

International Assessment and Strategy Center

China's Manned Military Space Ambitions

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China pursues a robust military space effort, to include manned and unmanned military space programs, while it accuses the United States of militarizing outer space and seeks via diplomacy to limit U.S. military space programs. The imminent launch of China's second manned space mission, called Shenzhou-6, perhaps as early as October 12, 2005, should draw attention to China's manned military space ambitions. The People's Republic of China (PRC) uses its manned space program to serve scientific goals, like experimentation and eventual Moon exploration, and political purposes, such as advancing nationalist pride and impressing the world with China's "peaceful rise." China would also like to leverage its manned space program to achieve greater access to European and multi-national space programs like the U.S.-led International Space Station.^[1]

However, all five of the previous Shenzhou missions since November 1999, including four unmanned test missions and the first October 2003 manned mission, were used to perform military missions. Early 2005 Chinese television images of Shenzhou-6 under construction indicate that it will also serve military surveillance missions. This evidence suggests that China's manned space program has been designed to serve military needs as well as others. This is at odds with Beijing's campaign against the "militarization of outer space," and contrasts in certain respects with the American pattern, but appears to follow the former Soviet Union's attempts to develop manned military space platforms. China also makes unmanned military satellites and has ambitious plans in this area.^[2]

Indeed, in March 2005, the National Air and Space Intelligence Center at Wright-Patterson Air Force based issued an unclassified report that noted:

"Chinese and Russian manned space programs have heavy military involvement...China's manned space program is run by the People's Liberation Army and includes research on military sensors for space reconnaissance, as well as experiments to understand the space environment. China wants to establish a space station of its own, probably one similar to the early Russian Salyut military space station missions."^[3]

China's military designs for its manned space program creates dilemmas for countries considering greater "civil" space cooperation with China. First, if China has decided that manned and unmanned military space combat capabilities are in its national security interests, then can "civil" space cooperation with China truly serve to curb greater military competition with China in space? Furthermore, could such cooperation serve to increase China's ability to develop more sophisticated manned or unmanned military

space capabilities which could threaten countries like Japan, Taiwan, or even the United States? And third, now that China is pursuing programs to put vehicles on the Moon, is it possible that China could even expand military competition to that realm?

Firm Military Control of China's Manned Space Program

China regularly criticizes American plans to “militarize” outer space. In June 2005 China joined Russia in the United Nations Conference on Disarmament to revive a Committee To Prevent the Arms Race In Outer Space, discontinued in 1994.^[4] But in China, both manned and unmanned space programs are run by the People's Liberation Army (PLA), or more specifically, the General Armaments Department (GAD) under the PLA's Central Military Commission. In his April 2002 message following the landing of the Shenzhou-3 capsule, former PRC President Jiang Zemin congratulated then GAD Director, now Defense Minister General Cao Gangchuan, as the “chief director of the national manned spacecraft program.”^[5] In November 2002 General Li Jinai was elevated to GAD Director, and the following July, Hong Kong press reports noted he had been appointed “commander-in-chief” of the manned space program, and had taken reports from Huang Junping, director of the Long March CZ-2F manned space-launch rocket program, and Yuan Jiajun, director of the Shenzhou spaceship program.^[6] And during a telephone call from space with China's leaders, China's first astronaut, Air Force Lt. Col. Yang Liwei, repeatedly addressed Defense Minister Cao Gangchuan as “chief.”^[7] In November 2004 General Chen Bingde was elevated to the CMC and to the post of Director of the General Armaments Department, and is assumed to be the current director of the manned space program.



China's First Two Space Chiefs: Former manned space program director and General Armaments Department Director General Li Jinai, and his predecessor, current Defense Minister General Cao Gangchuan, inspect a Yuan-class submarine model.

