

CHINA AND THE RMA

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The RMA and the Chinese Military

The history of world civilization has witnessed the emergence of three technological forms of society and five political forms of society. The former are nomadic society, agricultural society and industrial society while the latter are primitive communist society, slave society, feudal society, capitalist society and socialist society. The transformation of both the technological form of society and the political form of society has an important bearing on the change of the military form, but the former is more decisive. Now the development of civilization of humanity has come to another turning point. The whole world is currently immersed into the transition from industrial society to information society. In human history, there have been only two transitions for the technological forms of society, that is the transition of the nomadic society to agricultural society and that of the agricultural society to the industrial society. Concomitant with the two transitions, two comprehensive revolutions in military affairs (RMA) took place, namely, the "cold weapons" revolution and the "hot weapons" revolution (including the mechanized war revolution and nuclear war revolution). Now human history has developed to the point where the third transition for the technological form of society, i.e. the transition of the industrial society to the information society, has commenced. Along with it, a third comprehensive revolution in military affairs has come into being. This revolution could be dubbed the informationalized war revolution. The essence of the current RMA is that information plays a decisive role in warfare while in the cold weapons war and hot weapons war materials and energy in the form of fire and mobility are the main elements constituting combat power.

The developed countries, especially the United States, have already become an information society. Therefore, it is very natural for them to pursue the RMA. The People's Republic of China, however, is still a developing country. Can it start an RMA? If China has carried on a RMA, how is it shaping the development of the Chinese military? This issue is worth studying because China is a fast-developing country and it will become a great power with worldwide influence in the future.

In China, particularly in the People's Liberation Army, there are two different views on the subject whether or not China has engaged in a RMA. Some military strategists argue that the PLA still has a long way to go before starting a RMA. There are three reasons for this. The first is that the Chinese technological form of society is basically a industrial society. The second and the third are respectively the inadequacy of China's information technology and the backwardness of the PLA' weaponry. Now more than 90% of the weapons and equipment possessed by China's military are semi-mechanized or mechanized and only a very small part of the Chinese military inventory is informationalized equipment. The PLA is still in the process of mechanization, so it cannot run before learning how to walk. Therefore, it is continuing the process of mechanization. Only when the mechanization is completed, can the PLA put the RMA into effect, for the crux of the RMA is to informationalize the military. Others in the debate admit the fact that the Chinese

technological form of society and the equipment of the PLA are backward. They even agree that there is a "society gap" with the U.S. military. In other words, the PLA is a military of an industrial society while the U.S. armed forces is a military of an information society. In the eyes of this second group of analysts, however, this fact should not be seen as an unbridgeable impediment for the PLA to carry out a RMA. In order to modernize its military and close the gap speedily with the developed countries, the PLA can and should "walk on two legs." One leg is mechanization while the other is informationalization. Both of the opinions mentioned above are quite reasonable, but what are the facts? Has the China's military started an RMA?

The Social Base for an RMA in China

Can a comprehensive revolution in military affairs take place only when a technological form of society is changed into another? A comprehensive RMA is different from a partial RMA, which is usually driven solely by an important technological innovation. The most essential condition for the contemporary RMA to occur is that the country concerned must be in the process of transition from an industrial to an information society. One of the outstanding characteristics of the current RMA is that the information revolution and informationalization first occurred in society. After the potential energy of informationalization had been accumulated, it spread into the military field. The U.S. became an information society in early 1980s, which made its military the leader of the RMA.

Hence, if we want to find out whether China has the prerequisites to conduct a RMA we must look into its social base. The social base of China now is composed of three parts: the industrial, agricultural and information sectors, with the former comprising the lion's share and the latter growing fast.¹ China's leaders attach great importance to the development of information technologies and information industry and regard it as part of the country's bid to achieve sustained, robust economic growth, calling for proceeding with industrialization and informationalization simultaneously. In China, the information economy and information industry are called the "knowledge economy" and "knowledge industry." Indeed, the knowledge economy is hailed by the Chinese leaders as a potential solution for coping with the long-term re-employment problem created by the state owed enterprises restructuring. President Jiang Zemin is a staunch advocate, touting the idea of the knowledge economy by observing that "a nation will not be able to stand in the family of the world's advanced nations if it lacks the ability to innovate."² For his part, Premier Zhu Rongji has also been a strong proponent, publicly declaring that "developing the country by relying on science and education is one of the government's most important tasks."³

3. The information industry in China is developing apace. The information industry is the main pillar of an information society. Without a highly-developed information industry, a country can never evolve into a information society. The Chinese information industry has been developing rather fast in recent years. In 1997, the business volume of the telecommunication services totaled 177.9 billion yuan, up

¹ See William Riss, "China faces the newest revolution," *The Times*, March 27, 2000.

² Quoted in "Knowledge Economy and Learning Society", *Renmin ribao*, July 2, 1998 in FBIS-CHI-98-201.

³ Quoted in "Roundup on Knowledge Economy", *Xinhua*, January 11, 1999, in FBIS-CHI-1999-020.

33.3% over the previous year. The total capacity of public switchboards reached 110.97 million lines. Telephone services in all cities above the county level became program-controlled and the telephone network in China ranked second in the world. New mobile telephone users numbered 6.38 million, pushing the total number of users to 13.23 million, or 98.1% more than that at end of 1996. The total length of optical cable installed in the country reached 530,000 kilometers. A large capacity and high-speed long-distance optical cable network that covers the country has been completed. Supplementing that system are digital microwave and satellite communications systems. The ratio of long-distance digital transmission has reached 99% nationwide.⁴ The year 1998 was another good year for information industry expansion. Telecommunications service revenue increased by 25.4% over 1997, reaching 229.5 billion yuan; and the fixed asset investment expanded by 39.2% to reach 175.4 billion yuan. Manufacturers devoted to electronics information products also enjoyed gains. Sales in that sector reached 310 billion yuan, an increase of 14.1% over the previous year, with 23 billion yuan in profits and taxes from an export volume of US \$ 27 billion.⁵ In 1999, the Chinese information sector also continued to grow with telecommunication service revenues expanding by 24% (reaching 285.2 billion yuan), an increase by 16% for information products sales (reaching 360 billion yuan), and export value of US\$ 28 billion or increase by 3%. The year 2000 also promises to be a good year. According to the remarks of Cheng Guanghui, the spokesman for the Ministry of Information Industry, the sector has maintained a sustained, fast and healthy growth this year. By the end of May, telecommunication service revenues amounted to 123.47 billion yuan, an increase of 27.1% over the same period of last year; electronic information products sales has reached 200.7 billion yuan with a growth rate of 32.7%; and the export value has come up to 59.94 billion yuan with an expansion of 43.5%.⁶

