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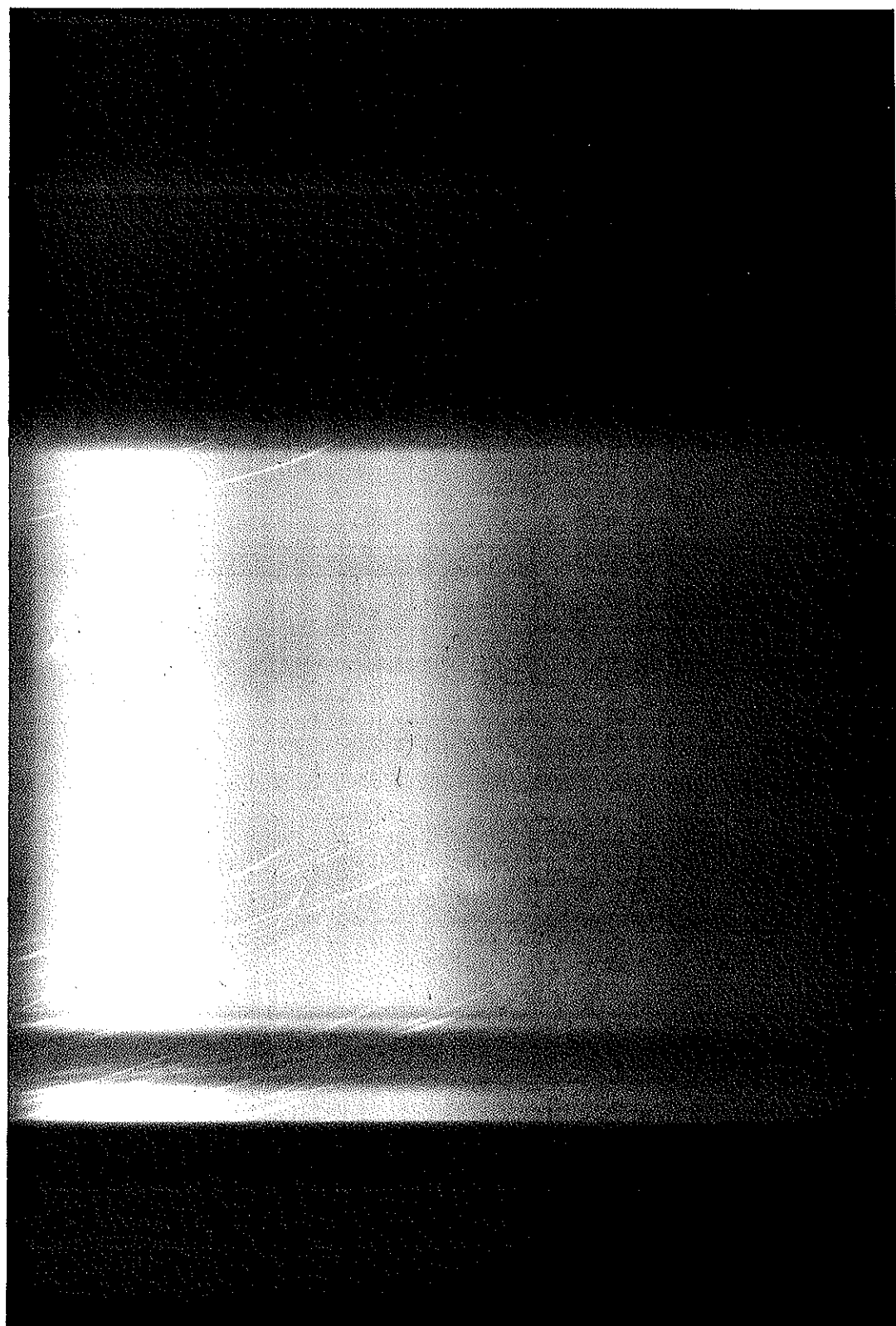
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Supérieure de Guerre in the interwar years, all the above occurred except that none of them became Commandant of the Marine Corps. The point is that such judgments are based on only one or two years of assessment in an academic environment. Also, other factors can influence these judgments, including cultural bias, language proficiency or lack thereof, personalities, etc. These may be either very accurate or incorrect. Only subsequent career performance will provide the final assessment.

What conclusions can be drawn from this experience? The Marine Corps believed sending officers to Paris benefitted the Corps. Highly professional officers were sent, those who had performed well in many diverse previous assignments and had career potential. All did well upon their return, with some achieving higher rank and fame than others. However, any officer detailed to such an assignment receives it because of analysis of his potential for the future based upon his past performance. Assignment and graduation from a professional military education school such as the Ecole Supérieure de Guerre only ensured that an officer would have an opportunity to succeed in positions of greater responsibility.

But would officers who might be given a two-to-three year assignment in Paris desire this posting? Surprisingly, many did not wish to be in "the city of lights." Many officers did not desire a multi-year assignment in Paris, or independent language study abroad. Brigadier General Lester Dessez recalled that for the year he was ordered to Paris, "They [i.e., the Marine Corps] had no applicants for the course." In fact, Dessez desired a posting with troops, with Paris his second choice of duty. Colonel Paul Drake, a peer of Dessez's and a captain in the mid-1930s, recently echoed these same sentiments: "I did not know of one of my close contemporaries who wanted to go. They did not want to take time, in the grade of Captain, away from the Marine Corps on that, nor on other such assignments, as Oriental languages. . . . There was no great general interest in the assignment. . . . [I had] no desire to attend that course, nor any special assignment on foreign duty away from the Corps as a Captain, which time, career-wise, was considered most valuable."⁴⁶

46. Dessez, Oral History Transcript, 133. Colonel Drake, letter to author, 25 July 1991. By the late 1930s, the potential assignment was announced to the Corps: see Headquarters, U.S. Marine Corps, Headquarters Bulletin, Number 144, 15 September 1937: "Student—Ecole de Guerre, Paris, France." The only stated prerequisite: "The officer selected for this assignment must be able to read and speak French fluently."

Hitler, the V-2, and the Battle for Priority, 1939–1943

☆

Michael J. Neufeld

ON 7 July 1943, Gen. Walter Dornberger and Dr. Wernher von Braun, military and technical heads of the German Army rocket program, flew east from the secret weapons center at Peenemünde to an audience with Adolf Hitler in East Prussia. That evening they showed the Führer a movie of the first successful launching in October 1942 of the A-4 (labelled "Vengeance Weapon 2" or V-2 by the Propaganda Ministry in 1944). Von Braun narrated the movie with the aplomb he was later to exhibit in front of American presidents, while Dornberger explained the production and deployment plans for the world's first ballistic missile. Hitler was enthralled, and declared the V-2 the weapon that could decide the war. According to Dornberger's memoirs, the Führer even said to him: "I have had to apologize to only two people in my life. The first is Field Marshal von Brauchitsch [Commander-in-Chief of the Army from 1938–41]. I did not listen to him when he told me again and again how important your research was. The second man is yourself. I never believed your work would be successful."¹

In Dornberger's memoirs, and in most accounts published since, this meeting was the crucial breakthrough which restored top priority to the project only months after "the Führer . . . dreamed that no A-4 will ever reach England."² Hitler's skepticism about the missile ever since

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1. Walter Dornberger, *V-2*, tr. James Cleugh and Geoffrey Halliday (New York: Viking, 1954), 107.

2. *Ibid.*, 91.

the winter of 1939–40 was said to have denied the project top priority and delayed it for years. As a result the V-2 came “too late” to make a significant difference in the war. Although the strategic importance of the V-2 has repeatedly been shown to be minimal, most notably by former Armaments Minister Albert Speer and more recently by Heinz Dieter Hölsken in *Die V-Waffen* (The V-Weapons), both Speer and Hölsken have failed to challenge the traditional account of the V-2 priority battle. In fact, at an August 1941 meeting with Dornberger and von Braun, Hitler declared the missile “of revolutionary importance for the conduct of warfare in the whole world.”³ In Dornberger’s memoirs this meeting is not even mentioned. Not only that, the Führer’s dream was of no significance—assuming it ever happened.

That being said, it is true that Hitler’s attitude to the project shifted only gradually from disinterest to enthusiasm between 1939 and 1941. He vacillated thereafter. As a result, Dornberger and his superiors had to fight again and again for top priority for the program. The development of the missile was brought into question three times in 1940, but this appears to have caused a delay of only a few months. The main effect of the Führer’s episodes of skepticism was to slow down the construction of an ill-conceived production plant at Peenemünde that Army Ordnance wanted to build before the missile had ever flown or was proven to work. If that plant had been finished earlier, it would have been ready too soon for the large-scale fabrication of the V-2, which was not ready for production as a military weapon until 1944. The many delays in its deployment were primarily due, I will argue, to the daunting technological challenges of the project.

