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PLA Air Force:
Bomber Force Training

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Bomber Unit Training

This paper provides information about bomber pilot training with a focus on daily training and over-water training in the Western Pacific and South China Sea, as well as participation in the Golden Dart competition in China and the Aviadarts component of the International Army Games (IAG / (国际军事比赛), which are co-organized by China, Russia, Belarus, Azerbaijan, Kazakhstan, Armenia, and Iran.

Daily Training

The following subsections provide information about the basic types of training noted for the bomber units.[1] Each subsection covers one main topic, but, as a general rule, each training subject (训练科目) includes two or more of the items discussed. For example, a long-distance mission that includes formations flying in different altitudes in different weather conditions that results in firing weapons after penetrating an "enemy" area wrapped in a complex electromagnetic environment (CEME). Given that training is guided by the PLAAF's Outline of Military and Evaluation (OMTE), each unit most likely has to train for each subject (课目). However, it appears that not every unit fulfills their annual requirement, which the PLAAF calls "falling through the cracks" (落训). For example, in June 2014, a 10th AD's regiment found that although half the year's flight time had passed, it had only completed one-third of its training requirements for its new bomber.[2] While emphasizing the transition, the regiment had neglected looking at the aircraft's weapons and equipment functions. Figure 1 shows bombers flying in a 3-ship and 2-ship formation. Although, as noted later, the PLAAF has mixed formations of two bombers and two fighters, no references were found for any 4-ship bomber formations, but they may exist.

Figure 1: 3-Ship Bomber Formation[3]

Flying in Weather Conditions

The PLAAF uses different terms to refer to flying during the day and night under visual flight rules (VFR) and instrument flight rules (IFR) conditions. These terms are often confused with "flying in all weather conditions" (全天候) which is distinguished by the use of modifiers such as good, poor, cold, hot, rainy, snowy, or minimum weather conditions.

- "Four-weather conditions" (四种气象) and "flying in difficult-weather conditions" (复杂气象) refers to flying during night and day under VFR and IFR conditions
- "Three-weather conditions" (三种气象) refers to flying at day and night under VFR conditions and at day under IFR conditions
- "Flying in simple-weather conditions" (简单气象) usually refers to flying under day and night VFR conditions.[4]

PLAAF bomber units appear to be improving their ability to operate in various weather conditions. For example, in 2015, an 8th AD pilot was coming back from a South China Sea combat patrol mission, when he hit bad weather, and was forced to carry out a low visibility landing, apparently a first for the unit.[5] According to the regiment commander, previously no one had dared to take-off and land in this type of extreme weather condition. However, as of late December 2016, 90% of regiment pilots had received low-visibility take-off and landing training. In2016, an 8th AD regiment emphasized being able to fly in all weather conditions.[6] Although, takeoff in poor weather is more dangerous with bomber aircraft due to their large bulk, the regiment gradually acclimated itself to poor weather flying, going from normal weather, to complex weather, to the lowest weather quality allowed in the OMTE, as a way of gradually acclimating. During one drill, the bombers had to strike "enemy" missile and radar sites. The bombers took off in rain, but approached the combat zone and successfully completed the mission. On an unidentified date, the 10th AD's "Model Bomber Group" (模范轰炸机大队) conducted maritime training under typhoon conditions.[7] After flying through a typhoon for an undetermined amount of time, they turned around and returned to base.

Different Times of the Day and Flying Periods

The PLA's Military Dictionary states that "a flying day is divided into three flying periods (场次), including day, night, and after midnight."[8] A flying period refers to a single combat, training, alternate landing, transit flight, test flight, special flight, or cargo flight mission.[9] Historically, the PLAAF's three distinct flying periods have been day (0800-1600), evening into night (1600-2400), and after midnight (2400-0800). During the 2000s, the PLAAF instituted "large flying periods" (大场次) that move from day into evening, evening into after midnight, and after midnight into day. The PLAAF also began conducting what it calls "rolling-type" (滚动式) training that can last up to 24 hours and transitions through all three flying periods.[10] Large flying periods and rolling-type training require greater maintenance support before and after the activity is conducted.[11,12]

For example, on 24 August 2018, several young PICs from an 8th AD's air regiment piloted H-6U aerial refueling aircraft and bombers from an airfield in southern China for night training.[13] The aircraft flew to target airspace several thousand kilometers away and began the regiment's night-time large-scale long-range mobility training. In the training, the gap between redeploying from an unfamiliar airfield was short. The pilots simulated aerial refueling and bombing targets in a set airspace. According to the Air Force News report on the activity, training on night deployment, low meteorological conditions take-off and landing, ad hoc flight route changes, electronic

countermeasures, and other training had been consciously strengthened, improving pilots' judgement, problem solving, and actual-combat refueling capabilities in complex environments (复杂环境).

In its first training of 2018, the 36th AD 108th Regiment's "Shenwei Flight Group" held group-formation long-range night mobility training.[14] Combat aircraft took off from their home airfield, stopped at several unfamiliar airfields (辗转多个陌生机场), and flew over ten hours day-into-night (昼夜飞行) and several thousand kilometers. Coordination and cooperation, long-range precision strike, ground support, and other training-subjects were included.