2. The level of social webnalization rises sharply. In industrial society the most important resource is capital. Without capital one can not start and run a factory or a firm. In information society, however, the most essential resource is information although it is not the only one.⁷ If information is made to play an important role, it must be able to flow and flow quickly, for it is useless when it does not move. The prerequisite for information to travel fast in a country, preferably at near real time, is that the society of that state must be highly webnalized. So we can say that the information society is also a webnalized society with all kinds of networks interconnecting all the elements and units of a country. In recent years, the Chinese government has devoted significant attention to the construction of information networks. As a result of this, China's society has been webnalized at a amazing speed, hailed by Taiwan and foreign newspapers. *The Times* of London said "China is welcoming a network revolution".⁸ *Business Week* pointed out that "in China the network is a fast-growing enterprise".⁹ *The World* acclaimed "China will soon become a country which will have

⁴ See State Statistical Bureau of the PRC, "Statistical Communique on Socia-Economic Development in 1997", *Beijing Review* May 11-17, 1998 p. 16-17; "China Telecom Develops Space", *Beijing Review*, May 4-18, 1998, p. 21.

⁵ See "Information Industry Entering New Development Period", *Beijing Review*, March 1-7, 1999, p.5.

⁶ See *People's Daily*, July 13, 2000.

⁷ See Wang Baocun, *The World New Revolution in Military Affairs*, Beijing: Junkeyuan chubanshe, 1999, p. 64.

⁸ See William Riss, "China faces the newest revolution," *The Times*, March 27, 2000.

⁹ See *Business Week*, May 15, 2000.

most subscribers of Internet in the world".¹⁰ The Japanese *Economic News* reported that "websites in China have sprung up like mushrooms."¹¹ The *China Times* asserted that "websites on the Mainland have multiplied at amazing rate, accomplishing a task in three years which the Americas spent 10 years to complete."¹² The rapid webnalization of Chinese society manifests itself in the following aspects:

a. Enhancing network construction. At the beginning of 1990s, the Chinese government initiated a series of "golden projects". These include the "the Golden Sea" project which provides the senior officials with immediate access to information and data from government organizations and agencies; "the Golden Bridge" project that runs an IT network covering all the provinces; "the Golden Tax" project that enables the tax authorities to have access to firms' sales records; and "the Golden Customs" which can speed the collection of tariff.¹³ Recently, Premier Zhu has called upon to accelerate the construction of the "Golden Projects," so as to help building a efficient and honest government free from corruption. In addition to the networks built by the central government, the different units and institutions at lower levels throughout the country also have constructed their own intranets.

b. Promoting the Internet. The Chinese government endeavors to make the country one of the world's largest users of the Internet (in absolute numbers) by 2003, when China is expected to have more than 20 million subscribers. (The optimists' estimates range as high as 34 million by 2003.) Recent measures taken by the government to promote Internet use included cutting access fees by half and offering free installation of a second residential phone line. Even prior to these policies, however, Internet use was already growing rather rapidly. The number of subscribers has doubled every year since 1996, rising to nearly 17 million by June 30, 2000.¹⁴

c. Setting up numerous websites. In order to let foreign people understand China better, various institutions in China have set up a lot of websites on the Internet. Most of the information sources are Chinese language sites while a few of them are in English. According to incomplete figures, there are 47 online editions of local Chinese newspapers. The most famous English-language sites are *ChinaOnline*, *Virtual China*, *Sinopolis* and *Inside China Today*. These tools can make it vastly more convenient for China watchers to keep abreast of China news, situations and analysis.¹⁵

3. The computer industry is booming. The computer is the "gene" of the information society. Only when a rather high percentage of the population possesses computers can we say that the country has entered the information society. The computer industry in China is developing at a great rate. Both the production and sales of computers are booming. The largest computer manufacturer is the Legend Group. Over the past ten years, the annual output of the Legend Group has grown from 2000 to 800,000 PCs and its sales volume has remained first in the domestic category.¹⁶ Today the sales rate of the PCs produced by the Legend on the Chinese market is 21.5%, with a good sale record throughout all Asian

¹⁰ See *World Paper*, January 29, 2000.

¹¹ See *Economic News*, May 9, 2000.

¹² See *China Times*, June 7, 2000

¹³ See Elizabeth Economy, "Reforming China", *Survival*, Autumn 1999.

¹⁴ See *People's Daily*, July 29, 2000.

¹⁵ See *Washington Journal of Modern China*, Spring 2000.

¹⁶ See *Beijing Review*, December 24-20, 1999, p.22.

countries except Japan. In 1999, the sales of computers made by the Hong Kong branch of Legend reached \$2.2 billion with a profit of \$58 million.¹⁷ Last year, about 6 million PCs were produced by the Chinese firms, whereas it is expected that the output of PCs made in China will rise to more than 8 million.¹⁸ In 1990, the China's annual PC sales volume was 80,000 units. However it soared to 1.15 million in 1995 and 3.5 million in 1997, ranking sixth in the world.¹⁹ In 1998, PC sales in China were more than 5 million units, moving into fourth place in the world by topping the sales of Britain and France. This year, China is expected to go up to the world's second place with 9.6 million computers sold to the Chinese users. Currently, there are about 27 million PCs in China, and families are the main buyers. According to a sample survey, 50% of computers sold were bought by households, rising to 70% in 1999.

Owing to the fact that more and more people in China have access to computers connected to domestic and international networks, all walks of life in China have been informationalized steadily. E-commerce is in the making, and remote education and medical treatment are being gradually introduced. Some libraries and buildings are initially digitized. All in all, the China's society has embarked on the road of speedy informationalization.