The first aim of this essay will thus be to dispel the mythology that surrounds the V-2 story. But the priority battle for Peenemünde also provides an illuminating example of the disarray in the weapons procure-

3. Dornberger Aktennotiz, 21 August 1941, National Air and Space Museum microfilm (hereafter abbreviated NASM), FE341. The original document is in Bundesarchiv/Militärarchiv Freiburg (hereafter cited as BA/MA), RH8/v.1211. For discussions of the A-4’s military ineffectiveness, see Albert Speer, *Inside the Third Reich* (New York: Avon, 1970), 467, and Heinz Dieter Hölsken, *Die V-Waffen: Entstehung-Propaganda-Kriegseinsatz* (Stuttgart: Deutsche Verlags-Anstalt, 1984), 203–12. Hölsken provides the only scholarly account of the priority battle. (A revised English edition is in press.) But Hölsken concentrates his attack entirely on the older popular literature that asserted or did not challenge the view that the V-1 and V-2 were “too late.” Although Hölsken discusses the August 1941 meeting, he nonetheless ignores the mythology surrounding Hitler’s role in the A-4 story, especially in English-language publications. He also makes a number of errors and implicitly accepts Dornberger’s argument that the priority-induced delays to V-2 development were considerable. For very influential but inaccurate accounts of the priority battle, see Dornberger, *V-2*, 64–113; and Frederick I. Ordway III and Mitchell R. Sharpe, *The Rocket Team* (New York: Thomas Y. Crowell, 1979), 27–50.

ment and priority systems of the war economy springing from the divided power structure of the Third Reich. Until recently, historians widely accepted the existence of a “Blitzkrieg economy” and “Blitzkrieg strategy” in Germany from 1936 to 1942. The Nazi regime was said to have explicitly planned for quick, decisive wars because its resources would allow nothing else, and because it feared the political consequences of imposing total mobilization on the population. But research has shown that a coherent planning process scarcely existed because the system was “polycratic” or “polycentric,” i.e., it was made up of warring bureaucratic empires presided over by Hitler. Insofar as there was planning before 1939, it was for total war in the period 1942–44. But Hitler wanted simultaneously to be able to fight small, decisive wars in the near term. In the end his attack on Poland brought on hostilities with the Western powers in 1939, provoking a bungled attempt at total mobilization.⁴ The disarray in the wartime priority and procurement system that resulted contributed as much to the survival as it did to the hindering of the rocket program. It allowed the Army to exploit the remnants of its autonomy in the system, while fending off challenges from Hitler, Fritz Todt (the first Armaments Minister) and the Luftwaffe.⁵

4. The argument largely follows the ground-breaking work of Richard J. Overy in “Hitler’s War and the German Economy: A Reinterpretation,” *Economic History Review*, 2nd series, 35 (1982): 272–91; “Mobilization for Total War in Germany 1939–1941,” *English Historical Review* 103 (1988): 613–39; and “Blitzkriegwirtschaft? Finanzpolitik, Lebensstandard und Arbeitseinsatz in Deutschland 1939–1942,” *Vierteljahrshäfte für Zeitgeschichte* 36 (1988): 379–435. For an exhaustive discussion of how the “polycentric” ruling system produced disarray in the war economy up to 1942, see Müller’s contribution in Bernhard R. Kroener, Rolf-Dieter Müller, and Hans Umbreit, *Das Deutsche Reich und der zweite Weltkrieg*, Bd. 5/1, *Organisation und Mobilisierung des deutschen Machtbereichs* (Stuttgart: Deutsche Verlags-Anstalt, 1988), 349–689. The *Militärgeschichtliche Forschungsamt* (Freiburg) historians have also been major contributors to the new interpretation. On “polycracy” see Peter Hüttenberger, “Nationalsozialistische Polykratie,” *Geschichte und Gesellschaft* 2 (1976): 417–42; and Ian Kershaw, *The Nazi Dictatorship: Problems and Perspectives of Interpretation*, 2d ed. (London: Edward Arnold, 1989). The use of the term “polycracy” must, however, be separated from the concept of “blocs” that Hüttenberger and Kershaw have used, i.e. that the regime was divided into three or four power blocs: the party, the armed forces, big business, and later the SS-police complex. The armed forces certainly formed no coherent bloc after 1935, and it is doubtful if big business or the galaxy of NSDAP organizations ever did.

5. Emphasis on interservice rivalry between the Luftwaffe’s V-1 flying bomb and the Army’s V-2 is not original; Hölsken actually exaggerates the conflict. David Irving’s older, unfootnoted, and often tendentious V-weapons book, which is based on some primary sources, *The Mare’s Nest* (Boston: Little, Brown, 1965), also emphasizes interservice rivalry, and largely accepts the traditional view of Hitler’s role in this story. The German edition of Irving’s book, *Die Geheimwaffen des Dritten Reiches* (Gutersloh: Sigbert Mohn, 1965) includes further primary-source research, but the argument remains unchanged.

Origins and Early History

Before we examine in detail the struggles over priority which erupted in late 1939, it is first necessary briefly to survey the origins of the German Army rocket program. The outlines of that story are fairly well known. The revival of the rocket in Germany as a battlefield weapon, and its transformation into the ballistic missile, began with a fad for spaceflight and rocketry in the Weimar Republic. Stunts in 1928–29 with rocket cars and airplanes were accompanied by serious literature on the feasibility of spaceflight and by the formation of small amateur rocket groups.⁶ The head of the ballistics and munitions section of Army Ordnance, Lt. Col. (later Gen.) Karl Emil Becker, took a particular interest in this technology, with a view to developing two distinct weapons types: battlefield solid rockets to carry chemical weapons and liquid-fueled, long-range missiles that could exceed the limits of conventional heavy artillery in range and payload. Becker had participated in the ultimate expression of German artillery development to that time, the Paris Gun, which spectacularly but rather ineffectively fired about 320 shells into the French capital from eighty miles (125 km) away in the spring of 1918.⁷

Assisted by a handful of junior engineering officers, most notably Dornberger, Becker began investigating solid-fuel rockets in 1929–30 and potentially more powerful liquid-fuel systems shortly thereafter. In fall 1932, Ordnance lured the twenty-year-old engineering student Wernher Freiherr von Braun away from the most prominent amateur group, the *Raketenflugplatz* (Rocketport) Berlin. Von Braun was installed as a doctoral student in physics at the University of Berlin and was given a place to work at the Kummersdorf test range outside of Berlin. After the Nazi seizure of power, in an environment of absolute secrecy and no restrictions on armaments development, this small program expanded to a revolutionary technological enterprise employing hundreds, and later thousands of people, with the aim of producing a liquid-fuel (liquid-oxygen and alcohol) ballistic missile. This expansion was given

6. 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: The Rocket Societies: 1924–1940* (Washington: Smithsonian Institution Press, 1983), 35–54.

7. Erich Schneider, "Technik und Waffenentwicklung im Kriege," in *Bilanz des Zweiten Weltkrieges* (Oldenburg/Hamburg: Gerhard Stalling, 1953), 225–47, here 236; Dornberger, *V-2*, 19; Dornberger, "European Rocketry after World War I," *Journal of the British Interplanetary Society* 13 (September 1954): 245–62, here 249. On Becker, the Gun, and the mentality of the artillery specialists, see Heinrich Klein, *Vom Geschoss zum Feuerpfeil* (Neckargemünd: Kurt Vowinkel, 1977), 28, 56–57, 72–73.

impetus by an alliance between the Army and the new, but politically powerful, Luftwaffe in 1935. The two services founded a joint program to develop rocketry for aircraft as well as missiles. Out of this sprang the Peenemünde secret-weapons center on the Baltic coast, which opened in May 1937.⁸

One year earlier, the Army Commander-in-Chief, von Fritsch, had approved the concept for the *Aggregat 4*, or fourth rocket in the Army Ordnance liquid-fuel series. Based on a projected twenty-five-metric-ton (56,000 lb.) thrust engine, Dornberger had laid down the A-4's requirements as a range of 270 km (168 miles) and a warhead of one metric ton—twice the range and one hundred times the payload of the Paris Gun. Becker and Dornberger were able to secure the backing of the Army leadership for a number of reasons. World War I artillery officers like von Fritsch and the next Commander-in-Chief, von Brauchitsch, dominated the upper ranks of the Army and they were convinced by Ordnance's enthusiastic belief in the psychological and physical damage that the missile could cause. Becker also had considerable personal influence in armaments development (he became head of Army Ordnance in 1938) and he and his subordinates, based on sketchy information about rocket development elsewhere, argued that Germany must not fall behind in a missile race with other powers.⁹

Their enterprise also flourished in an environment, created by the Nazis, of breakneck rearmament regardless of financial responsibility or careful strategic thought. As Hermann Göring's Luftwaffe—an ally of the rocket program—expanded, and as the competing services and Hitler's endless demands for more weapons undermined all attempts to coordinate rearmament, the rocket program had few limits except the

8. Dornberger, *V-2*, 23–41; Wernher von Braun, "Reminiscences of German Rocketry," *Journal of the British Interplanetary Society* 15 (May–June 1956): 125–45; Hölsken, *V-Waffen*, 15–18. Even Hölsken is dependent on the secondary literature for this period. The original material is in the BA/MA Freiburg, the Deutsches Museum, Munich, and on microfilm in the NASM archives, and will be cited in my forthcoming book, *The Rocket and the Reich: Peenemünde and the German Army Guided Missile Program* (New York: Free Press, c. 1994).

9. Irving, *Mare's Nest*, 18–19; Dornberger, *V-2*, 47–48; "The German V-2," *Technology and Culture* 4 (Fall 1963): 393–408, here 398, 402–3; and "European Rocketry," 256–57. For the belief in a competition with foreign powers and the faith in the impact of the surprise deployment of secret weapons, see Zanssen to Wimmer, RLM (C), 22 May 1935, in NASM, FE746c. For an indication of how little information was available on American rocket pioneer Robert Goddard, see Army General Staff, 3.Abt.Att.Gr.I, to Army Ordnance, 4 February 1936, in BA/MA, RH8/v.1945, and von Horstig to Akimoff, 28 August 1936, NASM, FE366/4. As a result, Goddard's technological influence on German development was nil.

maintenance of absolute secrecy and the great technical obstacles that had to be overcome.¹⁰

The War Economy and the Battle for Priority

The momentum that the Army liquid-fuel rocket program had acquired before the war carried it forward after the attack on Poland. Motivated by the need to justify the large expenditure on missile development in the unexpected war against Britain and France, Dornberger went to von Brauchitsch on 5 September 1939. The two had a close personal connection; the Ordnance Lt. Colonel was a heavy artillery veteran and had served under von Brauchitsch during the Weimar Republic. The Army Commander-in-Chief signed an order, apparently drafted by Dornberger, that the "Peenemünde Project" was "particularly urgent for national defense" and was to be "pushed forward with all possible means." The general demanded a quid pro quo: V-2 development was to be accelerated so that it be ready for military use by September 1941, instead of the projected date of 1943.¹¹ Presumably this was the earliest date that Dornberger thought possible; in any case it was a risky gamble. From now on the program had to be carried out under the pressure of unrealistic deadlines.