PLAAF units rarely conduct flight training in late December or early January, due to the PLAAF's aircraft maintenance schedule and holidays as well as weather conditions. For example, On 22 December 2016, an 8th AD's regiment conducted the last flying day (飞行日) for the calendar year.[15] On 7 January 2016, several bombers from an 8th AD regiment took off and held their first flights of the new year.[16] The article mentions that the regiment's maintenance group (机务大队) focused on the wet and rainy conditions of the season, among other things, and spent two days completing inspections of key aircraft parts, including engines, operation systems (操纵系统), and takeoff and landing gear (起飞着陆装置).

Training at Different Altitudes

Bomber pilots also train at different altitudes over water and over land. The PLA defines the five altitude levels as follows:[17]

- Minimum altitude (also identified as extreme-low or very-low altitude) (超低空) as less than 100 meters
- Low altitude (低空) as 100 to 1,000 meters
- Medium altitude (中空) as 1,000 to 7,000 meters,
- High altitude (高空) as 7,000 to 10,000 meters
- Ultra- high altitude (also identified as very-high altitude) (超高空) as 15,000 meters and above.

For example, on 3 September 2015 at a firing range in northwest China, bombers from the 10th AD flew at low altitude and fired two missiles, hitting a target.[18] In early 2018, an 8th AD's bomber unit commonly practiced maritime live-munition targeting missions (海上实弹打靶任务) that required them to attack under minimum-altitude penetration conditions.[19]

In 2015, aircraft from the 10th AD's "Model Bomber Group" flew the unit's first flight over the Pacific and conducted minimum-altitude flying for several tens of minutes.[20,21] The PIC then took control and lowered the aircraft another 20 meters within the minimum altitude level, and flew this way for another ten minutes. Since then, every unit has been conducting minimum-altitude training over water.

Plateau Training

In early winter 2015, an 8th AD bomber unit conducted plateau test training (高原试训) with a special operations aircraft unit (特种机部队) that was deployed for training (驻训) in the same location.[22] The two units conducted a combined arms drill (联合演练) together, verifying a combat method (验证战法). The regiment had already developed a good foundation in the training subject (课目) for plateau test training, but was adding content and working to improve flaws.

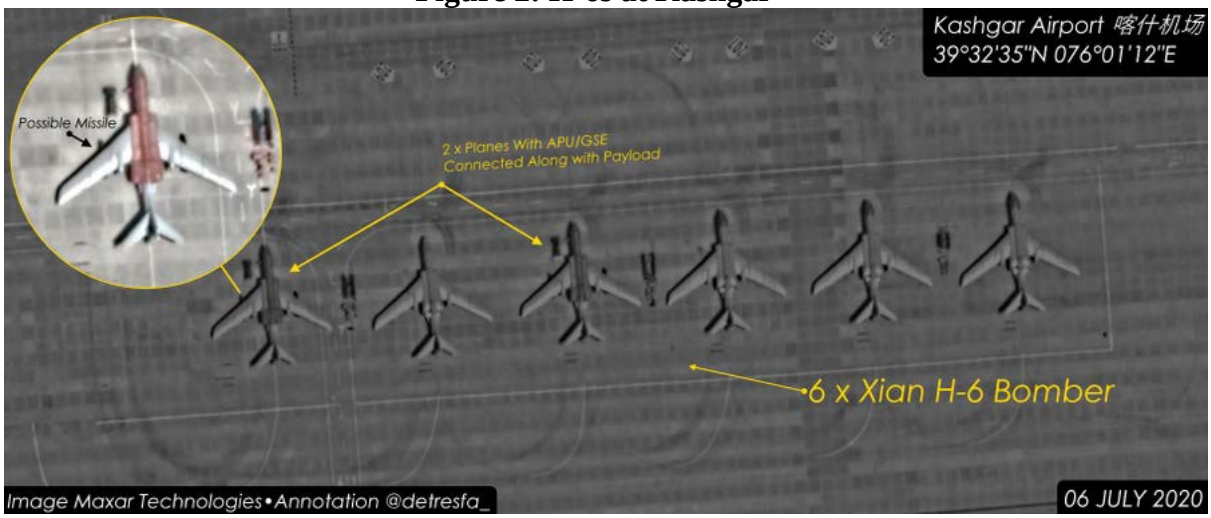
In Fall 2016, the 36th AD 108th Regiment's "Shenwei Flight Group" went into the plateau hinterlands (高原腹地) and participated in ground-air joint exercises with unidentified units.[23] The flight group set records for bomber unit high altitude, joint strike (联合打击), nighttime air attack (夜间临空突击), and other training subjects.

In 2016, bombers from the 8th Bomber Division practiced dropping live munitions in a plateau region.[24] Prior to the event, the crew was required to study the trajectory of live ammunition vs. training ammunition and the wind speed in a plateau region.

