



# Inside China's military buildup

BY DAVID LAGUE, JOHN SHIFFMAN AND DUFF WILSON

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# China's blue water breakout

Chinese generals boast of “dismembering” the Japanese archipelago in naval exercises aimed at projecting sea power

BY DAVID LAGUE

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**I**n late October, flotillas of Chinese warships and submarines sliced through passages in the Japanese archipelago and out into the western Pacific for 15 days of war games.

The drills, pitting a “red force” against a “blue force,” were the first in this area, combining ships from China’s main south, east and north fleets, according to the Chinese military. Land-based bombers and surveillance aircraft also flew missions past Japan to support the navy units.

In official commentaries, senior People’s Liberation Army (PLA) officers boasted their navy had “dismembered” the so-called first island chain — the arc of islands enclosing

China’s coastal waters, stretching from the Kuril Islands southward through the Japanese archipelago, Taiwan, the Northern Philippines and down to Borneo.

Named Manoeuvre 5, these were no ordinary exercises. They were the latest in a series of increasingly complex and powerful thrusts through the first island chain into the Pacific. For the first time in centuries, China is building a navy that can break out of its confined coastal waters to protect distant sea lanes and counter regional rivals.

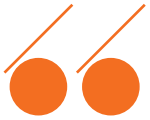
Beijing’s military strategists argue this naval punch is vital if China is to avoid being bottled up behind a barrier of U.S. allies, vulnerable to a repeat of the humiliation suffered at the hands of seafaring Europeans and Japanese through the colonial period. “It tells Japan and the United States that they are not able to contain China within the first island chain,” says Shen Dingli, a security expert and professor at Shanghai’s Fudan University. “So don’t bet on their chances to do so at a time of crisis.”

In the process, the rapidly expanding PLA navy (PLAN) is driving a seismic shift in Asia’s military balance. China, traditionally an inwardly focused continental power, is becoming a seagoing giant with a powerful navy to complement its huge ship-borne trade.

“As China grows, China’s maritime power also grows,” says Ren Xiao, director of the Centre for the Study of Chinese Foreign Policy at Fudan University and a former Chinese diplomat posted to Japan. “China’s neighbouring countries should be prepared and become accustomed to this.”

China’s strongly nationalistic Communist Party leader, Xi Jinping, has thrown his personal weight behind the maritime strategy. In a speech to the Politburo in the summer, Xi said the oceans would play an increasingly important role this century in China’s economic development, according to accounts of his remarks published in the state-controlled media.

“We love peace and will remain on a path of peaceful development but that doesn’t mean



China and Japan have to come to terms with the fact that their militaries will operate in close proximity to each other.



giving up our rights, especially involving the nation's core interests," he was quoted as saying by the official Xinhua News Agency.

### BLUE WATER AMBITIONS

**China is also making waves in the South China Sea**, where it has territorial disputes with a number of littoral states. But it is the pace and tempo of its deployments and exercises around Japan that provide the clearest evidence of Beijing's "blue water" ambitions. Fleets of pale grey, PLA warships are now a permanent presence near or passing through the Japanese islands.

An acrimonious standoff over a rocky jumble of disputed islands in the East China Sea, known as the Senkakus in Japan and Diaoyu in China, has given China an opportunity to flex its new maritime muscle. Beijing has deployed paramilitary flotillas and surveillance aircraft to this zone for more than a year, where they jostle with Japanese counterparts.

Tension flared dangerously last week when China imposed a new air defence zone over the islands, demanding that foreign aircraft lodge flight plans with Beijing before entering this area. In defiance of the zone on Tuesday, two unarmed U.S. B-52 bombers on a training mission flew over the islands without informing Beijing. The flight did not prompt a response from China.

"The policy announced by the Chinese over the weekend is unnecessarily inflammatory," White House spokesman Josh Earnest told reporters in California, where President Barack Obama is traveling.

Washington and Tokyo immediately signaled they would ignore the restriction. The Obama administration also reminded China that the treaty obliging the United States to defend Japan if it came under attack also covered the disputed islands.

Particularly unnerving for Tokyo are the increasingly common transits of powerful Chinese naval squadrons through the narrowest

straits of the Japanese archipelago, sometimes within sight of land.

This puts East Asia's two economic giants, both with potent navies, in direct military competition for the first time since the 1945 surrender of Japan's two million-strong invasion force in China. Drawing on a reservoir of bitterness over that earlier conflict, the demeanour of both sides signals this is a dangerous moment as U.S. naval dominance in Asia wanes. Even if both sides exercise restraint, the risk of an accidental clash or conflict is ever present.

"China and Japan have to come to terms with the fact that their militaries will operate in close proximity to each other," says James Holmes, a maritime strategist at the U.S. Naval War College in Newport, Rhode Island, and a former U.S. Navy surface warfare officer. "Geography compels them to do so."

### COORDINATED CROSSING

**As the Manoeuvre 5 drills got under way, PLA Senior Colonel Du Wenlong said he was looking forward to units from the three regional Chinese fleets simultaneously crossing three key choke-points — two through the Japanese islands, and one between Taiwan and the Philippines, according to reports in the official Chinese military media. It is unclear if the warships performed a coordinated transit. But the exercises and the response of the Japanese military contributed to a spike in tension.**

"The PLAN has cut up the whole island chain into multiple sections so that the so-called island chains are no longer existent," Colonel Du was quoted as saying.

In this and earlier exercises, the PLA provided daily commentaries and details of the ships, courses and drills, with pointed mention of transit points past Japan.

PLA officers or military commentators, in typical communiqués, say China has "demolished" or "fragmented" the island chain in a "break-through" into the Pacific — language that suggests the crossings are somehow opposed rather than



We will express our intention as a state not to tolerate a change in the status quo by force.



legal transits through international waters.

Tokyo dispatched warships and aircraft to track and monitor the Chinese fleet in response to the latest drills. Japanese fighters also scrambled to meet Chinese bombers and patrol aircraft as they flew out to the exercises and back. Japan's defence ministry later released surveillance photographs of a Chinese H6 bomber flying between Okinawa and Miyako Island on Oct. 26.

All this attention clearly irritated the PLA leadership. Beijing accused Japan of a "dangerous provocation" and lodged a formal diplomatic protest, complaining that a Japanese warship and aircraft disrupted a live fire exercise.

While the drills were under way, Japanese Prime Minister Shinzo Abe warned that his country would not be bullied. "We will express our intention as a state not to tolerate a change in the status quo by force," he told a military audience on Oct. 27. "We must conduct all sorts of activities such as surveillance and intelligence for that purpose."

Naval commentators suggest the bellicose rhetoric shows that both sides are struggling to adjust to their new rivalry. "Chinese hardliners do regional tranquility no service by talking about splitting Japan and so forth," says American naval strategist Holmes, co-author of an influential book on China's maritime rise, "Red Star Over the Pacific," with colleague Toshi Yoshihara. "And, the Japanese do regional tranquility no service by being alarmed when China's navy transits international straits in a perfectly lawful manner."

Part of the problem for Japan is that it has been slow to adjust to China's rise, according to some Chinese foreign policy analysts, and is now excessively anxious. "For so many years they looked down upon China which was big but weak," says Ren, the former Chinese diplomat. "Now the situation is different and they have to face up to the new reality."

