

# Orbital aspirations

## China is planning to launch a manned spacecraft in 1999

TIM FURNISS/LONDON

**T**HE CHINESE Academy of Space Technology (CAST) has announced plans for a national manned spaceflight (see box), an unmanned lunar explorer and radical improvements to space applications technology, thus enabling China to compete more effectively in the international marketplace.

A space applications plan has been announced to develop indigenous high capacity satellites for mobile and direct broadcast communications, as well as other uses, starting with the Dong Fang Hong 4 series; and a range of new environmental, ocean monitoring and remote sensing satellites called Zi Yuan. The latest weather satellite, the Fengyun 1F3, will be launched in October.

A new series of improved unmanned recoverable satellites for microgravity processing

research is also being developed.

In addition, the proposal includes offering commercial piggyback small satellite flights on national launches; and the development of small low-cost satellites. Ground equipment, such as testing chambers, computer systems and laboratories will be upgraded.

New, uprated commercial satellite launchers will be required and boosters will be needed to carry payloads of up to 20,000kg to low Earth orbit. "Launch vehicles which can carry 10,000kg are big enough to launch manned craft, but we need a 20,000kg lift capacity for deep space exploration, including flights to the moon and planets," says CAST vice-president Xu Dazhe.

China says that it plans to launch a dual satellite system, called Xinguan, to provide additional information about the



China is developing a more powerful booster than the Long March 3B

sun and solar processes affecting the near Earth environment, in conjunction with other international spacecraft, such as the European Space Agency's planned Cluster 2 fleet. Indeed, China wishes to become more involved in international cooperation.

The country is also making greater efforts to reduce the amount of space debris left in orbit after a launch. Yuan Jie, a scientist at the Shanghai Academy of Space Technology, says that residual propellant on the upper stage of the Long March 4 booster will be vented to reduce the likelihood of the stage exploding in orbit.

About 25% of orbiting space debris has been caused by exploding rocket stages. The trajectory of the third stage of the Long March 3 system has also been altered to shorten its orbital lifetime. □

## STEPS TO MANNED SPACEFLIGHT

**T**WO CHINESE astronauts are training for an orbital flight in 1999 to celebrate the 50th anniversary of the creation of the People's Republic of China. An unmanned test flight is expected later this year from China's Jiuquan base.

The crewed flight will make China the third nation to launch a national manned flight, after the former Soviet Union and the USA nearly 40 years ago. Yuri Gagarin flew into orbit and Alan Shepard made a suborbital flight in 1961. Space travellers from 23 other nations have since been launched by Russia and the USA.

China has enlisted the help of Russia to get its astronaut project off the ground. Chinese test pilots Wu Tse and Li Tsinglung have completed a course in cosmonaut training at the Yuri Gagarin Cosmonaut Training Centre, near Moscow.

As part of a \$1 million contract with Russia in 1997, a group of doctors attended the Gagarin centre to undergo training, so that they could develop a national training programme. One of the Chinese astronauts was to have flown in a Russian Soyuz TM craft to the Russian Mir space station,

but the flight has not materialised.

Although China plans to use an uprated version of its Long March 2E for the manned flight and to manufacture its own manned craft, it plans to buy Russian Soyuz manned spacecraft docking units, life support and other equipment. Indeed, the craft may well resemble the Russian Soyuz flight and service module.

The Chinese manned spacecraft will also be based on technology developed for the smaller FSW spacecraft and re-entry capsule, which has been used for years for unmanned military reconnaissance, remote sensing imaging and microgravity processing missions. The first FSW was launched and recovered in 1975.

The Long March 2E satellite launcher is capable of placing around 8,800kg into low Earth orbit, about the same weight as a Russian Soyuz spacecraft launched on the booster of the same name. The Long March 2E will also be equipped with extra redundancy and safety features, including a launch escape tower on top of the manned craft to allow it to be pulled free of the launcher should there be a major

failure during the initial launch phase.

The two-stage launcher and its four strap-on boosters are powered by nitrogen tetroxide and hydrazine, hypergolic propellants which ignite spontaneously on contact, like that of the Titan 2 launcher which carried the US Gemini two-man capsule in 1965-6. The LM2E first flew in 1992 and has had chequered record of ten launches with seven full successes.

Russia is also assisting in the development of a new Chinese heavy lift booster, capable of placing 20,000kg into low Earth orbit, a weight equivalent to that of one of the modules making up the Russian Mir space station. Russia may provide help with the production of the rocket engines. A new launch pad at Jiuquan is being built for the new heavy booster.

China plans eventually to launch its own space station. Copying Russian procedures as a stepping stone, China will probably form a "mini" space station by joining two manned craft together as the former Soviet Union did in 1969 when two Soyuz craft docked. The first Russian Salyut space station was then launched in 1971.