

# CHINA'S CRUISE MISSILE PROGRAM



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**D**URING OPERATIONS Desert Shield and Desert Storm, the U.S. Navy launched 288 Tomahawk land-attack cruise missiles. Eighty percent hit their targets.<sup>1</sup> The Tomahawk is so accurate that after a 1,600-kilometer (km) journey, its 454-kilogram (kg) warhead usually impacts within 3 meters of the aim point.<sup>2</sup> The People's Republic of China took note of the magnificent performance of these weapons and focused its efforts on acquiring cruise missiles.

During the 1991 Persian Gulf war, China also learned that the United States is too powerful to be challenged directly by military means. Having a stockpile of cruise missiles would enable China to influence U.S. decisions without becoming involved in a major conflict. Cruise missiles would offer China a precision-strike capability at a much lower cost than developing and training a modern air force would. Missiles require less maintenance than a fleet of modern jet aircraft; are suitable against land- and sea-based targets; are relatively cheap and reliable; and have few vulnerable parts.<sup>3</sup> Cruise missiles also do not entail political risks because, unlike disgruntled pilots, they cannot defect.<sup>4</sup>

China's effort to acquire cruise missiles is a disturbing development. Robert Walpole, a national intelligence officer for strategic and nuclear programs, testified before Congress that "[w]e may not be able to provide much, if any, warning of a forward based ballistic missile or land-attack cruise

*The views expressed in this article are those of the author and do not necessarily reflect the position of the Department of the Army, the Department of Defense, or any other government office or agency.—Editor*

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*China [reportedly] paid several million dollars to al-Qaeda to acquire two unexploded U.S. Tomahawk cruise missiles. The missiles had been fired during the 1998 raid against Osama bin Laden's terrorist training camps in Afghanistan. If true, Chinese engineers now have insight into some of the latest long-range cruise missile technologies.*

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missile threat to the United States. Moreover, land-attack cruise missile development can draw upon dual-use technologies."<sup>5</sup>

## **Missile Acquisition**

Technologies available on the commercial market have eliminated many of the barriers to cruise-missile proliferation, and many components used in cruise missiles are common to commercial aircraft. Companies manufacture cruise missile airframes using the same technologies as for manufacturing light aircraft. A country like China, which can build manned aircraft, can easily produce cruise missiles. China is also acquiring these systems by direct purchase and indigenous development.

**Direct purchase.** The best option for acquiring missiles is to procure the entire cruise missile system directly from another country. The National Air Intelligence Center (NAIC) estimates that by the end of the decade, at least nine countries will be capable of producing land-attack cruise missiles.<sup>6</sup> Many such countries will offer their cruise missiles for export in order to maintain their military industrial complex because their nation's defense budgets are in

The Delilah 1 antiradiation cruise missile.

www.israeli-weapons.com

***With TAAS Industries of Israel, China co-developed the air-launched, 400-km Delilah antiradiation cruise missile. Carrying a 54-kg payload, with an accuracy of less than 91 meters, these radar-hunting weapons can shut down Taiwanese missile defense sites and early-warning radar, leaving the door open for devastating air and missile strikes.***

decline. This rapid increase in the number of cruise-missile suppliers means that China will find itself seeking cruise missiles during a “buyer’s market.” Purchased missiles will give China an immediate precision-strike capability and the opportunity to use a proven system.

Since the 1989 Tiananmen Square incident and the curtailment of U.S. foreign military sales to China, China has turned to Russia to acquire most of its current weapons systems and has cloaked its military development in secrecy. China’s People’s Liberation Army (PLA) subscribes to Deng Xiaoping’s strategy of hiding capabilities to maximize options for the future.<sup>7</sup> It is difficult, therefore, to assess the full extent of China’s cruise missile acquisition program. However, the open literature suggests that China has purchased the Russian Kh-41 Moskit supersonic, sea-skimming, anti-ship cruise missile (ASCM).

