Junkers, then from Hugo Hückel, a wealthy hat manufacturer and engineer who was *Raketenflugplatz's* main benefactor. Like Oberth before him, Winkler attempted to build a large rocket to reach the upper atmosphere without proceeding through all the intermediate stages of development. In fall 1932, the "HW (Hückel-Winkler) II" proved a miserable failure, leaving Engel again without a job. Fortunately, Hückel had been investigating the possibility of creating a "Voluntary Labor Service" group under a government-sponsored work-creation project. Engel became Hückel's candidate for the leader of this rocket group, which he set up in Dessau in late December with eight unemployed engineers from the Junkers works in that city, plus twenty-two craftsmen. Soon thereafter, the Nazi seizure of power provided Engel's group with superb facilities, as the inhabitants of the famous Bauhaus school of design had fled or been forced out. But the honeymoon would be very short-lived.⁷

On April 4, 1933, Rolf Engel was arrested by the secret police – and thus began his private war against the German Army rocket project. While working in the state library, he was called to the door, where he met two leather-coated gentlemen. Without a word of explanation, they put him under arrest. He and his deputy, Heinz Springer, were soon charged with "negligent high treason" for corresponding about rocket technology with space advocates such as Robert Esnault-Pelterie in France, Nikolai Rynin in the USSR and G. E. Pendray in the United States. Shortly thereafter, the police confiscated all the group's technical material and correspondence. Suspecting the Army was behind the arrests, Engel wrote a letter from jail to Wernher von Braun, who had been hired by the military to work on liquid-fuel

rockets in late 1932. The group. Engel claims – I was upset by these re Becker, now a general independent confirmation end, the presiding judge evidence too slight for

Engel's assertion that his accounts of later Oberth and Fritz Todt in the believable. Over the Ordnance used the new rocket development in potentially devastating rockets carrying poison of revolutionary size. Treaty, since the rocket drew was that rocket secrecy, something that

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rockets in late 1932. The letter was conveyed to Berlin by someone from the Dessau group. Engel claims – based on later conversations with von Braun – that the latter was upset by these repressive measures and had an “angry confrontation” with Becker, now a general and head of Ordnance Testing Division. But there is no independent confirmation of this intervention or any effect it might have had. In the end, the presiding judge let Engel and Springer go on May 18 because he found the evidence too slight for a charge like treason.⁸

Engel’s assertion that the Army had initiated the arrests is similarly derived from his accounts of later conversations – this time with Nazi leaders Reinhard Heydrich and Fritz Todt in the mid-1930s and with Walter Dornberger in the 1950s – but is believable. Over the eighteen months after the Nazi seizure of power, Army Ordnance used the new police state to eliminate independent groups and consolidate rocket development in its hands. Becker and his subordinates viewed rocketry as a potentially devastating surprise weapon, whether in the form of battlefield solid rockets carrying poison gas, or in the form of long-range, liquid-fuel ballistic missiles of revolutionary size. Moreover, the technology was not banned by the Versailles Treaty, since the rocket had been unimportant in World War I. The conclusion they drew was that rocketry was so revolutionary it needed to be developed in extreme secrecy, something that was only possible if they monopolized the technology.⁹

After Engel was freed, he found his group in a state of collapse. Soon the labor service money ran out and he was once again broke. While in jail he had caught a case of jaundice, probably because of the overcrowding and filth produced by the mass arrests of the Nazi takeover. He went to restore his health in East Prussia, which he knew from Winkler’s ill-fated “HW II” launch expedition of the previous year. After doing physical jobs for the summer, he returned to Berlin to organize a “community of interest” among the few remaining rocket groups, with the aim of salvaging something from the Army’s campaign and the changing political climate. He talked to the Raketflugplatz and perhaps to Winkler, who had gone back to work for Junkers in Dessau and was thus sheltered from the Army’s growing campaign. With Nebel, Engel then approached the Army through Wernher von Braun – or so he claims. They talked to Becker and Dornberger, but the meeting degenerated into a shouting match when Dornberger dismissed the achievements of the amateurs and Becker insisted that they either work under Army control or not at all. The surviving Ordnance documents about Nebel in late 1933 show no trace of this confrontation (Engel is never mentioned), but Engel’s accounts of this incident are vivid and consistent.¹⁰

INTERLUDE WITH THE SA

At this point Rolf Engel and Rudolf Nebel decided to try their luck in the murky world of National Socialist politics. Nebel had a political connection, Franz Seldte, leader of the *Stahlhelm* (Steel Helmet) veterans group and Labor Minister in the first Hitler cabinet. Seldte recommended that they contact Ernst Röhm, the leader of the SA (*Sturmabteilung*) – the Stormtroopers. Röhm was bitterly critical of the Army leadership, whom he regarded as hidebound Prussian reactionaries; he hoped that his organization would become the new mass army. By Engel’s account, he had “many conversations with Röhm” and with *Obergruppenführer* (Lt. Gen.) von Krausser, to whom Röhm had assigned the rocketry issue.¹¹ It is not known if Rudolf Nebel also

met the SA chief, but Ordnance documents verify that he had at least one meeting with von Krausser. Twice in the spring of 1934, Röhm and the SA leadership intervened with the Army to promote Nebel.

Engel's claim to have been the central organizer of the independent groups' "community of interest" is certainly exaggerated, but his contacts helped him become a leader in an SA-sponsored rocket group, the *Versuchs-Abteilung* ("Test Section") of the *Luftschutz-Staffel* ("Air Defense Squadron"). The latter in turn was part of an SA auxiliary organization, the *Deutsche Luftwacht* ("German Air Guard"). In February 1934 Engel's rank was *Scharführer* (Sgt.); his later SS records list him as joining the SA in October 1933. The leader of the *Versuchs-Abteilung* was a mysterious Fritz Beck. In a recommendation for Engel, Beck stated that "our formation" was supported by "the Supreme SA leadership" for the purpose of developing "active air defense" with the "greatest possible speed." The intent was to concentrate on anti-aircraft rockets, because that would not intrude on the Army's interest in ground-to-ground bombardment. But the SA apparently put more talk than money behind this group, because Engel received no salary; Beck asked the "welfare office" to support Engel if possible, because all the resources they had were being devoted to technical development. Another recommendation for Engel, this time from the head of the *Deutsche Luftwacht*, states that he was the leader of "troop B," which was presumably the remnant of the Dessau group that Engel gathered under SA protection. The *Raketenschule* might have been "troop A," because Beck had also played a prominent role in the SA's approach to the Army on Nebel's behalf in February.¹³

All the plans of the SA, Nebel and Engel came to naught, however. In March 1934, Hermann Göring, the Reich Air Minister and heir apparent to Hitler, succeeded in having Röhm's *Luftwacht* eliminated as a potential rival to his own nascent *Luftwaffe* (Air Force). Engel was transferred with all other members to Göring's *Deutscher Luftsport-Verband* (German Air Sport League or DLV). His rocket group thereby lost the SA's protection on April 1 and had to carry on without funding. More seriously, a major crisis was brewing in the Reich because of Röhm's ambitions. The Army leadership pressed Hitler for action against the SA, and were joined by Göring and by Reichsführer-SS Himmler, who fed Hitler false rumors of an impending SA coup in order to aggrandize their own power. On June 28, SS execution squads with Army support rounded up and shot Röhm and other SA leaders, although not Obergruppenführer von Krausser. Nebel was thrown into prison at Gestapo (secret police) headquarters in Berlin, but got out quickly, only to find everything at the *Raketenschule* confiscated by the Army. Based on alleged later conversations with Heydrich and Todt, Engel says that Gen. Becker was then able to arrange a meeting with Hitler, who verbally agreed to an Army monopoly over rocket technology. No surviving document verifies the existence of this "Führer order," but it is possible.¹⁴

