Executive Summary

5/78	China's ability to sustain military power at a distance remains limited, but its armed forces continue to develop and field disruptive military technologies, including those for anti-access/area-denial, as well as for nuclear, space, and cyber warfare, that are changing regional military balances and that have implications beyond the Asia-Pacific region.	

Glossary of Acronyms

5/78	SESS: Space Event Support Ship	

China's Evolving Military Capability

11/78	• **Improving Anti-Access/Area-Denial Capabilities.** Advances in China's space-based reconnaissance and positioning, navigation, and timing, as well as survivable terrestrial over-the-horizon targeting, are closing gaps in the creation of a precision-strike capability.	

12/78	• **Competing for Dominance of the Electromagnetic Spectrum.** By improving space-based and terrestrial C4ISR and by moving communications infrastructure to fiber, China is hardening its own capabilities while making gains in developing weapon systems (e.g., counterspace, computer network operations, and anti-radiation systems) to deny these capabilities to others.	

Chapter Two

China's Military Strategy and Doctrine

Military Strategic Guidelines

25/78	**Space Warfare.** PLA strategists see space as central to enabling modern informatized warfare; indeed, a 2003 analytic article in the PLA's leading journal was entitled "Control of Space is Decisive in Modern High-Tech Informatized Warfare." That said, China does not appear to have a dedicated space campaign; rather, space operations form an integral component of all campaigns. The PLA's military theoretical journal China Military Science argues that "it is in space that information age warfare will come into its more intensive points." Specifically, space-based Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) is important to enable and coordinate joint operations and win modern wars. Accordingly, the PLA is acquiring technologies to improve China's space-based C4ISR. A PLA analysis of U.S. and Coalition military operations reinforced the importance of operations in space to enable informatized warfare, claiming that "space is the commanding point for the information battlefield. Battlefield monitor and control, information communications, navigation and position, and precision guidance all rely on satellites and other sensors." PLA Reserve Forces and China's Militia The PLA reserve is a key component of China's national defense. During peacetime, the National Defense Reserve conducts training and maintains social stability. During wartime, PLA reserve units may be transferred to active duty as directed by national mobilization orders. In 2008, the total strength of the PLA reserve was estimated at over 500,000. The PLA reserve is striving to become a more professional force by strengthening recruitment, training, and infrastructure. Professionalization will also require more emphasis on the	

	development of PLAAF, Navy, and Second Artillery Corps reserve units and combat support units, which will probably come at the expense of traditional ground combat units. China's militia system provides a large pool of personnel for national defense. All PRC males between the ages of 18 and 35 not currently serving in the military are technically part of the militia system. Many members of the militia do not belong to organized units, and China's 2004 Defense White Paper claimed that ten million people were organized into militia units. China's 2008 Defense White Paper indicates that these numbers will decrease to 8 million by the end of the 11th Five Year Plan (2006-2010). During wartime, militia may be mobilized to support the war effort within their home province. The functions of militia vary from locality to locality, covering diverse tasks such as air defense, emergency response, and technical support which can include technical maintenance and repair, as well as computer network operations. Concurrently, China is developing the ability to attack an adversary's space assets. PLA writings emphasize the necessity of "destroying, damaging, and interfering with the enemy's reconnaissance/observation and communications satellites," suggesting that such systems, as well as navigation and early warning satellites, could be among initial targets of attack to "blind and deafen the enemy." The same PLA analysis of U.S. and Coalition military operations also states that "destroying or capturing satellites and other sensors … will deprive the opponents of initiatives on the battlefield and [make it difficult] for them to bring their precision guided weapons into full play." PRC military writings also discuss the importance of space warfare for its supposed psychological impact on the will of the adversary to fight. In a PLA National Defense University book, Joint Space War Campaigns (2005), author Colonel Yuan Zelu writes: "[The] goal of a space shock and awe strike is [to] deter the enemy, not to provoke the enemy into combat. For this reason, the objectives selected for strike must be few and precise … [for example], on important information sources, command and control centers, communications hubs, and other objectives. This will shake the structure of the opponent's operational system of organization and will create huge psychological impact on the opponent's policymakers." The January 2007 test of a direct ascent anti-satellite (ASAT) weapon demonstrates that the PLA's interest in counterspace systems is more than theoretical. In addition to the "kinetic kill" capability demonstrated by the ASAT test, the PLA is developing the ability to jam, blind, or otherwise disable satellites and their terrestrial support infrastructure.	

Evolution of Joint Operations

27/78	***Collaborative Joint Operations:*** Sparse information is available on the PLA's first iteration of joint operations. It likely featured service elements acting independently, in different battle spaces, with different objectives, whose results were only indirectly mutually beneficial.	

Toward a Comprehensive View Of Warfare

28/78	For example, China has incorporated the concept of Legal Warfare into its attempts to shape international opinion and interpretation of the UN Convention on the Law of the Sea away from long-accepted norms of freedom of navigation and territorial limits toward increased sovereign authority out to the 200 nautical mile Exclusive Economic Zone, the airspace above it, and possibly outer space.	