As an air-launched ASCM, the Kh-41 Moskit has a range of 250 kilometers, can attack ships at speeds greater than Mach 2, carries a 200-kg payload, and can make 10-G turns to defeat a ship’s defensive capabilities.<sup>8</sup> The Kh-41 can “defeat U.S. Navy Aegis ship defense systems and destroyers,” which is daunting because the U.S. and Japan expect the

Aegis to play a key role in any future Japanese or U.S. theater missile defense system.<sup>9</sup> New Su-27 fighters and Su-30 long-range interceptors equipped with Kh-41s give China the capability to sink U.S. aircraft carriers. The U.S. Navy has only limited defenses against such capability.<sup>10</sup>

China plans to acquire the supersonic SS-N-26 Yakhont ASCM to place on its new Sovremenny-class destroyers. The SS-N-26 has a range of 300 kilometers and flies at just 5 meters above the sea surface, which enables it to defeat a ship’s defenses. The Su-30 interceptor can also carry the missile, enhancing the PLA’s air dominance over the Taiwan Strait and other contested areas of the South China Sea.<sup>11</sup>

China is also trying to acquire the Russian 3M54 Club ASCM, which can be launched from surface ship vertical launchers or submarine torpedo tubes, has a range of 300 kilometers, and flies at supersonic speeds to attack its target.<sup>12</sup> If China continues to acquire more capable cruise missiles, it will soon be able to threaten political, military, and economic targets in Taiwan, Japan, and beyond.

**Indigenous development.** China is trying to manufacture its own cruise missiles to deliver conventional and unconventional payloads. This is a time-consuming, technically challenging, and costly endeavor, but it offers China an opportunity to strengthen its manufacturing and technical capabilities, and it could become a source of national pride.

The biggest challenge to producing cruise missiles is acquiring critical components. However, many enabling technologies used to produce cruise missiles are available on the commercial market, and many cruise missile components are dual-use items; that is, they have both a civilian and a military use. The airframe structures, propulsion systems, and guidance systems on cruise missiles are staples of commercial aviation. Because manned aircraft are exempt from export controls, the inertial navigation systems, flight controls, jet engines, stealth materials, software, and other technologies designed for civilian and military aircraft can easily be transferred to cruise missiles.<sup>13</sup>

The lack of expertise in system engineering and integration can limit China’s ability to achieve repeatable results when working on intricate systems. Al-

US Navy personnel examine 3M-80 missile launchers (NATO codename SS-N-22 Sunburn) aboard a Russian *Sovremenny*-class guided missile destroyer purchased by the Chinese. The air-launched version of this cruise missile is the Kh-41 Moskit.



US Navy

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though the United States is recognized as the world leader in terms of its ability to integrate complex systems, other system engineering talent is not difficult to hire. For example, China can take advantage of Russia's poor economic conditions to purchase technical expertise in return for hard currency.

About 1,500 Russian scientists and technicians have been working in China's defense establishments since the early 1990s.<sup>14</sup> Also, the United States educates over 63,000 Chinese students a year, most of whom study science or engineering.<sup>15</sup> The ingredients and talent necessary for indigenous cruise-missile production are in place in China today. According to the NAIC, China will be able to produce a variety of new cruise missiles during this decade.<sup>16</sup>

China has already developed some cruise missiles with Russian and Israeli assistance. In 1995, China procured Russian cruise missile manufacturing technology, hired a Russian design team, moved it to Shanghai, and obtained access to Russian radar and infrared signature-reduction treatments.<sup>17</sup> This access furthered China's stealth technology development work in radar-absorbing materials that reduce a mis-

sile's radar signature by 1-1/2 orders of magnitude.<sup>18</sup>

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China is also developing two long-range cruise missiles. The first, based on the Russian Kh-65SE air-launched cruise missile, is powered by a turbofan engine, has a range of 600 kilometers, and carries a payload of 410 kg. The Kh-65SE gives China access to Western-quality navigation and guidance; stealth designs; and compact, highly efficient jet engines.<sup>20</sup> With modifications to carry more fuel, the KH-65SE can achieve a range of 3,000 kilometers.<sup>21</sup>

Other reports indicate that China is also working on a 1,500 to 2,000-km land-attack cruise missile with help from Russian technicians. This missile will have an inertial navigation system (INS), global positioning system (GPS), and terrain-matching navigation system to get it to its target.<sup>22</sup>

An EA-6B Prowler launches from the deck of the USS *Independence* after China's announcement that it will conduct live-fire war games off the coast of Taiwan, 10 March 1999.