The Theoretical Study of the RMA in China

In early 1991, the Gulf War broke out. The Chinese military followed the progress of the war closely. While lasting only 42 days, it had a great effect on the PLA. In the post-war period, many military institutions in China devoted themselves to intensive study of the epoch-making DESERT STORM and DESERT SWORD operations, and regard them as marking the transition from the industrial age to the information age. The campaign was different from the traditional, mechanized war in three aspects. First, the chief objectives of US-led allied forces were Iraqi military C3I systems, not its field forces, executing the so-called "decapitation principle".²⁰ Second, a close coordination of all the services and combat arms was truly realized and a real joint operation came into being.²¹ Lastly, a small amount of precision guided weapons (8%) played an important role in the war, destroying 40% of the high-value targets. These differences compelled many Chinese strategists to realize the way of war-fighting was experiencing a fundamental transformation and a new form of military was about to emerge from the fading industrial age. At this juncture, some American military scholars at first raised the notion of the technical military revolution and then the revolution in military affairs. Chinese military analysts were quick to learn. They have not only digested most of the foreign concepts on the RMA, but also developed the theory to a new level.

1. The motive forces of the RMA. Generally speaking, there are two kinds of revolutions in military affairs. One is comprehensive while the other is partial. In history, only two comprehensive RMAs (not including the current one) have occurred as mentioned above, but many partial ones have taken place. While the latter is caused mainly by technological advance, the former, involves many factors.

¹⁷ See *Business Week*, May 15, 2000.

¹⁸ See *Economic News*, May 9, 2000

¹⁹ See *Beijing Review*, December 24-20, 1999, p.22.

²⁰ See Wang Baocun, *The World New Revolution in Military Affairs*, Beijing: Jiefangjun chubanshe, 1999, p. 133.

²¹ See Wang Pufeng, *Information War and the RMA*, Beijing: Junkeyuan chubanshe, p. 121-123.

- The transition of industrial society to information society.²² The whole world now is experiencing the transition of an industrial society to an information society. But the transition is uneven for different countries. On the whole, the developed countries headed by the United States have already entered the initial stage of information society. By contrast, the new industrialized countries, such as Singapore and South Korea, are just knocking at the door, while the vast majority of the developing countries still have a long way to go. The general trend is that the information society is drawing near whereas the industrial society is fading away. The transition of the industrial society to the information society is the root cause for the current RMA. There are two reasons for it: (1) the society in any age is the "parent" of the military. In other words, a definite form of society will breed a definite form of military and the two are symbiotic; and (2) the military is a part of the society and when the society as a whole has changed, the military as its part must be changed accordingly, and changed fundamentally. The fundamental change in military affairs is a comprehensive RMA.
- The rapid development of high technologies, especially information technologies.²³ Any RMA, whether a comprehensive one or a partial one, usually follows a technological revolution. The rapid development of high technologies, especially information technologies, is the most direct driving force of the current RMA. Since the middle of this century, a large number of high technologies, such as microelectronic technology, computer technology, artificial intelligence technology, space technology, new energy technology, biological technology, new material technology, etc. have come to the fore. Information technologies are at the core of them. They are not only the base of the high technologies listed above, but also their "systems' technologies". In nearly a half of a century, the technological progresses in every field have led to a big improvement of the range, speed, accuracy and destructiveness nearly all the conventional weapons systems, most of which have reached the physical limits. The most striking effect caused by the advancement of high-tech, especially information technologies, is that the face and nature of war is changed. This can be seen clearly by observing the Gulf War and Kosovo Conflict.
- The emergence of a long period of relatively peaceful and stable international environment.²⁴ The above two factors are the internal causes for the RMA. The coming of a long period of relatively peaceful world situation is the important favorable external condition for the RMA to proceed. Without this essential condition a comprehensive RMA can never take place. After the cold war came to an end, the world was ushered into a new era with peace and development as its theme, thrusting humanity step into a new period of long-term peace and stability. There are three reasons for this trend. First, the world is slowly advancing in the direction of multi-polarity, though the United States will remain the only superpower for quite a long time. Moving towards a multi-polar world is conducive to peace, stability and economic development. The second reason is the rapid development of the globalization of the world economy. This trend sustains inter-state exchange and cooperation, and can help to contain large-scale war and military confrontation. The third is that

²² See Wang Baocun, *The World New Revolution in Military Affairs*, Beijing: Jiefangjun chubanshe, 1999, p.61-87.

²³ Ibid. p. 88-107.

²⁴ Ibid. p.108-127.

the international security mechanism will play a increasingly greater role in promotion of world peace and stability. Lastly, the information age is coming, the common interests of mankind above national interests will be increasingly underlined, and more and more countries will pursue a "cooperative strategy" rather than a competitive or even less a confrontational strategy. A comprehensive RMA can only take place in a long-term peaceful environment, for only in that sort of context military leaders are able to plan, carry out and experiment the fundamental military innovation. In wartime or crises, even in cold-war period nobody can or are will to this because they have no time and energy to start a RMA.

2. The essence of the RMA. Every comprehensive RMA results in the change of the form of war. The first RMA, which started in 2000 B.C., changed warfare from hand-to-hand combat into the "cold weapons war." The second RMA, which occurred in the 14th century A.D., brought about the "hot weapons war."²⁵ In general, the form of war is closely related with the type of weapons used in war. In turn, the types of weapons are determined by the energies consumed to make the weapons effective. In agricultural age, cold weapons were employed in war. These weapons, such as swords, spears and arrows, were all made of metals (mainly iron and bronze), and relied on physical energy. If a warrior was muscular, had great physical power and was very skillful, the weapon he used could play a greater role. A strong man could beat a weak man. This was a rule, not an exception.²⁶ In industrial age, hot weaponry was used in war. These weapons included guns, rifles, airplanes, warships and all kinds of munitions with different explosive destructive power. The energy to power them was thermal energy consisting of chemical thermal energy caused by gunpowder explosion and physical thermal energy released by nuclear fission and fusion. The physical energy and thermal energy were different in nature. The manifestation was that if a strong man with a sword in hand fought with a weak man with a pistol, the former would be killed easily by the latter. The same was true when a force armed with cold weapons engaged another force armed with hot weapons. The former would definitely be defeated by the latter.²⁷ This was because not only the latter possessed a far greater amount of energy than the former, but also "a age gap" existed between the two forces.²⁸ The former belonged to the agriculture age while the latter was a force in the industrial age. In the 18th and 19th centuries, the western imperialist countries conquered the whole world by force, for their militaries had entered the industrial age and the vast countries in Asia, Africa and Latin-America and their militaries still remained in the agricultural age. The "age gap" at this time manifested itself in the types and amount of energy. One side resorted to physical energy, whereas the other side applied thermal energy. The physical energy could never match the thermal energy in war.