The bloody decapitation of the SA virtually eliminated what little maneuvering room was left for Engel's rocket activities; he gave up on the remnants of the *Versuchs-Abteilung* at the end of July. He survived financially because his transfer to the DLV had given him an opportunity to enlist as a pilot trainee in the illegal *Luftwaffe*. The Versailles Treaty had forbidden Germany an air force, so Göring and the Air Ministry used various cover organizations, including the DLV, to build one up until the moment came to renounce the Treaty. For health reasons, Engel quickly dropped out of flight school, but got a civilian job in the regional air command in Berlin.¹⁵

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Bitter at the suppression of the rocket groups, Engel was not willing to give up his personal campaign to undercut the Army's dominance. With the tolerance of an executive at the huge electrical firm of Siemens, he organized a small group of rocket enthusiasts working in their spare time. They began building a test stand in the winter of 1934/35 in the Siemensstadt section of Berlin. He may have been under Gestapo surveillance, because this group soon met its end too. Dr. Walter Thiel, the later propulsion chief at Peenemünde, came as Ordnance's representative to ask him to join the growing rocket section under Wernher von Braun at Kummersdorf, 40 km southwest of the city. Engel asserts that he then met von Braun to discuss the possibility, but the idea of working under Army officers like Dornberger was intolerable to him. In the end, Thiel went to tell him that the Army had a monopoly under the alleged "Führer order"; his only other choices were to dissolve the group or deal with the Gestapo. Thus ended Rolf Engel's last attempt at practical rocket development for seven years.¹⁶

YEARS OF EXCLUSION – AND ASCENT IN THE NAZI APPARATUS

During the long period of exclusion – 1935 to 1942 – Engel never gave up thinking about rocketry and spaceflight, nor about ways to get back at Becker and Dornberger. The great majority of his time and energy went, however, into Nazi student politics and the SS. He first became a member of the *Nationalsozialistischer Deutscher Studentenbund* (National Socialist German Students League or NSDStB) in late 1933, at the same time or shortly after he joined the SA. Apparently he had been enrolled for one semester at the *Hochschule für Politik* (College of Politics) in Berlin, doubtlessly a Party-dominated institution. He was not able to return to college until the fall of 1935, when he enrolled in the Beuth School, the city's two-year technical college for mechanical, electrical and industrial engineering. By the spring of 1936 he was elected leader of the Beuth School's branch of the *Deutsche Fachschulenschaft* (German Community College Students Union), an autonomous off-shoot of the *Deutsche Studentenschaft* (German Students Union), which embraced all German university students. The picture in his *Fachschulenschaft* membership book from 1936 shows him wearing some sort of Nazi uniform. If Engel became involved in National Socialism in late 1933 mostly in order to use the SA as a means to fight back against the Army – and his pre-arrest writings bear out his claim to have been apolitical – by the mid-1930s he was acting like a true believer. His motivations may well have been cynical or opportunistic, but in 1936 his Luftwaffe boss described him as standing "completely on the foundations of the National Socialist government."¹⁷ Engel apparently diverted his bitterness about his 1933 arrest away from the regime and toward hatred of the officers in Army Ordnance.

By the end of 1936, Engel had become a functionary in the newly created *Reichsstudentenführung* (Reich Student Leadership or RSF) and by spring 1937, he was a member of the Nazi Party and SS. Engel's career in the RSF had its roots in his involvement at the Beuth School in the *Reichsberufswettkampf* (Reich Vocational Contest). The Hitler Youth, in collaboration with the German Labor Front, had launched this national occupational competition in 1934. Teams of school students, craft apprentices and young workers competed in many occupational areas; the definitions of the various categories had a strong National Socialist ideological bias. In 1935, the two-year college students joined the competition, at which time Engel

became involved. The following year he was the national coordinator of the mechanical engineering section of the contest for the Fachschulschaft. During 1935/36 the university students, through the national Studentenschaft, also became involved. But in a clear example of the students' elite mentality, the Studentenschaft ran its contest independently from the Hitler Youth. When the Reich Student Leadership was organized in November 1936, bringing together all the student groups, Engel was available in Berlin as a highly energetic leader and Reich Vocational Contest expert in the Fachschulschaft.¹⁸

Incessant infighting among the student organizations, leading to cynicism about the regime in the universities, had forced the formation of a single RSF. As a branch of the Party, the Munich-based NSDStB by definition embodied the Nazi elite among the university students and had established control over the Studentenschaft as early as 1931. Yet the Berlin-based leadership of the Studentenschaft, the national organization of the local student unions, set out after 1934 to carve out its own sphere of power in a battle typical of National Socialist Germany. It was a bureaucratic war that gives further proof – if any is needed – that the Third Reich was not a totalitarian monolith, but rather a collection of competing empires held together by Hitler's charismatic authority. By mid-1936, the infighting, arrogance and corruption of the leaderships of both organization had created a deadlock that attracted the attention of the SS's security service, the SD. Led by the Reinhard Heydrich, who also administered the Gestapo, the SD had, as one of its lesser duties, responsibility for ideological oversight over the universities. On the SD's urging, Himmler intervened. On November 7, 1936, *SS-Obersturmbannführer* (Lt. Col.) Dr. Gustav Adolf Scheel, a former Nazi student activist who was SD commander in southwest Germany, was appointed Reich Student Leader.¹⁹

One of the tasks inherited by the RSF, which was to be based in Munich in a sign of Party dominance, was the 1936/37 Reich Vocational Contest for students. This task was allotted temporarily to *SS-Sturmbannführer* (Maj.) Dr. Franz Six, a Heidelberg compatriot of Scheel who was a rising star at SD headquarters in Berlin. Six sought out local activists to run the contest office; thus Rolf Engel came to be one of the first new employees of the RSF. As a result, Engel postponed further engineering studies. When the 1936/37 contest was concluded, he moved with the office staff to Munich in June 1937. Furthering his career, Engel successfully applied for Party and SS membership and began publishing articles on the contest in Nazi periodicals, including one in Six's ideological journal.²⁰

On May 24, 1937, Engel officially joined the SS as an unpaid SD agent. He was assigned to Reich Student Leader Scheel's southwest German command of the SD, which seems like almost a natural consequence of joining the RSF. But Engel claims that he been recruited by Reinhard Heydrich earlier. In 1935, he says, he told a Studentenschaft leader about the Army's role in the suppression of the rocket groups, including the end of his Siemensstadt efforts. His counterpart was apparently a confidant of Heydrich, leading to a personal meeting with the SD/Gestapo chief. Heydrich, a cashiered naval officer, was fascinated by the military, but naturally suspicious of it. Beginning in 1936 (a more likely date for the meeting), he began to build up a foreign intelligence division of the SD that would become a rival of, and ultimately a victor over, the *Abwehr* (military intelligence). According to Engel, Heydrich took considerable interest in his story, was intrigued by the rocket's military potential, and promised to check into the "Führer order" giving the Army a monopoly. He allegedly ordered the Gestapo to stop surveillance of Engel but



Figure 2 Engel (fourth next in line to meet Ac Staatsarchiv Wurzburg

expected something matters. It is thus became involved with the RSF, rather than

During the middle Army and keep his technology division Fritz Todt, the big organizations. At E order" and was to monopoly, but only acquaintance with a Dr. Eugen Sänger, projects in this area: there is no way to cooperation between rocket development the monopoly had secrecy, the prospect his spare-time effort calculator, since the



Figure 2 Engel (fourth from right in the right-hand row, with square Nazi Student League armband) is next in line to meet Adolf Hitler at the New Reich Chancellery, Berlin, May 1, 1939. *Courtesy of the Staatsarchiv Würzburg*

expected something in return – that Engel become an SD informant in rocket matters. It is thus possible that the young student leader and space enthusiast became involved with the SS before 1937, and that this led to his recruitment into the RSF, rather than the reverse.²¹