US Army



***China, preparing for a potential conflict in the Taiwan Strait, appears to be using its armed forces as a coercive instrument of national power to force Taiwan to negotiate reunification with mainland China on Beijing's terms. These coercive military capabilities include the psychological intimidation offered by cruise missiles.***

China acquires critical enabling technology where it can. The Taipei *Times* reported that China paid several million dollars to al-Qaeda to acquire two unexploded U.S. Tomahawk cruise missiles.<sup>23</sup> The missiles had been fired during the 1998 raid against Osama bin Laden's terrorist training camps in Afghanistan. If true, Chinese engineers now have insight into some of the latest long-range cruise missile technologies, and since China is well known for producing reverse-engineered copies of products, a Tomahawk-like cruise missile might soon appear in its inventory.

Even more ominous is China's second long-range cruise missile—the newly developed YJ-83 anti-ship missile. A derivative of the Chinese C-802 ASCM, the YJ-83 has a range of 250 kilometers, can receive target data while in flight, and travel at supersonic speeds, making it difficult for ships to defend against. The YJ-83 represents a new capability to conduct over-the-horizon attacks on U.S. and allied naval forces. Chinese military experts believe the YJ-83 “indicates that longer range land-attack cruise missiles are just around the corner.”<sup>24</sup> Department of Defense (DOD) officials believe the YJ-83 is part of China's ongoing effort to develop a long-range strike capability against U.S. naval forces, especially aircraft carriers. With its 250-km range, the YJ-83 gives the PLA a new weapon that it can fire from

beyond the reach of U.S. Navy defensive systems.

The versatile YJ-83 can be launched from the air, from ships, and from submarine torpedo tubes.<sup>25</sup> The JH-7 can be armed with YJ-83s, both indigenously developed.<sup>26</sup> The JH-7 and YJ-83 combination provides the PLA with a power-projection capability of over 1,900 kilometers, which is more than adequate to cross the Taiwan Strait and put commercial shipping and Taiwan's military facilities at risk.<sup>27</sup> Usually armed with conventional, high-explosive warheads that detonate after penetrating a ship's hull, ASCMs are some of the most potent naval weapons around, packing a punch that gives China a powerful naval force even though it relies on older ships.

Another concern is the PLA's revelation of 25 H-6 cruise missile carriers at the November 2002 Zhuhai Airshow. The H-6s, each armed with four YJ-83s, can perform maritime reconnaissance, enforce a naval blockade around Taiwan, and conduct cruise missile strikes against U.S. bases in Okinawa.<sup>28</sup> The United States will not find it easy to defend its forward bases against this emerging threat. On 3 March 2003, the PLA's Air Force headquarters confirmed that, in keeping with the PLA's strategy that the best defense is a good offense, China had modified its bombers to carry cruise missiles for an offensive capability in the event Taiwan declared its independence.

## China's Cruise Missile Proliferation Efforts

Even as it acquires cruise missiles through direct purchase and indigenous development, China proliferates weapons through exports and by offering assistance to countries that desire to convert short-range ASCMs to long-range land-attack cruise missiles (LACMs). China has exported cruise missiles to various countries in East Asia, South Asia, and the Middle East.