Some senior Japanese officers accept that China is within its rights to traverse international waters between the Japanese islands. Likewise,

they say, the Japanese are entitled to track and monitor these movements and exercises.

"The Japanese Self Defence Force's reaction is also in full compliance with international laws, regulations and customs," says retired Vice Admiral Yoji Koda, a former top Japanese naval commander. Koda adds that the Japanese military routinely monitors Russian naval operations around Japan without friction or protest.

## RISE OF SEAFARING POWERS

The ideological keel of Beijing's modern bid to become a maritime power was laid down as China's economic revival in the early 1980s flowed through into sharply increased military budgets. The starting point for China's leading maritime thinkers is the trauma of European and Japanese colonization.

"The Qing Dynasty was badly defeated in naval warfare by overseas imperialist powers, leading to the decline and fall of the dynasty," wrote Zhang Wenmu, a professor at Beijing University of Aeronautics and Astronautics, in a 2010 article published in China's official state media.

Another premier Chinese maritime strategist is Ni Lexiong, a professor at Shanghai's University of Political Science and Law. He has documented how China's failure to properly fund its navy was a factor in its 1895 defeat in the first Sino-Japanese war and the subsequent loss of Taiwan.

Zhang and Ni are regarded as China's leading advocates of the theories of the American naval officer, strategist and historian Alfred Thayer Mahan. Both subscribe to one of Mahan's principal ideas: A truly powerful nation must have thriving international trade, a merchant fleet to carry these goods and a strong navy to protect its sea lanes. Mahan's works, considered visionary in the late 19th and early 20th centuries, are still avidly read and absorbed in Chinese naval schools, Chinese military analysts say.

The rise of earlier seafaring and trading powers — Portugal, Spain, Holland, Great Britain, the United States and Japan — have also provided important lessons for strategic



Control of Taiwan would open a huge breach in the first island chain around China.



thinkers. The vision and influence of the late Admiral Liu Huaqing, known as the father of the modern Chinese navy, also remains strong.

Liu, who died in 2011, rose to become overall commander of the PLA and a member of the Communist Party's Politburo standing committee, the country's supreme ruling body. While Liu was head of the navy in the 1980s, it was an obsolete, coastal fleet. But Liu was determined that China needed a blue-water fleet and aircraft carriers if it was to match the power of the United States and its allies.

Fundamental to the thinking of many Chinese strategists and military and political leaders is the conviction that China would be foolish to rely on the United States to protect its shipping. They acknowledge that the U.S. Navy has guaranteed freedom of navigation since the end of World War Two, underwriting an explosion in global trade to the benefit of most other countries, including China.

The figures bear this out. China last year overtook the United States as the world's biggest trader, according to official data from both countries. Up to 90 percent of Chinese trade is carried by sea, including most of its vital imports of energy and raw materials, shipping experts estimate. But Beijing's strategists fear the U.S. could interrupt this trade at a time of crisis or conflict.

Almost all of China's naval thinkers also agree that recovering Taiwan is crucial to realizing the dream of maritime power. Restoring "national unity" is a longstanding goal of the ruling Communist Party. But the self-governing island itself has immense strategic value, sitting astride sea lanes that are also vital for Japan and South Korea.

Control of Taiwan would open a huge breach in the first island chain around China. PLA warships and aircraft based on the island could extend China's military reach far into the Pacific and much closer to Japan, without the need to first pass through potential choke points or channels in the chain.

"Taiwan is a part of the first island chain,"

says Fudan University's Shen. "Instead of being integrated into mainland China, it has been used as a part of the U.S. first island chain strategy."

## ABANDONING THE MAOIST STRATEGY

**China's turn to the sea has boosted the status** of the navy, long the poor relation of the armed forces. The PLA, traditionally a massive ground force, was built around the Maoist strategy of drawing an invading enemy deep into the hinterland, where it could be destroyed through attrition.

Military strategists say this was thinkable before the country industrialized. Now that the eastern seaboard is the throbbing engine of the world's second-ranked economy, fighting a war here would be catastrophic for China, win or lose, they say. Far better to meet challenges at sea or on the territory of a hostile nation.

The late Admiral Liu is credited with sharply increasing the navy's share of the defence budget, outlays that have paid for a rapidly expanding fleet. In its annual assessment of the Chinese military published earlier this year, the Pentagon said the Chinese navy, now the biggest in Asia, deployed 79 major surface warships and more than 55 submarines, among other vessels. And the PLAN last year commissioned its first aircraft carrier.

Wu Shengli, the powerful admiral who now leads this force, is widely regarded as the most influential naval officer since Admiral Liu. Wu is also a member of the Central Military Commission, China's top military council.

PLAN warships are now highly visible in all major oceans, with an active schedule of ship visits to foreign ports. The Chinese navy is part of the international anti-piracy force in the Gulf of Aden. These deployments are heavily publicised in the state-controlled media as the navy becomes a symbol of China's growing international prestige.

This openness also applies to combat exercises. The U.S. and other major powers



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routinely chastise China for a lack of transparency surrounding its three-decade military build-up. But it is difficult to accuse Beijing of secrecy when it comes to recent naval operations near Japan. The state-run media and a stable of specialist military newspapers, journals, web-sites and television channels devote blanket coverage to the deployment of warships, submarines, aircraft and patrol vessels on missions near China's neighbour.

Some military commentators say Japan shouldn't overreact to these messages, as they are primarily aimed at a domestic Chinese audience.

"The PLAN is a relatively young organisation building up their capabilities and certainly not the 'senior service' in China," says Alessio Patalano, a specialist on the Japanese military at King's College in London. "It's important for its leadership and its members to establish their credentials and increase their profile."

For exercise Manoeuvre 5, the Chinese navy followed the U.S. practice of embedding journalists. Regular television reports from the Type-052 guided missile destroyer Guangzhou showed the 6,500 tonne warship ploughing through heavy seas on route to the exercises. Officers and sailors were interviewed at battle stations while they tracked targets and prepared missile launches.

Tokyo is keeping careful score. In its latest Defence White Paper, published in July, the Japanese military charted steadily expanding PLA deployments near Japan since 2008, documenting bigger visiting fleets, more powerful warships and increasingly complex exercises involving helicopters, support vessels and land-based aircraft.

## ENCIRCLEMENT

After decades confined to its coastal seas, the PLAN began regular voyages from the East China Sea into the Pacific early last decade. At first, Chinese warships mostly used the wide Miyako Strait between Okinawa and Miyako Island, according to statements from the Chinese

and Japanese militaries. Since then, in a series of firsts, they have transited all the other important channels between the Japanese islands, according to Japan's White Paper.


Then came encirclement.

In July, five PLA warships steamed out of the Sea of Japan through the Soya Strait, known as the La Perouse Strait in Russia, which divides the Russian island of Sakhalin and Hokkaido. The Chinese fleet continued on around the Japanese islands and back to China.

"The move marks the first trip by the Chinese navy circumnavigating the Japanese archipelago," said a report on China's official military website.