In 2016, the "Shenwei Flight Group" flew to a plateau airfield (高原某机场) to participate in an exercise mission (演习任务).[25] While awaiting orders, the flight group commander sent out an order to attack an enemy target. They moved out at night and were immediately under CEME. The communications navigation (通信导航) was hit with heavy interference (干扰), and the formation was unable to receive any commands. They then carried out a long range attack based on the target information they received before they took off. On 27 March 2018, the PLAAF announced that its "Shenwei Flight Group" had deployed 12 H-6K bomber aircraft, which flew long-range through the Guanzhong Pass (关中) in Shaanxi Province to another area for actual-combat military training (实战化军事训练).[26]

Plateau training is most likely done to practice for a situation with India. For example, in July 2020, up to eight H-6s, which were probably from the 36th AD, along with Y-20 transport aircraft, deployed to Kashgar (喀什) in the Tarim Basin region in southern Xinjiang Autonomous Region.[27] In September 2020, H-6 bombers from the 36th AD conducted training in the plateau near the disputed Line of Control (LOC) between China and India's Ladakh region.[28] It was not clear which airfield they flew out of.

Figure 2: H-6s at Kashgar[29]



Combined-Arms Training

PLAAF bomber units have reported conducting combined-arms training. For example, prior to 2016, the 8th AD had outdated operational concepts and outdated equipment, making it difficult to work closely with other units.[30] Long-range attack and precision strike were the core missions of this unit, but these required the ability to cooperate and integrate with other elements and having system-of-systems support (体系支援). Prior to the 2016 reorganization, the regiment had studied with a Nanjing MRAF air division. It had also cooperated with nearby SAM and radar units to conduct opposition force training with real personnel and equipment (实兵实装对抗训练). When deploying for training, the regiment used the opportunity to conduct trans-regional drills (跨区演练) with other combat branches (兵种). The regiment had gradually gained the ability to conduct cooperative operations (协同作战) with other aircraft types and combat branches, conducting attacks under informatized conditions (信息化条件) and in a complex electromagnetic environment (复杂电磁环境). The regiment held an opposition force drill in about January 2016 in which it worked under the fighter aircraft cover of a brother unit (兄弟部队). The formation flew at night under radio silence, penetrating the enemy lines and launching missiles.

Transregional Training

Every one of the bomber divisions practices what is calls transregional / trans-military region / trans-theater command (跨区) training, which can mean crossing provincial borders or crossing from one military region / theater command into another. For example, in September 2015, an 8th AD regiment held a trans-regional combat airfield switching (跨区战斗转场) mission under unknown conditions (未知条件). The bombers flew several thousand kilometers across more than half of China, landing at multiple unfamiliar airfields, and launching multiple precision strikes.[31]

Over-water Training

Since 2015, all three PLAAF bomber divisions have been flying H-6 bomber missions through the First Island Chain into the Western Pacific and into the South China Sea on a routine basis. These flights have been covered in detail by the media and in various outstanding reports by different analysts, including Nathan Beauchamp-Mustafaga, Derek Grossman, Logan Ma, Matthew Southerland, Ian Burns McCaslin, and Andrew Erickson.[32] This subsection provides an overview of the key flights but does not cover every flight, which are covered by the first three

reports noted in the footnote. It also provides information concerning the planning and implementation of the flights as well as obstacles that have been identified. It appears that bombers from all three air divisions have participated. Unless specified, the following paragraphs come from the four reports in the footnote. Of particular note, other than aircraft from Taiwan and Japan intercepting the bombers in their respective ADIZ, no information was found concerning any intercepts by foreign aircraft in the Western Pacific or South China Sea.

The establishment of China's East China Sea Air Defense Identification Zone (ADIZ) in 2013 gave the PLAAF, "for the first time, an operational patrol space well away from China's borders."[33] Since then, the service has been expanding its area of operations further beyond that zone. This effort has been marked by a number of 'firsts' for the service.[34] Many of those "firsts" have been high-profile and provocative. For example, since 2015, PLAAF H-6K bombers have begun making "not infrequent" flights within range of Guam in what was described by U.S. defense officials' briefing reports as "practicing attacks on Guam."[35] Although PLAN Naval Aviation bombers began flying into the Western Pacific in 2013, the first PLAAF bombers to fly through the Miyako Strait (between Okinawa and Taiwan) and Bashi Channel (between Taiwan and the Philippines) into the Western Pacific did not occur until 2015 when four different drills were conducted.[36] Specifically, the first flight took place in March through the Bashi Channel, the second in May through the Miyako Strait, the third in August through the Bashi Channel, and the fourth in November, but it is not clear which route they took.[37] Since 2015, these types of flights have become "routine" but continue to receive frequent press coverage from China, Taiwan, and Japan. Building on this momentum, the PLAAF conducted several bomber flights in 2016 — labeled "combat air patrols" (战斗巡逻) — over disputed features in the South China Sea, including Fiery Cross Reef (aka Yongshu Jiao / 永暑礁), Scarborough Shoal (aka Huangyan Dao. 黄岩岛), Mischief Reef (aka Meiji Jiao / 美济礁), and Woody Island (aka Yongxing Dao / 永兴岛).[38] See Figures 3 and 4 below for the relevant maps.