The manner in which this essential decision on the priority of Peenemünde was made is illuminating and typical of the prewar rearmament pattern. The Army was still convinced that it retained some autonomy in the Nazi system. Von Brauchitsch issued his 5 September order without consulting Hitler or the Supreme Command of the Armed Forces (*Oberkommando der Wehrmacht* or OKW), just as he had done with his November 1938 order to build a missile production plant at Peenemünde (the *Fertigungsstelle Peenemünde* or FSP). That project, which was so central to the priority battle, aimed to construct an Army-owned factory next door to the development facility, because of the anticipated difficulties of transferring such an exotic technology into

10. For indictments of the character of German rearmament, see Michael Geyer, *Aufrüstung oder Sicherheit? Die Reichswehr in die Krise der Machtpolitik 1924-1936* (Wiesbaden: Franz Steiner, 1980), 444-47, 463, 494-96; and Deist's contribution in Wilhelm Deist, Manfred Messerschmidt, Hans-Erich Volkmann, and Wolfram Wette, *Das Deutsche Reich und der Zweite Weltkrieg*, Bd. 1, *Ursachen und Voraussetzungen der deutschen Kriegspolitik* (Stuttgart: Deutsche Verlags-Anstalt, 1979), 371-532.

11. Von Brauchitsch order, 5 September, 1939, NASM, FE342 (-BA/MA, RH8/v.1213); Schubert *Fertigungsstelle Peenemünde (FSP) chronicle*, 6 September 1939, BA/MA, RH8/v.1206. Draft call-ups of crucial personnel may also have motivated Dornberger's visit. See Wernher von Braun, "Rundschreiben," 30 August 1939, NASM, FE750 and Burdach (AHA/OKH), "Zusatzbefehl," 8 September 1939, in NASM, FE342.

quantity production. It also reflected Dornberger's philosophy of building a large in-house facility in which corporate contractors played only secondary roles.¹² The construction of the FSP was only beginning to break ground when the war started, and it had to be greatly accelerated to meet the new deadline. That meant spending hundreds of millions of Reichsmarks and rounding up thousands of construction workers in a labor market even tighter than before the war—all to build a plant to produce a revolutionary new weapon that did not yet exist. Yet in 1939, as in 1938, the Army went ahead and consulted no one. Only after the fact was a priority order obtained from the OKW Economics Office on 15 September.¹³

There was, in fact, no coherent priority system at all in Germany before the summer of 1940. The services saw the war as a blank check to speed-up all their own armaments and munitions programs. At the same time no clear decision-making structure for the war economy existed; it was torn at least three ways. Göring, as Commissioner for the Four-Year Plan, was allegedly the Third Reich's "economic dictator," but lacked the time and competence to carry out his huge task while simultaneously acting as Commander-in-Chief of the Luftwaffe. The Economics Minister, Walter Funk, was a Nazi Party lightweight and creature of Göring who controlled the civilian economy. General Georg Thomas, who headed the OKW Economics Office, officially controlled military production and priority. As R. J. Overy has said, his concept was to pick up where Hindenburg and Ludendorff left off in 1918, and use his national network of armaments inspectors to impose a stifling military control on industry. This confused situation resulted in a botched mobilization of the war economy and what Thomas called "a war of all against all."¹⁴ To top it off, the OKW, Hitler's personal tri-service staff, was headed by the subservient Gen. Wilhelm Keitel, who commanded little respect from the service commanders.

Despite this confusion, Peenemünde sailed along relatively undisturbed until late November 1939. On 11 October, Thomas presented

12. Michael J. Neufeld, "The Guided Missile and the Third Reich: Peenemünde and the Forging of a Technological Revolution," forthcoming in Monika Renneberg and Mark Walker, eds., *Science, Technology and National Socialism* (Cambridge: Cambridge University Press, 1993).

13. Thomas to Funk and Todt, 15 September 1939, NASM, FE342. On the FSP, see von Brauchitsch to Becker, 21 November 1938, NASM, FE357; Schubert chronicle entry, 25 January 1939; and Schubert, "Vortrag," 7 June 1939, in BA/MA, RH8/v.1206.

14. Thomas, "Zentrale Kriegswirtschaftliche Führung," March 1940, in NA, T-77/339/1176622; Overy, "Mobilization for Total War," 623, 637, and passim; Bernice A. Carroll, *Design for Total War* (The Hague and Paris: Mouton, 1968), 194-96.

for Göring's signature a priority order for construction in an attempt to sort out the services' incompatible demands for labor and resources. In it, Peenemünde was put into first priority with U-boats and the Luftwaffe's "Ju-88 program," which actually included all major combat aircraft types. Göring issued the order, but it had little effect. Thomas later commented on the "building mania [*Bauwut*]" of the armed services in the fall of 1939. In this Army Ordnance and its Peenemünde project were full participants. On 9 October, Becker had asked for a further unrealistic acceleration of the V-2 schedule, perhaps because of the quick victory over Poland, with a goal of completing the FSP by 31 May 1941. This would require nine thousand construction workers.¹⁵ Meanwhile, Dornberger had relaxed secrecy and brought a number of university institutes into the program to expedite the V-2's technological development.

It was thus a great shock when Hitler ordered Becker on 20 November to cut back the steel quota for Peenemünde from six thousand to two thousand tons a month in 1940.¹⁶ This was the beginning of Dornberger's time of troubles and it shows that Hitler was indeed unenthusiastic about the program at this time. In the traditional accounts, much has been made of the Führer's visit to Kummersdorf in March 1939 to view rocket-engine testing there. He seemed unmoved, and afterwards issued the backhanded compliment, "Well, it was grand! [*Es war doch gewaltig!*]"¹⁷ (Hitler never set foot in Peenemünde.) But if he had not been impressed, it had little effect on the program before 20 November, and that decision must be set in two contexts missing from all previous accounts, including Hölsken's. First, Hitler was on very bad terms with the Army leadership after Poland because they thought his demands for an immediate offensive against France were reckless and they passively resisted them. Unbeknownst to the Führer, indecisive coup plots briefly flourished in the highest circles of the Army. Chief of the Army General

15. Draft priority order, 11 October 1939, in NA, T-77/201/937537-38; Kroener, Müller and Umbreit, *Das Deutsche Reich*, 5/1:370; Carroll, *Design*, 201; Dornberger to Leeb, chronology of 5 July 1941, in NASM, FE342. Hölsken, *V-Waffen*, 21-22, interprets the 11 October order as the priority system, but it was only a construction priority system, and a largely ineffective one at that.

16. Becker Aktenvermerk, 21 November 1939, on meeting with Hitler; and Dornberger to Leeb, chronology of 5 July 1941, in NASM, FE342. Hölsken, *V-Waffen*, 20-22, repeats Dornberger's error that the meeting was on the 21st instead of the 20th, completely misdates the founding of the *Versuchskommando Nord* to fall 1939 when it was fall 1941, and misdates a 6 January 1940 document as 14 September 1939.

17. Dornberger, *V-2*, 65-66.

Staff Franz Halder went to meetings with Hitler with a pistol in his pocket, but did nothing.¹⁸

Second, Hitler's Polish gamble had led to a major war far sooner than the military planning date of 1942-44, which contributed to a severe ammunition shortage after the Polish campaign. This shortage, plus a desire for further troop training to eliminate operational shortcomings seen in September, were the main reasons for Army resistance to a fall western offensive. By November a full-fledged "munitions crisis" broke out in the leadership of the Third Reich. Hitler fixed upon Army Ordnance, which produced most of the munitions for all three services, as the main scapegoat.¹⁹ Steel was in short supply, so cutting back Peenemünde's quota was Hitler's way of telling Ordnance to concentrate on more pressing construction projects—a perfectly valid decision.

But the most important point is that the 20 November order did not take away all priority from the rocket program, as so many accounts, based on Dornberger, allege.²⁰ Hitler ordered that development and construction continue as before within the limits of the steel quotas. Dornberger, however, was shocked because it would delay the Production Plant and reduce its size, thus upsetting the timetable for completing it at the same time as V-2 development was allegedly scheduled to be finished. He unleashed a campaign in December to have the decision reversed. It was to no avail, but von Brauchitsch did order that development continue unchanged.²¹ The net result was that the FSP was cut back from three main assembly buildings to one and production of V-2s would be cut back to five hundred per year. This was a remarkably low number, and it reflected the German military's excessive emphasis on skilled labor and its ignorance of factory management. Plans for a larger missile to follow the V-2 were put on hold.²²

Most astonishing, however, is Dornberger's ultimate argument for

18. Peter Hoffmann, *The History of the German Resistance, 1933-1945*, tr. Richard Barry (Cambridge, Mass.: MIT Press, 1977), 129.

19. Kroener, Müller and Umbreit, *Das Deutsche Reich*, 5/1:409-26; Overy, "Hitler's War," 275-77; Williamson Murray, *German Military Effectiveness* (Baltimore: Naval and Aviation Publishing, 1992), 229-43.

20. Dornberger, *V-2*, 69; Ordway and Sharpe, *Rocket Team*, 28-29; Irving, *Mare's Nest*, 18; Walter A. McDougall, *...the Heavens and the Earth: A Political History of the Space Age* (New York: Basic Books, 1985), 43.

21. Dornberger to Koch, 2 December; and Becker to Koch, 20 December 1939, in NASM, FE342; Dornberger Vortragsnotizen, 12 and 14 December 1939, in NASM, FE349.

