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CHAPTER ONE

Overcast, Paperclip, Osoaviakhim

Looting and the Transfer of German Military Technology

Michael J. Neufeld

World War II was a war of science and technology. By 1944 that truth was recognized by almost everyone, and certainly by leading officers in the U.S. armed forces. The spectacular mid-1944 debut of Germany's "vengeance weapons" – the jet-powered V-1 cruise missile and the rocket-powered V-2 ballistic missile – drove home that point even more firmly. Although ultimately ineffective, those weapons also raised the specter of a future "push-button" war fought over enormous distances – a specter even more real to the handful of decision makers who knew of the Manhattan Project to build an atomic bomb.

On August 21, 1944, the Anglo-American Combined Chiefs of Staff created the Combined Intelligence Objectives Subcommittee (CIOS), a joint operation, to coordinate the seizure of German weapons and technology by special "T-Forces" accompanying the ground units then breaking out from Normandy. However, the first technical intelligence team to enter Paris a few days later had already been formed in 1943. Major General Leslie Groves, head of the Manhattan Project, had created the Operation Alsos to seek out evidence of a German atomic bomb. Other American teams and organizations soon arose in imitation of Alsos and CIOS, or in response to the vision of farsighted military leaders like General Henry H. "Hap" Arnold, commander of the U.S. Army Air Forces (USAAF), who formed a "Scientific Advisory Group" in fall 1944 to investigate the advanced technologies needed to maintain American air superiority in the postwar era.[1]

Out of these organizations, and others on the British, Soviet, and French sides, emerged one of the most remarkable instances of plunder in world history – one with profound effects on the Cold War and German-American relations. Although plunder has been a feature of war since time immemorial, no earlier war, including World War I, had ended with the massive seizure of the defeated power's science and technology – not just weapons, but laboratories, patents, people, equipment, even whole factories and organizations.[2]

The centrality of science and engineering to the war was one major factor behind these massive operations. Equally important were the utter totality of Germany's defeat and the essential technological equality among the warring sides in Europe. Although the seizure of German technology by the Allies – popularly symbolized by the American "Project Paperclip" that emerged in 1945–6 – led to postwar myths of German technical superiority, in fact the Third Reich only led in some areas, such as missiles,

[1] John Gimbel, *Science, Technology, and Reparations* (Stanford, Calif., 1990), 3–10; Samuel Goudsmit, *Alsos* (New York, 1947); Michael H. Gorn, *The Universal Man* (Washington, D.C., 1992), 96–110.

[2] Jörg Fisch, "Reparations and Intellectual Property," in Matthias Judt and Burghard Ciesla, eds., *Technology Transfer Out of Germany After 1945* (Amsterdam, 1996).

jet aircraft, submarines, and chemical weapons.[3] Yet, even in areas where the Allies (particularly the Western Allies) were ahead, such as radar, conventional aircraft, and atomic weapons, there was almost always something to be learned from Nazi Germany's successes and failures. By contrast, Japan's technology was closely evaluated after its defeat but aside from a few areas like biological warfare, little effort was made to export Japanese scientific and technical knowledge and resources.

The liberation of occupied territories in Western Europe in 1944 produced some successes for technical intelligence. Most notably, there was fairly conclusive proof that the German nuclear, weapons project had not gotten very far. But only the final collapse of the Reich in April–May 1945 produced the actual race to seize and export German assets and weapons. Competition was embedded in the process from the outset. One of the earliest harbingers of the Cold War was the mutual suspicion and lack of cooperation between Soviet and Anglo-American intelligence forces in the seizure of key technical facilities and personnel in spring 1945. But even among the Western Allies there was rivalry and confusion. The joint structures of the Anglo-American alliance created some cooperation between the British and United States forces, but both thought the Free French were little better than the Soviets. British and American groups nevertheless sometimes fought bureaucratic battles with one another, which were compounded by a profusion of competing CIOS teams, leading some to nickname the organization "Chaos." Even inside the American forces, differing service interests were a factor. Army Ordnance formed "Special Mission V-2," the Navy the "Naval Technical Mission in Europe," and the USAAF "Operation Lusty."