In essence, war means a contest between amounts and forms of different energies. Now a new form of war – information war – is in the making as a result of the current RMA. In an information age war or information war, informationalized weapons will prevail in use, which will release a new form of energy. We call it information energy, which is actually the thermal energy regulated by information. The information-regulated thermal energy is the one brought about by information technologies,

²⁵ Ibid. p. 254.

²⁶ Wang Pufeng, *Information War and the RMA*, Junkeyuan chubanshe, 1995, p.41.

²⁷ Ibid.

²⁸ See Wang Baocun, " 'The Age Gap' Appears and Disappears", *Zhongguo junshi kexue*, Winter Issue, 1999.

which is very different from traditional thermal energy. The traditional bullets, bombs and artillery shells, which release traditional thermal energy, explode after being fired, are regulated by information programs and controlled by information when they identify targets, and determine flight bearings, ranges and modes of explosion. As a result, the informationalized weaponry is characterized by longer ranges and higher hitting rates, some of which even can perform the functions of stealth, night vision, counter-interference and self-homing.²⁹

Technological Era	Form of War	Form of Weaponry	Form of Energy
Nomadic society	Barehanded war	Sticks & stones	Bodily energy
Agricultural society	Cold weapons war	Cold weapons	Physical energy
Industrial society	Hot weapons war (mechanized war)	Hot weapons (mechanized equipment)	Thermal energy
Information society	Informationalized war	Informationalized weapons	Information-regulated thermal energy

3. The main contents of the RMA. The on-going comprehensive RMA covers all the four main aspects of military.

- Military technological revolution. Since the Second World War, the military technological revolution has gone through three stages of development – the military engineering revolution, military sensor revolution and the military communication revolution. The last two stages combined are called the military information revolution. The military engineering revolution began during the Second World War and ended in the West in the 1980s, which worked to increase most of the performance indexes of the weaponry, such as speed, range and accuracy almost to their physical limits by adopting new engineering technologies. The military sensor revolution is the second stage of the MTR and the first step of the RMA. It started from the 1970s in the West and the Soviet Union, and will last until the beginning of the 21st century. It has two functions: one is systematization of weapons; the other is that the accuracy of weaponry is greatly increased. The military communication revolution is the third stage of the MTR and second step of the RMA. It began from the 1980s. Due to this revolution, C4I systems appear which can process a large amount of information. Through the C4I systems, nearly all the operational functions of the different combat units and weapons systems, such as reconnaissance, supervision, tracking, decision-making, fire control, attack and damage-assessment, etc, can be integrated into a whole.³⁰

²⁹ Ibid., p. 42

³⁰ See Wang Baocun, *The World New Revolution in Military Affairs*, Beijing: Jiefangjun chubanshe, p. 145-161.

- Weapons and equipment leap forward across eras. The nature of military equipment leap is that the mechanized equipment in industrial age is changed into the informationalized equipment in information age. The military equipment of all the countries in the world, now, is in the process of transition from mechanized equipment to informationalized equipment, though the degrees of informationalization for weaponry vary greatly in different countries. This informationalization will lead to an integration of all the combat systems in a theater of war. The integration of combat systems have two meanings: one is the functional integration, that is, all the combat functions, such as fire control, command and control, fire attack, battlefield protection and battlefield maneuver, performed previously by several separate weapons, now can be performed by a single weapon system; the other is the functional integration, i. e. all the weapons systems and the forces of different services and arms are networked as a whole by C4I systems.³¹
- Military theory innovation. The Chinese military theorists argue that there is an interactive relationship between weapons-development and military-theory-innovation. That is, the former promotes the latter and the latter guides the former. This "pull and push" interaction will cause continuous self-negation of the two and lead to spiral development of them. Under the current wave of the RMA, the essence of military theory innovation is to informationalize the traditional military concepts and doctrines, i.e., change the military theory of industrial age with mechanized war theory as the core into one of information age with information war theory as the core. Information war will be the typical form of war in information age. What will it look like? It will have the following features relative to the mechanized war: the causes of war will be more complicated, including economic, political, diplomatic, spiritual, cultural, religious, ethnic factors; the goal of war will be more limited, in the sense of not seeking to conquering enemy's country and demand unconditional surrender; the contents of war concept will expand; the duration of war will be much shorter; the damage and casualties caused by war will decrease; the intangible factors such as computing power, bandwidth, reliability, real-time reconnaissance, simulation, etc. will play bigger role in war; the degree of jointness in battles will increase; war will become more plebianized.³²
- Military organizational reform.³³ The military organizational structures of all the countries also face the transition from the industrial age to the information age. Their development is in the direction favorable to a rapid flow and use of information. The general trend of the reconstruction is as follows:
 - The size of armed forces has been and will be further reduced. After the cold war, most of the countries in the world have drawn down the sizes of their armed forces and will do it further. The reason is that in the future information war, the combat strength of a force will lie in its quality, not in its size or quantity.
 - The operational command system will become flat and networked in shape. In industrial age, the shape of the operational system is like a tall tree with many layers. This type of command structure is

³¹ Ibid. p.162-171.

³² Ibid. p. 186-195.

³³ Ibid. p. 204-218.

detrimental to information flow. Now some of the developed countries are about to reshape their operational command structure. The measures adopted by them are to reduce the layers of the systems and make them flat.

- Combat units will be reduced in size, integrated in structure and diversified in functions. This means three things: the complements of the units such as divisions brigades, even companies will decrease; the forces will be composed of more services and arms; and the field units can carry out more combat missions in more complex conditions.

