China's Air Force Modernization

DOD (D. Myles Cullen)

Chinese air force Su-27 Flanker fighter

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The People's Liberation Army Air Force (PLAAF) is in the midst of a modernization campaign aimed at retiring and replacing obsolete aircraft designed in the 1950s and 1960s. While modernization has been under way in earnest for the past 15 years, China's air force is still in a transition phase, caught in the middle ground between the type of force that the PLAAF fielded over its first 50 years and the development of a new air force with modern equipment, doctrine, and capabilities. The thousands of J–6 fighters that once made up the fighter fleet have been retired: about 1,000 older J–7 and J–8 fighters remain in service, including 32 Russian-built Su-27UBK multirole fighters and 116 Chinese-assembled Su-27 variants; 73 Russian Su-33MKK fighters; and 62 of the new, indigenously produced J–10 multirole fighters. China is also developing and purchasing force multipliers, including advanced transport aircraft, tankers, and airborne early warning aircraft.[1]

The Chinese vision is of a highly trained modern air force equipped with high-tech aircraft, advanced precision-guided munitions, support aircraft that serve as force multipliers, and networked command and control and intelligence capabilities that allow the PLAAF to fight and win a high-tech war under "informationalized" conditions. This force not only would be more capable of carrying out missions such as air defense and support for ground forces against a modern adversary but also could undertake offensive strikes against ground and naval targets farther from China's borders.[2] The new PLAAF will integrate support systems such as airborne early warning aircraft, aerial refueling tankers, and intelligence collection and jamming aircraft to increase the effectiveness of combat aircraft and enhance warfighting capability.[3] Modernization will also include larger numbers of more capable air transports, which will enhance the effectiveness of PLAAF airborne forces for internal and external missions.

The Chinese air force of the future will consist of fewer but more capable aircraft and support systems. Yet the total size and precise mix of foreign and domestic aircraft remain open questions. This article seeks to illuminate the future force structure of the PLAAF by exploring the different ways of thinking about the role of the air force within overall PLA modernization plans, as well as the potential roles it will play in future PLA missions. It begins with a concise breakdown of the PLAAF as it stands now and is shaping for the future. It then shifts to the potential influences and missions that Beijing will weigh in making determinations for modernization. These influences are already affecting PLAAF transformation.

An Evolving Force

The PLAAF is now in transition between the limited force consisting mainly of obsolete capabilities that it fielded in the 1980s, and the more advanced force that it intends to field in the coming decades. The new PLAAF will be a smaller force, composed primarily of third- and fourth-generation multirole fighters and fighter-bombers. It is uncertain whether China will decide to build or acquire new bombers, but the deployment of advanced cruise missiles should allow existing bombers to contribute more effectively to a variety of missions, including antiship and ground attack taskings. The new air force will also fully integrate support

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systems such as airborne early warning (AEW)/airborne warning and control systems (AWACS), aerial refueling tankers, intelligence collection, and signal jamming aircraft to increase the effectiveness of combat aircraft and enhance warfighting capability. Modernization will also include larger numbers of more advanced air transports, which will enhance the effectiveness of PLAAF airborne forces for both internal security and external missions. The air force will continue to modernize its ground-based air defenses and will likely seek to develop more effective defenses against cruise and ballistic missiles.

The J–6 fighters that once made up most of the fighter fleet have all been retired.[4] The PLAAF's future aircraft are beginning to enter the force, although the total number and precise mix of foreign and domestic aircraft remain unknown. The PLAAF now has 15 years of experience with the Su-27 fighter as well as with Su-30s and J–10s and modern surface-to-air missiles. The Su-27s and Su-30s are being complemented with the J–11, the Chinese-assembled version of the Su-27. Initial "coproduction" involved Chinese assembly of aircraft kits provided by the Russians, but the Shenyang Aircraft Corporation plans to increase the proportion of domestically produced components for the J–11 gradually.[5] Throughout the 1990s, there were concerns in Beijing that the Russians were not giving China the most advanced version of the Su-27 but were offering more advanced versions of the aircraft to India. The Su-27SM system exhibited at the Zhuhai Air Show was reported to have upgrades aimed at addressing China's concerns, including multifunction liquid crystal displays and a precision navigation system incorporating laser gyroscopes and a Global Navigation Satellite System/NAVSTAR receiver.[6] China has continued to purchase Russian-built Su-30s and to assemble J–11/Su-27 aircraft.