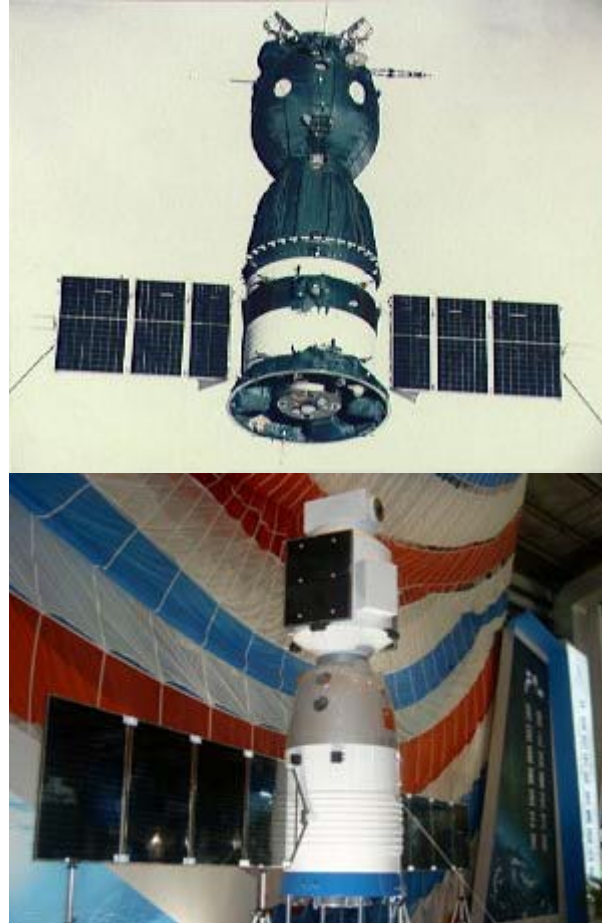
Future “PLA Space Force”?

Evidence suggests that the PLA understands the necessity of using and securing outer space as a military objective to serve terrestrial military objectives. The National Air and Space Intelligence Center quoted Liying Zhan, of the Langfang Army Missile Academy saying, “In future space wars, the main operations will consist of destructive satellite attacks and counterattacks, as well as jamming and antijamming operations.”^[8] According to a PLA officer interviewed in late 2004, who asked not to be identified in print, for a number of years a debate has proceeded within the PLA over which service should control the range of military-space missions. This officer noted that the debate has been between the Second Artillery, which controls nuclear and non-nuclear missiles, and the PLA Air Force.^[9]

The PLA officer may be correct. In July the Hong Kong journal *Chien Shao* published an article, claiming to be based on PLA literature and sources, asserting that China has been secretly preparing a “space war experimental team” that could lead to the formation of a new service, a “Space Force” to be assembled from elements of the General Armament Department, the Space Agency and the Second Artillery Corp. The Space Force might have 90,000 personnel and would be directly subordinate the Central Military Commission.^[10] The article makes clear the PLA did not yet have such a Space Force, but was actively studying the possibility, and that China’s leaders “...will accelerate the pace of space build-up and actively develop ‘killer’ weapons, including laser weapons, particle beam weapons, microwave pulse weapons, electromagnetic guided missiles, and anti-radiation missiles.”^[11]

Shenzhou’s Military Record

The original Shanghai Astronautics Bureau Project 921-1 manned space capsule was revamped in 1994 following Jaing Zemin’s visit to Russia, which led to a 1995 agreement to transfer Russian manned space technology. China purchased a Russian Soyuz space capsule, life support and docking technology, space suits, and astronaut training.^[12] While the PRC has boasted that it was responsible for the design and production of its subsequent space craft, it is clear that Russian technology has made possible the PRC’s first manned space program. With its November 20, 1999 test flight, the 921-1 craft gained the name “Shenzhou” or “Divine Vessel” from Jiang Zemin, and was revealed to be scaled-up Soyuz, featuring the same three-part design: orbital module; command/crew module; and a service or propulsion module. Shenzhou, however, at a weight of 7800kg, and a length of 7.79m is about 550 kg heavier and over a meter longer than the Soyuz. Unlike Soyuz, the 921-1 has a cylindrical orbital module that has its own solar energy panels, thrusters to enable minor maneuvers, and a digital data transmission system, making it capable of independent operations. All Shenzhou flights have entailed extended orbital module missions following the return of the command module.