4. The basic features of the RMA. The current RMA is an epoch-making one with unprecedented profoundness in history. Its main features are as follows:

- **Fundamentality.** The fundamentality of the RMA means a thorough transformation of the military form in industrial age, that is to say, remold the military form of the industrial age into the military form of the information age. This RMA is a qualitative change of the military form. It is both different from an ordinary military reform and is a progression or development in a particular military area. It is a thorough negation of the old military form.
- **Extensiveness.** In comparison with the other RMAs in history, the present one is much more extensive. The extensiveness here indicates two things: one is that every military aspect or every field related to the military will be involved and will make an "era change"; the other is that this "era change" can not take place in only one or two countries, but it will occur in many countries in the world, especially the big powers.
- **Unevenness.** Now, there are more than 200 countries in the world. The RMA can and will not occur in all these countries simultaneously. Some countries will conduct the RMA earlier, whereas others, later. This is decided by the law of uneven development of all the things in universe in general, and the fact that different countries are in different stages of development in particular. The U.S.A., U.K., France, Germany, Japan, and other western states have already entered the initial stage of information society, while most of developing countries are still in industrial or even agricultural society.
- **Protractedness.** The on-going RMA will last for a long time. There three reasons for it. First of all, this RMA is the most profound one in human history and can not completed in a single move. Instead, it will follow a long course. Second, the course of a RMA is one of vast investments and consuming huge quantity of materials. Therefore, even the richest country in the world can not meet this kind of high consumption in a short time. The investments can only be made gradually. Finally, because of the unevenness in development, the length of time needed by different countries to accomplish the RMA will vary greatly.

Has an RMA Started in China's Military?

In recent years, many scholars and officers in China's military have been studying the Revolution in Military Affairs (RMA) with immense zeal, resulting in a great amount of books, paper and articles on the subject. But whether China's military has begun to actually practice the RMA is something about which a lot of people are quite doubtful. To get to the heart of the problem, we should first of all gain a clear idea of what the current RMA really is and how to define it. We argue that the crux of the contemporary RMA is to informationalize the military, i.e. to change the mechanized military of an industrial society into the informationalized military of an information society. The process of military informationalization is in fact the RMA currently underway. From this definition, we can infer that as long as the military of a country has begun to informationalize itself, the RMA is proceeding in that country. According to this perspective, whether or not we admit it, the PLA of China has already taken the road of the RMA.

To support this conclusion, we shall examine five areas of PLA progress towards an RMA:

4. C4I modernization
5. Network-based wargaming
6. Information warfare personnel training
7. Information warfare field exercises
8. Informationalized equipment

Evidence shall be brought to bear through the examination of open source materials.

C4I Modernization

China's military has long realized that the "command automation system" is "the brain and nervous system" of modern wars and, without it, a military can never win a high-tech war.³⁴ In order to carry out China's military strategy of fighting and winning a high-tech war, the PLA has made great efforts to develop command automation systems. In May 2000, the Central Military Commission of China promulgated "The Program for Command Automation Construction".³⁵ The principal objective of the program is to accelerate the construction of an armywide integrated command automation system with multi-purposes, advanced technology, and great reliability and security, whereas its final aim is to "enhance information warfare capability and the capability of winning the future war under high-tech conditions".³⁶

In recent years, all of the military regions and provincial military districts or subdistricts have devoted significant resources to carrying out command automation construction, aiming at upgrading communication lines to optical fiber, digitizing information processing, regionalizing telephone networks and automating operational command. Since 1995, the length of optical fiber cables in the Chengdu Military Region, for instance, has increased 30 times in the whole region. As a result of this, the optical fiber lines have stretched over the 7000km border line, linking all of the group armies, divisions, brigades and regiments. In the whole military region now, information exchanges among the combat forces above regimental level have been networkized and information

³⁴ The term "command automation," which is borrowed from the Soviet/Russian military, is the synonym for the western concept of C³I or C⁴I.

³⁵ See "The CMC promulgates 'The Program for Command Automation Construction'," *Liberation Army Daily*, May 27, 2000.

³⁶ See "A Strategic Focus for Army Modernization Construction", *Liberation Army Daily*, May 27, 2000

processing is digitized; tv-phone-conferencing cables have reached divisions, brigades and frontier defense regiments, resulting in the fact that the defense posture on Tibetan border which is thousands km away can be transmitted read-time to the operational command center in the Chengdu military region headquarters; the telephone networks have been regionalized, the operational command has been automated and the operational training or exercises from military region headquarters to regiments can be carried out in the computer network.³⁷

In addition, more and more military academies and combat units in the PLA have set up their own intranets. According to official sources, the "intranet construction conducted by field forces is about to reach high tide."³⁸ "In recent years, all the leading organs and many field forces have accelerated the construction of office automation and networks, establishing a lot of intranets, some of which are connected with the General Department, Military Region and District Headquarters, and their respective subordinate units."³⁹ These intranets are mainly used to exchange information between different units, conduct wargames, hold videoconferences and engage in remote education.

Two units in Chinese military, the Shijiazhuang Army Command Academy and the Chengdu Military Region, are illustrative examples of how military academies and field forces, respectively, build and use their intranets. Shijiazhuang Army Command Academy reportedly serves as a model institution in the PLA for intranet construction. It began building its campus network in 1996. Now the campus net is composed of a large network classroom, more than 30 multimedia classrooms, a multimedia information center, an operational command information center, a books and reference materials information center and an administration information center. Three features of this academy's network modernization deserve special mention. First, the networking technologies solved some thorny technical problems associated with the academy's large amount of multimedia, particularly in the areas of information management, rates of information transfer, and real-time storage. Second, the system has allowed the academy to become "rich" in information resources, developing more than 20 applied systems and over 100 databases. Lastly, nearly all of the instructors in the academy use the multimedia for preparing lessons, teaching classes, cadets self-study, war-gaming, and test and evaluation. According to Chinese sources, the results have been extremely satisfactory.⁴⁰ Of the combat forces, a certain group army in Chengdu Military Region has made great gains in intranet construction. Since the mid 1990s, it has purchased over 5000 PCs and considerable supplementary equipment, setting up a three-level local network comprising the group army headquarters, the divisions (brigades) and regiments. A salient characteristic of this intranet are the strict security measures that have been taken against the threat of hackers and computer viruses.⁴¹

Despite the successes outlined above, however, several problems remain for intranet construction in the PLA. First, close coordination is a

³⁷ See the report entitled "News of Success for Communication Modernization Construction Keeps Pouring In," *Liberation Army Daily*, March 16, 2000

³⁸ Ibid.

³⁹ Quoted Zhang Xianglin "Let The Networks Bring Out Combat Effectiveness As Quickly As Possible," *Liberation Army Daily*, April 21, 2000

⁴⁰ See Dong Menghuai, "Land In The Campus Net Of The Military Academy," *Liberation Army Daily*, March 26, 2000.