Figure 3: Miyako Strait and Bashi Channel[39]

Figure 4: South China Sea[40]

A March 2016 Air Force News article emphasized a southern TCAF air regiment's commitment to giving far-seas training opportunities to young pilots in addition to experienced "backbone" personnel, citing a recent training mission where over half of participating pilots were young.[41] Formerly, due to the importance of the missions, only experienced pilots were allowed to take a leading role, affecting the development of young pilots. However the annual military training conference (年度军事训练会议) in late 2015 proclaimed that future war could not just rely on backbone personnel, and this kind of conservative thinking must be changed. Since then, half of the bomber pilots were young, and were teamed up with a corresponding backbone pilot.

Similar flights into the Western Pacific and South China Sea continued through 2021. One sortie through the Miyako Strait in September 2016 included more than 40 aircraft.[42] Although the H-6 bombers were the core, other aircraft, including Su-30 and Su-35 fighters, KJ-2000 airborne early warning aircraft, and tankers, escorted them at least part of the way.[43] Both fighters from the Japanese Air Self Defense Force (JASDF) and Taiwan's Air Force have intercepted the aircraft during these flights.[44] To date, there are no reports that USAF aircraft have intercepted any of the aircraft; however, in its 2021 Annual Report to Congress on China's military power, the U.S. Defense Department claimed that PLAAF H-6K flights into the Western Pacific demonstrate the PRC's ability to range Guam with air-launched LACMs.[45] Table 1 provides examples of PLAAF bomber flights into the Western Pacific , near Taiwan, and the Sea of Japan from 2015 through 2017.[46]

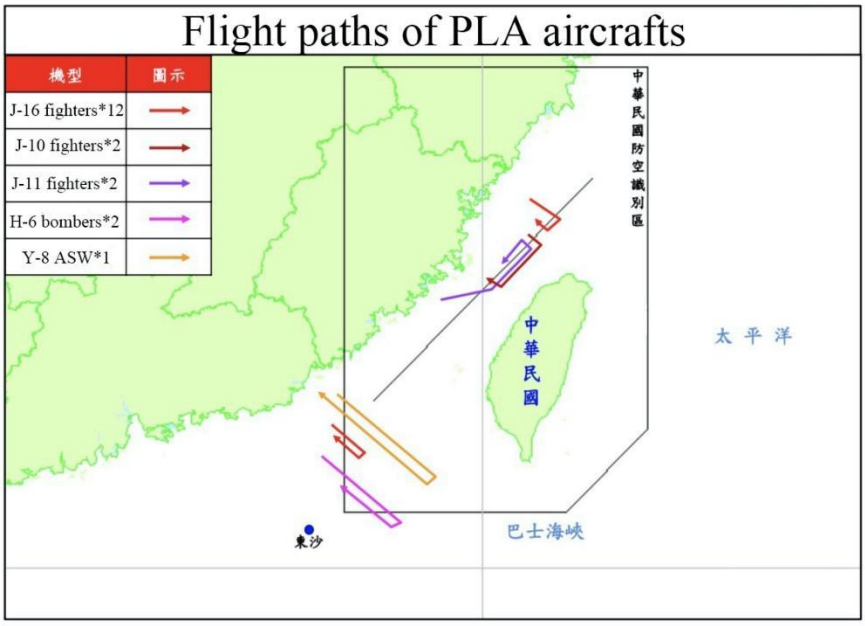
Table 1: PLAAF H-6 Flights into the Western Pacific and Sea of Japan 2015 through 2017

Date of Operation	Region	Aircraft Involved	Description
Mar, May, Aug, Nov 2015	Western Pacific	H-6s	Unidentified
Sep 2016	Western Pacific	H-6, fighters, and AEW&C aircraft	Probably first flight to include fighters and AEW&C aircraft beyond the first island chain
Nov 23, 2016	Taiwan	2x H-6K, 2x Su-30, 1x Y-8 Intel, 1x Tu-154	First and second circumnavigation of Taiwan through the Bashi Channel then Miyako Strait (Su-30s only transited Miyako Strait)
Dec 10, 2016	Taiwan	2x H-6K, 2x Su-30, J-10, 1x Y-8 Intel, 1x Tu-154	
Jul 13, 2017	Taiwan	4x H-6K	Circumnavigated Taiwan through the Bashi Channel then Miyako Strait
Jul 13, 2017	East China Sea	2x H-6K	Flew through Miyako Strait
Jul 20, 2017	Taiwan	4x H-6K, 1x Y-8 Intel, 1x Y-8 EW	Circumnavigated Taiwan through the Bashi Channel then Miyako Strait
Jul 20, 2017	Taiwan	4x H-6K	Circumnavigated Taiwan through the Miyako Strait then Bashi Channel
Jul 24, 2017	Taiwan	4x H-6K	Circumnavigated Taiwan through the Bashi Channel then Miyako Strait
Jul 25, 2017	Taiwan	1x H-6K	Flew south to north through China's portion of the Taiwan Strait
Aug 12, 2017	Taiwan and Japan	2x H-6K, 1x Y-8 EW	Circumnavigated Taiwan through the Bashi Channel then Miyako Strait; first flights along eastern Japan
Nov 2017	Western Pacific	H-6, Y-8 EW, tanker, fighters	Unidentified
Nov 2017	Western Pacific	H-6	Separate missions through both the Miyako Strait and Luzon Strait on the same day
Dec 2017	Western Pacific	H-6	Separate missions through both the Miyako Strait and Luzon Strait on the same day