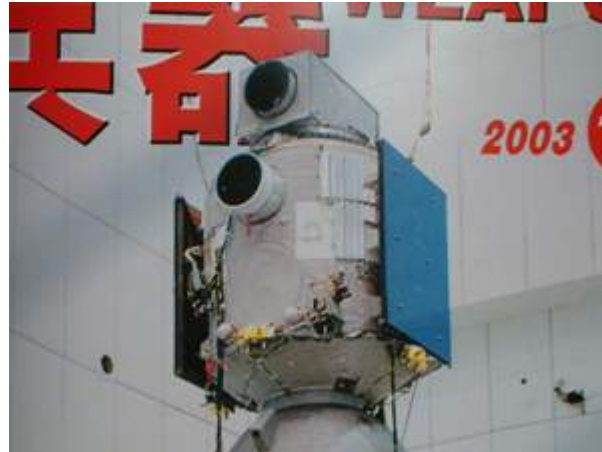
Russian Soyuz and China's Shenzhou Compared: Russia's Soyuz is primarily a space shuttle, though there were many unrealized Soviet-era proposals for military applications. China's Shenzhou is a slightly larger Soyuz-based design that incorporated military functions from the beginning. Source: Internet and RD Fisher

The first flight of Shenzhou in November 1999 lasted only 21 hours. The second unmanned test flight on January 9, 2001 lasted six days, and featured an extended flight for the orbital module that carried experiments, a feature of all subsequent Shenzhou missions. This mission also reportedly encountered an unexpected hard landing for the descent module, likely due to a parachute malfunction, with the implication that any occupants would have died.^[13] A third mission from March 25-April 1, 2002 saw the testing of a fully man-rated capsule that carried two dummy "Yuhangyuan" or astronauts that simulated most human functions, plus upgraded video and voice communication systems. A fourth test mission took place from December 31, 2002 to January 5, 2003, carrying dummies and science experiments. The fifth mission took place on October 15, 2003, in which the first Chinese astronaut, Lt. Col Yang Liwei, circled the Earth for 21 hours and 23 minutes.^[14]

It is now known that all of the unmanned and even the first manned Shenzhou flight performed military missions. Military systems are part of the Shenzhou's orbital module. Shenzhou-1 and 2 very likely performed electronic intelligence (ELINT) missions.^[15] This was indicated by the orbital module's carrying external Yagi-type antennae mounted on three extendable poles, construction that is consistent with ELINT missions. A Chinese space flight official indicated in early 2003 that Shenzhou-4 conducted ELINT missions, perhaps indicating that Shenzhou's-2 and 3 did so too. This same official also noted that Shenzhou 4 carried a "microwave" sensing device, very likely a prototype radar satellite.^[16] In addition, the orbital modules for Shenzhou's 3 to 5 all had external box structures that resemble cameras.

Close up photos of the orbital module for Shenzhou-5 reveal an external box that very likely contained a camera, and an aperture in the orbital module itself, very likely for a second camera. This could mean a hyper-spectral and a close-up camera were included.^[17] According to a Hong Kong report a PRC scientist claimed the Shenzhou-5 camera had a resolution of 1.6 meters.^[18] The twin camera configuration suggests both high-resolution imaging and hyperspectral cameras, combining imagery from both results in better image definition. Mark Wade, chronicler of the Encyclopedia Astronautica web page, concluded, "...it may be inferred that the main mission of China's first manned spaceflight will be military imaging reconnaissance."^[19] The Shenzhou-5 orbital module reportedly conducted "experiments" for 154 days, or about five months after separation from the command module, which may also correspond with the length of its imaging surveillance mission.^[20]