Asymmetric Warfighting

29/78	Elements of China's approach to asymmetric warfare can be seen in its heavy investment in ballistic and cruise missile systems; undersea warfare systems, including submarines and advanced naval mines; counterspace systems; computer network operations; special operations forces; and the "Three Warfares" concept.	

Figure 3. The First and Second Island Chains. PRC military theorists conceive of two island "chains" as forming a geographic basis for China's maritime defensive perimeter.

PRC Debates on Future Military Strategy

30-31/78	An article from July 2008 argues that "in the wake of constant extension of our national interests, the change in our peripheral security environment and the struggle in air and space is getting more acute, the strategic needs that national interests impose on air security are also increasing."	

31/78	Control the airspace over China's territory, • maintain air surveillance over China's maritime interests, defend against "foreign harassing attacks from space," and protect China's national dignity, sovereignty, rights, and interests.	

Chapter Three

Force Modernization Goals and Trends

Overview

32/78	Recognizing these shortcomings, China's leaders stress asymmetric strategies to leverage China's advantages while exploiting the perceived vulnerabilities of potential opponents using so-called "Assassin's Mace" programs (e.g., counterspace and cyberwarfare programs).	

Anti-Access/Area-Denial Capability Developments

32-33/78	In this context, China's anti-access/area-denial forces increasingly overlap, providing multiple layers of offensive systems utilizing the sea, air, space, and cyber-space.	

35-36/78	China's "information blockade" likely envisions employment of military and non-military instruments of state power across all dimensions of the modern battlespace, including outer space.	

Strategic Capabilities

36/78	China has made steady progress in recent years in developing offensive nuclear, space, and cyber warfare capabilities – the only aspects of China's armed forces that, today, have the potential to be truly global.	

Space and Counterspace.

37/78	China's space activities and capabilities, including ASAT programs, have significant implications for anti-access/area-denial in Taiwan Strait contingencies and beyond. Many of China's space programs, including the manned program and the planned space station, are run by the PLA. China views the development of space and counterspace capabilities as bolstering national prestige and, like nuclear weapons, demonstrating the attributes of a great power.	

Advances in C4ISR

38/78	Consequently, China is acquiring advanced land, air, sea, and space-based C4ISR capabilities to enhance battlefield awareness; identify, track, and engage military targets deep into the western Pacific Ocean; and, streamline supply and logistics functions.	

38/78	**Reconnaissance:** China is deploying advanced imagery, reconnaissance, and Earth resource systems with military applications. Examples include the Yaogan-1, -2, -3, -4, and -5, the Haiyang-1B, the CBERS-2 and -2B satellites, and the Huanjing disaster/environmental monitoring satellite constellation. China is planning eight satellites in the Huanjing program that are capable of visible, infrared, multi-spectral, and synthetic aperture radar imaging. In the next decade, as Beijing fields a more robust constellation of reconnaissance satellites, it probably will employ commercial satellite imagery to supplement existing coverage. Navigation and Timing: China is pursuing multiple possibilities for satellite navigation independence. Currently, the PRC uses the U.S. global positioning system (GPS), Russia's GLONASS, and its own BeiDou-1 (regional) systems for navigation. The BeiDou-1 system consists of three satellites and serves both civil and military purposes. The Beidou-1 system will be replaced by a BeiDou-2 system (expected to be operational in 2011) that will become a regional complement to the worldwide BeiDou-2/Compass system expected to be operational in 2015-2020. **Manned Space and Lunar Programs:** China successfully performed its first space walk in September 2008 from the Shenzhou-VII, which was preceded by the October 2007 launch of its first lunar orbiter, the Chang'e-1. China's goals are to have a manned space station and to conduct an unmanned lunar landing and return mission by 2020. The manned space program probably benefits PLA weapons development programs. Rocket and control system capabilities required ▪ for the Shenzhou-VII mission may have	

	applications for ballistic missile development. During its mission, the Shenzhou-VII deployed • the Banxing-1 (BX-1), a small imaging satellite, which successfully positioned itself into an orbit around the orbital module. The stated purpose of this technology is to monitor instrumentation in space and detect malfunctions. Further applications could support counterspace activities.	