Dec 2017	Sea of Japan	H-6	First flight into Sea of Japan and entered Korean ADIZ
Dec 2017	Western Pacific	H-6, Y-8	Circumnavigation of Taiwan

In response to all of the flight activity in 2020, Taiwan's Ministry of National Defense created a tab on its official website that showed daily PLA flight activity in Taiwan's ADIZ covering flights between the coast (Fujian, Zhejiang, and Guangdong) and the centerline and flights crossing the middle line and also flying into the southern portion of the ADIZ between Taiwan and Pratas Islands.[47] From September 2020 through 11 April 2022, 21 sorties involved H-6 bombers (70 in total), and all but three of these sorties included fighter escorts.[48] The largest number of H-6s in a single sortie was 12 aircraft on 4 November 2021, 8 aircraft on 21 January 2021, and 5 aircraft on 28 November 2021. With the exception of 3 sorties (19 August and 21 November 2021, and 23 January 2022,) that included only one aircraft, 13 sorties included 2 aircraft, 4 sorties included 4 aircraft, and 1 sortie included 5 aircraft. Although J-10s (38), J-11s (17), and JH-7s (4) escorted the bombers, the largest number of escorts was by J-16s (209). Only 10 sorties included a KJ-500, while all but 8 sorties also included a Y-8 ASW aircraft. Figure 5 provides an example of the types and number of PLA aircraft that entered Taiwan's ADIZ on 19 September 2020.[49]

Figure 5: PLA Aircraft Flight Paths in Taiwan AIDZ



Although the PLAAF is increasing the number of maritime flights, it has also acknowledged various challenges concerning far-seas flight training based on an interview with personnel from a Southern TCAF air unit in 2017, as shown below:[50]

Due to limited communications measures during far-seas training, comprehensive support measures, including regular radar, aerial command and communications aircraft, navy ships, and communications satellites need to be better integrated. Compared with flying over land, far-seas training is more prone to deviating from designated flight routes.

The multiple highly-difficult subjects involved in far-seas training pose new challenges to many pilots' technical and tactical capabilities who participate in far-seas training. These subjects include striking maritime targets, air combat of different types of aircraft both over land and over water, aerial refueling against tactical background and confrontational air and sea combat against the Navy. Far-seas training also challenges the capability of responding to special flight situations over water. Of particular concern, in terms of physical challenges, flying time which was longer than four hours normally led to fatigue of the pilots. The PLAAF's Military Medical University has focused on physical challenges as well as the growing amount of overall mental health issues due to growing amounts of training and concerns about personnel careers as a result of the PLA's 200,000-man force reduction that began in 2016.[51]

Weather conditions during far-seas training are unpredictable and the collection of weather-related data also continues to be a challenge. Search and rescue (S&R) operations during far-seas training remain to be a challenging task for the PLAAF; it remains a difficult mission due to limitations of S&R equipment, low visibility at night, and complex weather conditions. Due to time limitation of continuous operations of certain equipment, far-seas flight training continued to challenge the PLAAF's maintenance support capabilities. Many maritime-related malfunctions could not be practiced during a simulated verification process on the ground.

It is not exactly clear who talks with the pilots while they are in the air. Normally, it is one of the unit's senior officers either in the unit's control tower or temporarily deployed in an airborne early warning and command (AEW&C) aircraft. It does not appear that personnel in the Theater Command Air Force Command Center or Theater Command Joint Operations Command Center talk directly with the aircraft; however, one article stated that, "While practicing mobile target attack training over water (突击海上移动目标), an AEW&C aircraft was unable to participate, meaning they could not guide the bombers to the target. Therefore, a nearby naval ship launched a helicopter, which then took on the early warning role. This move won the notice and praise of other personnel."[52]

In order to keep advancing in the maritime domain, the PLAAF has overhauled training for its pilots to be better prepared for operations over water, including those farther from shore. These included the creation of new textbooks for its Aviation University, including A Practical Handbook on Maritime Live-Fire Training with Trainer Aircraft and Safety Checklist for Maritime Live-Fire Training.[53] Classroom work has been augmented by "regular high seas training" that was begun in 2015.[54] AUAF also performed its first live-fire training at sea in 2015.[55] The PLAAF has been holding exercises practicing offensive and defensive operations at sea in "unfamiliar sea areas" more frequently.[56] The increasing focus on operations in the maritime domain has been incorporated into the "four key training brands" (四大品牌) of the PLAAF.[57] For example, in 2015, the Golden Dart competition, which involves attack aircraft and bombers and "aims to improve troops' offensive air war-fighting capabilities," was held over water for the first time.[58] The aforementioned change was made in response to "national security threats" and was aimed at "improving the maritime combat capability" of the PLAAF.[59]