Shenzhou 1 and 5 Orbital Modules: The Shenzhou-1 orbital module shows antenna structures to support a possible ELINT mission. A close up picture of the Shenzhou-5 orbital module from a Chinese magazine shows an external box that very likely contained a camera, and a second opening in the module itself consistent with a camera device. Source: Chinese Internet

According to numerous reports, the next mission, Shenzhou-6, will feature a two-man crew and a flight that will last about 119 hours, or just short of five days.^[21] Chinese officials have noted that there are at least “100” new modifications to Shenzhou-6 to improve its flight performance, control systems, and crew habitability. Unlike Col. Yang Liwei’s first mission, the next crew of two will be allowed to leave the command module and enter the orbital module for experiments and personal functions.

However, there is evidence that Shenzhou-6 will also perform military surveillance missions. The Shenzhou-6 capsule was completed by at least early March 2005.^[22] Late January Chinese television images of the final assembly of the Shenzhou-6 capsule and orbital module show clearly that the latter has the same two-camera assembly as Shenzhou-5. A box structure outside the orbital module is consistent with the camera assembly on Shenzhou-5, as is an aperture in the module itself for an internal camera, also consistent with Shenzhou-5. Given that all of the Shenzhou missions have demonstrated gradual improvements to most systems, it is reasonable to expect that the camera and surveillance systems on Shenzhou-6 will be improved compared to Shenzhou-5. And as with all the previous Shenzhou missions, the unoccupied orbital module for Shenzhou-6 will remain aloft for many more months to perform surveillance missions.

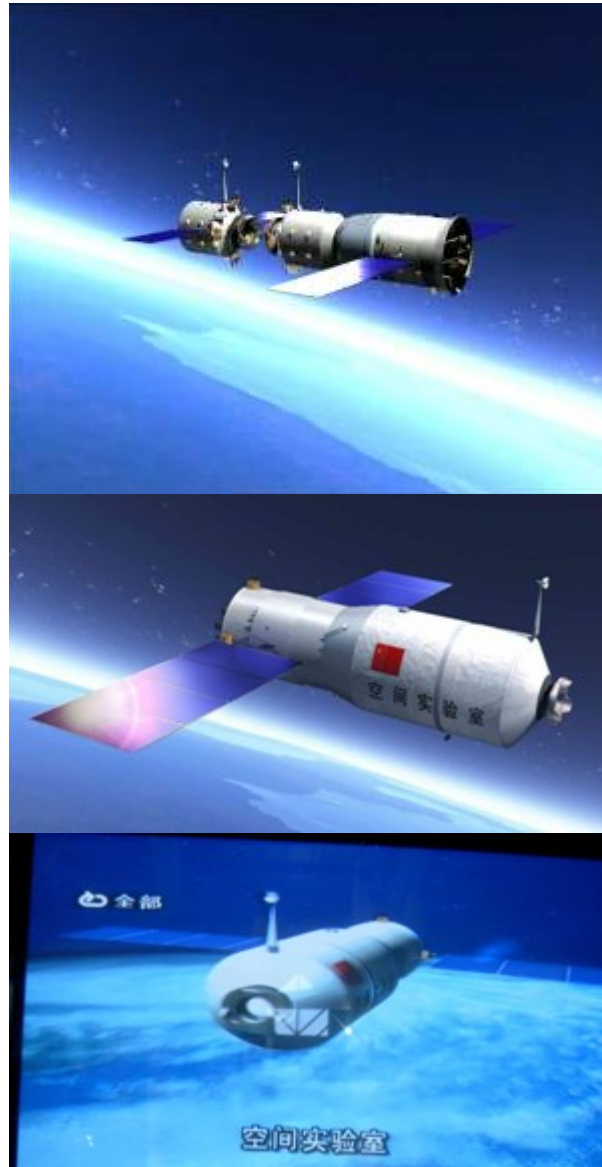


Shenzhou-6 Reconnaissance Features:
Chinese television images of Shenzhou-6 in assembly were aired in late January 2005. The video outtake with the orbital module says, “Shenzhou 6 Space Capsule Entering Final Assembly Stage, To Be Launched September to October This Year.” This picture clearly shows that the orbital module will have the same camera-related structures as Shenzhou-5.
Source: Chinese Internet/CCTV