Some Chinese strategists reject fears that deploying a powerful navy increases the odds of conflict. "I am more confident than many outside observers that China will behave out of the nation's fundamental interests, namely, to take a path of peaceful development," says Ren. "There is no reason to change this option."

For Japan, there might even be an upside. Chinese warships used to be mostly confined to home waters, and thus hidden. Now, they can now be monitored.

"The more exercises the PLAN conducts on the high seas around Japan, the better for the JMSDF to judge and collect the PLAN's warfare capabilities and intents," says Koda, the retired Japanese admiral. "The PLAN cannot intimidate Japan by these types of exercises." 

*Corrects typo in the word "defiance" in the 12th paragraph.*  
Cover photograph by **Carlos Barria**  
Editing by **Bill Tarrant**



# In the satellite technology race, China hitched a ride from Europe

The Beidou navigation system — developed with EU help — is a striking example of Beijing's global dragnet for military know-how

BY DAVID LAGUE

December 22 Hong Kong

**C**hinese leader Xi Jinping has exhorted the People's Liberation Army "to get ready to fight and win wars" and "to win regional warfare under information technology-oriented conditions."

For now, China's sprawling defense industries and research laboratories are relying on a high-tech short cut. In a vast and carefully coordinated effort, China is scouring the globe for know-how that can be coupled with domestic innovation to produce strategic weapons and equipment.

A year ago this month, technicians at a maker of satellite navigation gear in the Belgian town of Leuven worked over the year-end holidays to

test one such breakthrough. The Belgians loaded their receivers with a technical code for a new satellite-navigation system called Beidou, or Big Dipper.

The signal from the new Chinese system provided a surprisingly accurate position fix. "It was certainly better than you would expect from somebody doing this for the first time," says Jan Van Hees, sales manager for privately owned Septentrio, which plans to sell civilian equipment that can use Beidou's signal.

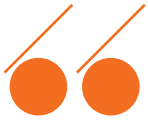
It wasn't beginner's luck, though. China had help — and it came from European Union headquarters in Brussels, just down the road from Leuven.

Know-how for the Beidou Navigation System, according to interviews with European researchers, a review of diplomatic cables and articles from military and technical journals, came from a technology partnership between Beijing and the European Union. The Chinese essentially piggybacked on a European satellite-navigation initiative, called Galileo, that was meant to rival two existing networks: the dominant Global Positioning System of the United States, or GPS, and Russia's GLONASS.

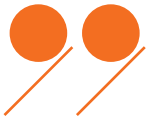
Sixteen Beidou satellites are now in orbit, with the network scheduled to expand to 30 when fully deployed by 2020. Europe's Galileo is expected to become operational only next year with 18 satellites. When fully deployed by 2020, the EU constellation will also have 30 satellites.

Senior Chinese military officers have said Beidou is more important to China than manned space flight or the Chinese lunar probes now under way, according to reports in the state-run media. The successful deployment of Beidou means the increasingly potent Chinese armed forces will have an accurate, independent navigation system - vital technology for guiding the missiles, warships and attack aircraft that allow Beijing to claim great power status.

Beidou is one of the most striking examples of China's global quest to buy, copy or steal the technology it needs to close the gap with the United States and other leading military powers.



The Chinese know exactly what they want and very often know exactly where to find it.



Highly accurate satellite navigation is fundamental to modern warfare. Aerospace experts say European and U.S. know-how and equipment have been indispensable for China to design, build, launch, position, test and operate its navigation network and other satellites.

“The Chinese know exactly what they want and very often know exactly where to find it,” says Oliver Brauner, a researcher on China’s arms trade at the Stockholm International Peace Research Institute’s China and Global Security Project.

Beidou isn’t only about national defense. Beijing sees it as a commercial coup for China’s fast growing market satellite navigation services for cars, mobile phones and other applications. Belgium’s Septentrio and other Western and Chinese companies hope to capitalize by making compatible gear for sale in China and abroad.

The Chinese cabinet on Thursday approved a blueprint that envisioned Beidou capturing 60 percent of a projected 400 billion yuan (\$65 billion) market for satellite navigation services in China, according to the English language China Daily. But the report also said that 40 percent of Beidou’s satellite applications would be for military use.

The system is a triumph for the Chinese military-industrial complex. Despite an arms embargo that’s been in place since the bloody 1989 Tiananmen crackdown, the People’s Liberation Army continues to secure much of the military or dual-use technology it needs from the United States and the European Union.

### THE 863 PLAN

**Some Chinese researchers play down the role of European technology in the Chinese network.** The EU-Chinese satellite collaboration broke down before the partnership ran its course, they note, and they say one of the reasons was that Europe was withholding key technologies.

“China was regarded as a funds provider rather than an equal collaborator” in the project, says Zhang Kefei, a professor and satellite

navigation researcher at the Royal Melbourne Institute of Technology and a former president of the International Association of Chinese Professionals in Global Positioning Systems. “They could not get any real benefit from the technology transfer.”

The Chinese Ministry of Defense said in a statement that China mainly relied on home-grown research, development and manufacturing for its military technology. “The Chinese people have the talent and capability to develop and make weapons needed for state security,” the ministry said. “History has proved that, and it remains the same now and will remain the same in the future.”

Beidou fills an important hole for the People’s Liberation Army. China has invested heavily on a massive and expanding arsenal of missiles able to strike targets throughout East Asia, including U.S. bases in Japan and South Korea. Regular reports in China’s military journals and popular military press show Beidou receivers are now in use with infantry squads, amphibious landing vehicles, tanks and artillery, as the technology is adopted throughout the PLA.

Before Beidou, however, the Chinese military had to guide its hardware using civilian signals provided free by the foreign-run GPS or GLONASS. These services aren’t as accurate as specialized military signals — and can be selectively switched off. The United States openly warns it will jam the GPS signal to prevent “hostile use.” With Beidou, China can go it alone.

A generation ago, the opening salvos of the first Gulf War demonstrated to a stunned Chinese military hierarchy how satellites gave the United States and its allies unchallenged knowledge and control of the battlefield. Armed with GPS navigation and data from surveillance and communications satellites, the U.S. coalition pulverized Iraq with smart and conventional weapons. The People’s Liberation Army was rapidly modernizing at the time, but it still had no capacity to match this overwhelming advantage.





Deng  
ordained  
the 863  
campaign  
as one of  
China's  
premier  
national  
R&D  
programs.



China's military research and development complex accelerated efforts to build a rival navigation network. Space technology was already a key element of Beijing's "863 Plan." The 863 directive — named after its March '86 launch date — came from Deng Xiaoping, architect of China's modernization drive. Deng ordained the 863 campaign as one of China's premier national R&D programs, with the goal of unifying military and civilian efforts to master strategic technologies.

In all of these measures to rebuild China through modern science and technology, the PLA has been a dominant player. Military thinking, goals and organization underpin the management of China's sprawling network of research and development labs, according to experts on China's space program. From the start, incorporating foreign technology has been a top priority for domestic satellite makers.

After a series of expensive satellite launch failures in the 1980s and 1990s, China turned to some of America's leading aerospace companies for technical help. This paid almost immediate dividends for China's space and missile industry — but led to a backlash in Washington.