During the middle 1930s, Engel also made other efforts to create trouble for the Army and keep his hand in the rocket business. Through his involvement in the technology division of the Reich Vocational Contest, he came into contact with Dr. Fritz Todt, the builder of the autobahns and head of the Party's engineering organizations. At Engel's behest, he claims, Todt asked Hitler about the "Führer order" and was told that the Army was not supposed to establish an exclusive monopoly, but only take the lead in rocketry. Engel also asserts that through his acquaintance with a leading official in the Air Ministry, he stimulated the hiring of Dr. Eugen Sänger, an Austrian rocket specialist, for the Luftwaffe's independent projects in this area. Sänger did come to Germany at the beginning of 1936, but there is no way to verify Engel's story, which may just be bragging. In any case, cooperation between the Army and Luftwaffe, plus the Army's inability to stop rocket development by corporations in the military-industrial complex, meant that the monopoly had quickly become moot. But for amateurs outside the pale of secrecy, the prospects for rocket work remained bleak. Engel decided to concentrate his spare-time efforts on designing and building an electromechanical integrating calculator, since the hand-calculation of trajectories had proved so laborious.²²

Engel's remarkable energy, both on and off the job, was rewarded by a quick ascent in his Nazi career. With his move to Munich, he replaced Six as the national leader of the Reich vocational contest for students. By early 1939 he was named deputy chief of his RSF division, the Office of Scholarship and Technical Education (*Amt Wissenschaft und Facherziehung*). In keeping with his role as a secret informant of the SD, Engel did not advertise his SS membership, but was promoted seven ranks by April 1939 from *Anwärter* (Candidate) to *Oberscharführer* (Staff Sgt.). A year later he jumped two ranks more to become a junior officer (*Untersturmführer* or 2nd Lt.). Moreover, on May 1, 1939, he was presented to the Führer at the annual contest ceremony where selected "Reich victors" were granted the high honor of shaking Hitler's hand. Officially, Engel appeared as the leader of a Technical University of Munich team that had designed a glider, but unless there was a massive conflict of interest with his role as national contest head, it is more likely that the RSF just inserted him in place of the actual team leader, who was not able to attend. Later in life, he claimed that this meeting was a reward for his integrating calculator work, but there is no evidence for this assertion.²³

When war broke out at the beginning of September, Engel's position did not immediately change as he expected. After 1945, he told various tall tales to explain his whereabouts in the summer and fall of 1939, including service in the Polish campaign with a student regiment or with a special intelligence team looting libraries and cultural institutions. Yet on September 30, 1939, he wrote from his home near Munich to his RSF superior, Dr. Fritz Kubach, then at Scheel's SD headquarters in Stuttgart:

"Slowly I am becoming nervous regarding the deployment to the East planned by the SD. I would be thankful to you if you could for once write openly to me if I can still expect such a deployment. In case it no longer takes place, I would prefer it if I could in the meantime come into contact with Danzig in order to, first, come nearer to taking my exam, and secondly, to build up a new existence there..."²⁴

Through his RSF activities, he apparently had found a professor at the Technical University of Danzig who was willing to let him take a doctorate in engineering based on his integrating calculator work. The same letter noted that he had had phone contact with someone in Army Ordnance in Berlin, and had expected to meet this person on the way to Poland. Because of his personal hatred for Dornberger, the head of the rocket section, the reasonable assumption is that some other section was interested in his calculating machine.²⁵

Yet, for unknown reasons, nothing came of these plans and the 1939/40 Reich Occupational Contest had been cancelled when the war started. Engel remained in Munich for the winter, filling in for Kubach, taking courses at the University, and getting married in November. He probably viewed the failure of the SD assignment to materialize as bad luck, but it was (at least for his post-war fate) quite the opposite. Members of the SD, along with the Gestapo and police, made up the *Einsatzgruppen* ("Action Groups") that carried out gruesome persecutions and mass executions of Polish intellectuals, Jews and political figures. An estimated 20,000 were killed in October alone.²⁶ Many of the SD men who served in these units then went on in 1941/42 to play prominent roles in the Holocaust. Instead, Engel's first active assignment was apparently not until June 1940. He briefly went to France in a unit looting libraries and cultural institutions, following behind the 7th Army of Gen.

Dollmann, which crossed the Rhine during the invasion. At least the various ones about Pe...

After returning to the front, Engel was commanded to join the 1st SS Panzer Division. In his life he most tried to avoid the front. He had once again delivered the mistakes of the First World War. In 1918, the Führer did not re-Germanised and National Socialism under civil administration. The adjoining German region across the Rhine in part of the Westphalia. Commander Scheel, including Engel, who was evaluated in early 1940 at the headquarters of the 1st SS Panzer Division.

Late in his life, Engel worked in an intelligence division, although he sought to avoid it. Actually that did not lead to action as a member of the 1st SS Panzer Division in Alsace. For his contribution to the war effort. According to his superior...

He [Engel] was re-evaluated. His time is also entrusted to the 1st SS Panzer Action, in addition to his duties. Ideologically an ideological leader. Führer. He is committed to everyone...

Through his oratorical capabilities, he has shown himself. Above all, he understood the subtle methods of the 1st SS Panzer Division.

Many "difficult situations" involved the expulsions of Poles and there were no less than 100,000 expelled unceremoniously during the war. Their property had already been expropriated. "Action" involved the execution of the action could provoke a riot in the camp. To carry out his duties in his commando. Of course, foreign intelligence could be more distant from the front.

Dollmann, which crossed the Rhine to attack the Maginot Line in the last part of the invasion. At least the available evidence makes this story believable – unlike his various ones about Poland.²⁷

After returning to his RSF job for the summer, in October Engel was “suddenly” commanded to join the secret police in occupied Alsace. Thus began the part of his life he most tried to obliterate in later years. Hitler’s lightning victory over France had once again delivered Alsace-Lorraine into German hands. Determined to avoid the mistakes of the Kaiser’s policy during the period of annexation from 1870 to 1918, the Führer did not approve immediate re-annexation, but wanted the territories re-Germanised and Nazified first. The two provinces were taken from France and put under civil administrators who were the *Gauleiter* (regional party bosses) of the adjoining German regions. For Alsace, the secret police administration was extended across the Rhine in parallel with the civil administration; thus Security Police and SD Commander Scheel took over Alsace. For personnel he drew on his RSF people, including Engel, whom he had given an extremely enthusiastic SS personnel evaluation in early 1940. On October 15, Engel reported to Mühlhausen (Mulhouse), headquarters of the security police in southern half of Alsace.²⁸

Late in his life, Engel began to admit that he had been head of SD’s foreign intelligence division (Office VI of the Reich Security Main Office) in Alsace, although he sought to minimize the import and the length of time of this service. Actually that did not become his post until May 1941.²⁹ Instead he was first thrust into action as a member of the security police aiding the brutal Nazification of upper Alsace. For his contributions, he was quickly promoted to *Obersturmführer* (1st Lt.). According to his superior’s February 1941 recommendation:

He [Engel] was responsible for heading the Names Action and at the current time is also entrusted with carrying out the remaining work on the Francophile Action, in addition to his duties as section head [of the local SD]...

Ideologically and politically, Engel shows himself to be a true follower of the Führer. He is completely imbued with National Socialist thought and champions it to everyone...