The forces of competition were no more clearly displayed than in the race to seize the fruits of the German rocket program. At the end of March, the Western Allies broke through the Rhine barrier. The U.S. Army soon found itself deep within Saxony and Thuringia, the future Soviet zone of occupation. On April 11, American units overran the underground Mittelwerk complex near Nordhausen, which used concentration-camp labor from the Mittelbau-Dora camp to produce operational V-2s, V-1s, and other weapons. Many engineers evacuated from the German Army rocket center in Peenemünde were still in the region. "Special Mission V-2" under Colonel Holger Toftoy immediately began the seizure of 100 V-2s or parts for same, plus relevant personnel and equipment, before the Soviets could move into their zone. Intelligence officers also ferreted out the location of the central cache of Peenemünde documents and whisked fourteen tons of paper out of a mine in the future British zone, allegedly just as the British Army was setting up checkpoints. Earlier in May, the core leadership from Peenemünde, headed by Dr. Wernher von Braun and General Walter Dornberger, had surrendered to American units in the Alps.[4]

The Peenemünde group quickly became an important factor in American postwar policy, as Toftoy and Army Ordnance wanted to bring a large number of them to the United States in order to acquire their knowledge of rocketry. Toftoy's initiative and that of others in the Navy and Air Forces led to the formal creation of "Project Overcast" by the U.S. Joint Chiefs of Staff in July 1945. This project's mandate was to bring 350 "chosen, rare minds" from Germany to help the war effort against Japan. The sudden end of that war the next month did not stop the program, however, as the Pacific war had been in part a convenient excuse to bring German scientists and engineers to America or at least deny them to the Soviets and other powers. Toftoy was allotted 100 slots for the Peenemünde group, although ultimately more than 120 came. Friction arose with the

[3] One of the most influential journalistic accounts, Tom Bower's *The Paperclip Conspiracy: The Battle for the Spoils and Secrets of Nazi Germany* (London, 1987), unfortunately upholds the myth of German superiority.

[4] James McGovern, *Crossbow and Overcast* (New York, 1964); Michael J. Neufeld, *The Rocket and the Reich* (New York, 1995).

British over some of the rocket experts, but ultimately the disagreements were minor. London had made a fundamental decision that it could not afford a major ballistic-missile program and was thus uninterested in competing with the United States.[5]

With the Soviet Union, the situation was far different. Soviet forces had captured Peenemünde in May, but found it stripped by the Germans, and occupied the Mittelwerk on July 5, only to find it partly stripped by the Americans, who had also taken with them hundreds of other German scientists and engineers from key laboratories and industries in Saxony and Thuringia – not always voluntarily.[6] There were, nonetheless, large quantities of production equipment and missile parts in the Mittelwerk and many second-rank rocket engineers and technicians still in the area. Frustrated at their inability to get Wernher von Braun, the Soviets still managed to lure Helmut Gröttrup, the deputy chief of guidance in Peenemünde, over to their side to lead a German rocket group. (The French also began to hire German engineers away from the American zone, many of whom laid the foundation for the French missiles and space program.) The Soviets used equipment from the Mittelwerk to restart limited rocket production. A year later, on October 22, 1946, Soviet troops suddenly rounded up and forcibly deported to the USSR the whole rocket organization in Thuringia, along with thousands of other "specialists" and their families from the Soviet zone. This coordinated action, code-named "Osoaviakhim," exacerbated the tensions already building between East and West over German occupation policy and many other issues.[7]

Although the V-2 program ironically proved to be a military boondoggle that damaged the German war effort, it clearly demonstrated the missile's feasibility and potential, especially if combined with the atomic bomb that suddenly arrived on the world scene with the Hiroshima attack of August 6, 1945. Thus, the centrality of missile technology to postwar Allied rivalry over German technical resources is not surprising. Yet, the prominence of the large von Braun group in Overcast and its successor, "Project Paperclip," has misled many. That group represented only a minority of those brought to the United States, and the same was true of the rocket engineers among the "specialists" sent to the USSR.

In both countries and probably in Britain and France too, aviation experts predominated. The USAAF and its successor, the U.S. Air Force (USAF) formed in 1947, took more than 700 German scientists and engineers under Overcast/Paperclip by 1952, somewhat more than the Army and more than twice as many as the Navy. Of the at least 3,500 "specialists" sent to the Soviet Union (many more were technicians and skilled workers than in the West), 35 percent are estimated to have come from aviation, about twice as many as from rocketry.[8]

For the United States, the Luftwaffe's massive investment in transonic and supersonic aerodynamic research was particularly attractive. Allied technical officers and experts were amazed at the lavish facilities and advanced wind tunnels captured by the Allies; in the British zone, it was the huge Luftwaffe research complex at Braunschweig-Völkenrode that stunned British

[5] Clarence Lasby, *Project Paperclip* (New York, 1971), 66–143; John Gimbel, "Project Paperclip," *Diplomatic History* 14 (1990): 343–65; Stephen Robert Twigge, *The Early Development of Guided Weapons in the United Kingdom, 1940–1960* (Chur, 1993), 185–7.