Space Station Ambitions

While the China’s manned space program may seem slow and deliberate, it may pick up speed around the turn of the decade by initiating a small “Spacelab,” a predecessor to a larger space station. The next three Shenzhou missions, perhaps as early as 2007, to 2008 or 2009, may feature a spacewalk, and then a docking maneuver between a Shenzhou ship and an orbital module left in orbit from another Shenzhou ship launched just before. Such a mission will serve to confirm the operability of space docking systems developed from Russian technology acquired in the early 1990s, as docking is an essential

competency to manage larger space platforms. In early 2004, Chinese Internet sources revealed a concept for a “Spacelab,” which consisted of a propulsion module from the Shenzhou, with a permanently attached section slightly larger than the combined sizes of the Shenzhou command and orbital modules. The front of the Spacelab contained a docking port. The validity of this image was later confirmed by its use in multiple space-related video presentations at the November 2004 Zhuhai Airshow.^[23]

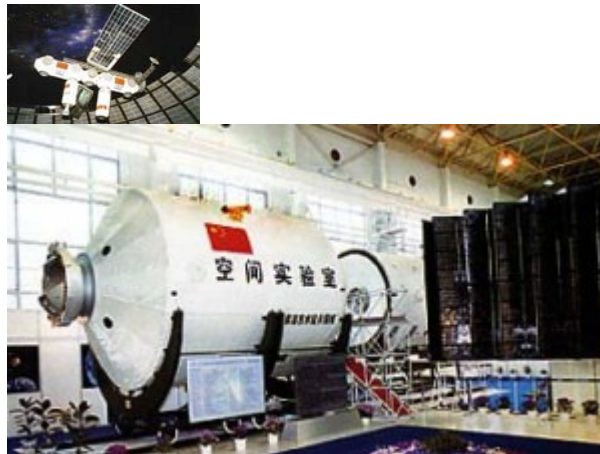


Space Docking and Spacelab: Chinese Internet source images, later used in video presentations viewed at the November 2004 Zhuhai Airshow, show China’s planned use of the Shenzhou to verify space docking technology, and then to use the Shenzhou as the basis for a small “Spacelab” platform. While the Spacelab may only be able to

support brief manned visits, this platform has the flexibility to be configured for surveillance or for active anti-satellite missions. Source: Chinese Internet

While it is to be expected that China will advertise its Spacelab as a larger space platform for scientific and commercial-related research, it could be used for military missions. The Spacelab concept released thus far is a relatively small ship that could only host brief manned visits, perhaps dependent on supplies taken on a Shenzhou. But it also has the advantage of being compatible with the existing CZ-2F space launch vehicle. The Spacelab could be enabled to perform military missions either by outfitting the main cabin or by attaching one or more Shenzhou orbital modules equipped with military systems. Thus equipped, a Chinese “Spacelab” could be variously configured to support surveillance missions, or to deploy micro satellites, or small missiles, to perform anti-satellite missions.