The J–10 is China's first domestically produced fourth-generation aircraft and will likely make up a large portion of the future force. The J–10 is a highly capable, multirole fighter strongly influenced by the Israeli Lavi, which was influenced by the F–16.[7] The J–10 is equipped with aerial refueling capabilities that significantly improve its range and flexibility.[8] The J–10 has entered into serial production, and some 60 aircraft (enough to equip about three Chinese aircraft regiments) are reportedly deployed.[9]

The PLAAF may also field the Xiaolong/FC–1, an indigenously developed fighter that is the product of a Chinese-Pakistani joint venture.[10] Originally known as the Super-7, the project goal was to upgrade the J–7 into a more capable fighter with an advanced engine and upgraded Western avionics to provide an effective but less expensive fighter.[11] The PLAAF is reportedly not enthusiastic about acquiring the Xiaolong, but the producer, the Chengdu Aircraft Industrial Group, is pushing for PLAAF purchases in order to validate the aircraft for foreign customers.[12] The Xiaolong/FC–1 would provide a less expensive alternative to the fourth-generation aircraft the PLAAF is currently acquiring.

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Along with fighters, the PLAAF will continue to modernize its ground-attack and bomber forces. China's efforts to improve its ground-attack capabilities include development of the JH–7/FB–7 Flying Leopard. Although the JH–7 is a multirole aircraft, its limited capabilities against modern fighters suggest that it will be used mainly for ground attack and antiship missions. The JH–7 is capable of carrying C–801/802 antiship missiles and was initially deployed with the PLA Navy (PLAN).[13] About 20 JH–7s are currently deployed with the PLAAF 28th Air Division in Hangzhou.[14] The air force is reportedly unenthusiastic about the JH–7 and would probably prefer to acquire more advanced multirole fighters.

J–10 fighter

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Bomber modernization is less certain than the efforts being made on behalf of ground-attack aircraft. Production of the H–6/Badger bomber has resumed, with an emphasis on a new variant capable of carrying antiship and land-attack cruise missiles.[15] Chinese military Web sites show pictures of the H–6 and the modified H–6D with cruise missiles on them as well as pictures of the H–6 firing cruise missiles from the air.[16] The H–6's vulnerability to modern air defenses suggests that it will likely be employed as a standoff platform to deliver cruise missiles outside the range of enemy air defenses. It is still unclear if the Chinese intend to upgrade the bomber fleet with the Russian Tu-22 and Tu-95 bombers. The Chinese press has openly discussed the pros and cons of those aircraft, but thus far there has been no decision to purchase either one. Chinese sources have indicated that the only reason the PLAAF would want to acquire new strategic bombers would be to prevent the United States from entering any Taiwan scenario. Some Chinese analysts believe the purchase of these aircraft would mark a significant shift in the balance of power in Asia.[17]

The PLAAF will also develop and deploy force multipliers that will enhance the capabilities of its combat aircraft. These systems will include tankers, AEW aircraft, electronic warfare and intelligence collection aircraft, and transports that will support a rapid-response capability for internal and external contingencies. The S–30 can be refueled by the Il-76/Midas tankers, with four already ordered from Russia although not yet delivered because of a production problem.[18] The J–8s and J–10s can be refueled by HY–6 tankers, a modified H–6 platform. Expansion of the tanker force and delivery of the Il-78 will extend the range and endurance of the PLAAF refuelable combat aircraft.

China has made several efforts to acquire or develop AEW and AWACS capabilities, but current information suggests that only limited progress has been made. Some Chinese sources take the position that AEW would be more beneficial to the PLAAF than AWACS since it would require fewer changes in current operational practices.[19] China reportedly signed a deal in 1996 to acquire the A–501 Phalcon AWACS from Israel, but the purchase was canceled in July 2000 after the Israeli government came under pressure from the Clinton administration.[20] China's initial effort to develop a domestic AEW

capability used the Il-76 as a platform for the KJ–2000, equipped with indigenously designed phased-array radar.[21] Research and development on this system has reportedly made significant progress, but the program was set back by the crash of a prototype in June 2006 that killed some 40 technicians.[22] A second domestic AEW program, the KJ–2, is being developed based on the Chinese Y–8X transport aircraft.[23] Both the KJ–2 and the KJ–2000 are to be equipped with data links compatible with the J–7, J–8, J–10, JH–7, and H–6. Both of the domestic AEWs carry phased-array radar.[24] The PLAAF is also making efforts to modernize its transport fleet, focusing primarily on the Il-76/Candid, the Chinese Y–8 and Y–9, and the Soviet Antonov An-12. Along with these dedicated transports, Chinese airlines fly large numbers of commercial aircraft that could be pressed into service in a crisis.