Perhaps the best summation of just how far the PLAAF has come since it began "open/far seas training," comes from a paraphrased statement given in December 2016 by PLAAF spokesperson Senior Colonel Shen Jinke to Xinhua: "in the two years since the Chinese Air Force launched open/far seas training, interference from various obstacles have been dealt with, [the Air Force] engaged in reconnaissance and early-warning, maritime patrolling, maritime assault, and mid-air refueling training, which improved open/far sea mobility and tested open/far sea combat capability."[60] The PLAAF has also gone further, holding events, including ones attended by its

senior officers, to review its own early progress for over-water training and making corrections where it sees fit.[61]

In 18 May 2018, an unidentified number of H-6K bombers from the 36th AD's 108th Regiment became the first PLAAF bombers to deploy to the Naval Aviation airfield on Woody Island, where they conducted takeoff and landing training as well as cruising around the island.[62] It is not clear how long they remained there. However, this is a good example of how bombers from as far away as the 108th Regiment (based in Wugong, Shaanxi) could deploy to Woody Island to conduct long-range missions.

Figure 6: H-6s at Woody Island[63]

Figure 7: Woody Island[64]

A further sign of the PLAAF's focus on expanding operations in the maritime domain has been the increased emphasis on improving maritime search and rescue capabilities. With an increasing number of PLAAF pilots, both veterans and cadets, flying over water, the service needs to be able to rescue them after training accidents and, if conflict breaks out, after being shot down. In November 2014, General Ma Xiaotian traveled to see the "Air Force's first maritime unit," which was established in 2012, to hear an update on the construction of a maritime training base, visit with PLAAF ships crews, and to emphasize the importance of improving the service's maritime search and rescue capability.[65] On the new urgency of improving maritime search and rescue operations, General Ma stated that, while "in the past, maritime activities were relatively infrequent," now with "maritime military actions becoming more frequent," the service must resolve such issues "as soon as possible."[66] In parallel, new training focused on the fact that pilots

must learn how to parachute over water and how to survive in the water until they can be found and rescued.[67] According to an interview in 2018 with the maritime training base's commander, the base was described as a maritime operations training support platform and a "whetstone" for far-seas flight and deep-blue combat.[68] Some of its primary missions include supporting maritime penetration assault, maritime rescue for aircrew members who have parachuted out of their aircraft, and joint search and rescue. Parachute training was carried out by having personnel parachute out of small transport aircraft and helicopters. The next steps for the base, starting in 2018, included strengthening research in the three fields of maritime target research and development, maritime complex electronic countermeasures environment construction, and upgrading and transforming equipment, including target vessels that have remote control, autonomous movement, and other functions. The base was also preparing to discuss military-civil fusion, including creating a joint search and rescue mechanism with local civilian maritime rescue organizations.

Penetration and Attack

Almost every long-distance sortie ends in penetrating enemy defenses and launching a strike (远程突防突击作战) with live munitions. In addition, almost every sortie involves complex electromagnetic environment (CEME) conditions (复杂电磁环境) to include "enemy" jamming or electronic interference and an electronic countermeasures measure by the bombers or support aircraft. For example, on one occasion in 2015, an 8th AD regiment participated in a penetration attack competitive assessment (突防突击竞赛型考核).[69] The regiment was generally expected to perform well. However, because the assessment happened in an unfamiliar environment, and the aircraft were suddenly hit with electromagnetic jamming, many of the aircraft's bombs were off target and led to failure. The regiment had thought they would get a chance to acclimate themselves before the assessment, but were reprimanded for thinking this way – would the enemy allow them a few test runs in a real war? Prior to the event, the regiment had gotten used to being given information about the enemy and the target ahead of time, limiting their ability to improve and develop. However, as a result of the failure, the regiment improved on this problem. In mid-autumn 2015, it took part in a penetration attack drill under unknown conditions (无知条件). Despite getting hit with jamming and radar searches, the bombers used anti-jamming equipment (反干扰设备) and reduced altitude, successfully bombing the target. Although the "enemy" had tried to disrupt the attacks by using electronic interference, the PLAAF's bombers had begun using electronic countermeasures (电子对抗) during all penetrations and assaults.[70]

On 28 June 2016, several tens of fighter and bomber aircraft from the Southern TCAF took off along with a jamming aircraft (干扰机) from a brother unit (兄弟单位).[71] The aircraft flew several hundred kilometers as a penetration echelon (突防梯队) toward the opposing team's defenses. Multiple aircraft types closely coordinated for a penetration attack (协同突防突击) as part of this real-personnel drill (实兵演练). As the bombers approached the target with heavy radar and air defense coverage, the jamming aircraft created a corridor (走廊), allowing the bombers to safely and accurately drop their bombs. In 2015, an 8th AD unit conducted an entire mission using radio silence (无线电静默), with the lead aircraft and wingmen relying on prior preparation and their knowledge of one another.[72] Students at the Harbin Flight Academy actually train using radio silence as well.[73]

Before dawn on 24 March 2018, several warplanes from the 10th AD took off for after-midnight flight training.[74] For one experienced pilot, it was just routine training. But this time, his

aircraft was locked on by enemy radar (被对手雷达锁定). He immediately made maneuvers to drop his heavy load (采取一连串大载荷机动迅速摆脱). After he thought he was in the clear, his radar and electronics (雷达电子设备) were jammed. This was highlighted as an attempt to emulate an actual combat scenario rather than previous over-idealized ones.