22. Dornberger to Koch, 2 December 1939, in NASM, FE342; Schubert to Dornberger, 6 January 1940, in NASM, FE349; Overy, "Mobilization for Total War," 636-37.

his program. He claimed that "in all larger states an intensive development in the area of the long-range rocket has been carried out with the support of the relevant armed services, e.g., France, England, the United States of America, and Russia." If Germany was not to lose its "uncontested lead of a few years" in this "perhaps decisive weapon," the FSP must not be "stopped" [sic]. There is great irony in Dornberger's claim that the weapon could be decisive. In his memoirs it only comes up in the context of the July 1943 meeting, where he allegedly became worried when Hitler asserted that it would be decisive.²³

One must wonder how he ever thought that relatively small numbers of conventionally armed missiles would have such an effect, since they would only be launched against "valuable area targets (warehouses, airports, military-industrial facilities, railyards, and so forth)."²⁴ To understand Dornberger's thinking, one must accept his (unrealistic) assumption, based on his engineers' theoretical calculations, that the accuracy of the missile would be less than a kilometer. But this targeting also appears to reflect the limited perspective of an artillery officer, with no influence from discussions of the aerial terror bombing of cities. Curiously, though, there is one instance where the missile may have been linked to chemical warfare against civilians. In his war diary, General Halder records a tour with Becker of a chemical weapons plant on 26 September 1939, immediately after the defeat of Poland. Halder's cryptic entry shows only that the Army Ordnance chief mentioned poison gas and the use of the long-range rocket against London in the same meeting.²⁵

With the onset of the harsh winter of 1939-40, which halted construction for three months, and the beginning of the steel cutbacks, the Production Plant project became bogged down in a morass of difficulties that were to last the next three years. Some of the problems were self-inflicted: from the beginning it was clear that building the FSP on the low-lying island of Usedom (where Peenemünde was situated) meant ground-water problems, plus the danger of air attack because of its northern coastal location.²⁶ To this were added the impossibility of

23. Dornberger Vortragsnotiz, 14 December 1939, in NASM, FE349; Dornberger, *V-2*, 104-6.

24. Specifications for the warhead design, Dornberger (drafted by von Braun) to Wa Prüf 1, 20 January 1940, in BA/MA, RH8/v.1260.

25. Generaloberst Franz Halder, *Kriegstagebuch*, ed. Hans-Adolf Jacobsen (Stuttgart: W. Kohlhammer, 1962), 1: 85. Since a development time of three to four years was mentioned, and since London could not be hit from German soil by the A-4, Becker presumably meant one of its two planned successors: the "A-4 glider," later called the A-9 and the A-4b, or the "100-ton [thrust] device," the root of the concept for the later (and never-built) A-10.

26. Schubert chronicle, 25 January 1939, in BA/MA, RH8/v.1206.

finding the construction workers needed and the necessity of housing them in barracks, because there was not much of a local housing market. During the priority battle the project came up against the valid question, from Hitler especially, as to why a factory should be built for a weapon that had never been tested. (In fairness, it must be said that 1938-42 launches of a sub-scale version, the A-5, did indicate that the problems were solvable.) Finally, the construction and manpower resources of the FSP were constantly being raided to finish more pressing projects in the development plant, such as the V-2 launch facility.²⁷

The latter point returns us to the central question: was the technological development of the missile much delayed by the priority problems of 1939-40? It does not appear likely. The very existence and priority of the project were brought briefly into question in January-February 1940, when an action to eliminate unnecessary construction projects was started, but Albert Speer, Hitler's chief architect, helped to fend that off. Speer had played a supervisory role over the construction of the FSP since the start of the war, and would prove to be a key ally over the next three years.²⁸ The rocket program's shaky political support did seem to unnerve at least one major contractor, but the company was reassured that high priority remained.²⁹ In April 1940 General Becker committed suicide at the end of a long, demoralizing struggle with Hitler, Göring, Thomas, and others over the "munitions crisis." The appointment in March of Fritz Todt, builder of the autobahns, as the first Armaments Minister had been a particular blow to Becker because Todt's initial assignment was Army munitions. Yet all of these things did not materially change the rocket program's situation. Becker's successor, General of Artillery Emil Leeb, was as big a supporter of Peenemünde as the former chief of Army Ordnance, and although Hölsken paints

27. See the chronicle and important documents from the project (January 1939-February 1944) assembled by its head, Ministerialrat G. Schubert, in BA/MA, RH8/v.1206-10.

28. For Speer's role in construction, see Schubert entries for 3 March and 6 September 1939, and minutes of meetings of 3-5 October 1939, in BA/MA, RH8/v.1206; Schubert entries of 9 and 21 February, 19 July, 23 August 1940, in BA/MA, RH8/v.1207; Dornberger circular, 6 August 1940, in NASM, FE349; OKW/WiRüAmt, "Interne Monatsbericht" for September 1939 in NA, T-77/178/913513; armaments inspectors meeting, 8 January 1940, in NA, T-77/85/808733-34; Albert Speer, *Inside the Third Reich* (New York: Avon, 1970), 469. Hölsken, *V-Waffen*, 24, repeats Speer's claim that he was involved in Peenemünde without Hitler's permission, which does not seem believable, and would in any case have been beneath the Führer's level of concern.

29. Dornberger (von Braun) to Kreislergeräte, 19 February 1940, in NASM, FE119.

Todt as unfriendly to the program from the outset, he was in fact moderately helpful during 1940.³⁰

Nonetheless, the ongoing severe problems with the Production Plant, plus lesser problems such as acquiring skilled manpower and equipment for the development program, deeply frustrated Dornberger and the leadership of Army Ordnance. In the national euphoria after the defeat of France in June 1940, they thought they saw their moment. Convinced of the decisiveness of the missile program, they wanted a kind of super-priority whereby Peenemünde would be rated higher than the U-boats, military aircraft production, and all other armaments programs of the Third Reich. Von Brauchitsch quashed the attempt, however, because it would involve going to Hitler to reverse the steel outback.³¹

The Army Commander-in-Chief doubtless saw that this was not the right moment to approach the Führer, who was confident in the Luftwaffe's ability to defeat Britain. Another consideration must have been Hitler and Göring's demand for the "redirection of armaments production (*Umsteuerung der Rüstung*)" away from the Army and toward the Navy and Luftwaffe. This "redirection" reflected their naive belief that a huge economy could be switched from one direction to another in a moment. In the end this action accomplished little but to spread confusion in a war economy already losing momentum because of the widely held belief that victory was near. To make matters worse, by late July Hitler was reemphasizing the buildup of the Army and its armored forces for an attack on the USSR.³²

As a part of these twists and turns, a new—and largely futile—attempt was made to straighten out the mess in the war economy and priority system. Todt's advances toward a more rational system were vitiated by the victory over France, which strengthened the hand of the military. His two main competitors—Göring and General Thomas of

30. Hölsken, *V-Waffen*, 23–24; Schubert chronicle, 9 April, 17 July, 1–3 October 1940, in BA/MA, RH8/v.1207; Dornberger Aktenvermerk, 24 June 1940, minutes of meeting with Todt, 18 July 1940, and Vortragsnotiz for Army Ordnance chief of staff, 8 October 1940, in NASM, FE342; Todt to Dr. Timm, Labor Ministry, 18 July 1940, in NASM, FE349. On Becker's suicide, see Kroener, Müller, and Umbreit, *Das Deutsche Reich*, 5/1: 474–75.

31. Dornberger presentation to Leeb, 20 June 1940, in NASM, FE349; Leeb minutes, meeting with Fromm, 19 June; Dornberger Aktenvermerk, 24 June, on meeting with Leeb and Army Ordnance leaders; Löhr (Ordnance chief of staff) phone call to Woike (Wa Prüf 11) on 29 June, noted on Leeb (Dornberger) draft letter, 24 June, Dornberger to Wa Stab Ib, et al., 4 July 1940, regarding von Brauchitsch decision, all in NASM, FE342.

32. Kroener, Müller, and Umbreit, *Das Deutsche Reich*, 5/1: 486–97, 502–22. For a different view of the war economy in the summer of 1940, see Overy, "Mobilization for Total War," 623–25; "Blitzkriegwirtschaft?" 399–400.

OKW—now attempted to adapt the priority system to the "redirection of armaments production." The V-2 story itself shows that there were at least two uncoordinated priority systems: the construction priority levels of Göring's October 1939 order and steel rationing. The latter had more impact, but stifled production rather than encouraging efficiency. Göring established a new priority system incorporating steel rationing on 18 July, but it contained only two levels, reflecting Hitler's penchant for avoiding difficult choices. It was not very meaningful, but shocked Army Ordnance because Peenemünde was not mentioned at all. After two weeks of panic, the rocket program was reinstated in priority level "I" "through the back door" (Hölsken) under the category of "munitions in short supply (*Mangelmunition*)."³³ Hölsken depicts this bureaucratic maneuver as a "label swindle (*Etikettenschwindel*)," exaggerating its conspiratorial character, because the decision was approved up to the level of Thomas at least. The only person who may have been "swindled" was Hitler. Essentially no information is available on the Führer's opinion of the rocket program between January and November 1940.³⁴

But the July incident was not the end of Dornberger's troubles. At the end of August the priority system entered a new state of flux, once again calling the rocket program's status into question. So ineffective was the July priority order that Thomas and the service ordnance chiefs agreed to split level "I" into "Ia" and "Ib." Hitler ordered on August 20 that above them be placed a "special level S" for "Operation Sealion"—the invasion of Britain. The problem was that the services were all jockeying to have their programs in the top level, while stealing resources from each other or blaming the OKW for their problems. So competitive and disorganized was the situation that Todt was forced to complain to Hitler. The Army had issued armaments orders directly affecting him that he heard about later only through "unofficial channels."³⁴

Dornberger meanwhile had responded to this new period of uncertainty with his usual arguments about the disastrous impact of a priority

33. Göring priority order of 18 July, entry of 26 July in Dornberger chronology of 24 September 1940, Koch (Dornberger) to Leeb, 3 August, Haseloff to Thomas, 5 August, Thomas order of 7 August, and Gschwender to Dornberger, 14 August 1940, in NASM, FE342; Stab II(Rüst), Chef H Rüst u BdE to Leeb, 27 July 1940, in NASM, FE349; Hölsken, *V-Waffen*, 23–24. Hölsken also attributes to von Brauchitsch documents that he did not sign, such as the 14 August letter, and consistently misidentifies documents under the letterhead of "Chef H Rüst u. BdE" (office of Gen. Fromm), as coming from von Brauchitsch—even long after he was forced out.