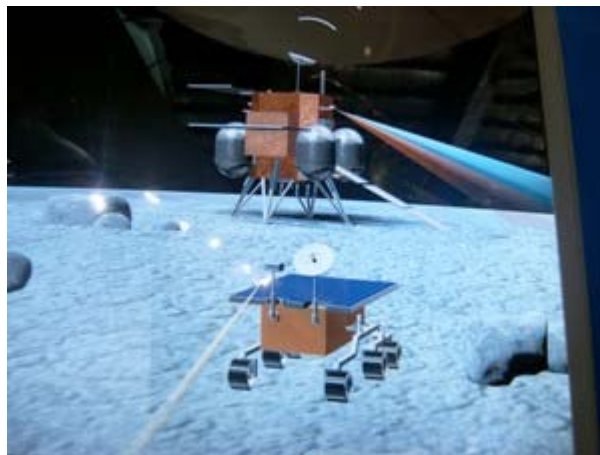
China could also use the larger cabin of the Spacelab as the base for additional modules that would in turn be connected by smaller modules that would host docking ports or solar power arrays. This concept approaches the former European Space Agency concept for a space station, that was superseded by the International Space Station. At the 2000 Zhuhai show a representative from Europe’s Astrium space technology company noted that the Chinese were very interested in the ESA space station concept.^[24] based on multiple linked small modules. Such a concept would allow the Chinese to attach or detach modules with a concentration of military functions depending on need. In addition, there are indications that the Chinese are also investigating significantly larger space stations, and have built at least one mock-up to support this ambition. China has also investigated the purchase of new technology fabric-based inflatable space station modules recently proposed by the U.S. Bigelow Company. “We talked to the Chinese on a confidential basis, and they indicated they are thinking seriously about opening their program to space commercialization,” said founder Robert T. Bigelow to Aviation Week and Space Technology in July 2004.^[25] Such technology could also form an potential inexpensive way for the PLA to expand its Spacelab platform to better perform military missions, or to more efficiently enable larger military space stations.



Larger Space Station Concepts: China has investigated a space station concept influenced by a defunct European proposal, displayed at the 2000 Hannover Exhibition, and may also be working on a mock-up for a much larger space station concept.

Moon Exploration Ambitions

In March 2003 China announced its “Chang’e,” Moon exploration program, named after an ancient folk-tale fairy princess who flies to the Moon. The program likely began in the early to mid-1990s and is now planned to have three stages. By 2007 China intends to launch Chang’e-1, a lunar satellite that will provide 3-D Moon images. By 2010 China intends to send a lander to the Moon’s surface that will then deploy a robot exploration vehicle. Work on this vehicle is already well underway. And then by 2020, according to open reports, China will send a lander equipped to return Moon surface samples to China. There are apparently some in China who question their governments expensive replication of what the U.S. was able to do better with its manned Moon missions.^[25] Such efforts might be justified if China also had an active manned Moon program, which has not been announced, but may still be secretly underway. But this effort would also benefit possible PLA ambitions to use the Moon for military missions. These might include setting up an unmanned surveillance facility designed to track U.S. and other deep-space military platforms.



China’s Chang’e Moon Lander: This image of a future Chinese moon lander and robot vehicle was on display at the November 2004 Zhuhai Airshow. While some Chinese question the expense and redundancy of this effort, from a PLA perspective it might be justified, if it were to lead to Moon-based surveillance capabilities. Source: RD Fisher

American and Russian Manned Military Space Record

The United States created the National Air and Space Administration (NASA) in 1958 as a separate government agency, apart from the Department of Defense (DoD), to manage space activities, especially manned space exploration. There is of course, great cooperation between NASA and DoD, but NASA remains firmly in civilian control. For example, the U.S. Strategic Command, which controls U.S. military space and deterrent capabilities, provided extensive support to enable NASA's return mission of the Space Shuttle Discovery in July 2005.^[27] In the late 1950s the U.S. began to develop what in 1963 became the Manned Orbital Laboratory (MOL) that envisioned combining scientific and military applications, such a space surveillance and space combat.^[28] However, this program was cancelled in 1969 and the U.S. has never since build dedicated manned military space vehicles.

While the former Soviet Union was accused of pursuing manned military space programs during the Cold War, the extent of its programs for manned military surveillance and combat were not revealed until after the end of the Cold War. An early review of post-Soviet sources by Steven Zaloga served to detail the extent of these programs, to include the use of missile-firing satellites and space combat planes.^[29] More recently, the Russian company NPO Mashinostroyeniya (NPO Mash) issued a history of its programs to mark its 6th anniversary.^[30] The programs described, along with anecdotes provided by NPO Mash employees at the 2005 Moscow Airshow, make clear that the Soviets had a robust manned and unmanned military space program. In the 1950s NPO Mash founder V.N. Chelomei developed an early space plane whose missions included "interception of artificial earth satellites."^[31] 1961 the Soviets launched a small test version of a manned space interceptor vehicle. And this concept was developed into what became a predecessor of the larger Buran space shuttle, a smaller space shuttle like space plane that could be armed with missiles and other space weapons.^[32] A NPO Mash Official went so far as to say weapons were also planned for the Buran space shuttle, to include the deployment of individual armed space-walking Cosmonauts^[33]—a vision from the James Bond movie *Moonraker*.