A Congressional committee chaired by Californian Republican Chris Cox probed the transfers of sensitive U.S. technology to China. In 1999, the Cox Report found that the United States, Germany and France had provided significant support to China's satellite programs.

In the aftermath of the report, U.S. aerospace companies Loral Space and Communications Ltd, Hughes Electronics Corp, and Lockheed Martin Corp were fined for providing technical aid to the Chinese satellite program. Lockheed Martin said that U.S. government licenses specifically allowed the transaction with the Chinese entities involved. Loral and Hughes denied they harmed American security in doing business in China.

Washington went on to restrict foreign access to satellite technology. From 1999, this effectively banned the export, re-export or transfer of this equipment or know-how to China. The

launch of U.S. satellites from Chinese territory was also prohibited.

## GALILEO PARTNERSHIP

**Blocked in America, China turned to Europe.**

European space companies had been collaborating with China through the 1990s. But tech transfers increased sharply when China in 2003 pledged to contribute 200 million euros (\$228 million at the time) to join the European Union's Galileo satellite navigation program.

Galileo was running years behind schedule. Brussels enthusiastically embraced China's involvement. European space contractors saw cooperation as an opportunity to expand access to the Chinese market while U.S. companies were effectively shut out, industry experts said.

From late 2004, the two sides signed 12 contracts, under which China would deliver key technologies for Galileo's early development, according to EU and Chinese briefing documents and European Space Agency contract announcements.

The National Remote Sensing Centre of China oversaw these projects, which were to account for 33 million euros of China's promised contribution to Galileo. The contracts also involved substantial European tech transfers, according to European space industry researchers.

The EU saw little risk. China's space sector was seen as backward. The PLA was not deemed a security threat to Europe. China's financial and political support to Galileo was also a welcome counter to U.S. opposition to the rival European network.

"That made it easy to develop this kind of partnership with China," says Nicola Casarini, security analyst at the European Union's Institute for Security Studies in Paris. "The Europeans were genuine in believing that cooperation with China was mostly civilian."

Beijing set up a special company, China Galileo Industries, to coordinate the research and development. The shareholders are some of China's top military aerospace companies.



Squabbling between the EU's many member states and companies over the funding and administration of Galileo caused indecision and delays.



They include the China Aerospace Science and Industry Corporation, a giant space contractor and missile designer and manufacturer, and the China Academy of Space Technology, a satellite and spacecraft maker.

It is unclear exactly how much European know-how was handed over. EU officials have been reluctant to discuss the transfers when questioned by participants at space industry seminars and conferences.

The European companies then involved in Galileo included the pan-European aerospace giant EADS and Thales SA of France, among others.

EADS declined comment on previous cooperation with China and referred questions on the Galileo project to the European Commission. A spokesman for the commission declined to comment, as did China Galileo Industries. Thales didn't respond to a request for comment.

Materials from a series of China Galileo Industries presentations at industry briefings in Europe and China after the deals were signed show the projects included a wide range of technology: development related to signals interference in the ionosphere; satellite positioning using lasers; measuring and predicting orbital paths; testing ground-based receivers; and search and rescue functions.

### THE BREAKUP

**Virtually all of the budgeted funds were spent** in China, and the Chinese contractors retained ownership of the resulting hardware and intellectual property, European space industry experts say. Still, tension mounted between the two sides.

The EU had always known China had plans to build a military navigation network. But it soon grew clear that China intended Beidou to compete with Galileo. The Europeans also came to realize that China was determined to extract as much dual-use technology as possible for its home-grown satellites. Brussels also grew

frustrated at China's plan to use frequencies for Beidou's military service that could overlap with Galileo's restricted signal for European government and military use.

Beijing also grew unhappy. Squabbling between the EU's many member states and companies over the funding and administration of Galileo caused indecision and delays. The EU network was supposed to enter service in 2008; this has now been pushed back to the end of next year at the earliest.

As China's know-how expanded, U.S. diplomatic cables released by Wikileaks show, American diplomats and officials urged European governments and aerospace companies to withhold sensitive technology from China in the Galileo partnership.

In discussions with U.S. diplomats, senior EU officials explained how the Chinese had exploited their links with the European project, the cables show.

After signing contracts, Chinese officials from the Ministry of Science and Technology made "shopping" visits to companies or research institutes across Europe using the agreements as authority for technology transfers, a senior EU official was quoted as saying in a 2009 cable from the U.S. embassy in Brussels. That cable also reported a senior EU official saying that "certain European-manufactured components have been transferred to China against the wishes" of the European Commission, the EU's executive body. The cable did not say what those components were.

A spokeswoman for the EU's GNSS Agency, which oversees the Galileo project, referred questions about technology transfer to China and to the the European Commission, which runs the EU. The European Commission did not respond to requests for comment.

### ATOMIC CLOCKS

**One of China's biggest coups was gaining access** to atomic clocks, a key technology Beijing needed for accurate satellite navigation, according to



The era of China relying on a foreign satellite navigation system is in the past. The era of China's Beidou has arrived.



aerospace experts and the leaked U.S. diplomatic cables.

China failed in attempts to buy these clocks from EADS, according to the leaked diplomatic cables. However, between 2003 and 2007, China bought up to 20 rubidium atomic clocks from the high-precision Swiss instrument maker Temex Time, now known as SpectraTime, according to industry experts and the diplomatic cables. Articles in Chinese technical journals suggest the Swiss clocks have been fitted to Beidou satellites.

SpectraTime, a unit of Orolia Group, declined to answer questions for this article, referring a reporter to Swiss authorities. Orolia "is known to the Swiss export authorities as a manufacturer and exporter of controlled dual-use goods," said Marie Avet, a spokeswoman for the Swiss Federal Department of Economic Affairs, but she declined to comment on "specific transactions."

Chinese companies now appear to have mastered the technology to build these clocks or reverse-engineered the Swiss versions.


A March article carried by China's state-owned China News Service reported that a research unit of state-owned China Aerospace Corp, the No. 203 Institute, began research and development on rubidium clocks in 2004. It has since successfully developed and built 10 of these clocks for Beidou satellites, the article said. "The rubidium atomic clock is the heart of a satellite navigation system," the article said.

By 2010, Galileo had become a 100-percent taxpayer financed project and came under new rules governing security, technology and procurement. And the partnership with China

was effectively dissolved. EU officials assured U.S. diplomats that no Chinese "technical staff will be working on the project and no staff of any type will be working in Brussels," according to a leaked U.S. diplomatic cable.

By then, however, China was well advanced in a hectic launch schedule for its own network. All 16 satellites in the Beidou constellation have been fired into orbit since April 2007.

The Beidou Navigation System is now playing a crucial role in China's military exercises, including the Mission Action 2013 military exercise that kicked off on Sept. 10, China's Xinhua news agency reported this month. The system demonstrated a capability of covering PLA units fighting on multiple fronts simultaneously.

"The era of China relying on a foreign satellite navigation system is in the past," Xinhua said. "The era of China's Beidou has arrived." 