Through his organizational skill, his very hard work and his above-average capabilities, he has become one of the best members of the whole commando... Above all, he understands how to master the most difficult situations through subtle methods of leadership.³⁰

Many “difficult situations” undoubtedly arose, because the “Francophile Action” involved the expulsion or arrest of those considered pro-French. The expellees – and there were no less than 45,000 from Alsace in the second half of 1940 – were unceremoniously dumped in occupied France with a few possessions on a couple of hours notice. Their property was confiscated and their families torn apart. (The Jews had already been expelled before Engel arrived). In the same vein, the “Names Action” involved the enforced Germanization of all French names. Resistance to this action could provoke harrassment, arrest, expulsion or even a trip to a concentration camp. To carry out his job, Engel would have worked closely with Gestapo colleagues in his commando. Only after his promotion, when he then spent a year building a foreign intelligence organization as head of Alsace Office VI, would he have become more distant from the direct repression of the local population.³¹

AN UNEXPECTED RETURN TO ROCKETRY

In late spring 1942, Engel's ascent in the Nazi hierarchy of espionage and terror came to a sudden and unwelcome end – and thus began his return to rocketry. During his stay in Mühlhausen and then at Strasbourg headquarters, he had allowed himself to be addressed as “Dr. Engel” and had even used that title himself on door signs, forms and stamps. When co-workers discovered in May 1942 that his intellectual demeanor concealed the fact that he had only three semesters of junior college education, they were “extraordinarily indignant.” Engel was put through a disciplinary proceeding and summarily transferred to Danzig in the east, where he had continued to maintain contacts. During the investigation, he was also accused of corruption – taking confiscated books and glasses as personal possessions without following procedures for paying for them. These charges did not really hold up, but Engel's own testimony revealed that during the “book burnings” of un-German literature in late 1940, “which were started by the Party and were all rather chaotic,” he had kept “two or three editions of classics” for himself. He had also bought “a large number of books on space research in Paris.”³²

Reassigned to the Danzig SD in disgrace, Rolf Engel seized the opportunity to reenter engineering and rocketry, as he had long intended to do. After reporting on July 1, 1942, he quickly went to work for the small company of an old friend, Dr. Frank Früngel. It was undoubtedly the reason that he was sent to Danzig in the first place. Früngel was an expert in the physics of devices operating on microsecond intervals; they set out to develop under Lufwaffe contract a strobe light for night air operations against the British. Engel's primary interest remained, however, reentering rocketry and exacting some revenge on Army Ordnance. If we can believe one of his stories, he had already met Wernher von Braun in November 1941 and pointed out the other liquid-fuel rocket projects that had arisen through Lufwaffe funding of alternatives to Peenemünde's main propellant combination of liquid oxygen and water alcohol. (By 1944 Helmut Walter's firm in Kiel had 5000 employees working on hydrogen-peroxide rockets and steam turbines; at BMW Aircraft Engines in Berlin-Spandau, Helmut von Zborowski was developing self-igniting propellants based on a nitric acid as an oxydiser). Von Braun allegedly arrogantly dismissed these competitors because of the large advantage in facilities he possessed. Whether Engel actually had such insight into secret weapons development at that time is questionable; the conversation could have taken place in late 1942 or 1943. In any case, Engel had decided – as early as the late 1930s, he claims – that he could not compete in liquid-fuel development, but that solid-fuel rockets had been relatively neglected. Moreover, he thought since at least 1933 that Ordnance's commitment to spin-stabilized battlefield artillery rockets was dogmatic and wrong. (Army solid rockets, beginning with the 15 cm diameter model first put into action in 1941, used canted nozzles to spin the rocket like an artillery shell for accuracy.) He thus set out in spring 1943 to find out if there were any opportunities to enter the field.³³

With astonishing speed, a conversation at the Air Ministry turned Rolf Engel into an SS rocket expert with his own company, the *Versuchs-Anstalt* (Test Establishment or VA) *Grossendorf*. Grossendorf was a fishing village outside of Danzig. The investment money must have come from the SS, because the Air Ministry official had told him that the SS Ordnance Office wished to develop its own highly mobile bombardment rockets separate from regular Army issue. Engel quickly received an SS contract to design (or possibly re-design) a truck-mounted battery of small 8-cm

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diameter solid rockets stabilized with fins. Just as quickly, he carried out the contract successfully and these rockets were deployed to *Waffen-SS* (Armed SS) units on the Eastern Front. Engel thereby acquired an enthusiastic supporter in the head of the SS Ordnance Office, *Oberführer* (between Col. and Brig. Gen.) Gärtner. In fall 1943, Gärtner nominated Engel for promotion to *Hauptsturmführer* (Capt.), which was eventually approved. Gärtner, no doubt impressed by Engel's accounts of his early rocket experiences and his extensive self-taught knowledge of solid-propellant design and chemistry, also made him the SS representative on a special commission of the Armaments Ministry, "where he is particularly useful for the reputation of the SS."³⁴

Fortunate timing, as well as considerable ability, made Engel's rapid rehabilitation possible. By 1943, the Army's power in the Third Reich had greatly declined as the result of Hitler's distrust of the generals, defeats in the East and Africa, and the rise of the *Waffen-SS* as an elite Party-based army. The mere existence of an SS Ordnance Office was opposed by Army Ordnance in earlier years, but the Army could not prevent its growth. Moreover, beginning in 1942/43, the SS became deeply interested in rocketry as a decisive future weapon and as a means to increase its power. In 1942 Reichsführer-SS Himmler encouraged battlefield solid-rocket work at the SS-dominated firms in occupied Czechoslovakia, and took particular interest in Helmut von Zborowski at BMW, who was an enthusiastic SS officer. In 1943, however, Himmler's attention shifted to penetrating the huge Army project at Peenemünde because Hitler had declared the V-2 ballistic missile to be a wonder weapon that could reverse the increasingly disastrous course of the war. By August 1944, the SS managed to acquire a dominant position in that program. The increasing desperation in the Reich leadership and armed services also led to a virtual free-for-all in rocket development among the *Lufwaffe*, SS, private corporations and even the Army. Engel estimates that the ill-coordinated competition in this field resulted in eighty distinct projects, involving twenty different liquid-fuel rockets and 160 solid-propellant types. Thus, after years of frustration, Engel suddenly found it easy to enter the field.³⁵

Engel did not miss the opportunity created by the Army's decline to add to the troubles of one of his old adversaries. According to Gen. Dornberger's memoirs, "SS officers... were openly saying that I was the brake on rocket development in Germany. If it had not been for me, they said, we should have been much further by this time. The loudest voice had been that of SS Captain Engel..."³⁶ Dornberger invited Gärtner and Engel to his office, where they were allegedly embarrassed to be confronted with these charges. After the general explained what Army Ordnance had accomplished since 1930, they "apologized, and assured me that they had no conception of it." In view of Engel's continued attacks on Dornberger after the war, this latter detail is doubtful, but Dornberger did write, as he states in his memoirs, a twenty-page history of his program in preparation for further attacks from those who wished to exploit Ordnance's suppression of the amateur groups after 1933. Internal evidence dates this document to late 1943 – precisely when Engel had become Gärtner's protégé. Ordnance also struck back at Engel through a "game of intrigue," he asserts, by delaying the large-scale production of his 8 cm rocket in 1944 until he brought this matter to the attention of Field Marshal Erwin Rommel, Commander of the Army Group defending northern France.³⁷

While Engel remained a minor player in the SS's machinations regarding the Army rocket program, success and access to power naturally brought him and his company other contracts for solid-rocket development. By mid-1944, VA Grossendorf employed about 250 people. Among the programs he worked on were a larger 15 cm battlefield rocket with a special wire-wound casing to reduce weight, the small 5.5 cm anti-aircraft rocket *Orkan* (Hurricane), which was modified into the air-to-air rocket R4M, and the further development of varieties of "smokeless powder" (solid propellants that were not traditional black powder). Among the latter was an investigation of a variety that was castable, that is, could be poured into a mold instead of being compressed in elaborate and expensive presses. But in these propellant developments, Rolf Engel was only improving on the technology emerging from Army Ordnance's decade-long investment in solid-rocket development and production, as he himself admitted in a history of German rocket development he wrote for the French in 1947-48.³⁸