34. Todt to Keitel, 3 September 1940, regarding comments to Hitler, in NA, T-77/178/914227; minutes of meeting of Thomas, Fromm, Udet, and Witzell, 15 August, and minutes of meeting of OKW/WiRüAmt with armaments inspectors on 13 September 1940, in NA, T-77/85/809036 and 809075; Göring priority order of 20 September in NASM, FE349.

reduction in light of the supposed international missile race. He mentioned the discovery by occupation authorities of secret military experiments by French rocketry pioneer Robert Esnault-Pelterie, suggested that Vichy France might still be pursuing a missile(!), and noted that news about Robert Goddard, the American physicist and rocket developer, had disappeared since 1938, when the U.S. War Department had supposedly intervened. Dornberger believed that Goddard was "about 2 years behind German development" in 1938. This estimate was not too exaggerated, but he had absolutely no intelligence to support the assumption that the Americans had also made huge investments in a serious ballistic missile program. Yet these claims were supported by Army Ordnance, and probably the Army leadership generally. In the midst of the Battle of Britain, however, this did not work, and the rocket program was reduced at the end of September to level "Ib"—i.e., third priority.³⁵

Although there had been some temporary loss of workers in the manufacturing of key subsystems and equipment for the V-2 in the uncertainty of July and August, this priority assignment produced the first really threatening situation for the development of the missile. Firms began responding with letters saying that their contracts for the program could not be fulfilled because of the demands of higher priority levels. Dornberger's protests went up the line to the Army Commander-in-Chief, and by mid-October Peenemünde had been bumped up to level "Ia" by the OKW. Dornberger then attempted to get all the way to "S," but failed. In November Hitler confirmed the rocket program's assignment to second priority. Hölsken claims that the Führer was remembering the project after the failure of the Luftwaffe in the Battle of Britain. This is a reasonable speculation, but should be labeled as such.³⁶

In early 1941 Peenemünde's priority level was given new urgency by the invention of yet another level above all others—"special level (*Sonderstufe*) SS," which had nothing to do with the SS. A process of priority inflation was at work: the services would all try to crowd their contracts into the top level until there was not enough manpower and

35. Dornberger to Leeb, 26 August, and Löhr to Fromm, 28 August 1940, indicating that Army Ordnance supported Dornberger's arguments "fully" in NASM, FE349; Schubert chronicle, 30 September 1940, in BA/MA, RH8/v.1207.

36. Hölsken, *V-Waffen*, 25. He misdates the document as 9 November instead of 19. Demag-Zug to OKH, 4 October, Löhr to Fromm, 11 October, Wilson (Wa Prüf 11) note, 23 October, on 14 October phone call, Keitel to von Brauchitsch, 19 November, Löhr to Leeb, 9 December, and Dornberger to Wa Prüf 11 sections, 16 December 1940, in NASM, FE349; Dornberger Vortragsnotiz, 8 October, and Dornberger to Leeb, 13 November 1940, in NASM, FE342; Schubert chronicle, 8, 16 and 30 October 1940, in BA/MA, RH8/v.1207.

resources to satisfy even that level's demands, given the German war economy's poor efficiency. Since the OKW was often too weak to refuse the demands of the services, and Hitler preferred to avoid hard decisions, it was easier to invent a new level than impose priority reductions. As a result, lower levels suffered "a certain degeneration," according to an OKW staff member. By February 1941 levels below "SS" and "S" were phased out as meaningless.³⁷

In this light, the rocket program was reevaluated and on March 27 its priority was split: development went to the top level ("SS") and the production plant was put in "S." One can only presume that this reflected Hitler's view—a reasonable one—that the missile should be proven to work before producing it. Information about what he was thinking in this period is limited, but in a 7 May phone call to Leeb, General Friedrich Fromm, Chief of Army Armaments, said: "in line with the Führer order only development is allowed in Peenemünde, therefore at most a test series."³⁸

Even level "S" proved not very valuable for the FSP, which fell farther and farther behind schedule.³⁹ But the critical question is again: was the development of the V-2 significantly delayed by the priority battle in 1940-41? It is clear that the confusion and shifts did cause some lost time on contracts for important development equipment, especially critical guidance-and-control components like gyroscopes and transmitters. Yet Steinhoff, the guidance-and-control chief at Peenemünde, wrote in his annual report for 1940—the single worst year for priority problems—that "the desired goals could almost everywhere be reached." Personnel problems in getting specialists were moderated in the course of the year. Only in the area of skilled craftsmen did Steinhoff see a significant continuing problem. Thus, when Dornberger claimed in October 1940 that development had already slipped three-quarters of a year to the end of 1941, it really represented the evaporation of the unrealistic deadline of May 1941.⁴⁰ That goal had

37. OKW Rüstungswirtschaftliche Abteilung to Keitel, 30 November 1940, in NA, T-77/17/728559; Maj. Kiesow lecture to armaments inspector trainees, 23 January 1941, in NA, T-77/237/978433; Carroll, *Design*, 196.

38. Schubert chronicle, 24 and 27 January, and 5 February 1941, in BA/MA, RH8/v.1208a; Dornberger chronology of 5 July 1941, in NASM, FE342.

39. Schubert chronicle, 4, 5, 10, 22 April 1941, in BA/MA, RH8/v.1208a; Dornberger Vortragsnotiz for Leeb, 28 April, and his chronicle of 5 July 1941, in NASM, FE342; Dornberger to Leeb, 8 May 1941, regarding Leeb-von Brauchitsch meeting of 29 April in NASM, FE728e.

40. Steinhoff report for 1940, 10 January 1941, NASM, FE769; Löhr to Leeb, 9 December 1940, in NASM, FE349; Dornberger to Leeb, 3 August, and Dornberger Vortragsnotiz of 8 October 1940, in NASM, FE342; repeated in Löhr to Fromm, 11 October 1940, in NASM, FE349. Hölsken, *V-Waffen*, 25, does not contest Dornberger's estimate.

been set by Becker, but, because Army Ordnance depended on Dornberger's judgment, the rocket program's chief was more guilty than anyone of accepting overly optimistic deadlines to ensure the survival and prospering of the program.

Hitler Approves, but the Battle Continues

With development returned to top priority in the spring of 1941, but production lagging behind, things remained rather quiet for some months. Another round of the "redirection of armaments production" began in the summer of 1941, however, throwing the war economy into turmoil again. This time Hitler ordered the reorientation of production away from the Army and toward an air force aimed at Britain in the days before "Operation Barbarossa" was launched on 22 June—so arrogant was his belief in quick victory over the USSR. Although Göring and Thomas had managed to stymie Todt's attempts to rationalize the war economy since May 1940, the Armaments Minister did get from the Führer the right to control all armed forces construction under the new "redirection" order. Todt set out to cut back Army construction in order to shift resources to the Luftwaffe.⁴¹

Army Ordnance immediately spotted the threat to the troubled FSP, but also the opportunity to offer the missile as an alternative to the bomber. Dornberger's 27 June memorandum is the first extant Ordnance document employing a terror-bombing argument for the V-2, which corresponds to his own recollection that he began to think of the missile in these terms only after the costly losses of the Luftwaffe over Britain in 1940–41. He now presented the V-2 as "significant relief for the employment of aircraft against England, and especially London and the port cities." The lack of any "means of defense," the "accuracy" of the missile, and the ability to launch "day and night at irregular times and regardless of weather" would make it a particularly effective contribution to "the defeat of England." Left unsaid was the implication that it would be employed as a terror weapon against civilian populations.⁴²

41. Keitel to von Brauchitsch, Göring, and Raeder, 16 June 1941, in NA, T-77/537/1711038–39; Todt to Thomas, Fromm, Witzell, and Udet, 11 July 1941, in NA, T-77/194/929154; Kroener, Müller, and Umbreit, *Das Deutsche Reich*, 5/1: 556–80.

42. Schubert chronicle, 23, 25, and 27 June 1941, in BA/MA, RH8/v.1208a; Löhr (Dornberger) Vortragsnotiz, 27 June 1941 (written for 28 June Leeb-von Brauchitsch meeting), in NASM, FE342; Dornberger, V-2, 71, "The German V-2," 402–3, and "European Rocketry," 256–59. In Dornberger to Thomas, 24 March 1942, in NASM, FE333, he repeated his argument for the A-4 as a "morale" weapon that would produce "panic and disorganization." The gross overestimation of the impact of the missile on civilian populations is here given eloquent expression.

Dornberger's renewed campaign to protect the rocket program quickly reached the top. Von Brauchitsch immediately began looking for an opportunity for his protégé to make a direct presentation to Hitler. Interservice rivalry must have been a factor in the Commander-in-Chief's sense of urgency on this issue; Army Ordnance leaders reacted with paranoia to an expression of interest in the rocket program by Luftwaffe engineers who had been visiting the Army side of Peenemünde to discuss new joint projects in anti-aircraft defense.⁴³ Reaching the Führer could fend off threats from both Todt and Göring, while giving the Army a bigger role in the defeat of Britain.

For most of the period July to September, things proceeded on two disconnected levels. On the one hand, Todt became ever more threatening in his tone, while demanding outbacks in what he now saw as an extravagantly built production facility at Peenemünde. In a tart 30 July letter to Fromm, he said: "In Peenemünde they are building a paradise. The housing, the social provisions, the clubs and apartments, the warehouses and factory halls, all present the highest amount of expenditure one could possibly imagine." He demanded that rough barracks-like construction be applied as much as possible to the plant, which had been conceived of in peacetime as a model manufacturing facility.⁴⁴

Meanwhile, after a delay of some weeks, the Army was finally able to pull off its end run around Todt. On 20 August, Dornberger, von Braun, and Steinhoff met the Führer at his headquarters. Dornberger's 31 July memorandum for Hitler had, on von Brauchitsch's order, avoided complaining about the previous troubles of Peenemünde and had emphasized the damage to "morale" the V-2 could cause. Also discussed were joint projects with the Luftwaffe, a winged V-2 for longer ranges, and the possibility of a two-stage missile to hit "America." The latter idea doubtless appealed to the German leadership at this time. Confidence in the imminent defeat of the USSR was high, while worry about the entry of the United States into the war was rising; the Luftwaffe had its own grandiose plans for a bomber that could fly to America and back. During the meeting with Hitler, Dornberger lectured on these topics after showing a propaganda movie about the rocket that ended with an ominous warning about foreign competition. According to Dornberger, the Führer said: "This development is of revolutionary importance for the conduct of warfare in the whole world. The deployment of a few thousand devices per year is therefore unwise. If it is deployed, hundreds

43. Löhr (Dornberger) Vortragsnotiz, 27 June, Kipper to Wa Prüf, 28 June, Leeb (Dornberger) Vortragsnotiz, 5 July, for adjutants of Hitler and von Brauchitsch, and Löhr to Fromm, 5 July 1941, in NASM, FE342.