39/78	**Communications:** China uses commercial, consortium, and civil communications satellites (COMSATs) for both regional and international telecommunications, to include satellite television, internet, and telephony. Along with regional development of related technologies, China has recently entered the world market by exporting COMSATs and infrastructure to Venezuela and Nigeria. In April 2008, China launched its first data-relay satellite, the TianLian-1. **Small Satellites:** Since 2000, China has launched a number of small satellites, including oceanographic research, imagery, and environmental research satellites. China has also established small satellite design and production facilities and is developing microsatellites – weighing less than 100 kilograms – for remote sensing, and networks of imagery and radar satellites. These developments could allow for a rapid reconstitution or expansion of China's satellite force in the event of any disruption in coverage, given an adequate supply of boosters. Beijing's effort to develop small, rapid-reaction space launch vehicles currently appears to be stalled. **ASAT Weapons:** In January 2007, China successfully tested a direct-ascent ASAT missile against a PRC weather satellite, demonstrating its ability to attack satellites in low-Earth orbit. The direct-ascent ASAT system is one component of a multi-dimensional program to limit or prevent the use of space-based assets by potential adversaries during times of crisis or conflict. China's nuclear arsenal has long provided Beijing with an inherent ASAT capability. Ultra High Frequency (UHF)-band satellite communications jammers acquired from Ukraine in the late 1990s along with probable indigenous systems give China the capacity to jam common satellite communications bands and GPS receivers. In addition to the direct-ascent ASAT program (see above), China is developing other technologies and concepts for kinetic and directed-energy (e.g., lasers, high-powered microwave, and particle beam) weapons for ASAT missions. Citing the requirements of its manned and lunar space programs, China is improving its ability to track and identify satellites – a prerequisite for effective, precise counterspace operations.	

Power Projection – Modernization Beyond Taiwan

40/78	Over the long term, improvements in China's C4ISR, including space-based and over-the-horizon sensors, could enable Beijing to identify, track, and target military activities deep into the western Pacific Ocean.	

China's Advancing Defense Industries

Increasing Efficiency and Capacity.

46/78	• The manned space flight program, including its vessels and tracking stations;	

Sector-by-Sector Analysis.

48/78	Progress across China's defense industry sectors has been uneven. Production trends and resource allocation appear to favor missile and space systems, followed by maritime assets (both surface and sub-surface), aircraft, and ground force materiel.	

Missile and Space Industry:

48/78	China's space launch vehicle industry is expanding to support satellite launch services and the manned space program.	

Foreign Technology Acquisition.

49/78	Additionally, Russia cooperates with China on technical, design, and material support for numerous weapons and space systems.	

Looking to the Future: Trends and Projections

51/78	**Key Fields and Priority Subjects.** Specifically, China's defense industries are pursuing advanced manufacturing, information technology, and defense technologies. Examples include radar, counter-space capabilities, secure C4ISR, smart materials, and low-observable technologies.	

51/78	**Major Special Items**. China has also identified 16 "major special items" for which it plans to develop or expand indigenous capabilities. These include core electronic components, high-end universal chips and operating system software, very large-scale integrated circuit manufacturing, next-generation broadband wireless mobile communications, high-grade numerically controlled machine tools, large aircraft, high-resolution satellites, manned spaceflight, and lunar exploration.	

Beijing's Courses of Action Against Taiwan

56/78	**Air and Missile Campaign.** Limited SRBM attacks and precision strikes against air defense systems, including air bases, radar sites, missiles, space assets, and communications facilities, could support a campaign to degrade Taiwan's defenses, neutralize Taiwan's military and political leadership, and possibly break the Taiwan people's will to fight.	

Developments in PRC Efforts to Develop, Acquire, or Gain Access to Advanced Technologies that Could Enhance its Military Capabilities

63/78	Shu Quansheng, a naturalized U.S. citizen • who worked as a physicist in the United States, pleaded guilty to violating the Arms Export Control Act by providing the PRC with information on the design and development of a fueling system for space launch vehicles.	

Developments in China's Asymmetric Capabilities

64/78	**Space and Counterspace Capabilities**. China is rapidly improving its space-based intelligence, surveillance, reconnaissance, navigation, and communications capabilities, allowing for greater military support from space. In parallel, China is developing a multi-dimensional program to improve its capabilities to limit or prevent the use of space-based assets by potential adversaries during times of crisis or conflict. Although China's commercial space program has utility for non-military research, it demonstrates space launch and control capabilities that have direct military application. China conducted 11 space launches in 2008, • putting 15 satellites in orbit. Included in this number are four new remote sensing satellites: Yaogan-4, Yaogan-5, Huanjing-1A, and Huanjing-1B; the Shenzhou-VII manned spacecraft along with its accompanying small	

	satellite, Banxing-1; three communications satellites; and, two meteorological satellites. In April 2008, China successfully launched its first data relay satellite, TianLian-1. According to PRC news broadcasts, TianLian-1 was initially tasked to support the launch of Shenzhou-VII manned space mission, increasing surveillance and control coverage of the manned spacecraft's path from 12 percent to roughly 60 percent. China began development and testing of the Long March V rocket, the world's largest. Intended to lift heavy payloads into space, it will more than double the sizes of Low Earth Orbit (LEO) and Geosynchronous Orbit (GEO) payloads that China can place into orbit. To support these new rockets, a launch facility near Wenchang on Hainan Island began construction in 2008. The Chang'e-1 lunar probe, launched in late 2007, continued to operate successfully with a controlled orbit. Chang'e-2 will launch in 2009 to conduct a lunar surface survey. China plans to land a lunar rover on the moon in 2012. China's leaders remain silent about the military applications of China's space programs and counterspace activities.	