Future Size

The preceding section has examined the modernization programs under way and the aircraft and systems that will constitute the future PLAAF. However, the ultimate size of the future force is unclear, with questions remaining about what quantity and mix of aircraft China will eventually deploy. A number of influences and perspectives will shape what the air force looks like. Leaders will have to balance modernization goals between somewhat competing sets of factors. This section describes five perspectives that may influence the future size and composition of the PLAAF.

The first perspective focuses on China's external security environment, the military missions derived from potential threats, and the air force capabilities and force structure necessary to carry out these missions. The 1991 Gulf War highlighted to the Chinese how advanced U.S. military capabilities and operational concepts could make a country vulnerable, prompting intensified efforts to build a more advanced and capable PLA. Beginning in 1993, Beijing's sense that momentum toward Taiwan independence was growing further accelerated PLA modernization. The issue of Taiwan threatened to bring China and the PLAAF into direct confrontation with the United States, a possibility made clear with the deployment of two U.S. aircraft carriers to the vicinity of the 1996 Taiwan Strait crisis. Most of the aircraft acquisitions and development programs shaping today's PLAAF were initiated prior to the leadership's intensified concern about Taiwan independence, including the acquisition of Russian Su-27/Flanker fighters, the J–10 fighter development program, and initial efforts to build tankers and AEW/AWACS. The threat of Taiwan independence led the PLAAF to build near-term combat capabilities through purchase and coproduction of Russian multirole fighters, such as the Su-30, while decreasing the emphasis on strategic air force assets such as tankers and strategic bombers.

J–11B fighter armed with PL–8 air-to-air missile
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The general assessment of the international security environment will continue to influence overall Chinese defense budgets and the resources available for army building, but specific contingencies might shape air force modernization more directly. Some of these scenarios include a relatively benign security environment in which the air force concentrates on its air defense mission. This would imply greater emphasis on air bases and air defense assets along China's land and maritime borders and a relative neglect of long-range strike capabilities. This scenario would see decreased emphasis on long-range bombers and aerial refueling capabilities, including tanker acquisition. Another scenario would have the air force focusing on power projection into the East China and South China Seas to ensure a PLAAF capability to protect vital Chinese sea lines of communication. This would imply greater emphasis on aerial refueling capabilities, overwater flight training, long-duration maritime patrol and intelligence collection, and perhaps strategic bombing capabilities. This scenario might bring the PLAAF into conflict with the PLAN naval aviation over responsibilities for these missions.

A third scenario would involve greater attention to potential threats from Japan and India. This scenario might also include preparation for dangers stemming from the U.S. Air Force beyond Taiwan, which would be the most demanding scenario for the PLAAF. This would require a greater emphasis on training operations in preparation for well-equipped air forces. Geographically, the PLAAF might redeploy its assets in order to increase its capabilities to strike India and, to a lesser extent, Japan. The lack of overseas bases constrains the contributions that tactical aviation assets (such as multirole fighters) can make to scenarios that require long-range operations. Air refueling can help extend the operational range of tactical aircraft but is an imperfect substitute for overseas bases. Without overseas bases, the PLAAF might be at a disadvantage relative to the navy and the Second Artillery in fighting for budget resources in some scenarios.

A second means of assessing the future size for the PLAAF and Beijing's modernization choices is to look at the potential military requirements associated with China's growing international interests. Continued economic growth and global integration have increased dependence on foreign sources of energy (especially oil and gas) as well as access to international markets to maintain that economic growth. This is stimulating a more activist foreign policy that may eventually require new military missions.[25] The extent to which expanding international interests translate into new military requirements for the PLAAF will depend on how Chinese leaders decide to pursue their interests and the relative value of military instruments (especially airpower). To date, the leaders have stressed Beijing's peaceful development and downplayed the potential for using force to pursue national interests. If this approach continues, the most likely new missions for the PLAAF would be strategic airlift to support Chinese contributions to international peacekeeping, disaster relief, and evacuation of Chinese nationals from conflict zones. A

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All photos: DEFENCETALK

Clockwise from top left: Front view of FC–1 fighter; H–6 tanker refuels J–10 fighter; Joint Chinese-Pakistani air forces JF–17 fighter

more aggressive approach to resource conflicts could generate requirements for an air force capable of expeditionary operations, but this appears unlikely. This scenario would call for increased acquisition of transport aircraft.