Additional reporting by **Tim Hepher and Caroline Copley**  
 Editing by **Bill Tarrant and Michael Williams**



# Hunting for U.S. arms tech, China taps legion of amateurs

Beijing “floods the zone with buyers” for smuggled American military gear, leading to a 50 percent spike in arms trafficking cases since 2010, Reuters has found

BY DUFF WILSON AND JOHN SHIFFMAN

December 18 Seattle

**I**n its quest to bypass embargoes and obtain the latest U.S. military technology, China isn't only relying on a cadre of carefully trained spies.

It's also enlisting a growing army of amateurs.

Their orders come indirectly from the Chinese government and take the form of shopping lists that are laundered through companies with ties to Beijing.

The recruits who buy the weapons and system components for those companies are scientists, students and businessmen, and they appear to be motivated more by profit than ideology. As one U.S. Homeland Security official put it, the Chinese “flood the zone with buyers” — a strategy that significantly complicates U.S. efforts to stop the flow of American armaments to China.

“When you have nation-states that go outside the normal intelligence agencies and open it up to any person ... it just exponentially opens the door for bad guys,” said Robert Anderson Jr, assistant director for counter-intelligence at the Federal Bureau of Investigation.


Today, investigations into arms trafficking linked to China have swelled to at least 350 active cases - up by more than 50 percent since 2010, according to a Reuters review of confidential U.S. government records. The total number is likely higher than 350 because the count does not include many cases that began as regulatory inquiries or investigations into other crimes. U.S. officials also say their China counter-proliferation case load is growing at a faster pace than investigations linked to any other nation.

About two-thirds of the cases prosecuted by U.S. officials since 2005 involved people of Chinese ancestry, a Reuters analysis of court records shows. That includes Chinese citizens living in China or residing legally inside the United States, and U.S. citizens with family ties to China.


China's defense ministry says Beijing's efforts to modernize its military are rooted in research, not thievery. “Some people always accuse China of stealing other countries' technology when China makes progress in weaponry development,” it said in a statement to Reuters. “Such notions are baseless.”

U.S. government agents say many past cases and active investigations demonstrate how individuals who have left China — and appear to hold little allegiance to the Chinese government — have become players in Beijing's effort to procure military components.

Such was the case of Lian Yang, a 49-year-old



About a third of the cases linked to China involved military aerospace technology.



software engineer who once worked for Microsoft Corp and had family ties to an anti-government group in China. In March 2011, the father of two pleaded guilty to conspiracy to violate U.S. arms trafficking laws for buying radiation-hardened microchips and making plans to send them to China. Yang served nearly 11 months in prison and another four months under house arrest. He was released in March.

In interviews, Yang characterized his efforts as “stupid” and “wrong.” But he said the U.S. government “grossly exaggerated” what he did.

Yang said a college friend in China had approached him about buying the microchips. But that friend, Yang said, was simply a businessman like himself, looking to obtain the components for another buyer — and ultimately, for the Chinese government.

### A LOOK AT 280 CASES

Reuters reviewed confidential investigative records gathered by the FBI, including hours of secret recordings, transcripts and emails. They show Yang as an arms trafficking novice, motivated by money and casting about for others willing to help him for a cut of the profits.

In emails and transcripts from an FBI undercover operation, Yang spoke of the urgency to obtain the U.S.-made components for China's military and satellite programs.

“They're very firm, and they want it yesterday,” Yang said on one FBI recording about his buyers in China. “They want it so badly. They have the funds.”

On recordings, Yang told a family friend — who had turned government informant — that they could share in \$1 million a year in profits. Later, as his plans shrank, he was working on a much smaller sale to net a few thousand dollars.

“That's your typical case, the kind you see almost every day,” the FBI's Anderson said. “Here's a guy who's just trying to make a buck.”

Reuters reviewed 280 arms export and embargo cases brought by the U.S. federal government during the past eight years. (The

review didn't include cases involving Mexican gun smugglers, a crime that's distinct from those that jeopardize U.S. military forces). Of the 280 cases, 66 — almost one in four — involved China.

A Defense Department report to Congress this year, based on some of these investigations, said China supports its military procurement and modernization with “illicit approaches that involve violations of U.S. laws and export controls to obtain key national security technologies.”

The cases reveal layers of buyers and sellers that connect to Beijing. In one recent case, investigative records contain the names of 31 Chinese companies — almost all of them state-controlled — that sought to buy smuggled military-grade communications gear. In another case, a Chinese procurement network used a series of five bank transfers between China and California to cloak a half-million dollar purchase of satellite components.

### DRONE PARTS AND GYROSCOPES

About a third of the cases linked to China involved military aerospace technology, such as the radiation-hardened microchips. Arms traffickers have been caught in the last five years with military-grade gyroscopes and accelerometers, essential for China's space and missile programs; unmanned aerial vehicle or drone parts; and microwave amplifiers used for weapons guidance and radar jamming.

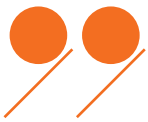
The individuals trying to obtain these components in the United States ranged from business people to professors, from citizens of China to permanent U.S. residents and American citizens. Many had access to technology that cannot legally be exported to China — or enough technical know-how to try to get it.

Among the Chinese citizens recently convicted:

- A missile expert working for a New Jersey defense contractor. He took company files, including design data for missiles, rockets



None of these guys are hardened criminals — they are businessmen.



and drones, to a technical conference in China.

- A Shanghai broker who tried to smuggle from New York thousands of pounds of high-grade carbon fiber, which can be used for military purposes.

- A Harvard-educated businessman who set up a company in Massachusetts that he used for years to smuggle millions of dollars worth of American-made electronic warfare, missile and satellite components to Shenzhen.

A handful of Americans also have been recently convicted. A man in a small New York town tried to smuggle \$100,000 worth of carbon fiber to China. An export control manager at a Pennsylvania manufacturer falsified records that allowed dozens of sensitive communications devices to be shipped to China and other nations. He later explained to authorities that he had been “too busy” to obtain the proper licenses.

“None of these guys are hardened criminals — they are businessmen,” said Craig Healy, a senior Homeland Security Investigations official who directs the U.S. government’s counter-proliferation center. “But they give very little thought to the consequences, that the little widget they are selling could be used at some point to kill an American or allied soldier.”

The United States imposed an embargo on arm sales to China after the 1989 Tiananmen Square massacre. Under the embargo, anything designed for police or military use has been banned for export to China; “dual-use” items — those that have both civilian and military applications — require U.S. government permission before they can be sent there.

Lian Yang’s own shopping list had seven items the Chinese government wanted to buy in bulk for space and missile systems. Two items could be legal to export with U.S. government permission. Five — including the microchips — were totally restricted because of their importance to weapons systems.

“You can’t operate missiles or satellites without radiation-hardened chips because the

environment is so hostile in space that the electronics will be fried or disrupted,” said James Lewis, an arms expert with the Washington-based Center for Strategic and International Studies. “Somebody in China sent out a tasking: get me those chips.”

### CHINESE BUYER

Yang had left China for the United States in 1988 and became a U.S. citizen in 1999. He sponsored his parents, too; his mother, he said in interviews with Reuters, had been persecuted by the Chinese government for her involvement in the spiritual movement Falun Gong.