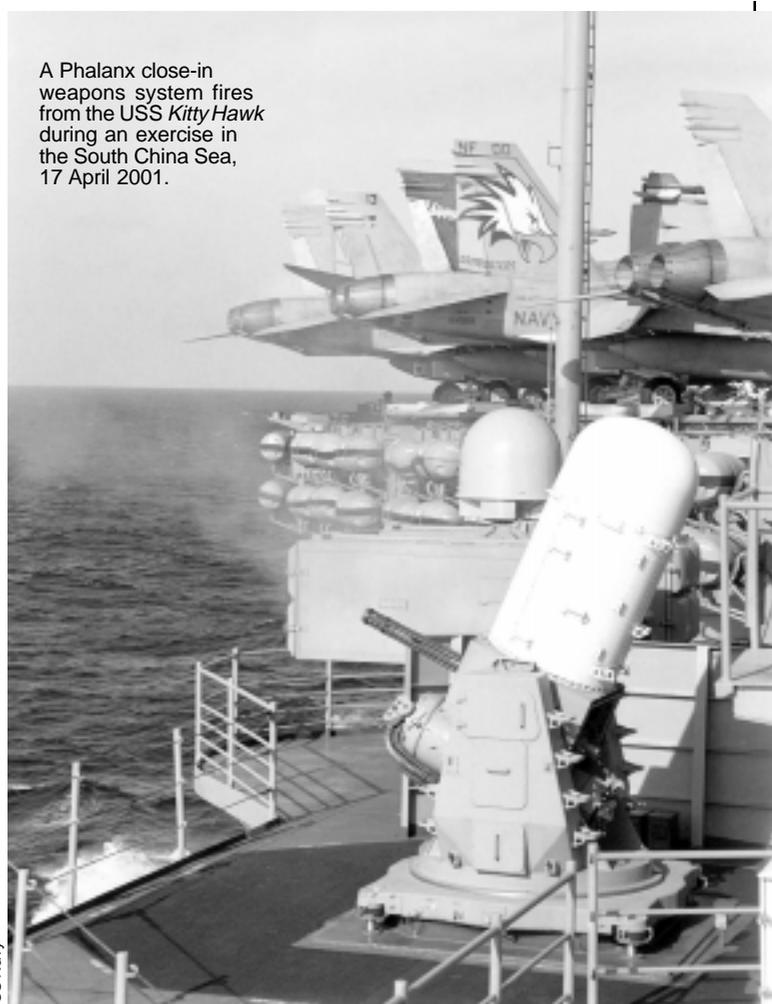
Of concern are missiles exported to Iran, such as the long-range C-802 and the shorter-range C-801 ASCMs. In 1996, Iran deployed C-802s on Qeshm Island in the middle of the Strait of Hormuz. The C-802's range could allow Iran to stop the flow of much of the world's oil supply during future conflicts because oil from Persian Gulf states passes through the Strait.<sup>29</sup> China's missile sales are not subject to export controls because China is not a member of the Missile Technology Control Regime, which is a voluntary organization to prevent the spread of certain ballistic and cruise missiles.<sup>30</sup>

Less developed countries are eager to convert ASCMs to LACMs because of commercially available LACM technologies and the approximately 75,000 ASCMs around the world.<sup>31</sup> ASCMs and LACMs have a similar technology, so only a few changes are needed to convert ASCMs to LACMs. Chinese Silkworm ASCM missiles (HY-1, HY-2, HY-3, and HY-4), which have large volumes and simple designs compared to modern ASCMs such as the French Exocet, are easy to convert to LACMs.

If increased range is the goal, modifying the Chinese turbojet-powered HY-4 is the easiest way to convert an ASCM to an LACM. The HY-4, which has a range of 150 kilometers, a payload of 500 kilograms, and a cruising speed of Mach .8, is already in the arsenals of many countries. With China's technical assistance, a determined state could easily convert the HY-4 into an LACM. An analysis by Pacific-Sierra Research Corporation found that replacing the HY-4's bulky autopilot and avionics with an integrated INS/GPS guidance package increased the HY-4's accuracy to less than 100 meters, freed up internal volume to allow more space for fuel, which in turn, provided a longer range.<sup>32</sup> Adding two short fuel plugs increases the HY-4's range to 700 kilometers.

Converting short-range ASCMs to long-range LACMs is significant. A 500-km-range LACM would allow Iran to target oil and port facilities along the Persian Gulf region. With a range of 700 kilometers, North Korea could strike key targets in Japan.<sup>33</sup> China's willingness to transfer not only cruise

A Phalanx close-in weapons system fires from the USS *Kitty Hawk* during an exercise in the South China Sea, 17 April 2001.



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missiles but expertise is of concern; doing so would enable countries such as North Korea and Iran to produce even more advanced cruise missiles indigenously. These proliferation efforts seek to counter U.S. power around the world and to make it more difficult for the United States to intervene in a conflict in the Taiwan Strait.

## Implications

China's national security strategy assumes that the United States poses a significant long-term challenge. China believes the United States seeks to contain China's power through the U.S. presence in Asia, the U.S. alliance with Japan, and U.S. efforts to expand NATO.<sup>34</sup> Consequently, the PLA has embarked on a force-modernization program to deter U.S. intervention in East Asia; its cruise-missile acquisition efforts are aimed primarily at denying a U.S. presence and power-projection capability in East Asia.



A soldier with the 82d Airborne Division prepares to launch a JLENS system, Bagram Airfield, Afghanistan, 18 July 2003. The JLENS system complements the Airborne Early Warning and Control System (AWACS) because keeping AWACS constantly aloft is expensive in terms of both time and dollars.