44. Todt to Fromm, and Todt to Dornberger, 30 July 1941, in NASM, FE342; Schubert to Dornberger, 18 October 1941, in BA/MA, RH8/v.1208b.

of thousands of devices per year must be manufactured and launched."⁴⁵

Hitler's comments were an interesting mixture of perceptiveness and absurdity. In the long run the ballistic missile was a revolutionary weapon, just as its advocates had been saying since the early 1930s, but not in the limited, conventionally armed form of the V-2. The Germans never made the connection between nuclear weapons and the missile, because they did not consider the atomic bomb as feasible before the end of the war. On 20 August at least, Hitler appears to have correctly perceived the minimal strategic impact of small numbers of conventional V-2s—thus he asked for hundreds of thousands. This request sent the planners at Peenemünde and in the OKW Economics Office into feverish studies, which rapidly demonstrated the absurdity of the raw materials and manufacturing requirements involved; for one thing, the entire aircraft manufacturing capacity of Germany would have to be taken over. Hitler's comment showed his complete inability to comprehend the principles or complexity of the liquid-fueled missile.⁴⁶

While the Führer's huge numbers soon had to be given as inconspicuous a burial as possible, the visit provided most of what Dornberger had wanted. Hitler embraced the program with a new enthusiasm, giving Peenemünde extra political momentum; the production facility was promoted to first priority ("SS") and merged into one unit with the development facility. Hitler did withhold the order for mass production, depending on the outcome of the V-2's development, but the FSP was renamed the "pilot production plant" (*Versuchsserienwerk* or VW), with the task of pioneering large-scale manufacturing. In fact it would soon return to its old function as a regular plant, along with another facility to be erected at the Zeppelin works in Friedrichshafen on Lake Constance. The V-2 manufacturing goal was eventually set at five thousand per year—without anyone telling Hitler.⁴⁷

45. Dornberger Aktennotiz, 21 August, in NASM, FE341; Bühne Vortragsnotiz, 17 July, on von Brauchitsch's wishes, and Dornberger Vortragsnotiz, 31 July 1941, in NASM, FE342; movie script, dating from after October 1940, in NASM, FE338.

46. Hölsken, *V-Waffen*, 29; Thiel, "Vorschläge zur Triebwerksvereinfachung des A 4," 4 September, and Thiel minutes of meeting, 17 September 1941, in Deutsches Museum (hereafter cited as DM), Peenemünde archive (file number unavailable due to ongoing reorganization); Thiel Aktenvermerk, 5 September 1941, in NASM, FE728d; Broszat Aktennotiz of 8 September, 1941, in BA/MA, RH8/v.1260; OKW/WiRüAmt documents, 12-23 September 1941, in NA, T.77/37/750312-19. On the German nuclear program, see Mark Walker, *German National Socialism and the Quest for Nuclear Power, 1939-1949* (Cambridge: Cambridge University Press, 1989).

47. Keitel to von Brauchitsch, 20 August, and Thomas priority order, 15 September, in NASM, FE341; Stegmaier minutes of 29 August 1941 meeting in NASM, FE357; Dornberger (Thom) to Hartmann (Arm. Min.), 17 March 1942, in NASM, FE333.

In the meantime, Armaments Minister Todt had still been fighting with Army Ordnance for a cut in Peenemünde's construction budget. In a 13 September letter to Dornberger, he threatened to recommend a complete construction stoppage to Hitler. Leeb was amazed; Todt did not even appear to know about the Führer's order! In fact, the Minister did refer in passing to that order, but his lack of knowledge about it speaks volumes about the disorganized and competitive character of the war economy and priority system before 1942, and about the ability of the Army, however much its power was in decline, to exploit the situation. Dornberger, backed by the OKW's priority order issued on 15 September, wrote to Todt mentioning the Hitler visit. In his letter he indicated his belief in the "decisive importance of this weapon for the war" and his fear of "the progressive development of this same area by the USA. We must maintain our lead if we want to beat the Americans." The Minister's reaction to this assertion is not recorded, but a compromise budget was eventually worked out.⁴⁸

Hitler's backing also allowed von Brauchitsch to ameliorate some of Peenemünde's manpower problems. He ordered the founding of the "Northern Experimental Command (*Versuchskommando Nord*)," a unit with active duty status that allowed the program to call back engineers and craftsmen from the front. At the same time, Dornberger launched an Army Ordnance "working committee" to plan V-2 production; it was most noteworthy for ignoring the Armaments Ministry altogether.⁴⁹ But in the winter of 1941-42 it became clear that even a Führer order did not solve the seemingly endless labor and supply problems of the production plant (VW). Particularly in the case of workers for construction and manufacturing, the severe labor shortages of the German economy meant endless problems. This led Peenemünde deeper and deeper into the use of foreign, prisoner-of-war and, finally, concentration-camp labor between 1940 and 1943. Technological problems and urgent construction on the development side also resulted in further raids on the VW's manpower, with the result that relations between the two parts of the Peenemünde Army facility became tense—a fact that is absent from all memoirs.⁵⁰

48. Todt to Dornberger, 13 September (with Leeb's marginal comment) and 20 September, Dornberger to Todt, 19 September, Todt to Leeb, 10 October, and Leeb to Todt, 28 October 1941, in NASM, FE342; Thomas priority order, 15 September, and Dornberger Vortragsnotiz, 8 October 1941, in NASM, FE341.

49. Löhr order, 23 October 1941, in BA/MA, RH8/v.1260; Stegmaier to Stellv. Generalkommando II. AK, Stettin, 15 November 1941, in NASM, FE728f; von Braun(?), organizational report on A-4 and A-8, c. December 1941, NASM, FE692c.

50. Schubert chronicle, 26 May and 8 December 1941, in BA/MA, RH8/v.1208a; same, 16 and 21 January, 10 and 11 March 1942, in BA/MA, RH8/v.1209; Schubert to Dornberger, 21 June 1943, in BA/MA, RH8/v.1210; Dornberger to Peenemünde,

But the greatest source of tension was the pressure to fly the V-2 as promised. Dornberger's nerves were stretched to the breaking point because he had gambled on launching by the end of 1941. Between November 1941 and February 1942 he sent three appeals and angry letters to the leading engineers at Peenemünde. Test-stand explosions and accidents produced especially bitter complaints.⁵¹ Development began to lag, but the causes were technical, rather than priority-related. In March the first flight vehicle was destroyed in a ground test. On 13 June the first launch attempt was made; after initial success, the missile's guidance failed and it fell back. The second attempt in August 1942 did better, but suffered a similar fate. The optimistic launch timetables that had been planned could not be carried out. None of this, in retrospect, is surprising, nor is it any comment on the stunning technological achievement of the von Braun's engineers, who had come so far since 1932. But they were about to find out how difficult it was to build a reliable missile—not to mention one that could be produced in large quantities. In many areas the technology of the V-2 was too new or too complicated—in part because development had been rushed to meet politically determined deadlines.⁵²

The year 1942 was the time when the rocket program had to prove itself or fall into real jeopardy. Nonetheless, high priority for development continued. The forced retirement of von Brauchitsch in December 1941 as scapegoat for the failure of "Barbarossa," and Hitler's self-appointment as Commander-in-Chief of the Army, meant the loss of an important ally, but it seems to have had little effect. Perhaps this was because Todt was killed in a plane crash in early February 1942, bringing Albert Speer into the chair of Armaments Minister. Speer quickly finished the work of rationalizing the war economy begun by Todt in late 1941. With Hitler's backing he absorbed most of Thomas's OKW Economics Office. The Armaments Minister was, as we have seen, a friend of Peenemünde and his organization had controlled construction there since 1939-40. Hitler also continued to support the V-2, if not as

5 February 1942, in NASM technical file "Peenemünde #2." In the latter, Dornberger refers to a request from von Braun to shut down the VW and give the personnel to the development works if there are any cutbacks, and Thiel's marginal comment was: "The VW will once again be the death of us! It eats up people and produces nothing!" This document is found in a number of files, but Thiel's original is in NASM.

51. Dornberger to Peenemünde, 7 November 1941, in BA/MA, RH8/v.1260; same, 23 December 1941, in NASM, FE728e; same, 5 February 1942, in NASM tech. file "Peenemünde #2."

52. The engine in particular, with eighteen small injectors instead of one large one, was a noteworthy case of adopting an interim solution for lack of time. A revealing document on the many problems caused by forcing the propulsion system into production is Thiel to von Braun, 16 March 1943, in NASM, FE692f.

enthusiastically as before; no one contradicted him when he discussed the possibility of making three thousand per month or launching five thousand at once. After Speer's report of the June failure of the first launch, the Führer doubted that the guidance system would be successful. In the summer of 1942 Speer created a new superpriority, "DE" (*Dringende Entwicklung*—"urgent development"), and granted it for the first twenty test missiles only.⁵³

The Luftwaffe, meanwhile, began to mount a campaign against the rocket program. Perhaps as repayment for the Army's disingenuous presentation of the missile as "relief" for the air force, it asked for a "theoretical investigation" of the missile's worth in March 1942. Hitler refused. Irrked that the "Army was beginning to fly," the air service started its own long-range weapons program in spring 1942—the later V-1, a primitive jet-propelled cruise missile. In all accounts of the Peenemünde story, this interservice battle is much emphasized. It certainly shows how divided the German military establishment was. Yet these accounts neglect the complexity of the war economy and priority system, while exaggerating the Army-Luftwaffe battle. Although the leadership of the two services came into conflict over the V-weapons, members of their development organizations worked together for the war effort and Göring approved a new joint program to create an anti-aircraft missile, later called *Wasserfall*, in September 1942. In any case, the V-1 never proved a decisive threat to the survival of the V-2 as a program, although it did at times worry Dornberger.⁵⁴

The program's fate really lay in the hands of its personnel—and luck. Preparatory to a third launch attempt, Dornberger wrote to Peenemünde that: "1) the Führer does not believe in the success of the guidance system . . . , 2) the Reich Minister of Armaments and Munitions doubts our success . . . , 3) . . . [General Fromm] has lost trust in our ability to meet our deadlines because, at the end of 1942, we still have not achieved a long-range shot, [and] 4) the chief of Army Ordnance is beginning to doubt our word."⁵⁵ The spectacular success of 3 October,

53. Speer minutes of Führer meetings, 19 March, 23 June, and 13/14 October 1942, in Willi A. Boelcke, ed., *Deutschlands Rüstung im Zweiten Weltkrieg* (Frankfurt: Athenaion, 1969), 74, 138, 194; Leeb to Rüstungsamt/Arm. Min., July 1942, BA/MA, RH8/v.1959; Dornberger to Peenemünde, 17 September 1942, in NASM, FE692f. On the war economy, Kroener, Müller, and Umbreit, *Das Deutsche Reich*, 5/1: 610-17, 639, 664-89.