⁴¹ See Jianghua "A Group Army Takes Strict Security Measures to Protect Its Information Highway," *Liberation Army Daily*, May 24, 2000.

conspicuously lacking in the construction of networks, resulting in a serious waste of resources. Second, some units are active in network building, but slack in managing and using those networks, leading to deterioration of network capability. Third, network security measures have not received a high priority, threatening the integrity of the network.

Conducting wargames on networks

In the wake of the establishment and development of various C4I networks, some military regions started conducting network-based simulated exercises. According to an article in PLA Daily, at least three military regions have carried out large-scale network exercises since the end of 1999. In April 1999, Central Military Commission Chairman Jiang Zemin, and Vice-chairmen Zhang Wannian and Chi Haotian watched the demonstration of the "Operational Training Command Automation System" built by the Beijing Military Region. The system reportedly comprises four subsystems: the information network subsystem ("a military information highway"), which is composed of a digital channel, phone channel, command network channel and confidential network channel, and is used by commanders to transmit orders, operational plans and combat maps; the command-operation subsystem, which uses computers to process written language and graphics, and can raise efficiency twenty times greater than traditional manual operations; the audio-visual demonstration and regulation subsystem, which uses optical fiber channels as transmission media, and can transmit images; and the information security subsystem, which can ensure security in information transmission.

From 15-19 October 1999, the Beijing Military Region used this automation system to conduct the largest network-based operational wargame to date. The maneuvers, which lasted five days, witnessed the Red Forces and Blue Forces locked in reconnaissance and anti-reconnaissance, interference and anti-interference, air-raid and anti-air-raid, interdiction and anti-interdiction, maneuvers and anti-maneuvers, and airborne operations and anti-airborne operations.⁴² It showed that the PLA had been successful in conducting large-scale maneuvers using the Operational Training Command Automation System, thus making a historical change in PLA's training methodology. On 18 November 1999, the Lanzhou Military Region held "Four-level Commander Headquarter Exercises on Network". The four levels included military region, group army, division and regiment commanders, as well as headquarters.⁴³ On 24 March and 5 April 2000, the Shenyang Military Region conducted two exercises called "Competition on Network among Chiefs of Staff". The first exercises involved the Chiefs of Staff at three levels (corps, brigade and regiment)⁴⁴ while the second included corps, division, brigade and regimental Chiefs of Staff.⁴⁵ According to Chinese sources, network-based maneuvers have five advantages. First, it is more confrontational and can help get rid of "red forces always win" problem. Second, it is more realistic, raising the commanders' training standards. Third, it enables commanders and units to master joint operations. Fourth, the network provides an enormous amount of strategic,

⁴² See Chenhui "The PLA Operational Command Enters Network Age", *Beijing Youth Daily*, November 9, 2000.

⁴³ See Zhang Feng "China Military Advances Into Virtual Battlefield," *Liberation Army Daily*, November 24, 1999.

⁴⁴ See Zhang Jianjun "Four Level Chiefs of Staff Enters Internet for Fighting," *Liberation Army Daily*, March 25, 2000.

⁴⁵ See Zhang Jianjun "Three Level Chiefs of Staff Competes on the Simulated Battleground," *Liberation Army Daily*, April 6, 2000.

operational, and tactical information, and is therefore conducive for commanders to receive a comprehensive awareness of the battlefield. Lastly, it is more practical and can save significant training resources.⁴⁶

Training information warfare personnel

Chinese theorists maintain that information warfare is the core of the RMA. To carry out information warfare, training information personnel is a must. Since May 1999, the General Staff Department has conducted four courses for information warfare personnel training. Of them, three courses were held by Wuhan Communication Command Academy (WCCA). The WCCA is an information warfare research and training center, often holding symposiums on information warfare and publishing a number of information warfare monographs such as On Command and Control of Information Operations, On Technologies of Information Operations, Basic Theory of Information Operations, On Digitized Forces, etc. The WCCA held the first training course for the PLA academies' instructors in May 1999 under the supervision of the GSD. This course focused on the teaching and study of the command and control theory of information operations, stressing the combination of theoretical study, technical application and the study of operational and training methodologies for information operations. In the course, participants studied the theory, technologies, command and control, and operational methods of information operations. They were exposed to twenty-one subjects of theoretical teaching, more than ten demonstration and drills, and took part in more than twenty academic seminars.⁴⁷ In June and July 1999, the second course, which lasted forty days, was conducted by the WCCA. This course was one of great significance, because the participants were the chiefs of staff at division and brigade levels throughout the PLA. Moreover, ALLIED FORCE had just come to an end. According to an editor of PLA Daily, "At the end of the forty days' training, all the participated chiefs of staff came to a consensus: the Kosovo War affected the PLA officers strongly in terms of the compelling information warfare. The key to meeting future challenges is to start information warfare training in an all-round way and let information warfare training dominate the battlefield."⁴⁸ After going back to their units, the newly trained chiefs of staff revised information warfare training, and published numerous articles on information warfare operational and training methodology.⁴⁹ The third course was executed, also by WCCA in June 2000. The trainees in this course were division and brigade commanders, and the directors of operation and communication departments in the headquarters of the PLA's "Emergency Maneuver Combat Force" (known in the west as the Rapid Reaction Force).⁵⁰ Also, in June 2000, the Hefei Electronic Engineering College held a fourth course called the "PLA Joint Operation Information Warfare and Electronic Warfare Theory Training". During the training, participants focused their study on three courses entitled "Essentials of Operations," "Information Operations" and "Electronic Warfare in Joint Operations."⁵¹ By holding these courses, the PLA has trained hundreds of information

⁴⁶ Ibid. See 10.

⁴⁷ See the report, *Liberation Army Daily*, May 22, 1999.

⁴⁸ Quoted Zhang Guoyu. "Let Information Warfare Dominate the Battlefield," *Liberation Army Daily*, July 13, 1999.

⁴⁹ See Wang Qiang, "Create New Mode of Training Information Warfare Personnel," *Liberation Army Daily*, June 17, 2000.

⁵⁰ Ibid.

⁵¹ See a report entitled, "The GSD Holds Joint Operation Information Warfare Training," *Liberation Army Daily*, June 26, 1999.

warfare specialists, laying down a foundation for conducting information warfare.