At some point, the "Model Flight Group" conducted a cooperative drill (协同演练) with a brother unit in which the two units conducted an air-to-ground strike under CEME.[75] However the two units did not cooperate sufficiently, and the attack was a failure. The flight group spent the next half month reviewing problems that had occurred on the mission, improving its cooperation with other units and aircraft types.

One 36th AD Shenwei Flight Group training mission required participants to detour around or suppress (绕过或者压制住) multiple ground-based air defense units (大量的地面防空部队)..[76]

Firing Weapons

A 2016 Air Force News article highlighted an Eastern TCAF air regiment's initiative to train bomber co-pilots to act as additional weapons controllers, allowing the launch of two missiles simultaneously--one by the actual weapons controller and one by the co-pilot.[77] Before this innovation, this unspecified "new model" of bomber was limited to firing one missile at a time because the final stage of launch required watching a digital feedback image (数字回传图像) and using a control stick for terminal guidance and was only carried out by the weapons controller. The article also described a September 2015 test of this concept in which two missiles were fired simultaneously at a firing range and reached their target. The article did not specify whether the two missiles were fired at separate targets, but the brief discussion of the method appears to indicate that would be possible.

In March 2018, a 36th AD unit reported a shift from using training bombs ((训练弹; "水泥弹")) to live munitions (实弹) for training.[78] Differences in weight and center of gravity meant that training bombs had different trajectories than live munitions, and weapons operators ((武器操纵员)) who trained using them would become inaccurate with live munitions. Before shifting to live munition training, a 10-meter margin of error when firing live munitions would rank among the best, but since the change it had become among the worst. The flight group researched and analyzed different variables, including air pressure, temperature, wind speed, wind direction, the tiny pitch angle when the bomb is dropped, the calibration of the photoelectric pod, the mounting position of the bomb in the bomb bay, and many other factors and the accuracy of the hit were able to improve accuracy. Figure 8 below shows different variants of bombs that the PLAAF has used.

Figure 8: PLAAF Bomber Bombs[79]

Flying under Fighter Cover and "Enemy" Intercepts

At the end of 2015, an 8th AD unit participated in a higher level system-of-systems opposition-force drill (上级体系对抗演练).[80] Early in the morning, there were orders from the command post (指挥部) for long-range penetration assault operations (远程突防突击作战命令). Refueling aircraft, fighter aircraft, and bomber aircraft took off from several airfields. Several H-6s under fighter aircraft cover facing strong electromagnetic interference launched missile attacks against "adversary" target sites. Figure 9 shows two PLAAF fighters escorting a bomber from the 8th AD. Since the PLAAF began routinely flying around Taiwan in 2015, Taiwan's Air Force has conducted intercepts and then flown near them while they are in Taiwan's Air Defense Identification Zone (ADIZ). Figure 10 shows a Taiwan Air Force aircraft intercepting and following alongside a bomber from the 10th AD.

Figure 9: PLAAF Fighter Escorts[81]

Figure 10: Taiwan Air Force Intercept[82]

In one training event, a "Model Bomber Group" squadron commander described a mission in which he was an aircraft co-pilot (副驾驶) and wingman to the lead aircraft, which was piloted by the regiment commander.[83] There were also two fighter aircraft with them, and he describes this four-ship formation as a tactical formation "small system" (战术编队小体系). In the rear there were also early warning aircraft, reconnaissance aircraft, and refueling aircraft, as well as support aircraft from other services (跨军种), which he describes as a "big system" (大体系).

Crew Training

During winter 2015 in the lower Yangtze valley, an 8th AD unit engaged in maximum-range far-seas flight training covering several thousand kilometers.[84] Compared to the first time they did this training, this time the distance was longer, more aircraft were involved, and the special situations over sea were more complex. They flew to areas that Chinese military aircraft had never flown to before. The pilots studied international approach procedures (国际进场程序), charts (航图), communications (通信), and Beidou navigation satellite system usage (定位系统使用). They also established a small group (小组) to study radar, communications, and fire control (火控) equipment functions.

Of note, the crews need to be able to speak a foreign language in order to communicate with foreign aircraft or ground stations while flying their mission. For example, personnel from the 10th AD are required to learn foreign languages and have knowledge of the law.[85] They studied theory, operations, developed combat methods (战法), and performed far-seas missions. They were on near constant combat readiness (备战状态) for a whole year. A good example occurred in the morning during Summer 2016, when, soon after entering the far-seas, two foreign combat aircraft began to closely follow them. During the flight, the co-pilot spoke in a foreign language over the radio with the aircraft and told them that they were a PLAAF aircraft conducting routine training in international airspace, and to not interfere. The aircraft shadowing the bomber did not respond and followed them for a bit longer before leaving the area. Another example is from January 2016. Not long after entering an unidentified "far-seas" location in January 2016, bombers from the 8th AD flying in an unspecified location in far-seas were approached by two foreign military aircraft.[86]

The bombers had drilled (演练) for this eventuality, and had practiced common English aircraft phrases. They issued a warning (警告) that they were from the Chinese air force carrying out routine training (例行性训练) in international waters. The foreign aircraft continued to accompany them for a while, then left.