Soviet and Chinese small space plane concepts: Russia intended to arm their small space planes for orbital combat. Might China be planning the same? The Chinese space plane comes from a single-stage-to-orbit concept developed by the Shenyang Aircraft Company. Source: NPO Mashinostroyenia via RD Fisher, Chinese Internet

NPO Mashinostroyenia was also responsible for the development of the Salyut manned space station series, or by its military designation, “Almaz.” Three such military-configured space stations flew: Salyut 2 (1972); Salyut 3 (1974 -75) and Salyut-5 (1976-83).^[34] Its main military mission was servicing of film-based reconnaissance cameras and the dropping of small re-entry capsules containing film and other electronic recording media. The Almaz was also the first manned space platform to carry a weapon: a single 23mm cannon configured for space use. It required the reorientation of the whole station in order to aim at an incoming target. Former combat-trained Cosmonauts, who later went to work for NPO Mash, related that the Salyut was designed to withstand combat damage, in the vacuum of space, and still allow them to escape to their re-entry capsule.^[35] When asked about the possibility and likelihood that China would follow the

example of Soviet example of manned military space capabilities, a NPO official responded “Of course, why not?” The “nature of this regime” makes such a direction possible he said.^[36]



Soviet Salyut (Almaz) Military Manned Space Station: Equipped with a 23mm cannon and designed to withstand combat damage in the vacuum of space. Source: NPO Mashinostroyeniya via RD Fisher

^[1] Chinese officials have tried to convey the idea that their manned space program entitles them to international cooperation opportunities. For example, in early 2004 Dr. Joan Johnson-Freese, Chairperson of the National Security Decision Making Department of the Naval War College told a reporter that a Chinese space official “was in tears as he pleaded for U.S. recognition and cooperation,” and she said, “They are shocked that the U.S. is not reaching out to them,” see Broward Liston, “China ‘Shocked’ At U.S. Cold Shoulder In Space,” *Reuters*, April 27, 2004; Dr. Johnson-Freese has often argued for Chinese-U.S. cooperation in space, see her “Space Wei Qi, The Launch of Shenzhou V,” *Naval War College Review*, Spring 2004, pp. 139-143.

^[2] For more on China's military navigation, communication, reconnaissance and micro satellite programs, see Richard D. Fisher, Jr., “Part 2.2 Missiles and Space,” in *The Impact Of Foreign Weapons And Technology On the Modernization Of The People's Liberation Army*, A Report for the U.S.-China Economic and Security Review Commission, January 2004, http://www.uscc.gov/researchpapers/2004/04fisher_report/04_01_01fisherreport.htm.

^[3] National Air and Space Intelligence Center (NASIC), Wright-Patterson Air Force Base, Ohio, *Challenges To U.S. Space Superiority*, NASIC-1441-3894-05, March 2005, p. 9.

^[4] Martin Sief, “China, Russia join against U.S. Star Wars,” *UPI*, June 20, 2005.

^[5] “Jiang Zemin Congratulates Spacecraft Program Head On Return of Unmanned Spacecraft,” *Xinhua*, April 1, 2002.

[6] Peng Hai-lei, "Shenzhou V Spacecraft Will Leave the Factory As Planned; Li Jinai is Appointed as Commander-in-chief of China's Manned Space Project," *Wen Wei Po*, July 25, 2003, in *Foreign Broadcast Information Service (FBIS) CPP20030725000088*.