The VA Grossendorf was destined only to last about fifteen months, because the Red Army's huge summer offensive in 1944 threatened Danzig. In August, Rolf Engel became the head of the test division in Pibrans (occupied Czechoslovakia) of the Waffen-Union Skoda-Brunn, a Reich-owned, SS-influenced company. Over the next couple of months, much of the material and personnel from Grossendorf was evacuated to Pibrans and the VA continued its contract under the Waffen-Union name. The most spectacular of these was codenamed "Firework Z" – a Luftwaffe-financed experimental development for the first stage for the anti-aircraft missile *Rheintochter* (Rhine Maiden). This stage was a booster that was to burn 250 kg of propellant in less than one second and then be jettisoned – something Engel's group succeeded in demonstrating in ground and launch tests. Engel also got a contract of a rather different sort from Armaments Minister Albert Speer: to assemble a film documentary on the history of rocketry in Germany. Engel was one of the few people who had an overview of all the various groups, although his SS affiliation presumably did not hurt either. Together with his old SA crony, Fritz Beck, Engel compiled over two-and-a-half hours of footage going back to the 1920s, but Germany's collapse prevented the completion of the film.³⁹

On April 1, 1945, Beck replaced him as the head of Pibrans; Engel had quit because of his health and because virtually all research activities had been stopped in favor of desperate attempts to produce more weapons. Not long thereafter he led a convoy to the west of all those who did not wish to be overrun by Soviet troops. Left behind in Pibrans, according to the memoir of one of his subordinates, were a number of Polish forced laborers. Whether Engel had also used forced labor at Grossendorf is unknown, but seems likely given its ubiquity in the Nazi war economy after 1942.⁴⁰

Engel went into hiding in the village of his second wife in the Bavarian Alps, but she died some months later as a result of the terrible conditions of the first year of occupation. In the meantime, American intelligence officers eventually found him and he was questioned, he claims, by the OSS (Office of Strategic Services), the forerunner of the CIA. He allegedly was offered a contract to go to the United States, but refused. He later said that he did not wish to be exploited and then sent back, but in letters he wrote in 1949/50, he mentioned that he did not go because he and Wernher von Braun "did not always get along," and that his "relations with W.v.B. were not exactly the best."⁴¹ This is in interesting contrast to his 1947/48 history, where he expressed very positive feelings about von Braun as opposed to Dornberger

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The twists and turns into the function of the greatest value of the history of science narrative of Germany which has shaped the interests of the prominent in the design, development simultaneously and scientists in Engel strongly a Rudolf Nebel and were also ultra-unfortunate but of Engel's involvement is a useful corrective project. It is true Reich – and how

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and Becker. It seems that Engel's intrigues in 1943/44 had angered von Braun, but it is unclear what contact they had in the summer of 1945, when the technical director of Peenemünde was assembling the "team" that went to the United States. Nor is it clear what impact such contacts might have had on Engel's negotiations with the Americans. Engel himself did not leave until 1947, when he received an offer from the French that he considered acceptable. Once he reached France, his five years there would be the beginning of a new rocket career – one in which the falsification of his Nazi past was no small aid. Once again Rolf Engel had successfully reinvented himself.⁴²

CONCLUSION

The twists and turns of Engel's Nazi career are fascinating for the glimpses they give into the functioning of the SS, SD and National Socialist student organizations. Yet the greatest value in examining his career lies in its potential for helping us rethink the history of science and technology in the Third Reich and the specific master narrative of German rocketry created by Dornberger and von Braun. That narrative, which has shaped numerous popular histories, put at the forefront the spaceflight interests of the handful of veterans of the Weimar rocket groups who were prominent in the massive research-and-development teams of World War II. The design, development and production of weapons for Hitler's Germany was simultaneously downplayed and validated as merely the patriotic duty of engineers and scientists in wartime. Yet, in 1933–34 with the SA, and in later years with the SS, Engel strongly advocated the military development of rocketry for weapons, as did Rudolf Nebel and Hermann Oberth.⁴³ All were spaceflight enthusiasts, but they were also ultra-nationalists who saw military work as critical, not merely as an unfortunate but necessary "detour" on the road to space. Moreover, the examination of Engel's involvement in solid rocketry and non-Peenemünde missile development is a useful corrective to the overwhelming attention paid to the Army liquid-fuel project. It is truly astonishing how extensive was rocket development in the Third Reich – and how chaotically it was organized in the last half of the war.

In Dornberger and von Braun's master narrative, wartime weapons development and production eventually brought the meddling of incompetent or malevolent "Nazis" – often representatives of the Armaments Ministry, but especially members of that "alibi of a nation," the SS.⁴⁴ "The Nazis" were always the other, the external force, the alien influence, in the value-neutral yet progressive world of science and technology. In fact, in Dornberger's memoirs Engel himself appears as a minor example of the malevolent and meddling SS man.

The false dichotomy between "Nazis" and others embedded in this narrative bears a strong resemblance to aspects of what Mark Walker has called the "apologetic" version of "the myth of the German atomic bomb." After the war, German physicists, led by Prof. Werner Heisenberg, found it convenient to brand advocates of an "Aryan" physics, plus a few other administrators and enthusiastic servants of the regime, as "the Nazis" in physics. By definition, the scientific competence of these individuals was questioned. Moreover, the physicists around Heisenberg saw themselves as patriots who worked on the German nuclear project out of duty, but, when confronted by the real possibility of putting an atomic bomb in Hitler's hands, they sabotaged, or intended to sabotage, the development of the bomb through

passive resistance. Thus they were really "anti-Nazis." The rocket engineers could scarcely make a similar (questionable) claim, because they had obviously tried very hard to make the V-2 and other missiles work. Yet they and their chroniclers did try to distance themselves from military missile development by making it into a "detour."⁴⁵

The resemblance between the post-war narrative of physicists and rocket engineers is far from coincidental; they shared what Walker had called the "apolitical ideology" of science, in which politics and science are "antithetical" – the first "subjective," the second "objective." By definition, all those who introduced politics into science and engineering violated its norms and were therefore technically incompetent.⁴⁶ Of course, the physicists and rocket engineers also shared the need to construct a Cold War apologia that protected their usefulness to the West; it became critical to draw a public line between themselves and "the Nazis."

Engel's National Socialist career demonstrates how artificial such a dichotomy is. Few individuals, including Wernher von Braun, had a stronger pedigree from the Weimar spaceflight movement than Engel: he had not only been at the Rakettenflugplatz, but had also worked with Oberth and Winkler and had established his own group. Yet after his arrest, Engel's bitterness led him into the netherworld of Nazi politics where he became "a true follower of the Führer." Thwarted in his attempts at independent research, and snubbing an opportunity to work for the Army, Engel pursued a career in the RSF and SD until such time as he could return to his first love. When that opportunity arrived unexpectedly and unpleasantly, Engel quickly capitalized on it to become an SS rocket expert and entrepreneur. His actions before and during that time were often morally repugnant, but there is no doubt about his technical competence in the solid rocket field in the last two years of the war. Clearly, being a member of the SS was not incompatible with scientific and engineering brilliance – a comment that applies even more clearly to *SS-Sturmbannführer* (Maj.) Wernher von Braun, although he was an opportunist holding an essentially honorary rank, rather than a committed activist like Engel.

As Andreas Heinemann-Grüder has noted, it is not easy to make distinctions between the behavior, let alone the competence, of armaments engineers in the Third Reich on the basis of political attitudes. With rare exceptions, the active Nazis like Engel, the apolitical opportunists like von Braun, and the secret anti-Nazis like Hans Lindenmayr, the head of the valve laboratory at Peenemünde, all worked very hard to develop weapons in a society that valued their work highly. Whether the motivation was service to the Führer, the nation, or technological progress, or merely the desire to keep one's job and advance in one's profession, the rocket engineers, like others in the armaments field, exerted themselves energetically to design weapons and make them work.⁴⁷ Yet there is an undeniable value in understanding the motives and actions of Nazi activists like Engel, because only then can we begin to break through the apologies, myths and master narratives constructed after the war, and understand the realities of institutional life and political behavior among scientists and engineers in the Third Reich.

