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Making Breakthroughs in the Turbulent Decade: China's Space Technology During the Cultural Revolution

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This article discusses why Chinese space programs were able to develop to the extent they did during the turbulent decade of the Cultural Revolution (1966–1976). It first introduces briefly what China had accomplished in rocket and missile technology before the Cultural Revolution, including the establishment of a system for research and manufacturing, breakthroughs in rocket technology, and programs for future development. It then analyzes the harmful impacts of the Cultural Revolution on Chinese space programs by examining activities of contemporary mass factions in the Seventh Ministry of Machinery Industry. In the third section, this article presents the important developments of Chinese space programs during the Cultural Revolution and explores briefly the significance of these developments for the future and overall progress in space technology. Finally, it discusses the reasons for the series of developments of Chinese space technology during the Cultural Revolution. This article concludes that, although the Cultural Revolution generated certain harmful impacts on the development of Chinese space technology, the Chinese essentially accomplished their scheduled objectives in their space program, both because of the great support of top Chinese leaders, including the officially disgraced Lin Biao and the Gang of Four, and due to the implementation of many effective special measures.

Introduction: A Short Survey of Chinese Space Technology before 1966[1]

The heavy casualties and losses of logistic supplies China suffered in the Korean War (1950–1953) made it clear to Chinese leaders that China would be at a grave disadvantage in modern warfare without advanced weaponry and that it was therefore fundamentally important for the national defense to develop new types of weaponry.[2] Consequently, while vigorously developing combat aircrafts and conventional weapons, Chinese leaders decided in January 1955 to build atomic bombs. In the meantime, Soviet advisers recommended that China develop strategic missiles as well. In October 1955, Qian Xuesen (or Tsien Hsue-Shen), a prominent American-educated Chinese aerospace engineer, returned to China after spending five years under virtual house arrest in the United States. Soon

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[1] Since the mid-1980s, many works and memoirs have addressed the Chinese development of missile and space technologies. 《当代中国的航天事业》[*The Space Programs in Contemporary China*] published in 1986 is the first official and authoritative publication that discussed comprehensively the development of Chinese missile and space programs. Its editor-in-chief, Zhang Jun, was then the minister of the Ministry of Space Industry. As the PRC's opening-up policy deepens, a large number of articles, monographs, memoirs, and biographies concerning Chinese missile and space programs have appeared since then. In 2006, Li Chengzhi, one of the authors of this essay, published《中国航天技术史稿》[A Draft History of Chinese Space Technology] (山东教育出版社), which is 960,000 Chinese characters long. Scholars overseas are also interested in the study of Chinese missile and space programs and have published many relevant books and articles. John Wilson Lewis and Hua Di, "China's Ballistic Missile Programs: Technologies, Strategies, Goals," *International Security* 17, no. 2 (1992): 5–40 gave a detailed introduction on the development of Chinese ballistic missiles. Yanping Chen (陈燕萍), whose father, Chen Bin, was the director (1982–1988) of the PRC's Commission for Science, Technology and Industry for National Defense (COSTIND), had opportunities to interview many eyewitnesses and thus has obtained much important historical materials. As a result, Yanping Chen's thesis, "China's Space Activities: Policy and Organization, 1956–1986" (PhD dissertation, The George Washington University, 1999), is of special value. Iris Chang, *Thread of the Silkworm* (New York: Basic Books, 1995), a biography of Qian Xuesen, is helpful for understanding Qian's activities and situation during the Cultural Revolution. Joan Johnson−Freese, *The Chinese Space Program: A Mystery within a Maze* (Malabar, FL: Krieger, 1998) and Brian Harvey, *China's Space Programme: From Conception to Manned Spaceflight* (Chichester: Praxis, 2004) are two comprehensive monographs on the development of the Chinese space program, which have been widely cited, but are primarily introductory and based mostly on secondary sources. Stacey Solomone has published many specialized papers on the Chinese space program, one of which deals specifically with its development during the Cultural Revolution ("China's Aerospace Industry and the Cultural Revolution," in *Mr. Science and Chairman Mao's Cultural Revolution: Science and Technology in Modern China*, ed. Chunjuan Nancy Wei. and Darryl E. Brock (Lanham: Lexington Books, 2012). Solomone's viewpoints are somewhat radical and her sources are limited. Roger Handberg and Zhen Li, *Chinese Space Policy: A Study in Domestic and International Politics* (New York: Routledge, 2007), has comprehensively analyzed the decision making and relevant policy factors concerning the Chinese space program. James Clay Moltz, *Asia's Space Race—National Motivations, Regional Rivalries, and International Risks* (Columbia University Press, 2011) introduced the Chinese space program from political, economic, military, and other perspectives. The literature mentioned above is of certain reference value.

