

China Achieves Its Next Milestone In Space Exploration

by Marsha Freeman

Nov. 17—There could be no better example of Lyndon LaRouche’s contention that the future direction of civilization is now located in the Asia-Pacific region, and not the Trans-Atlantic West, than the progress in China’s space exploration program. While both Western Europe and America toss into the dustbin of history five decades of stunning successes in space exploration, China is fulfilling its commitment to become a space-faring nation. The contrast could not be more dramatic.

On Sept. 29, China launched *Tiangong-1*, a small space station prototype module, to test procedures that it will need to master before a manned space station is put into Earth orbit at the end of this decade. On Nov. 1, an unmanned *Shenzhou* spacecraft, similar to those that have carried astronauts into space, was launched. Two days later, *Shenzhou-8* automatically docked with *Tiangong-1*. After the duo orbited the Earth for 12 days, they separated, and then carried out a second successful redocking. *Shenzhou-8* then returned to Earth on Nov. 17, while *Tiangong-1* will remain in orbit, to carry out further tests.

China has now completed three major steps needed to assemble, service, and operate a space station: launching astronauts; doing extravehicular activities, or “space walks” outside the spacecraft; and now, docking two craft in orbit.

While television screens in China were filled with images (live, for the first time) of the meeting of the two spacecraft, and of the excitement in Beijing’s mission control at the success, members of the U.S. Congress and the bureaucracy of the European Union were also



China Manned Space Engineering

This drawing depicts a moment just before the successful docking of the Tiangong-1 test module (right) with the Shenzhou-8. This Shenzhou capsule is a variant of the one China uses to carry astronauts into space. The two craft remained docked for 12 days, in the first rendezvous and docking of two Chinese orbiting spacecraft.

meeting. But their purpose was to try to figure out which space projects should be cut, delayed, “descoped,” or eliminated, because “there isn’t enough money.” Considering the fact that the U.S. space program costs each American about 15 cents a day, money is clearly not the issue. Space exploration has always represented an optimistic belief in the future. That is what is under attack and in retreat in the West.

Leaving the dying *anciens régimes* behind, China and a handful of other Asian nations are planning their future for the next generations.

Taking Leaps

In 1992, the Chinese government decided to develop a manned space exploration program. With initial help

from Russia, spacecraft were designed, built, and tested. In November 2000, the Information Office of the State Council released an eight-page white paper, for the first time in English, titled “China’s Space Activities.” The 20-year program outlined many applications of space technology, and also a series of manned space flights. Three years later, Yang Liwei became the first Chinese astronaut to orbit the Earth.

Following that mission, China specified that the next steps in the manned program would be similar to those followed by the U.S. and Russia in the 1960s—to extend the stay of astronauts in orbit, to carry out space walks, and then demonstrate orbital rendezvous and docking technology. For the U.S. and Soviet Union, these capabilities were needed to go to the Moon. For China, they are prerequisite for their next goal, which is a manned space station. In 2005, two men orbited the Earth for multiple days in a Shenzhou capsule, and in 2008, a three-man crew performed China’s first space walk.

Unlike the U.S. and Soviet programs of the 1960s, China has not launched frequent missions, but with each one has demonstrated an entirely new capability. And also, unlike the 1960s “race” to the Moon, China has determined to build substantial Earth-orbital infrastructure, before venturing beyond Earth orbit. The goal for the rest of this decade is to lay the basis for a space station by 2020. The space station will in turn lay the basis for travel in deep space.

The Chinese manned program is both conservative in approach, in terms of protecting the lives of the astronauts, and also high risk, by moving ahead, not incrementally, but in large steps. With only three previous operational flights of the Shenzhou capsule completed, China’s engineers and managers decided to test rendezvous and docking techniques. But, with the advances in technology not available in the 1960s, they decided not to risk the lives of astronauts during the tests.

The Chinese no doubt had in mind the March 1966 mission of Gemini 8, which included the future Moon-walker, Neil Armstrong, and which also conducted the first docking of two spacecraft in orbit. But, due to a technical glitch which threatened the lives of the astronauts, the mission was aborted, and the crew was returned to Earth safely.

Instead, China developed the ability to do automated maneuvers, which pose less risk to human life,



This image was sent to China’s Mission Control on Nov. 14 from a camera on board the Shenzhou-8 spacecraft. The Tiangong-1 test module is seen, after separating from the Shenzhou-8, in preparation for a second test docking.

but are more difficult.