54. Speer minutes of Führer meeting, 19 March 1942, in Boelcke, *Deutschlands Rüstung*, 79; Hölsken, *V-Waffen*, 32-37; Göring order, 1 September 1942, and related documents in NASM, FE738/4; Dornberger to Stegmaier, 9 October 1942, in NASM, FE728f; von Braun to Dornberger, 16 October, and Dornberger to Leeb, 22 October 1942, in DM, Peenemünde archive.

55. Dornberger to Peenemünde, 29 September 1942, in NASM, FE342.

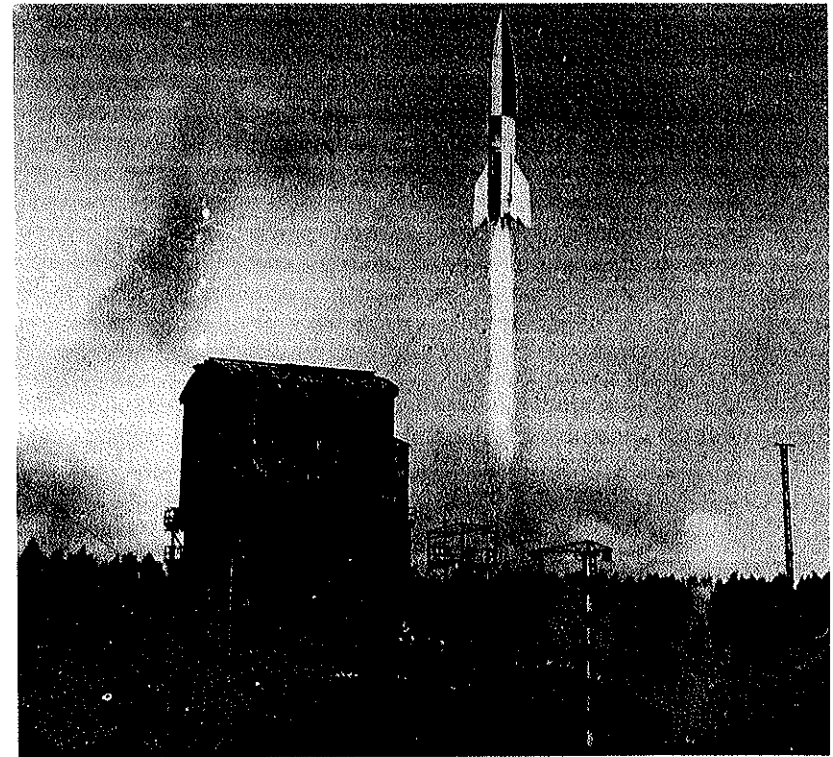
when the missile travelled 190 km, was thus perfectly timed. Many failures would follow over the winter of 1942-43, but they did not seem to make much difference. The ominous turn of the German strategic situation since the end of 1941, combined with the growing effectiveness of RAF raids on German cities from March 1942 on, initiated Hitler's search for "vengeance weapons" to foster his illusions. An early 1943 remark shows that he was also worried about the possibility of an American missile attack on the Continent.⁵⁶ He indicated his approval of planning for V-2 quantity production on 22 November 1942. Exactly one month later, Speer informed Dornberger that the Führer had given his blessing to manufacturing and to preparation for military deployment.⁵⁷

The Intrusion of the Speer Ministry and the SS

The 22 December production order, like the August 1941 meeting with Hitler, shows how misleading Dornberger's influential account of the priority battle is, with its emphasis on a breakthrough in July 1943. But his problems were not over, which helps to explain his perception of the next period. With the power of the Army in ever swifter decline, the rocket program became more and more dependent on other power centers in the Nazi system. The chief of the rocket program finally realized in late 1942 that he could no longer plan production without the Armaments Ministry. Speer appointed an "A-4 Special Committee" headed by the energetic but bullying organizer of locomotive production, Gerhard Degenkolb. Degenkolb barged into the program and shook up production planning. He offended Dornberger and nearly everyone else, in part because he began to demand unrealistic monthly V-2 production figures. The A-4 Special Committee also attempted to sell the VW to electrical engineering giant AEG, and then attempted to convert the whole Army facility to a company. In the end the Army retained enough power to fend off this move, but the backing of the

56. "The Führer thinks it is absolutely essential, in view of the rocket development going forward in America, that the most urgent experiments be made to find out if the jamming of the guide beams can provide a defense against such rockets." Speer minutes of Hitler meetings, 3-5 January 1943, in Boelcke, *Deutschlands Rüstung*, 214. On this period and Hitler's vengeance concept, see Hölsken, *V-Waffen*, 36-37, 83-93. Hölsken's assertion on p. 37 that the next thirteen missiles failed after 3 October is, however, nonsense.

57. Speer minutes of Hitler meeting, 22 November 1942, in Andreas Hillgruber, ed., *Kriegstagebuch des Oberkommando der Wehrmacht (Wehrmachtführungsstab)* (Frankfurt: Bernard & Graefe, 1963), 2/2: 1312; Löhr to Wa Prüf, 24 November 1942, in BA/MA, RH8/v.1701; Dornberger minutes of meeting with Speer, 22 December 1942, in NASM, FE355.



An early experimental version of the A-4 (V-2) is launched from Peenemünde, 1942 or 1943.

Armaments Ministry was influential in getting the production plant out of its morass. Construction and machinery acquisition moved ahead quickly toward a goal of beginning production in fall 1943.⁵⁸

The SS began to intrude into the program as well. As Hölsken has said, "Dornberger himself had brought this power into his domain," although he complained so loudly about the SS's intervention in his memoirs. After Heinrich Himmler's first visit to Peenemünde on 11 December 1942 (not April 1943, as virtually all accounts, including Hölsken's, assert), the rocket program's chief attempted twice in the next two months to use Himmler's influence to get another visit with

58. Ibid.; Dornberger, *V-2*, 69-86; Schubert chronicle, 23-26 February, 10-12 and 16-19 March, and 30 April 1943, in BA/MA, RH8/v.1210; Hölsken, *V-Waffen*, 39-43. Hölsken asserts that the Heeresanstalt Peenemünde became a GmbH, which is another error.

Hitler. On the second occasion, Dornberger was not satisfied with the Armaments Ministry's efforts in the area of electronics. To get enough manufacturing capacity, the radar program would have to be harmed—as Dornberger explicitly stated.⁵⁹

Himmler soon tried to gain more influence over Peenemünde by exploiting an unsubstantiated accusation of anti-Nazi activity against the Army establishment's commander, Colonel Leo Zanssen. Zanssen was temporarily removed from office.⁶⁰ Even before this incident had taken place, the SS acquired a further role when the A-4 Special Committee recommended using concentration-camp prisoners for manufacturing, a suggestion taken up willingly by the managers of the VW and Dornberger. SS prisoners were to be used at all production locations, including a third added by Degenkolb near Wiener Neustadt in Austria. In June a small concentration camp was set up in one of the VW's buildings. A larger Soviet and Polish labor camp under Army control had long existed south of the site. These unfortunates had been employed as construction workers.⁶¹

As all of this activity suggests, the rocket program scarcely lacked priority or political momentum in the spring of 1943. Yet Dornberger's memoirs makes much of Hitler's alleged dream in March that "no A-4 would ever reach England." There is no evidence that this dream had any effect, and the only evidence that it even happened is Dornberger's recollection. David Irving speculated many years ago that Speer invented the story to explain why Hitler would not grant a new audience or give the top "DE" priority level to the rocket program.⁶² As we have seen,

59. Schubert chronicle, 11 December 1942, in BA/MA, RH8/v.1209; Gottlob Berger (Chef, SS-Hauptamt) to Himmler, 16 December 1942, in NA, T-175/117/2642360; Stegmaier (for Dornberger) to Berger, 26 January, Berger to Himmler, 1 February, Himmler to Berger, 8 February 1943, in T-175/124/2599320-22; Dornberger, *V-2*, 180-95; Hölsken, *V-Waffen*, 37-41. The SS originals are at the Bundesarchiv Koblenz.

60. The SS documents are in NA, T-175/124/2599300-19, and 2599323. See also Dornberger, *V-2*, 182-85.

61. Schubert chronicle, 8-9 and 12 April, 17 June, 11 and 16 July, Rudolph report, 16 April, on use of concentration camp prisoners at Heinkel-Oranienburg, and Storch minutes of meeting, 2 June 1943, in BA/MA, RH8/v.1210; Dornberger travel report, 24 April 1943, in BA/MA, RH8/v.1959; Dornberger minutes of meeting, 4 August 1943, in NASM, FE750. These documents show that the use of concentration-camp prisoners was not forced on the rocket program by the SS after the evacuation of production to the Mittelwerk underground factory in September 1943. For ground-breaking work in this area, especially in regard to Peenemünde projects in Austria, see Florian Freund and Bertrand Perz, *Das Kx in der Serbenhalle* (Vienna: Verlag für Gesellschaftskritik, 1987), and Florian Freund, *Arbeitslager Zement* (Vienna: Verlag für Gesellschaftskritik, 1989).