Notes

The author would like David DeVorkin, Tom for lending his Engel i (Daimler-Benz Aerosp

Reference

1. See, for example *Interplanetary Soc.* James McGovern *Wernher von Braun: Spaceflight Revolution* Sharpe, *The Rock Ordway III, Wern* (Malabar, Fla.: K
2. Linda Hunt, "U.S. Secret Agenda" (Ne Joseph, 1987); an 176–230.
3. Mark Walker, *G Cambridge Univ Mark Walker, et Press, 1994); anc Einfeld, "Der Ing and Thomas A. S*
4. For example, in Archives Division: Grossendorf con years attending t is Susanne Päch (June 1980), 231 Before Engel's t edited from Eng *Stunde* (Munich: Horeis less than There are also m in 1947–48 and Report No. 6 (F Heinz Gartman (German title: 7
5. Michael J. Neufc in Germany, 192 to the Space Age (
6. Horeis, *Rolf Eng* 5–23. See also translated in "Sj file; and miscel Archiv, Ottobru name was Rudo
7. Horeis, *Rolf Eng* Projects...", 39– Pendray Papers.
8. Horeis, *Rolf Eng* DASA, Engel correspondence
9. Horeis, *Rolf Eng* "Denkschrift: D. 1930–1943", c. 1 Neufeld, *The Ro* spring 1933 cam

Notes

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Reference

1. See, for example, Wernher von Braun, "Reminiscences of German Rocketry," *Journal of the British Interplanetary Society* 15 (May-June 1956), 125-45; Walter Dornberger, V-2 (New York: Viking, 1954); James McGovern, *Crossbow and Overcast* (New York: William Morrow & Co., 1964); Erik Bergaust, *Wernher von Braun* (Washington, DC: National Space Institute, 1975); William Sims Bainbridge, *The Spaceflight Revolution* (New York: John Wiley and Sons, 1976); Frederick I. Ordway III and Mitchell R. Sharpe, *The Rocket Team* (New York: Thomas Y. Crowell, 1979); Ernst Stuhlinger and Frederick I. Ordway III, *Wernher von Braun* (Esslingen: Bechtle, 1992) and *Wernher von Braun: Crusader for Space* (Malabar, Fla.: Krieger, 1994).
2. Linda Hunt, "U.S. Coverup of Nazi Scientists," *Bulletin of the Atomic Scientists* (April 1985), 16-24, and *Secret Agenda* (New York: St. Martin's, 1991); Tom Bower, *The Paperclip Conspiracy* (London: Michael Joseph, 1987); and Michael J. Neufeld, *The Rocket and the Reich* (New York: The Free Press, 1995), esp. 176-230.
3. Mark Walker, *German National Socialism and the Quest for Nuclear Power 1939-1949* (Cambridge: Cambridge University Press, 1989), esp. 4-6 for the "apolitical ideology"; Monika Renneberg and Mark Walker, eds., *Science, Technology and National Socialism* (Cambridge: Cambridge University Press, 1994); and Mark Walker, *Nazi Science* (New York: Plenum Publishing, 1995). See also Rainer Eisefeld, "Der Ingenieur in der deutschen Rüstung: Die Rolle Wernher von Brauns," in Torsten Hess and Thomas A. Seidel, *Vernichtung durch Fortschritt* (Berlin: Westkreuz, 1995), 32-42.
4. For example, in his "Curriculum Vitae," c. 1954, available in the National Air and Space Museum Archives Division (hereinafter NASM), Engel biographical file, he asserted that he started his Grossendorf company in 1939 instead of 1943. He also omitted his Nazi/SS career and invented two years attending the Technical University of Danzig after 1937. The only substantive article about him is Susanne Päch's "Rolf Engel: Fifty Years of Activity in Rocketry and Space Flight," *Spaceflight* 22 (June 1980), 231-36, which includes a later, somewhat less fictional version of the Third Reich years. Before Engel's death, Prof. H. O. Ruppe's institute informally published a short autobiography edited from Engel's writings and interviews: Heinz Horeis, ed., *Rolf Engel - Raketenbauer der ersten Stunde* (Munich: Lehrstuhl für Raumfahrttechnik/TU München, n.d. [1992]). Engel lied less to Horeis less than to Päch, but the book still contains numerous falsehoods, distortions and omissions. There are also major gaps in the valuable history of German rocketry that Engel wrote for the French in 1947-48 and later published in Egypt: *Beiträge zur Geschichte der deutschen Raketentechnik*, CERVA Report No. 6 (Heliopolis?: CERVA, 1954). This book is clearly the source for the Engel stories in Heinz Gartmann, *The Men Behind the Space Rockets* (London: Weidenfield and Nicolson, 1955), 95-98 (German title: *Träumer, Forscher, Konstrukteure*).
5. Michael J. Neufeld, "Weimar Culture and Futuristic Technology: The Rocketry and Spaceflight Fad in Germany, 1923-1933," *Technology and Culture* 31 (October 1990), 725-52; Frank H. Winter, *Prelude to the Space Age* (Washington, DC: Smithsonian Institution Press, 1983).
6. Horeis, *Rolf Engel*, 8-25; Engel interview with Neufeld, 1 Aug. 1991; Neufeld, *The Rocket and the Reich*, 5-23. See also Engel, "Die geschichtliche Entwicklung der Raketentechnik," ms., 1 Jan. 1932, translated in "Spaceflight Projects as I Saw Them Nearly 50 Years Ago," both in NASM, Engel bio. file; and miscellaneous documents, 1931-32, in the Engel Papers, Daimler-Benz Aerospace AG Archiv, Ottobrunn (hereinafter DASA). Engel's papers from the early 1930s show that his actual first name was Rudolf. Whether he ever legally shortened his name is unknown.
7. Horeis, *Rolf Engel*, 30-47; Engel, "Rocket Research in Voluntary Labour Service," in "Spaceflight Projects...", 39-45, NASM, Engel bio. file.; Engel to G. E. Pendray, 23 Jan. and 16 Mar. 1933, in the Pendray Papers, Seeley G. Mudd Manuscript Library, Princeton University.
8. Horeis, *Rolf Engel*, 47-49; Engel, *Beiträge*, 23; Anhaltisches Amtsgericht, "Beschluss," 18 May 1933, in DASA, Engel Papers; Engel interview by Frank Winter/NASM, Jan. 1984; Engel-Pendray correspondence, 23 Jan.-4 Apr. 1933, in the Pendray Papers (see preceding note).
9. Horeis, *Rolf Engel*, 48-49; Engel interviews by Winter, 1984, and Neufeld, 1991; W. Dornberger, "Denkschrift: Die Eigenentwicklung des Heeres-Waffenamtes auf dem Raketengebiet in den Jahren 1930-1943," c. late 1943, Deutsches Museum Archives, Munich, and NASM, FE microfilm, FE496; Neufeld, *The Rocket and the Reich*, 5-32. Engel is less convincing in making his arrest part of a broader spring 1933 campaign. He has claimed that the Army wanted Nebel arrested and the Raketenflugplatz