[2] Nie Rongzhen 聂荣臻,《聂荣臻回忆录》[*Nie Rongzhen's Memoir*] (Beijing: People's Liberation Army Publishing House, 1984), 764–65.

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Figure 1. Qian Xuesen and Mao Zedong at a banquet held in Beijing on February 1, 1956. Mao personally changed Qian's seat from Table 37 to Table 1, arranging Qian to sit with him. (Credit: 院史编委会 Editorial Board of *A History of China Academy of Launch Vehicle Technology,* ed.《中国运载火箭研究院院史 . 1957-1987》(上)[*A History of China Academy of Launch Vehicle Technology,* vol. 1] (Beijing: 中国运载火箭研究院 [China Academy of Launch Vehicle Technology], 1994), Pic. 2.)

after Qian's return, top Chinese leaders like Mao Zedong, Zhou Enlai, and Nie Rongzhen greeted him in person and listened to his suggestions on missile development. At Nie's request, Qian submitted "A Proposal on Establishing Our Country's Defense Aviation Industry" in February 1956.[3] On March 14, Zhou chaired a meeting at the Central Military Committee, resolving to put Nie and Qian in charge of setting up a new government agency, publicly named the Aviation Industry Committee (AIC), to lead China's missile development. The AIC comprised two divisions, dealing with scientific research and administration respectively. The former research division was named the Fifth Academy of the Ministry of Defense (hereafter The Fifth Academy) and the latter the Fifth Bureau of the Ministry of Defense (hereafter The Fifth Bureau). The Fifth Bureau was officially established in August. Two months later, on October 8, the Fifth Academy, China's first research institution on missile technology headed by Qian Xuesen, was founded (Figures 1 and 2).[4]

According to the initial plan, the Fifth Academy would deal only with research and design and other agencies would be responsible for manufacturing and testing. At its founding, the Fifth Academy comprised ten research groups and a total of three-hundred staff, among whom two hundred were new college graduates.[5] As the number of missile research projects increased, the Academy continued to grow and reinforce its staff, often by taking over many agencies and technical staff from other ministries. By the end of 1957, the Fifth Academy had been reorganized into two branch academies. At the beginning of the 1960s, China suffered its worst economic crisis and many government agencies had to downsize their personnel, but the Fifth Academy continued enlarging rapidly. In 1960, for instance, the Academy's total number of personnel went up from 17,000 to 30,000 and its technical staff grew from 3500 to 10,000. (See ref. 7) By 1964, the Fifth Academy had added two more branch academies. Meanwhile, it gradually transformed itself from an institution focusing only on research and design to a comprehensive establishment that oversaw not only research and design, but also manufacture and testing.

In January 1965, the Fifth Academy was elevated to the Seventh Ministry of Machinery Industry (hereafter the Seventh Ministry), administrating the scientific research, design, trial manufacture, production, and infrastructure construction of missile and rocket development. General Wang Bingzhang, who had been in charge of the Fifth

[3] Zheng Chengliang et al.《钱学森年谱》(上) [*The Chronical Biography of Qian Xuesen, Part I*] (Beijing: zhongyang wenxian chubanshe, 2015), 126. For the purpose of confidentiality, "Defense Aviation" was used to replace sensitive words such as rocket and missile.

[4] Wang Shouyun et al. "Qian Xuesen" in《中国科学家传记》[*Biographies of Chinese Scientists*], vol. 1 (Beijing: Kexue chubanshe, 1991), 775.

[5] Zhang Yanpu. "Lao wu yuan chu chuang shi qi de hui yi [Memories on the early period of the Fifth Academy]" in《航天事业三十年》[*Thirty years of Chinese cause of space science and technology*] (Beijing: Hangtian gong ye bu, internal distribution edition, 1988), 223.