Married and the father of two boys, Yang had been earning well over \$100,000 a year as a senior software engineer for Microsoft before starting his own business in 2007. His wife ran a travel agency. They owned two houses in a Seattle suburb; one was paid off and occupied by his parents.

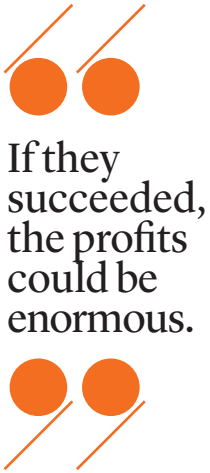
In 2009, about a year before the FBI began the sting operation that sent him to prison, Yang attended the wedding of his wife’s friends. There, he posed for a photograph next to the groom’s half-sister — former U.S. Secretary of State Condoleezza Rice. “She was very nice,” Yang recalled.

At the time, Yang’s wife was close to the bride and to the groom, Rice’s half-brother Gregory S. Bailey. Yang’s wife was the matron of honor at the wedding; one of their sons was the ring-bearer.

In the months that followed the ceremony, Yang and Bailey, himself an entrepreneur, worked together to sell water equipment and liquid crystal displays to companies in China — items that are legal to export.

“He represented himself as a person who had contacts,” Bailey said in an interview. Both say these business efforts flopped.

Rice, now a professor at Stanford University, had nothing to do with the men’s business efforts. The wedding “was the first and only time that she encountered Mr. Yang,” said Rice’s chief



If they succeeded, the profits could be enormous.

of staff, Georgia Godfrey. Rice, she added, “is not involved in or knowledgeable about his business affairs or those of Greg Bailey.”

Shortly after the wedding, one of Yang’s contacts in China began to give him lists of items in high demand: military components.

Precisely who was behind Yang’s effort remains unclear. In court filings, federal officials say the military-grade microchips Yang sought to purchase were destined for China’s satellite program. The FBI and prosecutors wouldn’t elaborate. Yang said he couldn’t discuss certain aspects of his activity until his probation ends in 2016.

According to a March 2010 email from Yang, the parts were meant for China Aerospace Science and Technology Corp, the state-owned satellite and missile maker. An official with China Aerospace’s satellite subsidiary, China Spacesat Co Ltd, said he was unaware of the Yang case.

In a May 2010 e-mail message, Bailey told Yang that he could get some of the military-restricted microchips on Yang’s shopping list from California-based Xilinx Inc. They were radiation-hardened versions that would be illegal to send to China. Even so, Bailey wrote in the email: “I will, if needed have my team purchase 87 Xilinx units, this is the number I have available, it will be 32 weeks for any additional Xilinx products.”

A Xilinx spokeswoman declined to comment.

Bailey also wrote that the LCDs — which were legal to export to China — would have to be sold first.

Bailey told Reuters that he intended only to offer the LCDs and never planned to sell the military chips, describing his proposal as “disinformation” for Yang. “Was that wise?” he said. “Absolutely not, in retrospect. But I never had any intention of doing anything illegal or anything to hurt this country and never made any provision to do so.”

In an email to Reuters this month, Bailey wrote that he “never was implicated or accused of anything,” and that he “proactively and voluntarily assisted the FBI” in the Yang case. He

wrote that the agents told him he was “a good and loyal American.”

An FBI spokeswoman in Seattle declined to comment on Bailey.

## ‘MONEY TRAIL’

**Yang and Bailey had a falling out, and Yang pursued other partners.** He reached out to a man he considered “a very close family friend.” Unbeknownst to Yang, the man alerted the FBI.

As Yang presented his plans to try to buy military technology that China sought, his family friend wore a wire.

They discussed a cover story. “The money trail is a problem,” Yang told the friend. “It would be from Hong Kong. We can say...”

“Well, the money could be an investment,” the friend suggested.

“Yeah, I mean, for R&D there’s really no problem,” Yang said.

The family friend, who had experience in international trade, played along. He told Yang that he had already approached two U.S. companies, pretending to want technology for Chinese civilian passenger jets. He said the companies told him that they don’t sell to brokers and they don’t sell to China.

The FBI recording captured Yang and the friend talking about setting up a Nevada front company that would claim to want the chips for research. Its purpose was, in part, to hide Yang’s role — and his Chinese surname.

“When they see Chinese, they automatically suspect,” Yang said, laughing.

If they succeeded, the profits could be enormous, Yang said; they could make a million dollars a year — 10 percent on \$10 million in annual sales.

“That much, uh?” the friend replied. “Wow!”

To the buyers, money was no object, Yang said. But the items needed to be of military grade.

“Of course, when you have the military stuff, it’s just simply better,” Yang added.

“Yeah,” the informant replied.

“It’s simply better and more expensive.”



Yang met the undercover agents in Seattle. They gave him the chips. He handed them the money. Within minutes, Yang was arrested.



“Sure, yeah.”

“And they want the more expensive stuff.”

### AWAY ON BUSINESS

**Andaluca is an upscale restaurant in downtown Seattle** with subdued lighting and high-backed booths that are ideal for private conversation. Over dinner there in September 2010, Yang’s family friend — the informant — introduced Yang to two associates. The men claimed to know people who could forge paperwork and get radiation-hardened microchips.

They were undercover FBI agents.

According to their secret recording, the agents drew out Yang on the ultimate buyers — the Chinese government — and the potential size of the deal.

“A huge amount of money,” Yang said.

Using a standard undercover technique, the agents steered Yang to confirm that he understood what he was proposing to do was illegal. It’s a requirement necessary to gain a conviction under U.S. arms trafficking laws.

If anything were to go wrong, one of the agents said, “We’re all sitting in the same cell together. You know what I’m saying?”

“Oh,” Yang replied.

“I’m not trying to be mean.”

“Yeah, understand,” Yang said.

Just before ordering dessert, Yang explained how he believed his effort was actually aiding the United States by helping the balance of trade. “My take on this is that we’re doing a service

to the country,” he said. “Personally I know because I’ve been dealing with China for 10 years with Microsoft. Outsourcing. Buying hardware.”


Then, they all got the cheesecake. Yang picked up the tab. “You’re the guests,” he said. “Appreciate that,” an agent replied.

About three months later, on Dec. 3, 2010, Yang gathered \$20,000 in cash he had cobbled together from five banks. His China connections had not come up with upfront money after all. The cash, in addition to money Yang had already wired to an FBI front company, would cover the \$80,000 price tag for a test buy of five of the microchips — a purchase that Yang thought would establish a business relationship.

U.S. agents say Yang had planned to cross the border to Canada later that day in a rental car. He had already bought a ticket from Vancouver to Beijing for the following day.

Yang met the undercover agents in Seattle. They gave him the chips. He handed them the money. Within minutes, Yang was arrested.

He was charged with conspiracy to violate the federal arms trafficking law. His lawyer negotiated a guilty plea for a reduced sentence.

Before he began his prison term, Yang said he told his young sons he would be away on business — in China. 

Edited by **Blake Morrison**





# Chinese military's secret to success: European engineering

German diesel engines now power China's stealthy submarines — among the many weapons and parts Beijing has sourced from America's European allies

BY DAVID LAGUE

December 19 Hong Kong

**I**f the People's Liberation Army went to war tomorrow, it would field an arsenal bristling with hardware from some of America's closest allies: Germany, France and Britain.