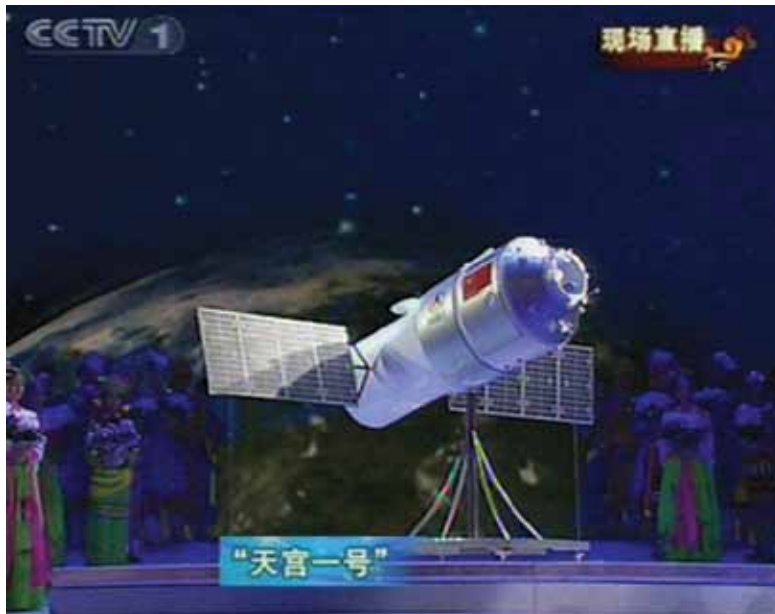
Based on the success of the recent Tiangong-1/Shenzhou-8 mission, China plans to launch Shenzhou-9 and Shenzhou-10 next year. At least one of the two missions will be manned. Crews have been training for orbital rendezvous and docking, including carrying out the delicate maneuvers manually. There are also indications that one of the two female astronauts now in training could be on the Shenzhou-9 or 10 mission next year.

Tiangong-1 is the first in a planned series of test modules to enable China to develop the technology for long-duration stays in orbit.

A ‘Kiss’ in Space

In order to dock the two spacecraft, each traveling more than 17,000 miles per hour, the passive target craft, Tiangong-1, was launched first. Shenzhou-8 was then launched, with exceptional precision, into an orbit 6,214 miles behind Tiangong-1. Five planned orbital maneuvers were carried out for Shenzhou-8 to “catch up” to Tiangong-1, and position itself within close proximity. At a snail’s pace, Shenzhou-8 approached the target, guided by microwave and laser ranging, as the staff at the Beijing Control Center watched from cameras on board. When all indications showed that the docking was successful, cheers broke out in Mission Control. Success was expected; more than 1,000 docking simulations had been done on the ground.

The first test of the guidance technology during the Nov. 3 rendezvous and docking was carried out on the



CCTV

In January 2009, during a television special celebrating the Chinese New Year, this scale model of the Tiangong-1 was displayed. Millions of Chinese watched the historic docking of Tiangong-1 with the Shenzhou-8 spacecraft on live TV.

night side of the orbit, to avoid interference from sunlight. But to assemble, resupply, or deliver crew to a space station, docking will need to be carried out in a variety of orbital and environmental conditions, as would an emergency escape from a station.

After Tiangong-1 and Shenzhou-8 had been docked for 12 days, Shenzhou-8 undocked, backed away about 460 feet, and then approached and redocked with the module, this time in the sunlit portion of the orbit. Mission Control reports that the test went according to plan.

The Tiangong-1/Shenzhou-8 mission was carried out with great confidence on the part of the engineers and mission managers. Years before, Chinese officials had outlined this next step in manned space flight. In the Fall of 2008, Shenzhou spacecraft chief designer Qi Faren told the press, as China was preparing to launch Shenzhou-7, which would carry out China's first space walk, that space docking would be next. In March 2009, Chinese television aired a broadcast, which, for the first time, graphically illustrated the Tiangong-1/Shenzhou-8 mission.

Before the launch, Chinese print and electronic media outlined the mission in great detail, with animations of each step, and interviews with managers and scientists about what should be expected. Each phase of the mission was carried, when possible, live on China Central Television.

In addition to the live coverage, this mission was

evidence of "opening up" in other ways. Aboard Shenzhou-8 were joint experiments with Germany, in the life sciences and other microgravity fields. The German Aerospace Center provided the SIMBOX experiment equipment, housing six experiments from German research institutions. For the first time, another country has had access to China's manned space program.