[6] John Gimbel, "U.S. Policy and German Scientists: The Early Cold War," *Political Science Quarterly* 101 (1986): 433–51.

[7] Ulrich Albert, Andreas Heinemann-Grüder, and Arend Wellmann, *Die Spezialisten* (Berlin, 1992); Norman M. Naimark, *The Russians in Germany: A History of the Soviet Zone of Occupation, 1945–1949* (Cambridge, Mass., 1995), chap. 4; Steven J. Zaloga, *Target America* (Novato, Calif., 1993).

[8] See Burghard Ciesla, "German High Velocity Aerodynamics and Their Significance for the U.S. Air Force 1945–1952," in Matthias Judt and Burghard Ciesla, eds., *Technology Transfer Out of Germany After 1945* (Amsterdam, 1996), 93–106; Albert, Heinemann-Grüder, and Wellmann, *Die Spezialisten*, 176–80. Systematic studies of French and British postwar exploitation of German science and technology are much needed.

and American visitors; in the Bavarian Alps, it was the evacuated Peenemünde wind tunnels at Kochel. The U.S. Navy eventually sent the Kochel tunnels to the new Naval Ordnance Laboratory outside Washington, D.C., along with nine leading members of the institute. The USAF got the institute director, Dr. Rudolph Hermann, plus wind tunnels and many more experts from Braunschweig and other places. Once again, as in the case of the V-2, it was the victors who benefited from Germany's extravagant misdirection of its research resources.[9]

Certain results from German aerodynamic research proved to be of immediate value. The theory first formulated by Dr. Adolf Busemann in Germany, that swept rather than straight wings would improve lift and drag around and above the speed of sound, had been independently discovered in America, but German wind-tunnel data provided the needed confirmation. This data led to the redesign of important, early USAF jets such as the F-86 fighter and the B-47 nuclear bomber. But the USAF, the Navy, and the aircraft firms also benefited from a panoply of other German developments in areas such as turbojet engines, aircraft structures, ejection seats, and exotic designs. In many cases, notably in jet engines, the German lead over Britain and the United States was small but still of interest. (The Soviets, on the other hand, had no significant jet programs and thus gained proportionately more from the seizure of aircraft industries and experts in their zone.) Another area where the United States made significant gain from German research was in aerospace medicine – the study of special stresses on the human body such as high altitude and speed, and the development of equipment to ensure the survival of pilots and their ability to function effectively.

On the Navy side, there were further important gains beyond the application of aeronautics to sea power. German submarine technology, much of it undeployed at the end of the war, opened new vistas on undersea performance. In the waning days of the war, a joint British-American team seized the Kiel firm of legendary inventor Professor Hellmuth Walter. The team members already knew about his experimental use of hydrogen peroxide as a propellant for high-speed submarines, as well as the widespread application of the substance to German rocket aircraft and missiles. They found further evidence of his innovations, including a revolutionary rounded hull shape already tested in 1939 and other means of increasing underwater speed and endurance, such as greatly enlarged battery packs. Some of these innovations had been incorporated into the conventional diesel-electric Type XXI U-boats just deployed at the end of the war. Walter and his associates were extensively debriefed and later brought to Britain and the United States.[10]

Walter's innovations raised the possibility that the submarine could remain submerged for long periods of time and have the speed to outrun surface sub-hunting ships. As relations with the USSR deteriorated, this possibility became both alluring and frightening for American naval officers: If the Soviets could manufacture large numbers of Type XXI U-boats, the antisubmarine warfare technology of the Western Allies would be worthless. The Navy brought German experts to America under Paperclip, started at least three hydrogen-peroxide projects, launched experimental programs in submarine design, investigated German advances in sonar, and pursued the already existing American lead in oceanography as applied to submarine concealment and detection. Ultimately, it would be nuclear power, developed entirely at home, that would make virtually unlimited underwater performance possible, but German advances played a crucial role in initiating a revolution in submarine design. Certain experiments with launching rockets from U-boats also influenced the emergence of the ballistic-missile submarine in the 1950s.[11]

[9] Ciesla, "German High Velocity Aerodynamics"; Peter Wegener, *The Peenemünde Wind Tunnels* (New Haven, Conn., 1996), 103–34; Helmuth Trischler, *Luft- und Raumfahrtforschung in Deutschland 1900–1970* (Frankfurt am Main, 1992).