Most of China's advanced surface warships are powered by German and French-designed diesel engines. Chinese destroyers have French sonar, anti-submarine-warfare helicopters and surface-to-air missiles.

Above the battlefield, British jet engines drive PLA fighter bombers and anti-ship strike aircraft. The latest Chinese surveillance aircraft are fitted with British airborne early warning radars. Some of China's best attack and transport helicopters rely on designs from Eurocopter, a subsidiary of pan-European aerospace and defense giant EADS.

But perhaps the most strategic item obtained by China on its European shopping spree is below the waterline: the German-engineered diesels inside its submarines.

Emulating the rising powers of last century — Germany, Japan and the Soviet Union — China is building a powerful submarine fleet, including domestically built Song and Yuan-class boats. The beating hearts of these subs are state-of-the-art diesel engines designed by MTU Friedrichshafen GmbH of Friedrichshafen, Germany. Alongside 12 advanced Kilo-class submarines imported from Russia, these 21 German-powered boats are the workhorses of China's modern conventional submarine force.

With Beijing flexing its muscles around disputed territory in the East China Sea and South China Sea, China's diesel-electric submarines are potentially the PLA's most serious threat to its American and Japanese rivals. This deadly capability has been built around robust and reliable engine technology from Germany, a core member of the U.S.-led North Atlantic Treaty Organization.

Arms trade data from the Stockholm International Peace Research Institute (SIPRI) to the end of 2012 shows that 56 MTU-designed diesels for submarines have been supplied to the Chinese navy.

"They are the world's leading submarine diesel engines," says veteran engineer Hans Ohff, former managing director of the Australian Submarine Corporation, the company that built Australia's Collins-class conventional submarines.

MTU declined to answer questions about transfers to the Chinese navy, future deliveries or whether it supplies technical support or servicing.



The Chinese navy's best-known vessel — its sole aircraft carrier, the Liaoning — was purchased from Ukraine.



“All MTU exports strictly follow German export laws,” a company spokesman said.

### CHINA'S MILITARY MARKET

The Chinese defense ministry says the PLA's dependence on foreign arms technology is overstated. “According to international practice, China is also engaged in communication and cooperation with some countries in the area of weaponry development,” the ministry said in a statement responding to this series. “Some people have politicized China's normal commercial cooperation with foreign countries, smearing our reputation.”

Transfers of European technology to the Chinese military are documented in SIPRI data, official EU arms trade figures and technical specifications reported in Chinese military publications.

These transfers are crucial for the PLA as it builds the firepower to enforce Beijing's claims over disputed maritime territory and challenge the naval dominance of the U.S. and its allies in Asia.

China now has the world's second-largest defense budget after the United States and the fastest growing military market. Many of Europe's biggest defense contractors have been unable to resist its allure. High-performance diesels from MTU and French engine maker Pielstick also drive many of China's most advanced surface warships and support vessels, SIPRI data shows. Pielstick was jointly owned by MTU and German multinational Man Diesel & Turbo until 2006, when Man took full control.

Some military analysts remain skeptical about the quality of China's military hardware. They say the engines and technology the PLA is incorporating from Europe and Russia fall short of the latest equipment in service with the United States and its allies in Asia, including Japan, South Korea and Australia. This leaves the PLA a generation behind and struggling to integrate gear from a range of different suppliers, they say.

Others counter that China doesn't need to match all of the most complex weapons fielded by the United States and its allies. Even if it deploys less than the best gear, Beijing can achieve its strategic goal of blunting U.S. power.

“At what point do they become good enough?” says Kevin Pollpeter, a specialist on Chinese military innovation at the University of California Institute on Global Conflict and Cooperation at San Diego. “If they have sufficient quantities of good-enough weapons systems, maybe that will carry the day.”

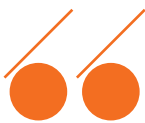
### LIMITS OF EMBARGO

Russia remains China's most important outside source of arms and technical assistance. The Chinese navy's best-known vessel — its sole aircraft carrier, the Liaoning — was purchased from Ukraine. A U.S. Navy vessel nearly collided with a Chinese warship last week while maneuvering near the Liaoning, during a time of heightened tensions over Beijing's recent declaration of a new air-defense zone in the East China Sea.

European hardware and know-how fills critical gaps, however. It wasn't supposed to play out this way.

The European Union has had an official embargo on arms shipments to China since the 1989 Tiananmen crackdown. Washington imposes even tighter restrictions on transfers of U.S. military technology to China, inspiring energetic efforts by Beijing to smuggle American gear and know-how. Europe's embargo, however, has been far more loosely interpreted and enforced. Thus weapons and, perhaps more importantly for the PLA, dual-use technology have steadily flowed from America's European allies to China.

EU arms makers have been granted licenses to export weapons worth almost 3 billion euros (\$4.1 billion) to China in the 10 years to 2011, according to official figures from Brussels collated by the London-based Campaign Against Arms Trade. EU governments approved the sale



Critics of the EU's arms trade with China say member states have failed to devise a system to enforce the embargo.



of aircraft, warships, imaging equipment, tanks, chemical agents and ammunition, according to official figures.

Michael Mann, an EU spokesman in Brussels, said the EU arms embargo issued in June 1989 “does not refer to dual use goods.” It is up to individual member states to exercise control over such goods, Mann said.

From China's perspective, France and the UK interpret the arms embargo most generously, mostly blocking only lethal items or complete weapons systems. France was by far the biggest EU supplier, accounting for almost 2 billion euros of these licenses. The United Kingdom ranked second with almost 600 million euros, followed by Italy with 161 million euros. The value of weapons actually shipped is difficult to extract from the data because some countries, including the UK and Germany, don't report these figures.

The value of German export licenses for weapons was a relatively modest 32 million euros in the decade to 2011. However, EU arms trade figures don't include dual-use technology that in many cases can be sold without licenses. Examples of such technology include many kinds of diesel engines. The same applies to transfers of commercial aerospace design software that can be used for fighters, bombers and unmanned aerial vehicles.

Arms industry experts say dual-use transfers are almost certainly more valuable to the PLA than the actual weapons Europe has delivered. But it's impossible to calculate a hard number for European-Chinese trade: The EU lacks a consistent system for tracking these transfers amid the vast flow of goods, services and intellectual property to China. Europe shipped goods worth 143.9 billion euros to China in 2012, according to EU trade statistics.

Critics of the EU's arms trade with China say member states have failed to devise a system to enforce the embargo. They say this reflects the loose structure of the EU, where each member state interprets the restrictions differently according to domestic law, regulations and trade policies.

Geography plays a role, too: The distance between Europe and Asia means there is ambivalence about the rapid growth of Chinese military power. From Europe, China looks like an opportunity, not a threat.

## SELLING COMPONENTS

**The embargo is nevertheless an embarrassment** for Beijing; senior Chinese officials routinely call for it to be lifted, and pressure from Washington keeps it in place. That means the sale of complete weapons like the pan-European Eurofighter, German submarines or Spanish aircraft carriers remain impossible for the foreseeable future.

