



# The PLA Air Force's

# Four 金头盔 Key 金飞镖 Training 蓝盾 Brands 红剑

Jana Allen and Kenneth Allen

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To request additional copies, please direct inquiries to  
Director, China Aerospace Studies Institute,  
Air University, 55 Lemay Plaza, Montgomery, AL 36112

E-mail: [Director@CASI-Research.ORG](mailto:Director@CASI-Research.ORG)

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# Introduction

Guided by its service-specific strategy to “integrate air and space and be simultaneously prepared for offensive and defensive operations,” which was approved in 2004<sup>1</sup>, the People’s Liberation Army (PLA) Air Force (PLAAF) is pursuing an ambitious path of modernization to transform itself from an inward-focused homeland air defense force to a world-class “strategic air force”<sup>2</sup> capable of playing a decisive role in China’s national security and military strategy.<sup>3</sup> To this end, over the past decade the PLAAF has fielded increasingly modern and more capable equipment and weapon systems. Its likelihood to achieve victory, however, in informatized, high-intensity combat in a complex electromagnetic environment (CEME) is contingent on more than equipment modernization. Success in modern warfare also necessitates highly trained personnel who can adapt to tactical scenarios in a combat environment and perform sustained combat operations at their home bases and in deployed locations.

After taking power in late 2012, Chinese President and Central Military Commission (CMC) Chairman Xi Jinping put forth a vision for building a strong China, known as the “Chinese Dream” (中国梦). The modernization of China’s military is essential to the success of this strategy, as a strong PLA is viewed as a prerequisite for “building a well-off society” and “rejuvenating the Chinese nation.”<sup>4</sup> In April 2014, Xi urged the PLAAF to speed up its transformation into a strong air power with an integrated air and space capability, emphasizing that the PLAAF must focus on training that boosts combat capability.<sup>5</sup> Xi’s remarks allude to the difficulty of developing a truly combat-capable force, a longstanding challenge for the PLAAF. Indeed, historically PLAAF training was characterized by highly scripted scenarios that did not reflect the realities of modern combat.

The PLAAF's desire to advance its strategic transformation through qualitative changes is evidenced by its development of what it calls the "four key training brands"<sup>6</sup> (四大品牌).<sup>7</sup> These include: the *Golden Helmet* (金头盔) military competition; the *Golden Dart* (金飞镖) military competition; the *Blue Shield* (蓝盾) exercise, which includes the *Golden Shield* (金盾) competition; and the *Red Sword* (红剑) exercise.<sup>8</sup> This report provides an overview of these annual training events, which are described by the PLAAF as its "four main actual-combat oriented training series."<sup>9</sup>

The four key training brands increasingly serve as an important platform to test and further develop the PLAAF's operational capabilities, and also present an opportunity to assess the PLAAF's progress toward becoming a modern "strategic air force." Although they cannot be considered impartial sources, the frequent reports in Chinese media and commentary by key personnel and military experts about these annual training events provide some insight on PLAAF developments. In 2016 and 2017, Chinese official media published several reports detailing the success of the four key training brands, which form the basis for this report. The official PLAAF newspaper, *Air Force News* (空军报), is an especially useful source of reporting on PLAAF training. Its more official descriptions and commentaries provide a starting point for analysis of the four key training brands, despite the lack of transparency regarding some details. These training events have evolved in complexity as the PLAAF took concrete steps to reduce the gap between training scenarios and what is expected under actual-combat conditions.

Key observations on the four key training events include:

- The primary focus of the four key training brands is on preparing for actual combat under unknown (unscripted) conditions in a CEME. The PLAAF has gradually increased the complexity of each of the four key training brands since their inception and will likely continue to include more complex components in the future, as it moves incrementally toward completely unscripted training.
- The competitions and exercises conducted under the four key training brands provide a platform for the PLAAF to assess existing tactics and combat methods and to make recommendations for adjustments or creating new ones. They are also used to help the PLAAF identify shortcomings in equipment and pilot capabilities. The PLAAF is taking concrete steps, albeit incremental, to raise training to the next level. This has likely led to a corresponding increase in capabilities, such as improved pilot autonomy.