***The Joint Land-Attack Cruise Missile Defense Elevated Netted Sensor (JLENS) system is a promising program to counter cruise-missile threats. JLENS's focus is to develop new radar systems and the network to link various sensors in a theater of operations, including aerostat balloons as low-cost, elevated platforms for advanced sensors to conduct long-term surveillance of potential attacks.***

China, preparing for a potential conflict in the Taiwan Strait, appears to be using its armed forces as a coercive instrument of national power to force Taiwan to negotiate reunification with mainland China on Beijing's terms.<sup>35</sup> These coercive military capabilities include the psychological intimidation offered by cruise missiles.

Cruise missiles also offer China a cost-effective way to level the playing field and eliminate the effects of the technology gap between it and the United States. With cruise missiles, the PLA can conceal its intentions and use a relatively small force to dominate an enemy by means of the element of surprise, a strategy consistent with the PLA's operational theory of catching the enemy unprepared.<sup>36</sup>

The U.S. military must deliberately plan and prepare against China's growing cruise missile threat. The U.S.-China Security Review Commission estimates that by 2005, China will have the military capability to reunify with Taiwan by force.<sup>37</sup> Analysts indicate that China will fit its entire fleet of new SU-27 strike aircraft with long-range ASCMs by 2010. This should be of great concern to U.S. policymakers because the General Accounting Office reports that the U.S. Navy has "only limited capabilities against cruise missile threats."<sup>38</sup>

Cruise missiles will be difficult to defend against because of their short flight time across the Taiwan Strait and because they can fly at low altitudes and attack from any direction. China's military strategy calls for quick, massive air strikes against military and civilian targets in Taiwan within 24 hours. After this, reunification talks would begin—under China's terms.<sup>39</sup>

Another PLA option is a naval and air blockade of Taiwan.<sup>40</sup> A blockade would cripple Taiwan economically without damaging its infrastructure. China's Sovremenny destroyers with Moskit and Yakhont ASCMs, H-6 bombers armed with YJ-83 cruise missiles, Su-27 air-superiority fighters, and Su-30 long-range interdiction aircraft could enforce a complete naval and air blockade of Taiwan.

The United States would most likely respond to a blockade of Taiwan by sending in aircraft carrier battle groups on patrol in the Pacific and fighter aircraft stationed in Japan. However, U.S. aircraft carriers could be vulnerable to a saturation raid by Chinese cruise missiles. According to defense experts, the fleet's capabilities against Moskit and Yakhont ASCMs are "questionable."<sup>41</sup> Even minor damage to the carrier flight deck by an ASCM strike would stop air operations for hours, hours that could prove to be decisive in a high intensity battle.

Chinese bombers and fighters armed with long-range cruise missiles can put U.S. military bases and force-generation capabilities in Okinawa at risk. In effect, these weapons raise the political, economic, and military costs of U.S. intervention. If the PLA could disrupt or delay U.S. intervention, China could easily overwhelm Taiwan. To defend its forward-deployed forces against this emerging threat, the United States must improve existing air defenses.

Because they are physically small and fly at low altitudes, cruise missiles are difficult to detect. Still, a mix of elevated and netted sensors can detect them while they are still over the horizon, identify them as cruise missiles (not small commercial aircraft), and quickly launch interceptors.

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## Challenges

China knows it is in no position to directly challenge U.S. military might, so it is acquiring the capabilities to hold U.S. forces at risk and to raise the

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military, political, and economic cost of any U.S. intervention in East Asia. Cruise missiles are asymmetric weapons that China could use to influence the will of U.S. leaders while avoiding a major conflict.

China believes asymmetric capabilities enable "the inferior to defeat the superior" and emphasizes operations to disrupt or delay an enemy's campaign.<sup>43</sup> China aims its cruise-missile acquisition program primarily at denying U.S. naval operations and striking at U.S. forward-deployed forces. China's cruise missile systems could hold high-value U.S. assets at risk, and the threat of these weapons against U.S. forces could deter the United States from intervening on Taiwan's behalf. If the PLA can disrupt or delay U.S. intervention, it can easily overwhelm Taiwan.

The United States needs a deployable cruise-missile defense system in East Asia. JLENS promises to detect and track advanced cruise missiles at a relatively reasonable cost. If the United States does not have an effective cruise missile defense capability, China might indeed be able to deter the United States from defending its allies. **MR**

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