A third approach for sizing the PLAAF would focus on the priorities of top civilian leaders, which encompass a range of strategic, developmental, and political objectives. From this perspective, the future size of the force is a function of the leadership's estimate of the return on investments in air force capabilities relative to other uses of the resources. Civilian leaders are clearly concerned with the need to keep defense expenditures in proper proportion to economic development; the 2006 Defense White Paper calls for "coordinated development of national defense and the economy." However, defense and civilian industries can have positive synergies, so leaders might support some additional military expenditures (especially in research and development) due to their benefits for the civilian economy. Civilian leaders might also view defense spending increases as a means of helping to ensure the loyalty of the military to the Communist Party. Significant portions of recent hikes in spending have been devoted to increased pay and improved living conditions for the military. Without more detailed knowledge of how Chinese civilian leaders think about the costs and benefits of various air force capabilities, it is difficult to derive a specific size for the PLAAF from this perspective.

A fourth approach would be to focus on the relative return on investment in air force capabilities compared to other military resources. The future size of the PLAAF would depend on the relative contribution airpower can make to the PLA's overall ability to perform its missions and execute its campaign plans. The PLAAF's primary mission has long been air defense, with support for ground troops an important secondary mission. The air defense mission requires close coordination of both aircraft and ground-based air defenses such as surface-to-air missiles and antiaircraft artillery.[26] Despite the longstanding secondary mission of supporting ground troops, the PLAAF has never been able to perform close air support missions for ground forces and has only had limited capability to perform bombing and interdiction missions in support of ground operations.

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The 2004 Defense White Paper describes the PLAAF responsibility "for safeguarding China's airspace security and maintaining a stable air defense posture nationwide," noting that "the Air Force has gradually shifted from [a mission] of territorial air defense to one of both offensive and defensive operations." It highlights "the development of new fighters, air defense, and anti-missile weapons" and emphasizes training "to improve the capabilities in operations like air strikes, air defense, information countermeasures, early warning and reconnaissance, strategic mobility, and integrated support."[27] The 2006 Defense White Paper stresses PLAAF efforts to speed up "its transition from territorial air defense to both offensive and defensive operations" and to increase "its capabilities in the areas of air strike, air and missile defense, early warning and reconnaissance, and strategic projection."[28] The white papers and other PLA doctrinal literature reveal that the air defense mission is now conceived as a nationwide responsibility that incorporates both offensive and defensive actions. The emphasis on offensive operations, air strikes, and strategic mobility (coupled with the PLA-wide emphasis on joint operations and joint campaigns) implies a higher priority for operations that support ground forces.

The overall balance between offensive and defensive capabilities, emphasis placed on air force missions and campaigns, and relative contributions the PLAAF can make to joint campaigns will all influence the size of the air force compared to other services. The 2004 Defense White Paper called for "giving priority to the Navy, Air Force, and Second Artillery Force," implying the need for greater investment in air capabilities. However, ground force officers remain dominant within the PLA, so parochial service considerations are likely to continue to influence resource allocation.

A fifth approach would emphasize building the PLAAF into a modern air force capable of engaging and defeating other air forces. Here the most ambitious benchmark would be the ability to engage and defeat the U.S. Air Force. A less ambitious goal would be to tackle modern Asian air forces such as those of India and Japan. This approach implies the development of advanced fighters and force multipliers such as tankers and AWACS aircraft. In terms of force structure, such an approach would emphasize additional procurement of Russian aircraft, efforts to acquire advanced Western technology for Chinese platforms, and a reluctance to procure less capable indigenous systems.

These five perspectives outline different ways of thinking about the future size of the PLAAF. Each suggests a different view about the role the air force might play in national security and what force structure would be appropriate. However, none provides a straightforward prediction as to what the future force will look like. In reality, the PLAAF force structure will be the product of a political process that incorporates some aspects of each of these perspectives.

How top civilian leaders assess the overall international security environment and the resources they are willing to devote to military modernization will shape the overall budget and policy environment in which air force modernization takes place. A leadership reassessment of China's security environment might change the relative priority and resources devoted to modernization.

For example, the need to prepare for a conflict over Taiwan independence has been a key justification for increased military spending in recent years. If the Taiwan situation appears more stable and the international environment is relatively benign, the need for increased military spending may be less persuasive to civilian leaders focused on domestic priorities, such as promoting development and reducing inequality between urban and rural parts of China. There are some indications that PLA strategists are beginning to look beyond the Taiwan issue and articulate the rationale for building a military capable of global operations in defense of China's sea lines of communication and expanding global interests. It is unclear how persuasive this rationale will be to national leaders. Conversely, a downturn in Sino-U.S. relations could reinforce concerns about potential threats posed by the United States and cause an increased emphasis on military modernization.