[10] Gary E. Weir, *Forged in War* (Washington, D.C., 1993), 68–79.

[11] Ibid., 115–47, 228–73.

The arrival of so many scientists and engineers in America from an often hated enemy inevitably created controversy. From the outset, the American military chose to carry out Overcast and Paperclip in secret but, by late 1946, the presence of the Wernher von Braun group in Texas and many others elsewhere was so well known that carefully controlled public relations efforts were necessary. This sparked a brief round of protest in early 1947 from left-wing scientists and Jewish groups, but the Cold War soon made it difficult to question the presence of "Nazi scientists" in the United States. Opponents were further hampered by the military's deliberate cover-up of the questionable records of a number of Paperclip Germans, such as von Braun's associate Arthur Rudolph, who had been production manager in the underground slave-labor plant, and Dr. Hubertus Strughold, a leader in aerospace medicine who had knowledge of if not direct involvement in gruesome experiments on concentration-camp prisoners at Dachau. Only in the 1980s did many of Paperclip's scandals come to light.[12]

Even inside the U.S. government there was conflict over the Germans and their records. From the beginning of Overcast in mid-1945, State Department officials created roadblocks, if only because the Germans were brought overseas under military custody, circumventing regular immigration procedures. Moreover, Overcast and Paperclip implicitly contradicted State Department programs to prevent the exodus of Nazis abroad to restart weapons production in third countries, as after World War I. But in 1946–7, the dubious records of some of those imported under Paperclip also became an issue between military and State Department officials, leading to the rewriting of the security files of von Braun and others to evade the restrictions against importing "ardent Nazis." Some journalists have detected a conscious mid-level conspiracy in the Pentagon to violate President Harry Truman's policy as laid down in the March 4, 1946, directive creating Project Paperclip. Yet, these evasions of the law appear to have been approved by the Cabinet and probably Truman himself. Pragmatism ruled, not principle; Paperclip was designed first to benefit American military and industrial power, second to deny German technology to other countries – at first, almost everyone; later, the USSR in particular.[13]

Inevitably, this pragmatic and at times cynical policy also conflicted with occupation policy in Germany. In July 1945, CIOS disappeared along with the joint military command; the American deputy military governor, General Lucius Clay, created the Field Information Agency, Technical (FIAT) on July 14 to coordinate the exploitation of German technology and industry in the American zone. FIAT oversaw a massive program of plunder, not just of military technology and laboratories but also of industry. American teams, many of them consisting of corporate executives in uniform, went through German industry seizing machines, documents, and patents. Some of this material, such as that relating to synthetic rubber and gasoline, had direct relevance to military technology, but the long-term value of this program, particularly its civilian side, is unclear, and it certainly did not cripple German industry as some feared.

One of the side effects of this wholesale technology transfer was the undermining of denazification policy. Almost all of the engineers and scientists sent to America under Overcast and Paperclip were taken without having gone through denazification trials, and many other examples of the evasion of these laws became known under FIAT. Reinforced by the imminent Cold War, the exploitation of German science and industry generated further cynicism in Germany about denazification. At the same time, the value of German technology to the Allies contributed, at least in a small way, to the revival of German national pride and to respect

[12] Linda Hunt, "U.S. Coverup of Nazi Scientists," *Bulletin of the Atomic Scientists* (Apr. 1985): 16–24; and Linda Hunt, *Secret Agenda: The United States Government, Nazi Scientists, and Project Paperclip, 1945 to 1990* (New York, 1991); Bower, *Paperclip Conspiracy*; Christopher Simpson, *Blowback* (New York, 1988).