- closed down; the same fate was to befall a solid-rocket group under Reinhold Tiling. But Nebel was protected by his acquaintance with Reich Labor Minister Seldte; Tiling allegedly had friends in the Navy. Surviving documents from Ordnance files only show, however, harassment of Nebel starting in the fall. (Tiling and two assistants were killed in an accidental explosion in October 1933). If Engel's group was the only one targeted, it does raise the question of why. On the other hand, Engel always conflated his arrest with attacks on the other independent rocket groups from as much as a year later. See the above sources and Engel, *Beiträge*, 23.
10. See particularly Engel, *Beiträge*, 23–24, chap. written 26 Dec. 1947 in Paris. See also Horeis, *Rolf Engel*, 50. The Ordnance documents are in M.I.14/801(V), Imperial War Museum, London (hereinafter IWM). See esp. Schneider to V2, 22 Dec. 1933.
 11. Engel, *Beiträge*, 24. See also Horeis, *Rolf Engel*, 50.
 12. Lietze/Chef Heereswaffenamt (draft by Schneider) to the Obersten S.A. Führer, sent 10 Mar. 1934, Zwengauer (Dornberger), to Abwehr, 7 Jul. 1934, and Funke to Bodenschatz, 27 Jul. 1934, in IWM, M.I.14/801(V); Neufeld, *The Rocket and the Reich*, 28–30. Nazi ranks have been translated according to their U.S. Army equivalents.
 13. Lietze to Obersten SA-Führung, 10 Mar. 1934, in IWM, M.I.14/801(V); Engel, *Beiträge*, 25–26; Horeis, *Rolf Engel*, 50–51; Ritter to Deutsche Luftwacht/LSS, 29 Jan. 1934, Beck, "Bescheinigung," 4 Feb. 1934, von Harlinski/Führer der DLW, "Dienstbescheinigung," 31 Mar. 1934, and Beck, "Arbeitsbescheinigung," 4 Oct. 1935, in DASA, Engel Papers; Engel SS officer files, Berlin Document Center (hereinafter BDC). The BDC has since become the Berlin-Zehlendorf section of the Bundesarchiv; microfilm of the archive is being made available at the National Archives (hereinafter NA), College Park, Maryland. Part of the Engel SS files are on NA/BDC reel SSO-187. In January 1934, Beck had also falsely claimed to be Chairman of the VfR in a letter to the Army on Nebel's behalf—at a time when the society was being torn apart. The Society's leadership had expelled Nebel and tried, unsuccessfully, to have him arrested for embezzeling its funds. Beck to Heereswaffenamt/Wa Prw. 1/1, 15 Jan. 1934, in IWM, M.I.14/801(V). Moreover, Ordway and Sharpe, *Rocket Team*, 19, report that the Raketenflugplatz became a drill ground for the Luftwacht.
 14. Von Harlinski?, "Dienstbescheinigung," 31 Mar. 1934, and Beck, "Arbeitsbescheinigung," 4 Oct. 1935, in DASA, Engel Papers; Karl-Heinz Völker, *Die deutsche Luftwaffe 1933–1939* (Stuttgart: Deutsche Verlags-Anstalt, 1967), 25–26; Neufeld, *The Rocket and the Reich*, 30–31; Engel, *Beiträge*, 25; Horeis, *Rolf Engel*, 48–51.
 15. Beck, "Arbeitsbescheinigung," 4 Oct. 1935, and Gürle/Luftkreiskommando II, "Führungszeugnis," 11 Feb. 1936, in DASA, Engel Papers.
 16. Engel interviews with Winter, 1984, and Neufeld, 1991; Engel, *Beiträge*, 26–27; Horeis, *Rolf Engel*, 51–52. In my interview with Engel he denied this story about the end of the Siemensstadt group. After discovering the same story in more detail in his 1947/48 history, I now believe that he was, for unknown reasons, lying to me in 1991. For an earlier formulation, see Neufeld, *The Rocket and the Reich*, 296n59.
 17. Gürle, "Führungszeugnis," 11 Feb. 1936, Beuth-Schule transcripts, 1936, and NSDStB and Fachschulschaft membership books, 1935/36, in DASA, Engel Papers; Engel marriage application, 8 Nov. 1939, in BDC, SS-RuSHA; Engel, "Spaceflight Projects..." NASM, Engel bio. file; Horeis, *Rolf Engel*, 24–25. Engel's SS records give wildly inconsistent dates for when he left the SA—anywhere from 1934 to 1938: see BDC, SS-RuSHA document above, 15 Jun. 1939 questionnaire in BDC, Parteikanzlei records?, and NA/BDC, SSO-187, frames 634–35, 638–639.
 18. Michael H. Kater, "The Reich Vocational Contest and Students of Higher Learning in Nazi Germany," *Central European History* 7 (1974), 225–61, here 225–30; Günter Kaufmann, *Der Reichsberufswettkampf* (Berlin: Junker und Dünnhaupt, 1935); Gustav Adolf Scheel, *Die Reichsstudentenführung* (Berlin: Junker und Dünnhaupt, 1938); Horeis, *Rolf Engel*, 55; Amtsleiter to Engel, 11 Sep. 1936, in Staatsarchiv Würzburg (hereinafter StAW), RSF I, 11 g 260/1; "Aktiennotiz für SS-Sturmbannführer Six," 19 Nov. 1936, in StAW, RSF III, A-0/2.2. The surviving records of the RSF are now found in the Bavarian state archive in Würzburg.
 19. Geoffrey J. Giles, *Students and National Socialism in Germany* (Princeton: Princeton Univ. Press, 1985), 6–7, 197–205; Michael Stephen Steinberg, *Sabers and Brown Shirts* (Chicago: Univ. of Chicago Press, 1977), chap. 10; "Führerwechsel im NSD-Studentenbund," *Die Bewegung* (NSDStB weekly), 11 Nov. 1936, and "Dr. Scheel übernimmt die Führung..." in same, 18 Nov. 1936. Engel's later depiction of the Studentenschaft as independent from, and even fighting against, the NSDStB is an outrageous attempt to make himself look anti-Nazi during his career as a student functionary. See Päch, "Rolf Engel," 232, 234; Horeis, *Rolf Engel*, 55.
 20. Engel, "Der studentische Reichsberufswettkampf," *Volk im Werden* 5 (Apr. 1937), published in another form in *Die Bewegung*, 15 Jun. 1937; Engel draft articles for latter, 1937, in StAW, RSF III, A-0/2.3; Kater, "Reich Vocational Contest," 230, 256–57; Six, "Rundschreiben Nr. 3," 20 Nov. 1936, in StAW, RSF III, A-0/1.25; note, 8 Jun. 1937, in StAW, RSF III, A-2/2.91; Engel NSDAP file card, BDC; Engel SS officer file card, NA/BDC, SSO-187, fr. 634–35.
 21. Engel SS NA/BDC George C 1990), ch. 1940 "Lei SS on Ma for 1937.
 22. Horeis, *Rolf Engel*, 1 Winter, 1
 23. Engel, "I A-0/1.27 BDC, SS-articles 1 (hereina Bundesarchiv Horeis, 1
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 29. Päch, "Dienst
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 33. Engel | 73–77; DASA, Engel' Zborov' Guides
 34. Engel 61–63:
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21. Engel SS officer file card, Scheel "Personal-Bericht," early 1940, and "Lebenslauf," 16 Feb. 1940, in NA/BDC, SSO-187, fr. 634-35, 638-41; Päch, "Rolf Engel," 234; Engel interview with Neufeld, 1991; George C. Browder, *Foundations of the Nazi Police State* (Lexington: University Press of Kentucky, 1990), chap. 15; David Kahn, *Hitler's Spies* (New York: Collier Books, 1978), 59-61, 251-71. In his 1940 "Lebenslauf" and in his BDC, SS-RuSHA 1939 marriage application he stated that he joined the SS on May 1, 1936. This might indicate when he became an informant, or might simply be a mistake for 1937.
22. Horeis, *Rolf Engel*, 48, 55-56, 68; Engel, *Beiträge*, 30-31; Päch, "Rolf Engel," 234; Engel interviews with Winter, 1984, and Neufeld, 1991; Neufeld, *The Rocket and the Reich*, 41-62.
23. Engel, "Der Reichswettkampfleiter im RBWK ddSt." draft cover letter, 5 Jul. 1937, in StAW, RSF III, A-0/1.27; 15 June 1939 questionnaire, BDC, Parteikanzlei?; "SS-Stammkarten-Abschrift: c. 1941, BDC, SS-RuSHA; *Die Bewegung*, 9 May 1939 (includes cover photo of Engel shaking Hitler's hand and articles by Engel), clippings in Fritz Kubach Papers, Library of Congress Manuscripts Division (hereinafter LC), German Captured Documents microfilm, reel 478, container 803 (originals in the Bundesarchiv); Reichssiegerliste, May 1939, and note, c. Apr 1939, in StAW, RSF III, A-4/1.44(1); Horeis, *Rolf Engel*, 57; Päch, "Rolf Engel," 234. Engel also misdates his encounter with Hitler as 1938.
24. Engel to Kubach, 30 Sep. 1939, in Kubach Papers, LC German Captured Documents, reel 474. See also Kubach to Hopp, 4 Oct. 1939, in *ibid.*; Päch, "Rolf Engel," 234; Horeis, *Rolf Engel*, 57-58. Kubach was a secondary figure in the campaign for an "Aryan physics": Alan Beyerchen, *Scientists Under Hitler* (New Haven: Yale Univ. Press, 1977), 145, 154, 162, 164-65. But he also played a role in resisting the pseudo-scientific "glacial cosmogony" pushed by Himmeler. See Brigitte Nagel, *Die Welteislehre* (Stuttgart: Verlag für Geschichte der Naturwissenschaften und Technik, 1991), 80-83, 152-54.
25. Engel to Kubach, 30 Sep. 1939, in the Kubach Papers, LC German Captured Documents, reel 474; Horeis, *Rolf Engel*, 57.
26. Alwin Ramme, *Der Sicherheitsdienst der SS* (Berlin-East: Deutscher Militärverlag, 1970), 112-17, 136. For Engel, see RSF correspondence in StAW, RSF III, A-4/1.82, A-5/1.1 and A-5/6.12, and Kubach Papers, reel 474, LC German Captured Documents; and Engel marriage application, 8 Nov. 1939, BDC, SS-RuSHA.
27. Horeis, *Rolf Engel*, 57-58; Engel interviews by Winter, 1984, and Neufeld, 1991. Engel correspondence, May/June 1940, in StAW, RSF III, A-4/1.0, seems to indicate his absence in early June; he also uses the name of Dollmann in different sources for his Army commander in either Poland or France, but Dollmann did head 7th Army in the France.
28. Heigl/RSF to Pohl, 14 Oct. 1940, in StAW, RSF III, A-5/1.1 (quotation); Scheel, "Personal-Bericht," early 1940, and Hauptsturmführer?, "Beförderungsvorschlag," both for Engel, 26 Feb. 1941, in NA/BDC, SSO-187, fr. 640-41, 659-60; Lothar Kettenacker, *Nationalsozialistische Volkstumspolitik im Elsass* (Stuttgart: Deutsche Verlags-Anstalt, 1973), 59-62, 141; Chef der Zivilverwaltung beim AOK.7, 30 Jun./1 Jul. 1940 orders, in NA, Captured German Records microfilm, T-175, r. 280, fr. 2774333-34; Marie-Joseph Bopp, *L'Alsace sous l'Occupation Allemande 1940-1941* (Le Puy: Éditions Xavier Mappus, 1945), 270-71.
29. Päch, "Rolf Engel," 234; Horeis, *Rolf Engel*, 58; Fischer/Befehlshaber Sipo u. SD Strassburg, "Dienstleistungszeugnis für SS-Obersturmführer Engel," 7 Aug. 1942, NA/BDC, SSO-187, fr. 682.
30. Hauptsturmführer?, "Beförderungsvorschlag," 26 Feb. 1941, NA/BDC, SSO-187, fr. 659-60.
31. Kettenacker, *Nationalsozialistische Volkstumspolitik*, 167-172, 248-252; Jacques Lorraine, *The Germans in France* (London: Hutchinson, n.d. [1947]), 73-75; Winkler/Befehlshaber der Ordnungspolizei, report, "Lagebericht vom 17. Oktober 1940," NA, T-175, r. 280, fr. 2774364. Engel's true career in Alsace was first briefly discussed in Bower, *Paperclip Conspiracy*, 144.
32. The disciplinary proceeding is found in Engel's SS officer file, NA/BDC, SSO-187, fr. 680-717; his testimony is fr. 711-13.
33. Engel promotion records, 1943-44, in NA/BDC, SSO-187, fr. 647-48, 654-55; Engel, *Beiträge*, 24, 36, 73-77; Horeis, *Rolf Engel*, 59-61; Engel ID card, Geräteentwicklung Danzig GmbH, 3 May 1943, in DASA, Engel Papers; Engel interview by Winter, 1984. There are many chronological inaccuracies in Engel's accounts of the war period due to his need to cover up his SD career. For Walter and Zborowski, see their contributions to Theodor Benecke and A. W. Quick, eds., *History of German Guided Missile Development* (Braunschweig: E. Appelhaus, 1957), 263-80, 297-324.
34. Engel promotion records, 1943-44, in NA/BDC, SSO-187, fr. 647-48, 654-55; Horeis, *Rolf Engel*, 61-63; Engel, *Beiträge*, 73-81.
35. Engel, *Beiträge*, 115-16; Horeis, *Rolf Engel*, 66. For SS rocket development in Czechoslovakia, see reports to Himmeler from Voss/Verbindungstab zur Waffen-SS bei den Skodawerken u. Waffenwerken Brünn, 4 Jun. and 10 Jul. 1942, in NA, T-175, r. 129, fr. 2655376-83. On von Zborowski and Peenemünde, see Neufeld, *The Rocket and the Reich*, and the sources cited therein. For further analysis of the ill-coordinated competition in the missile field, see Dieter Hölsken, *Die V-Waffen* (Stuttgart: Deutsche Verlags-Anstalt, 1984) or the revised translation, *V-Missiles of the Third Reich* (Sturbridge, Mass.: Monogram Aviation Publications, 1994).
36. Dornberger, V-2, 181-82.