Also of note, when PLAAF aircraft fly through Taiwan's Air Defense Identification Zone (ADIZ), the pilots from both sides talk to each other in Chinese.[87] Also as noted later in this report, PLAAF pilots have participated in Russian-led exercises and in maritime patrol missions. It is not clear what language both sides speak when communicating with each other.

In 2012, the 8th AD was the first division to receive a new type of H-6K strategic bomber.[88] In the past, plans for joint training (联合训练) had fallen far short of expectations.[89] Thus, in 2016, the division applied to higher authorities for greater powers, and organized its own joint training, which it wanted to regularize (常态化) and make more like actual combat (实战化). The division had since invited top training units (训练尖子) and support experts (保障能手) from every branch to come teach about different equipment and common combat methods (战法), so that all branches could become familiar with each other's equipment. It combined command (指挥), staff officers (参谋), logistics (空勤), and support (保障) from multiple work units for every mission. There has always been concern in the PLAAF about lack of proper training for new pilots and for crews who transition from one variant to another. For example, 2018 comments by the commander of an Eastern TCAF flight group revealed that a new generation of military training rules and regulations (军事训练法规) brought higher requirements for bomber flight group pilot "flight preparation" (飞行准备). As a result, the commander suggested the flight group must expand its role in flight training from one of simple manager and supporter to training organizer and director. The commander also recommended pairing older pilots with younger ones to train them in flight preparation, focusing mainly on essentials such as flight paths, weather conditions, operation essentials, and handling special situations... Through receiving help from older pilots in a one-on-one fashion, the ability to independently prepare (自主准备能力) and flight skill (飞行技术) would improve. In prior flight preparations, there were far more flight leads who emphasized technology (重技术多) than those who empathized tactics (重战术少). To deal with issues like this, the commander noted that the group should train flight leaders to have the ability to research and develop new combat methods (战法研究创新等能力).[90]

Ground Crews

Historically, each aircraft has been assigned a dedicated ground crew (地勤人员) of about 6 to 11 personnel, depending on the type of aircraft. For example, in the late 2000s, each bomber had a ground crew of about 11 personnel.[91] An entry concerning ground crew members in the China Air Force Encyclopedia shows nine personnel standing in front of a J-11 fighter.[92] Each ground crew, which includes officers, NCOs, and two-year enlisted personnel, consists of personnel from the airfield station and maintenance group.[93] The ground crew maintains the aircraft between sorties and prepares it for take-off, including loading munitions. It is not uncommon for the ground crew to work an 18-hour day for a single flying day.[94] Whereas most ground crew activity used to occur in an open area next to the runway, the PLAAF has now constructed hundreds of overhead shelters, where maintenance and even refueling takes place.

In November 2017, *Air Force News* reported that the PLAAF initiated a change to the ground crew structure and maintenance for fighter aircraft inside hangars at an unidentified Test and Training Base (试训基地). The changes were most likely then implemented over the next couple of years by all other fighter aircraft units as well as for bomber units. According to the article, "aircraft maintenance crew was no longer divided by their technical specialties (专业划分), but by positions (岗位划分), where each position must be familiar with at least two technical skills. This "position inspection method (岗位检查法)" turned out to be more efficient and each combat aircraft's re-dispatch time (再次出动时间) had been shortened by 10 minutes. Under the changes, the number of maintenance crew for each aircraft was reduced from 7-8 people to 4-5 people and the efficiency for maintenance support had been improved." [95]

ENDNOTES

[1] The information from these bullets is taken from a total of 117 articles, including 85 from *Air Force News*, 23 from *China Air Force* magazine, 12 from *China Armed Forces* magazine, and 7 from *PLA Pictorial* magazine for the period of December 2015 through November 2019. Citations are not provided for every article.
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[89] By definition, “joint training” (联合训练) involves two or more services. However, the PLAAF often uses “joint training” for “combined-arms training” that involves two or more branches.
[90] Note: In the PLAAF, combat methods (战法) and tactics (战术) are different concepts and are developed separately, but they are often combined into the same training subject.
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[93] The information in this paragraph is based on analysis of several photos in *China Air Force* of ground crews preparing aircraft and standing in formation at the front of an aircraft while waiting for pilots to approach the aircraft. See photos in *China Air Force* Volume 2003-2 inside cover, and Volume 2008-1, 38 and 59. See also the entries for “Aircraft Maintenance Personnel” (航空机务人员), “Ground Crew” (地勤人员), and “Ground Crew” (地勤机组) in Yao, ed., [*China Air Force Encyclopedia*], Volume 1, 237, 251. Information on personnel assigned to a single aircraft for their career comes from analysis of articles in *Air Force News* describing the career of certain maintenance personnel. See *Air Force News*, 11 June 2002, 2. *Air Force News*, 15 March 2003, 1. *Air Force News* 15 June 2006, 1.
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