[13] John Gimbel, "German Scientists, United States Denazification Policy, and the 'Paperclip Conspiracy,'" *International History Review* 12 (1990): 441–65.

for Germany in the West. In view of the equally cynical but much more harshly applied policies of plunder, dismantling, and exploitation by the Soviet occupation forces in the East, the policies of the United States, Britain, and France ultimately did not look so bad to the Germans. Even more important, these policies ironically helped integrate West German industry with the West because using German patents and processes often meant reestablishing contacts to get the necessary "know-how."[14]

FIAT was abolished in July 1947, in large part because its industrial program apparently conflicted with the policy of reviving German industry. But Project Paperclip continued unabated into the early 1950s and, under various cover names, for twenty years thereafter. Even so, it is clear that the great bulk of the transfer of military science and technology from Germany to the United States took place between 1945 and 1950. Once the Bundeswehr was formed and armed in the late 1950s, some technology was reexported to Germany – or at least the flow of military technology equalized and then reversed. A noteworthy example is the license production of the Lockheed F-104 Starfighter by the German aircraft industry beginning around 1961, which helped build and modernize that industry. In small part, this represented the reexport of German high-speed aerodynamic and jet-engine research to its country of origin.

With the transition to the Cold War in 1947–8, the United States transferred another form of military knowledge as well: the strategic, tactical, and practical experience of German officers, particularly in waging war with the USSR. For the U.S. Army, this transfer evolved from the massive interrogation program of the Historical Division of the Army in Europe. Thousands of German officers and general officers in prisoner-of-war camps were interviewed or paid to write studies for official histories of U.S. Army campaigns. In 1947, as tensions rose in Germany, some former officers were asked to write about the Eastern Front and German experiences fighting the Soviets. After 1948, most were released and were paid to write at home; by the mid-1950s, some two thousand reports and interrogations had been done. A few studies, such as those on cold-weather fighting or Soviet tactics, were issued as pamphlets to American troops. Seeing the success of this program, the USAF launched a more limited effort at Karlsruhe in 1952, leading to about twenty monographs by former Luftwaffe officers, mostly on the air war in the East. This material, like some of that written for the Army, helped educate American forces regarding Soviet tactics and doctrine and brought German and American officers closer together. The cost was the all-too-ready acceptance of the apologia of former Wehrmacht officers for their role in the genocidal, racist campaign in the East and their corresponding underestimation of their former enemy.[15]

All in all, the transfer of military technology and knowledge after 1945 had profound effects on German-American relations. Despite its origins in the outright plunder of the defeated Reich, under the pressure of Cold War conditions this transfer aided the cooperation between the United States and the later Federal Republic. German scientists and engineers were incorporated into the American defense establishment and industries, while German and American officers cultivated closer relations. Those German industries most damaged by American and Allied exploitation, the aircraft and armament industries, were also those the Germans had the least desire to revive in the 1940s and 1950s. In other cases, the seizure of German patents and processes helped revive industrial contacts over the long run. The value of German technology

[14] See Raymond G. Stokes, "Assessing the Damages: Forced Technology Transfer and the German Chemical Industry," in Judt and Ciesla, eds., *Technology Transfer*, 81–91.

[15] United States Army Headquarters, Europe, Historical Division, *Guide to Foreign Military Studies* (Karlsruhe, 1954); Telford Taylor, "Introduction to the Series," in Richard Suchenwirth, ed., *Historical Turning Points in the German Air Force War Effort* (1959; reprint, New York, 1968).

to the Allies also contributed to national pride and respect for Germany, in part by fostering myths of German technological superiority.

The impact on this transfer on the Cold War was equally profound. The seizure of German science and technology helped speed the Cold War's coming by fueling the mutual suspicion and incipient arms race between East and West. Most notably, the German rocket program and its exploitation by both sides accelerated the appearance of the nuclear-armed ballistic missile by as much as a decade, with destabilizing effects on the arms race. Both sides gained much from German aeronautics and submarine technology as well, and both acquired the nerve gases Tabun and Sarin, which had been secretly invented in Germany but fortunately never used. In absolute terms, the United States gained most from the transfer of German technology and knowledge; it acquired the best people and the best selection of patents, equipment, and weapons. Yet – in another irony – in relative terms, Stalin's Soviet Union gained more from the plunder of the Third Reich because it was behind the West in aviation, nuclear, naval, and radar technology and because it moved more energetically to build a rocket program after the war. The USSR became a global military threat to the Western alliance sooner because of what it gained from the Germans. Thus, the transfer of German military knowledge and technology contributed much to the security of America and the West after the war – but, unavoidably perhaps, much to their insecurity as well.

The United States and Germany in the Era of the Cold War, 1945–1990

A HANDBOOK

Volume 1: 1945–1968

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GERMAN HISTORICAL INSTITUTE
Washington, D.C.
and
CAMBRIDGE
UNIVERSITY PRESS

2004