37. Ibid.; Dornberger, "Denkschrift," cited above in n. 6. Dornberger dates the incident as April 1943, but this is clearly wrong, as the "Denkschrift" refers to the Peenemünde air raid of August. See Engel, *Beiträge*, 81, for Rommel, and passim, for post-war attacks.
38. Engel, *Beiträge*, 57-71, 81-97; Horeis, *Rolf Engel*, 60-65.
39. Engel, *Beiträge*, 99-103; Horeis, *Rolf Engel*, 70-74; fragmentary VA Grossendorf and Waffen-Union Skoda-Brünn documents, 1944-45, in DASA, Engel Papers, and NASM, Engel bio. file.
40. Waffen-Union Skoda-Brünn, "Bestätigung," 7 April 1945, in DASA, Engel Papers; Pibrans staff lists, 1945, in NASM, Engel bio. file; Dr. Franz Kalscheuer memoir, Anhang 3 to Horeis, *Rolf Engel*, 110-11.
41. Engel to Brügel, 6 Oct. 1949 and 26 Feb 1950, in DASA, Engel Papers. On his immediate post-war fate, see Horeis, *Rolf Engel*, 76-77; Pach, "Rolf Engel," 235.
42. Engel, *Beiträge*, 27; Horeis, *Rolf Engel*, 77-78.
43. Michael J. Neufeld, "The Excluded: Hermann Oberth and Rudolph Nebel in the Third Reich," IAA.95-IAA.2.3.03, paper presented at the 43rd Congress of the International Astronautical Federation, Oslo, Norway, Oct. 1995.
44. Gerhard Reitlinger, *The SS: Alibi of a Nation* (New York: Viking, 1957).
45. Walker, *German National Socialism*, 222-33, and *Nazi Science*, 243-57. The latter book is in part a response to a new attempt by Thomas Powers in *Heisenberg's War* (New York: Knopf, 1993) to revive the thesis that Heisenberg and others sabotaged the bomb project out of moral concern.
46. Walker, *German National Socialism*, 4-5.
47. Heinemann-Grüder in Renneberg and Walker, *Science, Technology*, 41-42; on Lindenmayr, Walter Wiesman oral history interview by Neufeld, 1990, deposited in the NASM Department of Space History, p. 20.

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