[7] "Authorized Release on Manned Space Launch" by Reporters Huang Guozhu, Tian Zhaoyun and Sun Yanxin: "Cao Gangchuan Smoothly Communicates With Astronaut Yang Liwei Between Earth and Space," *Xinhua*, October 15, 2003.

[8] NASIC, pg. 16.

[9] Interview, Shenzhen, China, November 2004.

[10] Chin Chien-li, "PRC is preparing for form a space force," *Chien Shao*, No. 173, July 1, 2005, pp. 52-55.

[11] *Ibid.*

[12] Veronika Romanankova and Viktor Gritsenko, "Russo-Chinese Space Cooperation," *Tass*, October 17, 1996; Mark Wade, "Project 921," *Encyclopedia Astronautica*, <http://www.astronautics.com>; "Russia helped China prepare for first manned space mission," *Agence France Presse*, October 12, 2003.

[13] Craig Covault, "China Adds Science Ops to Manned Effort," *Aviation Week and Space Technology*, January 13, 2003, p. 401.

[14] Craig Covault, "Shenzhou Solos," *Aviation Week and Space Technology*, October 20, 2003, p. 22.

[15] Sven Grahn, "Shenzhou-3 Notes;" Craig Covault, "Chinese Milspace Ops," *Aviation Week and Space Technology*, October 20, 2003, p. 26.

[16] Sibing He, "Space Official in Beijing Reveals Dual Mission of Shenzhou," *SpaceDaily.com*, March 7, 2003.

[17] Mark Wade, "Shenzhou-Divine Military Vessel," *DRAGON SPACE*, October 2, 2003, <http://www.spacedaily.com/news/china-03zd.html>

[18] Li Tung-mei and Wu Yung-chiang, "Chinese Academy of Sciences Successfully Develops Shenzhou Spacecraft-Mounted Infrared Camera with A Resolution of 1.6 Meters," *Ta Kung Pao*, October 12, 2003, in *FBIS CPP20031013000062*.

[19] Wade, *op-cit.*

[20] "China's Shenzhou V orbiting capsule ends 152 days of space experiments," *Agence France Presse*, March 16, 2004.

- [21] “China's Second Manned Space Flight After October Holiday: Report,” *Agence France Presse*, September 12, 2005.
- [22] “Shenzhou 6 Finishes Assembling, with Shanghai-Developed ‘Heart,’” *People’s Daily*, March 9, 2005.
- [23] This image was used in the video presentations by the China Aerospace Co. (CASC) and of tactical missile-maker CASIC.
- [24] Interview, Zhuhai Airshow, November 2000.
- [25] Craig Covault, “Inflation Factor,” *Aviation Week and Space Technology*, July 5, 2004, pp. 20-21; also see <http://www.bigelow aerospace.com> for more information about this innovative technology.
- [26] “China's Unmanned Lunar Program Stirs Domestic Debate,” *XNA*, June 28, 2004, from *SpaceDaily.com*.
- [27] Petty Officer 3rd Class Ted Green, “USSTRATCOM support shuttle in return to flight,” http://www.stratcom.mil/News/Shuttle_26jul05.html
- [28] Mark Wade, “MOL,” <http://www.astronautix.com/craft/mol.htm>.
- [29] Steven Zaloga, “Red Star Wars,” *Jane’s Intelligence Review*, May, 1997.
- [30] Federal State Unitary Enterprise, *Machine building Research and Production Association, 60 Years of unremitting toil for the cause of peace*; Published under the general supervision of G.A. Yefremov, Director General and General Designer of the Machine building Research and Production Association, obtained at the August 2005 Moscow Airshow.
- [31] *Ibid.*, p. 44.
- [32] *Ibid.*, p. 47; Interview, Moscow Airshow, August 2005.
- [33] Interview, Moscow Airshow, August 2005.
- [34] Federal State..., *op-cit*, p. 45.
- [35] Interview, Moscow Airshow, August 2005.
- [36] *Ibid.*