Conducting information warfare field training

The PLA started information warfare field training in the mid 1990s and has intensified the process since ALLIED FORCE. At the beginning, the different military regions carried on tentative information warfare training separately. Then the military training department of the GSD intervened, helping military regions sum up lessons and exchange experiences on information warfare training. The training is now usually incorporated into field exercises. The contents of the training are likely as follows: (1) studying the fundamental theory of information warfare, including the concepts and features of informationalized war, the current and future trends of information warfare, and the state of research on information warfare in the PLA; (2) mastering the basic technologies of information warfare; namely, those of information acquisition, transmission, processing, measures and countermeasures, information reconnaissance, interference and anti-interference, coding and decoding, and destruction and counter-destruction, etc.; (3) practicing information warfare methodology, mainly operational methods of anti-reconnaissance, anti-interference, anti-destruction, anti-air, anti-cruise missile, and command center destruction; (4) exercising information warfare command and control, consisting of the principles and methods, the preparation and execution, information security, and assurance of information warfare command and control.⁵² As the content of information warfare training becomes richer, the focal points of training for various specialties, personnel and units diverge. In the training for commanders and staff, stress is placed upon information warfare command and control. When training communication, reconnaissance, electronic countermeasures and radar units, emphasis is given to information warfare basic techniques, and methods of counter-reconnaissance, counter-interference and counter-destruction. As for the training of infantry, armor and artillery units, anti-air, anti-cruise missile and anti-C2 operations are practiced more. When air defense units engage in information warfare training, they mainly practice the acquisition of air raid information from battlefield information systems, how to enhance the effectiveness of counter-reconnaissance, counter-interference and counter-destruction, how to strengthen the capabilities of anti-air, anti-cruise missile and anti-C2 operations, as well as how to interfere in target acquisition system and command and control systems.⁵³ Despite this progress, there are still a number of impediments to PLA information warfare training. No master plan has been worked out for combat forces information warfare training. The division of labor for the training has not been made clear, leading to confusion about the responsibilities of different functional departments.⁵⁴ Thus, the PLA shall pursue the following in the future: to develop and produce more advanced training equipment and materials; to build up information warfare training facilities including information warfare rotation training bases and large comprehensive training centers; to train qualified information warfare trainers who are familiar with information warfare operational methodology, know the ropes of information warfare technologies and techniques and master information warfare equipment.⁵⁵

⁵² See Zhang Guoyu, "Let Information Warfare Dominate the Battlefield," *Liberation Army Daily*, July 13, 1999.

⁵³ Ibid.

⁵⁴ Ibid.

⁵⁵ Ibid.

Developing informationalized equipment

The on-going RMA is a process of transforming mechanized militaries from the industrial age (or society) into informationalized militaries in the information age (society). One important aspect of military informationalization is to change mechanized equipment into informationalized equipment. Thus, a military that has begun informationalizing its equipment can be considered in the midst of an RMA. If the PLA has begun to informationalize its weaponry, then we can say that it has begun the RMA. Now, the question of how to define informationalized equipment has cropped up. A piece of informationalized equipment or weaponry is defined as one that contains a high percentage of electronic information technologies. Usually informationalized equipment is composed of informationalized ammunitions such as guided bombs, guided artillery shells, guided mines, cruise missiles, terminal guided missiles, etc.; informationalized platforms, including advanced tanks, military airplanes and warships equipped with a large amount of electronic information devices; or military high-tech robots and C⁴I systems.⁵⁶ According to the materials we have gleaned from limited resources, the PLA has indeed been carrying on "equipment informationalization construction" as they call it, although their level of weaponry informationalization cannot be compared with that of U.S. military.

It is important to note that the PLA can undertake this informationalization because Chinese society is being informationalized at a good pace. The PLA has benefited, like the rest of China, by the opportunity to skip a generation of hard-wire telephony by moving quickly into optical fiber, mobile and satellite communication system.⁵⁷ These advancements will enhance national strategic command and control, but will only improve battlefield communications on the margin.⁵⁸ Obviously, the PLA has endeavored to develop and set up its strategic, operational and tactical automation command and communication systems. In terms of informationalized ammunition, the PLA has made a lot of progress in developing a series of precision guided missiles, including several types of air and sea-launched cruise missiles and anti-aircraft missiles. Since it currently has not deployed cruise missiles capable of attacking land targets, the PLA will give first priority to develop land attack cruise missiles. "These weapons will give the (PLA) navy and air force capabilities needed for several local war scenarios."⁵⁹ At the same time, China's military has already fielded some anti-aircraft systems. The most numerous indigenously-produced missiles are designated as HQ-61A. Another advanced SAM, FT-2000, is also under development, reported to have a maximum range of about 100km, carry a 60 kilogram fragmentation warhead and be an "AWAC's killer".⁶⁰ As for the combat platforms, the PLA's newest main battle tank under development, the T-90 and T-90II, has an integrated fire control system. The most recent indigenous fighter, the JH "Flying Leopard," the J-10, which is still under development, and the naval Lubai class destroyers, have all adopted much information technologies."

⁵⁶ See Wang Baocun, *The World New Revolution in Military Affairs*, Beijing: Jiefangjun chubanshe, 1999, p. 163.

⁵⁷ See James Mulvenon and Richard Yang, eds., *The People's Liberation Army in the Information Age*, Santa Monica: RAND, 1999, p. 276

⁵⁸ Ibid.

⁵⁹ Ibid. p. 277

⁶⁰ See *Annual Report on the Military Power of the PRC*, June 2000, p. 14-15

Conclusion and Prospect

Our conclusion is that the Chinese People's Liberation Army has really started the RMA, whether the Chinese leadership realizes it or not.

In pursuing an RMA, the PLA has favorable internal and external conditions and seeks to take advantage of them. Internally, Chinese society has embarked on a rapid informationalization. Externally, information technologies are developing rapidly around the world, especially in developed countries. As the technological base for military informationalization, information technologies have extensive defusibility and permeability. This is because information technologies are of dual use, that is, they can be used both in military and civilian sectors, and advanced information tech products, such as computers, optical instruments and electronic equipment, can be purchased in international markets. In an information society, which defies any state boundaries, info tech is "soft" and hard to control. Precisely because information technologies are highly diffusible, some western military strategists were amazed at how easily developing countries can acquire these technologies and information warfare weapons. In this case, as long as the PLA takes advantage of this and is good at absorbing information technologies from developed countries, they can accelerate the progress of the RMA.