62. Irving, *Mare's Nest*, 26-27; Dornberger, *V-2*, 91; Ordway and Sharpe, *Rocket Team*, 42-43.

Peenemünde did have a "DE" rating for some aspects of development, but Irving's explanation is plausible, if unproven. Speer had already put one apparent obstacle in the way of the program by constituting a "Long-Range Bombardment Commission" of Third Reich luminaries to judge the relative worth of the Luftwaffe's flying bomb versus the V-2. But since Speer himself dismissed the V-1 on 22 December 1942 as no threat to the Army's missile, this Commission may have only been a political maneuver to protect the Armaments Minister from criticism. When that Commission came to view the two weapons at Peenemünde on 26 May, it delivered a non-decision typical of compromises between competing groups in the Third Reich: both programs would go ahead as scheduled.⁶³

About the only thing the missile program had lacked before this time was a final blessing from the top that production had an absolute priority over everything else. The Commission provided the political cover to issue such an order. On 2 June 1943, Speer gave a blanket "DE" rating to the V-2. A document from the Ministry nine days later stated that: "The Führer has ordered that the A-4 program rates in priority before all other armaments production."⁶⁴ The conclusion is inescapable: the 7 July meeting with Hitler had no impact on the decision-making process. It merely allowed Hitler to work himself into a frenzy about the V-2. It also served to reward the Peenemünders. Wernher von Braun received the title of professor on Speer's suggestion; Walter Dornberger, on the other hand, had already been promoted to general three weeks before. In the meeting's aftermath Hitler reemphasized the program's priority over all other armaments production.⁶⁵ It was precisely the sort of short-sighted order that Dornberger and the Army had wanted from the outset.

Conclusions

If the July 1943 meeting has none of the significance attributed to it by Dornberger and countless popular histories, a careful reconstruction of the priority battle also undermines the view, accepted even by Hölsken, that Hitler significantly delayed the V-2's deployment. There

63. Dornberger minutes of meeting with Speer, 22 December 1942, in NASM, FE355; Dornberger, *V-2*, 96-98; Dornberger minutes of Long-Range Bombardment Commission visit, 26 May 1943, in BA/MA, RH8/v.1954. Ordway and Sharpe, *Rocket Team*, 49, absurdly date the visit as 1944. I have not attempted to correct the errors in this and other popular accounts because the task is gigantic.

64. Dornberger minutes, 26 May 1943, in BA/MA, RH8/v.1954; Waeger (Arm. Min.) Aktenvermerk, 11 June 1943, in DM, Peenemünde archive.

65. Speer minutes of Hitler meeting, 8 July 1943, in Boelcke, *Deutschlands Rüstung*, 280; Dornberger, *V-2*, 100-106.

is no doubt that the Führer was moody and inconsistent in his actions, and that did not end. In the spring of 1944 he cut back missile production temporarily since he was more infatuated with the flying bomb.⁶⁶ The numerous priority crises between 1939 and 1942 doubtless wasted Dornberger's time, and certainly caused significant delays in finishing the Peenemünde production plant. But that project was poorly conceived, and it ran up against the legitimate question from Hitler as to why huge resources were being committed to building a factory for a weapon that was unproven. After the August 1941 Hitler meeting, and especially after the December 1942 production order, the VW's situation was improved such that its assembly line was almost ready to go when Peenemünde was hit by the first major air raid on the night of 17–18 August 1943. That raid resulted in major changes. Production was shifted to the infamous Mittelwerk underground facility, run by the Armaments Ministry and the SS, where thousands of prisoners died under horrible conditions manufacturing V-2s.⁶⁷

If the VW was largely finished in the late summer of 1943, it soon became apparent that the missile was not. Launches to train the troops in Poland in the winter of 1943–44 showed that the V-2 had a distressing tendency to break up during the last phase of the reentry. Many other dangerous or difficult technological problems cropped up for the launch crews. Military deployment was delayed as well by the air raid, the transfer of production to Mittelwerk and problems manufacturing sufficient ground equipment. The first launchings against London and Paris did not finally come until early September 1944—much later than promised. If the Peenemünde production facility had been done sooner, it would have manufactured a defective weapon that could not have been deployed immediately in any case.

The key question remains, however, if the priority battle had much of an effect on the resources available to von Braun's development group. The available sources show only three occasions, all in 1940, when there was significant interference in contracts for crucial components, especially in the guidance-and-control sector. Yet guidance chief Steinhoff assessed the progress of his division as very good for that year. There definitely were some problems finding sufficient numbers of engineers and craftsmen, but formation of the Northern Experimental Command in late 1941 largely eliminated these difficulties for von Braun's side of the facility. Making an estimate is very problematic, but it appears that the priority battle at most delayed the missile by a few months. The overcrowding of weapons systems in first priority status,

66. Hölsken, *V-Waffen*, 65–66.

67. Manfred Bornemann, *Geheimprojekt Mittelbau* (Munich: J. F. Lehmann, 1971); Hölsken, *V-Waffen*, 51, 53.

where V-2 development was most of the time, may have added a few more months. The long delays that did occur came simply from the huge technological challenge of the project. That challenge was underestimated in part because it was hard to anticipate the difficulties. But the underestimation was at times political: Dornberger and Army Ordnance accepted unrealistic deadlines to sell the program.

The selling of the V-2 brings up other revealing and new aspects of the priority battle. With the obvious exception of the Manhattan Project, the German Army rocket program represented one of the largest investments in World War II in a radical, new weapons technology. Yet it should have been clear from the outset that small numbers of conventionally armed missiles could not effect a result proportionate to the effort needed to develop them. Of course the strategic bomber was similarly overestimated in the 1930s, but it did not require a revolutionary leap in the technology of flight. In the end Hitler adopted the V-2 because it provided an escapist fantasy of vengeance in the increasingly disastrous strategic situation he had created—that is well known. But the priority battle also shows everyone else involved in a poor light, too. The World War I artillery officers who dominated the Army and Army Ordnance readily accepted the ballistic missile as an extension of their weapon—and happily overestimated its effects as they had with the Paris Gun. Under greater pressure during the war to justify their pet program, they readily accepted Dornberger's new terror-bombing rationale in order to protect Peenemünde and fend off the Luftwaffe. Speer, infatuated with the romantic appeal of the technology, went along willingly, as he later admitted.⁶⁸ Almost everyone involved, including Hitler, seem to have accepted the existence of a missile race with the United States without any good supporting intelligence. This was an ironic mirror image of the assumptions behind the Manhattan Project, but with less cause. That the Germans even assumed the existence of such a race has remained essentially unknown until now. It is another convenient omission from Dornberger's memoirs.

The priority battle provides, finally, a revealing look at the sad state of weapons procurement and priority determination in the German war economy. That the rocket program was able to escape reasonably unscathed from the early indifference of Hitler, and challenges from Todt and the Luftwaffe, must be attributed not only to the arguments made in favor of the missile, but also the "polycratic" ruling structure of the Third Reich. Certainly no coherent Blitzkrieg economy or strategy manifested itself in this story. In the Nazi system bureaucratic survival tactics and powerful patrons were the keys to success. The Army was such a patron; it used its remaining autonomy to protect its prestige

68. Speer, *Inside the Third Reich*, 469.

project. It also had in Dornberger a talented salesman and bureaucratic in-fighter. Weak leadership from the top was another critical factor: Hitler avoided hard choices between contending parties when possible, Göring was incompetent and overburdened as economic dictator, and Keitel and Thomas at OKW did not provide effective tri-service coordination. The resulting priority and procurement system caused confusion and delays for the program, but also created many loopholes for survival and a return to favor.

In the end, Germany invested around two billion marks to produce what was, after the atomic bomb, probably the greatest technological achievement of World War II—and its most conspicuous waste of advanced scientific and engineering resources. At Peenemünde the foundation was laid for both the intercontinental ballistic missile and the space booster. The Soviet, American, and French missile programs all had their primary origin in German rocket technology. Yet the launching of three thousand missiles at London and Antwerp had little impact on the war. The V-2 may indeed have shortened the war, as its backers claimed it could—but in favor of the Allies.

Book Reviews

Hoplites: The Classical Greek Battle Experience. Edited by Victor Davis Hanson. London: Routledge, 1991. Illustrations. Notes. Indexes. Pp. xvi, 286. \$45.00. (Paper: \$17.95 [Dec. 1993].)

This work, edited by Victor Davis Hanson, one of today's foremost experts on classical Greek warfare, features essays on hoplite (infantry) combat from nine leading specialists in the field. Their contributions center around three major themes: the fighting men and their weaponry (J. K. Anderson, Pamela Vaughn, Hanson); the battlefield environment (J. F. Lazenby, Peter Krentz, Everett L. Wheeler); and the rules of war (Josiah Ober, Michael H. Jameson, A. H. Jackson). The book opens with an important introductory essay by the editor, highlighting the characteristics of hoplite warfare and addressing some of the misunderstandings about it among modern scholars (e.g., specialists in classical antiquity or anthropology and professional military historians).

The various aspects of hoplite combat dealt with here have already received considerable attention elsewhere: armament, tactics, leadership, agonistic practices [deriving from the Greek view of war as a contest], and religious rites. But one of the principal merits of this book—its originality, really—is that it is not content to approach these aspects from a traditional standpoint. It draws the reader into the very heart of battle, to the side of the hoplite, as he faces death in murderous hand-to-hand combat. We hear the clash of arms, the sound of trumpets. We find ourselves taking part in the high councils of war, in the removal of the dead, in the invocation of the gods. All of this is achieved without recourse to imagination or reconstruction, but rather through constant reference to the ancient authors themselves. This is the approach which Victor Hanson used so successfully in his earlier work, *The Western Way of War: Infantry Battle in Classical Greece* (1989). The audience at which this present volume is aimed—students, researchers, military historians—will read it from cover to cover with great interest.

A critical observation needs to be made here, but one which should not be allowed to detract from the interest of this book. The rehabilitation of combat as a topic in war studies is certainly an excellent step. Combat has been somewhat neglected in recent research because of the discrediting of "battle history" in favor of the history of *mentalités*. What the authors of the essays in this book show us so well is that, even when viewed from a strictly military point of view, combat as lived experience teaches us a lot about the men who made up the hoplite army. This having been said, is it necessary