- Evaluation criteria for the four key training brands were developed to emphasize the actual effects of each engagement rather than simply focusing on scores and who wins. Furthermore, evaluation criteria are intended to guide the forces toward studying “real enemies” and identifying areas of weakness. This indicates the PLAAF is making some progress toward providing personnel with accurate and impartial feedback, which it has been hesitant to do in the past. As a deputy chief of staff of an Eastern Theater Command Air Force (TCAF) air regiment noted in 2016, “The real point of *Golden Helmet* is not to rack up glories for the unit, but to uncover and fix mistakes.”<sup>10</sup>
- Overall, the PLAAF is increasingly including key components of the surface-to-air missile (SAM) and radar branches, and communications specialty units, as well as each component of the aviation branch, including fighter, attack, bomber, intelligence surveillance and reconnaissance (ISR), refueling, and airborne early warning (AEW) aircraft, in these competition and exercise events. Of note, however, no references have been found to the antiaircraft artillery (AAA) branch or the airborne branch.
- Although the overall number of individual components in each event is growing, there were no reports found in Chinese media of multiple aircraft, SAMs, and radar units training together in a joint engagement zone (JEZ). For example, although fighter and SAM units train separately on a regular basis against “enemy” aircraft, no information was found concerning any training that involves a PLAAF aircraft taking off, being vectored to an air engagement by a controller in the control tower or an airborne early warning and control (AEW&C) aircraft, engaging an “enemy” aircraft, and then having a SAM fire at the “enemy” aircraft at the same time that the PLAAF aircraft is in the air. Furthermore, although the PLAAF has official definitions for a missile engagement zone (MEZ) and a fighter engagement zone (FEZ), it does not appear to define a JEZ, where aircraft and SAMs engage the enemy in the same airspace (see Appendix A).
- The four key training brands are developed by and for the PLAAF. As such, they focus on honing PLAAF core competencies, rather than joint interoperability. The one exception was in 2017, when three Naval Aviation pilots from the South Sea Fleet (SSF) air brigade participated in the *Golden Helmet* competition for the first time.<sup>11</sup> They did not win any awards; however, their inclusion provided an opportunity for valuable individual and joint training, and may be an indication of more to come.

- Although the Dingxin Test and Training Base in the Gobi Desert in Gansu Province has been the primary location for the four key training brands, some events have taken place in Eastern China, the Bohai Gulf, and over water off the east coast of China.
- The PLAAF has given personnel who excelled during the four key training brands opportunities to participate in international military competitions, such as Aviadarts.<sup>12</sup> This competition was held in Russia from 2014 to 2016 and in China in 2017.

# The Four Key Training Brands

Since 2016, the evolution of the four key training brands has occurred against the backdrop of massive organizational reforms being implemented across the PLA writ large. Within the PLAAF, major organizational reforms have included:

1) the shift to a Base-brigade structure<sup>13</sup> that began in 2012 from the traditional command post-division/regiment structure for the aviation, SAM, airborne, and radar branches, as well as communications brigades;

2) the consolidation and upgrading of flight colleges and their restructuring into training brigades that began in 2011;<sup>14</sup>

3) the change from seven Military Region Air Forces (MRAF) to five Theater Command Air Forces (TCAF) in early 2016;

4) changes in the headquarters and staff organizations that began above the corps level in early 2016 and were implemented at the corps level and below in 2017; and

5) a division of responsibilities between the PLAAF Headquarters, which is responsible for “construction” functions, such as organizing, manning, and equipping units, and the five TCAF Headquarters, which are responsible for combat operations.

In addition to these organizational changes, as of the 19th Party Congress in November 2017, the PLAAF commander, along with the other service commanders, is no longer on the CMC.<sup>15</sup> Despite these extensive and likely disruptive organizational reforms, the PLAAF leadership remained focused on its mandate to accelerate the building of the force. In January 2016, the Air Force Party Committee emphasized that “in times of reform and tackling tough issues, it is particularly essential to unswervingly push forward realistic combat training.”<sup>16</sup>

Table 1 below provides a brief overview of the four key training brands, including their name, type, when they began, where they occur, and the types of units that participate. Each brand is discussed separately in the sections that follow. Regarding terminology, it is important to note that although the PLAAF generally refers to them as the “four key training brands” (四大品牌),<sup>17</sup> Chinese official media is not consistent in how it identifies these events in Chinese or English (see Appendix B). For purposes of this report, the term “competition” will be used for *Golden Helmet* and *Golden Dart* and the term “exercise” will be used for *Blue Shield* and *Red Sword*, even though since 2017 the *Blue Shield* exercise has included the *Golden Shield* competition. When discussing all four together, they will be referred to as the “four key training brands”.