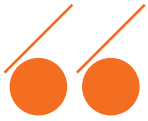
In the meantime, Europe has discovered a lucrative trade selling components, particularly if they incorporate dual-use technologies that fall outside the embargo.

“Nobody sells entire weapons systems,” says Otfried Nassauer, director of the Berlin Information Centre for Transatlantic Security and an expert on Germany's arms trade. “But components, especially pricey high tech components, that works OK.”


Under Beijing's long-term policies to promote innovation, domestic arms makers are encouraged to import the foreign technology that China lacks. The challenge is to adapt this range of components and know-how into locally built weapons.

One example is how German engine makers have contributed technology to support China's expanding fleet of support vessels that monitor satellites and missiles.

Man Diesel & Turbo last year announced it would supply engines built under license in China for two new transport vessels for the China Satellite Maritime Tracking and Controlling Department, part of the PLA's General Armament Department (GAD). The GAD oversees weapons research and development and manages all of China's military and civilian space operations, including the tracking of satellites and missiles. The European engine



China's military is reluctant to acknowledge the role of foreign technology in its latest weapons.



maker will also supply gear boxes, propellers and propulsion control systems for the ships from its Danish manufacturing unit, it said.

A spokesman for Man Diesel & Turbo said about 250 of its engines had been made under license in China and supplied to the Chinese navy. The company also provided some selected services and spare parts including fuel equipment.

"All our business does fully comply with the applicable export control or embargo regulations set by Germany and the European Union," the spokesman said. He added that Pielstick brand engines supplied to the PLA navy by Chinese licensees were not subject to export approval. "None of these engines is specifically designed for military purposes," he said. "There is a broad variety of civil applications for these engines, too."

## UNDERWATER DISASTER

**Reliable submarine engines top Beijing's shopping list, and China's navy has good reason to want the best.**

In the late spring of 2003, a disabled Chinese submarine was found drifting, partly submerged, in the Bohai Sea off China's northern coast. When the boat was raised, rescuers found all 70 of its crew dead. Their deaths were blamed on "mechanical difficulties," according to reports at the time in China's state-controlled media. The outcome of any inquiry was never made public.

Since then, submariners all over the world have speculated about what went wrong aboard Ming class submarine number 361, a Chinese copy of an obsolete Russian design. Most agree it was probably a fault with its diesels. The engines either didn't shut down immediately when the submarine submerged, sucking the oxygen out of the hull in minutes, or the suffocating exhaust vented internally rather than outside the hull. Either way, the outcome was catastrophic.

It was one of Communist China's worst peacetime military disasters, and the navy chief and three other senior officers were sacked. But

the People's Liberation Army navy was already taking delivery of diesels from MTU. Engineers at the Wuchang Shipyard on the Yangtze River were fitting these power plants in China's first indigenously designed and built conventional submarines, the Song class.

MTU is a unit of Germany's Tognum Group, which is jointly owned by UK-based multinational Rolls Royce Group PLC and Germany's Daimler AG. Contracts with the PLA and powerful defense manufacturers give MTU and its parent influence in competing for contracts in China's massive civilian market. China's biggest arms maker, China North Industries Group Corporation, or Norinco, has been making MTU engines under license since 1986.

In 2010, Tognum opened a joint venture with Norinco to assemble large, high speed MTU diesel engines and emergency generators at a plant in the city of Datong in Shanxi Province. A major goal of the joint venture is to win orders for emergency backup generators for China's expanding roster of nuclear power plants, Tognum said in a press statement. MTU engines are also built under license at the Shaanxi Diesel Engine Heavy Industry Co Ltd, a subsidiary of one of China's two sprawling military and commercial shipbuilders.

Submarine diesel technology is hardly new, but these engines are built to exacting standards to ensure reliability under extreme conditions. MTU has been building them for more than 50 years. The engine delivered to China for the Song and Yuan classes, the MTU 396 SE84 series, is one of the world's most widely used submarine power plants. Each of the Chinese submarines has three MTU diesels, according to technical specifications listed in Chinese military affairs journals and websites.

China's military is reluctant to acknowledge the role of foreign technology in its latest weapons, preferring to recognize the performance of its domestic designers and arms makers. But articles in maritime magazines and naval websites have credited the close relationship between MTU and China's domestic industry for



The Chinese boat had been undetected while it was apparently shadowing the U.S. carrier and its escorts.



providing the Song class with “the world’s most advanced submarine power system.”

In its promotional brochures, MTU says almost 250 of these engines in service with submarines around the world have racked up over 310,000 hours in operation. Some have also been fitted to nuclear submarines as back-up power plants, the company says. MTU also sells different versions of the 396 series for use in locomotives, power generation and mining.

A spokesman for the Federal Office for Economics and Export Control (BAFA), the German authority that has to approve dual-use exports, said exports of diesel engines built especially for military use would be illegal. Engines that can be used for both civilian and military purposes would have to be approved by BAFA, he said — and in the case of China, such dual-use engines “would probably not be approvable.” He declined to comment specifically, however, about the MTU diesel engine sales to China’s navy.

### STEALTHY SUBMARINES

**Top quality diesel engines like the MTU designs** minimize vibration and noise, reducing the risk of detection by enemy sonar. In the hands of a capable crew, modern diesel submarines can be fiendishly difficult to detect. When using their electric motors, they are significantly stealthier than nuclear submarines such as those in service with the United States, naval warfare experts say. For a relatively modest investment, a diesel electric sub could sink a hugely expensive aircraft carrier or surface warship.


With whisper-quiet engines, China’s best conventional submarines armed with modern torpedoes and missiles may pose the biggest danger to any potential adversary — including the U.S. Navy. Beijing’s naval strategists are banking on their growing fleet of subs to keep the Americans and their allies far away from strategic flashpoints in the event of conflict, such as Taiwan or disputed territories in the East China Sea and South China Sea.

That means the Pentagon’s favored method

of modern warfare — parking carriers near the coast of an enemy and conducting massive air strikes — would be very risky in any clash with China.

The PLA navy has already demonstrated this capability. In 2006, a Song class submarine shocked the U.S. Navy when it surfaced about five miles from the U.S. aircraft carrier *Kitty Hawk*, well within torpedo range, in waters off the Japanese island of Okinawa. The Chinese boat had been undetected while it was apparently shadowing the U.S. carrier and its escorts, U.S. officials later confirmed.

PLA submarines are becoming much more active. Recorded Chinese submarine patrols increased steadily from four in 2001 to 18 in 2011, according to U.S. Naval Intelligence data supplied in response to freedom of information requests from a Federation of American Scientists researcher, Hans M. Kristensen.

A senior U.S. Navy official declined to comment on German delivery of diesel engines to China, but said the United States is well aware of the challenges such submarines pose. “Diesel engines are notoriously difficult to detect, but we are also always investing in improving own capabilities to make our submarines quieter,” the official said. 

*Fixes the paragraph about MTU promotional brochures, to clarify the phrase “310,000 hours in operation,” by removing the word “each.”*

Additional reporting by **John Shiffman in Washington and Sabine Siebold in Berlin.**

Edited by **Bill Tarrant and Michael Williams**