Other factors will also influence military budgets, including China's ability to sustain its rapid economic growth, whether it avoids a serious economic or financial crisis, the relative weight placed on military expenditures compared to other leadership priorities, and additional costs for social spending as the population ages.[29] Barring an economic collapse, air force budgets are likely to increase even if China's recent pace of double-digit increases in real defense spending slows. Nevertheless, budget limitations will still force leaders to make difficult choices about air force modernization.

Modernization Paths

In addition to the strategic perspectives, PLAAF force structure will be shaped by narrower decisions about the division of labor on air defense and conventional strike missions, proper tradeoffs between foreign and domestic production, high-tech versus lower-cost systems, and relative emphasis on support aircraft. The most likely path for PLAAF modernization is to maintain present efforts to build the air force using a variety of means, including ongoing procurement of advanced aircraft from Russia, continued domestic efforts to design and produce advanced aircraft, and incorporation of imported engines, avionics, and munitions into Chinese aircraft designs. The preference is to gradually shift away from foreign procurement and use of foreign components as the domestic aviation industry's capabilities to produce advanced aircraft and components improve.

Three variations on this force modernization path illustrate alternative possibilities.

Efforts to Maximize Capability Quickly. This path would likely flow from a leadership assessment that China's security environment was deteriorating and that more resources needed to be devoted to accelerate military modernization. The likely consequences would be increased procurement of foreign aircraft, redoubled efforts to acquire foreign AWACS, tanker, and transport aircraft, and accelerated production of both high- and medium-quality indigenous aircraft. Efforts to replace imported components with Chinese-produced equivalents would be deemphasized in favor of buying increased stocks of critical foreign components. Given procurement and production lead times, this scenario would require at least 2 to 3 years to produce substantial gains in capability. The PLAAF's ability to absorb and employ additional aircraft would be constrained by its capacity to train pilots and maintenance personnel and the time needed to upgrade units to operate more advanced aircraft.

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A High-Tech Air Force. This path would emphasize advanced aircraft, support systems, and command, control, communications, computers, and intelligence capabilities to integrate aircraft into informationalized operations. The PLAAF would focus procurement on Russian fighters and possibly the J–10 fighter while procuring few if any FC–1 or JH–7 aircraft. China might also explore "co-development" of new advanced aircraft with Russian partners as a means of upgrading its aircraft inventory and improving the research and development capability of its defense industry. The PLAAF would retire older aircraft as more capable replacements entered the force in order to focus its resources on advanced aircraft. Investment in support aircraft such as AEW/AWACS and tankers would be a priority, with renewed efforts to procure foreign platforms and technology combined with intensified indigenous development. The PLAAF would resist efforts to replace foreign engines and avionics with Chinese-produced equivalents that did not deliver the same performance or reliability.

A Domestically Produced Air Force. This path would emphasize indigenous efforts to produce advanced weapons and seek to avoid reliance on foreign suppliers. It implies less emphasis on procurement of Russian aircraft, increased purchases of J–10 fighters (and possibly FC–1 and JH–7 aircraft), and enhanced efforts to replace foreign engines and avionics with indigenous equivalents. Development of force multipliers such as AEW/AWACS, tankers, and transports would depend on how quickly the defense industry's research and development efforts progressed. (A spiral development model where initial capabilities were deployed and then improved over time would be a possibility.) This approach implies a more relaxed pace of modernization but would lay a firmer foundation for future Chinese efforts to develop advanced aircraft. This path would likely result from leadership confidence that the security environment was improving and that a military conflict was unlikely in the midterm.

The People's Liberation Army Air Force hopes to build a force consisting primarily of advanced aircraft integrated with effective support systems, with the capability of conducting offensive strike missions against ground and naval targets and effective air defense against advanced militaries. This air force would be capable of conducting and supporting joint operations and would rely heavily on networking and informationalization to employ airpower effectively. These aspirations will likely be constrained by the current technological limitations of the Chinese aviation industry and by the resources made available to support defense modernization. One of the biggest uncertainties is whether the air force will choose (or be forced) to procure large quantities of less capable aircraft to support the Chinese aircraft industry or to support the leadership's goal of indigenous innovation and self-reliance. Decisions about

how many J–10, FC–1, and JH–7 fighters to procure will be a key indicator. In theory, the defense reorganization of 1998 that established the General Armaments Department should give air force requirements greater weight in procurement decisions, but this may not be true in practice.

Chinese leadership perceptions of the international threat environment (to include assessments of the likelihood of a crisis over Taiwan or a conflict with the United States) and budget allocations will have a significant influence on the overall size of the future People's Liberation Army and the speed with which modernization takes place. Nevertheless, it is already clear that the future People's Liberation Army Air Force will be a significantly smaller but more capable air force. **JFQ**

NOTES

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