At the same time, the RMAs underway in China and the United States are quite different in nature. The major dichotomies are summarized below:

2. China's RMA has just begun while the US RMA has already come a long way. The PLA's informationalization construction was initiated only a few years ago. Its automation command system is still in its infancy, the percentage of its informationalized weaponry is very small and its mechanized organizational structure remains untouched. By contrast, the US military started the RMA much earlier than China. It has already established a comprehensive and integrated C4ISR system. Most of its equipment and weapons have been informationalized and its organizational structure is now undergoing a fundamental change.
 3. The PLA has just started and entered the first phase of the RMA. Thus, the starting point for China is low while that for the US is high. Owing to the engineering revolution in the military arena, the range, speed, accuracy and destructiveness of US military equipment and weapons reached their physical limit in the 1980s. In order to make their weaponry more effective, they will have to find a way out. The best way is to pursue the "system of systems"⁶¹ "at the heart of the RMA"⁶², linking all of the equipment, combat service and combat service support units as a whole. China's military, however, is still an industrial-age military whose main task is to improve the performances of its individual weapons systems. Though it started informationalizing a portion of its weaponry, it is still far behind the US military.
- The PLA emphasizes theoretical study while the US military values both theory and practice. Chinese military scholars and officers are highly sensitive to world military developments. With their superior strategic, abstract and rational thinking capabilities, they have grasped the essence and trend of the RMA, putting forward a number of resourceful and profound theoretical views. Americans are a very pragmatic people with an active mind. They have used their experiences with the RMA to guide the current stages of the transformation.
 - The PLA has no overall plan to conduct the RMA while the DOD of the United States has incorporated the RMA into its long-term defense

⁶¹ Quoted Bill Owens, 'Lifting the Fog of War', *FSG*, 2000, p. 18

⁶² *Ibid.*

strategy.⁶³ The PLA's long-term development strategy did not consciously incorporate the RMA into the plan, even though the leadership recognized that "the world military was in the midst of fundamental transformation".⁶⁴ US military leaders, such as former defense secretary William Perry and the current defense secretary William Cohen, are all ardent advocates of the RMA. Under their leadership, the RMA in the US military has not only been unfolding relatively smoothly, but incorporated into the QDR and JV2010 and JV 2020.

The Chinese military leadership and strategists have been following the development of the "New Global RMA"⁶⁵ closely. They have published a large quantity of theoretical literature on this subject, regarding it as both a great opportunity and challenge for the PLA's defense construction and development. Some of them earnestly point out: "The RMA presents a golden opportunity for us. There have only been a few such opportunities in the entire path of human history. By grasping the opportunity, we can close the gap with the militaries of developed countries."⁶⁶ How to close the gap is a difficult question, which must be properly answered. The solution offered by Chinese military thinkers is to "walk on two legs."

- Press ahead with military reform and the RMA simultaneously. As we elaborated above, the substance of the on-going RMA is to transform the mechanized military form into an informationalized military form. It will take a long time to informationalize the equipment of the military, as well as harmonize that equipment with military technologies, strategy, doctrine, tactics, organization, training, recruitment, logistics, and mobilization. Thus, various components of the mechanized military form should be transformed into the informationalized military form in a staggered way. However, once some components of the mechanized military form begin to be transformed, the RMA starts off. There is no doubt that some parts of Chinese military have begun the transformation. Yet military reform is different in nature from the RMA. It is a change within the boundary of the mechanized military form. The PLA will push forward the military reform and the RMA, at the same time, weighing more towards the former in a certain coming period of time and then speeding the pace of the latter.
- Pursue mechanization and informationalization simultaneously. The US and other western countries took the road of first mechanizing and then informationalizing their weaponry and equipment. China, however, pursues its weaponry development in a different manner. It will mechanize and informationalize its military equipment simultaneously. The PLA has yet to spend a great deal of time on mechanization, for most of its equipment is just semi-mechanized or mechanized with little informationalized weaponry. The range, speed and agility of its tanks, aircraft and warships must be further raised. Its artillery and missiles have much room to improve their accuracy and range. All of these are within the scope of mechanization. Along with continual mechanization, the PLA will make more efforts in developing information technologies and informationalized equipment. This means that in the initial stage the mechanization will remain the focus, but as time goes on the informationalization will gradually take the lead. The PLA will give priority to developing C4I systems, precision attack weapons, electronic equipment and various information weaponry. The advantage of pursuing both mechanization and informationalization at the same time is that it can keep

⁶³ See "The Quadrennial Defense Review", *USDOD*, 1997

⁶⁴ Jiang Zemin, "The Speech at the 16th CCPNC," *Liberation Army Daily*, March 18, 1998

⁶⁵ See Wang Baocun, *The World New Revolution in Military Affairs*, Beijing: Jiefangjun chubanshe, 1999.

⁶⁶ Wang Baocun, *The World New Revolution in Military Affairs*, Beijing: Jiefangjun chubanshe, 1999, p. 360.

the PLA stable, take care of the recent needs of the military, keep high readiness and deal with possible contingencies, and in the meantime increase the PLA's informationalization level and gradually close down the gap with the advanced militaries.

- Carry on symmetric and asymmetric strategies simultaneously. The terms "symmetry" and "asymmetry" were first adopted by the Pentagon in its 1997 QDR. But the meaning of the two words for PLA strategists is somewhat different. Chinese military strategists insist that in defense construction, army building and military struggles the PLA should and will pursue both symmetric and asymmetric strategies. The reason for adopting a symmetric strategy is that armed forces building and war-fighting is a science with its own objective laws and truths. Militaries of either socialist or capitalist countries should obey these laws to avoid losses, defeats or dead ends. For example, it is inevitable that all the militaries in the world will eventually become informationalized. Since there are common laws and rules for military development in general, the PLA should learn from the experiences of advanced foreign militaries and assimilate their theories of military construction and war-fighting. Meanwhile, the PLA will also press on with an asymmetry strategy. This is because both China and its military are faced with unique conditions. These conditions decide that China must build a military with its own characteristics.