On the one hand, this is the first time China has taken such a large step to open up to international cooperation. On the other, as Joan Johnson-Freese, Chinese space expert at the U.S. Naval War College, observed, this "indicates Chinese acceptance as a spacefaring nation by most countries." Of all of the world's space agencies, only NASA is forbidden, by law, from cooperating with China in space.

Tiangong-1 ("Heavenly Palace") is a 34-foot-long, 8.5-ton spacecraft. It is a new design, both larger and heavier than the Shenzhou series of spacecraft that have been

launched before. Tiangong-1 is made up of two modules—an experiment module that includes the area where crew will live and work, with a docking port to receive visiting craft, and a resource module, which provides the spacecraft with power. Astronauts will have more space to move in, "much more than they had in the Shenzhou spaceship," Yang Hong, chief designer of Tiangong-1, explained just before its launch. Inside there are two sleeping sections with an adjustable lighting system, exercise equipment, entertainment systems, and visual communications equipment.

According to Dr. Morris Jones, an expert on the Chinese space program, Tiangong-1 also appears to have fairly advanced cameras inside, suggesting there could be broadcast-quality video during next year's planned crewed mission.

Tiangong-1 is designed to remain in orbit for two years. While most of that time it will be alone, visiting Shenzhou craft will deliver supplies and scientific experiments. Shenzhou-8, for example, carried materials, including plant seeds and cancer cells, to observe the effect of microgravity. The samples were then returned to Earth aboard Shenzhou-8.

Tiangong-1 is China's first long-duration spacecraft designed for manned use. In order to operate, monitor, and maintain a functioning facility on orbit for long periods of time, on Nov. 13, China established an opera-

tion committee within the overall manned space program. This group will provide ongoing technical management and flight control, and make preparations for future docking missions. This is China's first long-duration space asset, and now, its first dedicated management organization.

Tiangong-1 is the first step in an upcoming five years of activities, which will enable long-duration manned missions.

The Road to a Space Station

Over the next five years, increasingly sophisticated missions will be carried out to increase the duration, and capabilities, of China's manned orbiting facilities. Officials have described Tiangong-2 as designed for Earth observation and Earth science research, as well as experiments in space medicine. *SinoDefense.com* has reported that this craft will be able to support three crew members for 20 days.

Tiangong-3 will reportedly focus on tests of regenerative life support systems, or the recycling of critical materials, such as a breathable atmosphere and water, and spacecraft environmental control. It is also reported

that the aim will be to extend missions for a crew of three for up to 40 days,

By 2016, China plans to have a space lab operational, which would not be permanently manned, but would accommodate visiting astronaut crews. It could consist of linked Tiangong modules, and would be augmented by Shenzhou visits. Joan Johnson-Freese observes that life support and other equipment that will be tested on the future Tiangong modules, will be indigenously made, not purchased from the Russians, as in the past.

In order to service such a facility, an unmanned cargo vehicle, with a launch weight of 13 tons, similar in function to Russia's Progress craft, will also be developed over the next five years. The vehicle will deliver consumables, such as water and food, as well as fuel, to the complex. It will be composed of two modules—one to carry cargo, and the other, a service module, carrying fuel, thrusters, and other operational equipment.


By 2020, the plan is for a 60-ton long-duration space station, comparable in size to the 1990s Russian Mir space station, with a core module in the 22-ton range. Two experiment modules of a similar size would complete the complex. Last April, the China Manned Space Engineering Office asked the public to help come up with a name and logo for the space station.

Zhang Jianqi, former deputy chief of China's manned space program, said, before the recent successful docking, that the future Chinese space station would be an "open platform. The Chinese people will be more than happy to conduct scientific experiments with foreign scientists and astronauts." Chinese space officials have remarked throughout the Tiangong-1/Shenzhou-8 mission that the docking mechanism used could be easily modified for docking with the International Space Station (ISS).

It has not escaped anyone's attention that just as the Chinese space station would become operational, it is possible that the currently orbiting ISS, from which China has been excluded, could be reaching the end of its operations. Along the path being traveled now, China could have the only orbiting scientific laboratory, at the end of this decade.

China and other nations that have begun to extend their reach into space recognize that "Space is very much an indicator of a country's willingness to look into the future," Joan Johnson-Freese explains.

What does that say for the nations on a trajectory to destroy the very space exploration capabilities that new nations are working so hard to develop?



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