**Table 1: Four Key Training Brands**

Event	Type	First Time	Location	Participants
Golden Helmet	Competition	2011	Dingxin Test & Training Base	PLAAF and Naval aviation fighters and attack aircraft
<i>Golden Dart</i>	Competition	2014	Different locations: Dingxin Test & Training Base, East China, and over water	PLAAF attack aircraft and bombers
<i>Blue Shield</i> includes <i>Golden Shield</i>	Exercise includes competition	2002	Bohai Gulf and Dingxin Test & Training Base	PLAAF fighter and attack aircraft, and SAMs
<i>Red Sword</i>	Exercise	2009	Dingxin Test & Training Base	PLAAF fighters, attack aircraft, airborne early warning (AEW), and reconnaissance aircraft, radars, ECM units, and SAMs



# Golden Helmet (金头盔) Competition

Established in 2011, the *Golden Helmet* competition has been held for seven consecutive years. It is an air-to-air combat competition designed to “improve and assess pilots’ skills and capabilities in combat conditions,” and it features “one-on-one” and “two-on-two” engagements between similar and dissimilar aircraft as well as three-aircraft close-quarters combat (三机近战).<sup>18</sup> The *Golden Helmet* competition is normally held for about ten days during November and/or December in the Gobi Desert at the PLAAF’s Dingxin Test and Training Base in Gansu Province. The one exception was in 2014, when the *Golden Helmet* competition was held in September and was immediately followed by the inaugural *Golden Dart* competition. The competition results in a few outstanding individual pilots winning the *Golden Helmet* award and the top unit receiving the *Skyhawk Cup* (天鹰杯) award. According to Chinese media reports, this competition represents the highest standards of the Chinese Air Force’s air battle training, and winning the competition is considered the highest honor for PLAAF fighter and attack pilots.<sup>19</sup> At least one *Golden Helmet* winner has been chosen to represent the PLAAF in the Aviadarts international competition.<sup>20</sup> This competition was held in Russia from 2014 to 2016 and in China (in Changchun, Jilin Province) in 2017.

From 2011 to 2016, participation in the *Golden Helmet* competition ranged from 108 to 170 pilots selected from approximately 15 to 20 air regiments and brigades per year.<sup>21</sup> The criteria and timeline for selecting individual and unit participants is unclear, though one source from 2014 indicated that for the first time the pilots were selected at random by PLAAF Headquarters, rather

than by individual units, which ensured that half of the selectees were first-time participants.<sup>22</sup> One Northern TCAF air brigade, currently commanded by Xu Liqiang (许立强), has participated in all seven competitions.<sup>23</sup> Another air brigade from the Eastern TCAF has had six pilots win the *Golden Helmet* award and four win the *Golden Dart* award, which indicates this particular unit has both air-to-air and air-to-ground capabilities.<sup>24</sup> In the most recent *Golden Helmet* competition in November 2017, a total of only 100 pilots from 16 air brigades competed. The lack of participation by any air regiments in 2017 is likely explained by the PLAAF's shift to a brigade structure, which began in 2012. By mid-2017, all PLAAF fighter and ground attack air divisions had been abolished and all subordinate regiments were either upgraded to brigades, merged into brigades, or abolished.<sup>25</sup> Of the 100 participants, six pilots received *Golden Helmet* awards and one unidentified Northern TCAF air brigade received the *Skyhawk Cup* award.<sup>26</sup>

Three Naval Aviation pilots from a SSF air brigade participated in the *Golden Helmet* competition for the first time in 2017, though Naval Aviation pilots had apparently observed earlier iterations.<sup>27</sup> Additionally, prior to 2017, Naval Aviation pilots had engaged *Golden Helmet* winners in at least one other training event. In August 2014, two pilots from the East Sea Fleet's (ESF) "Blue Force" unit equipped with Su-30MK2s conducted the first-ever joint free-air combat opposition-force training over water with the Air Force.<sup>28</sup> The PLAAF pilots were *Golden Helmet* winners flying J-11s. Chinese media reported that after training for five months, the Naval Aviation pilots won the two-minute competitions, which involved "one-on-one" and "two-on-two" engagements. This could indicate that the Naval Aviation pilots "trained for the test" during the five months leading up to this event, a problem that has also characterized PLAAF training, rather than focusing on actual training requirements under the revised Outline for Military Training and Evaluation (OMTE), i.e. pilots spend much of their time training for a particular event.

Table 2 provides information about each of the seven *Golden Helmet* competitions. According to one unconfirmed report, as of 2017 a total of 63 awards have been presented, including three pilots who have won the award more than once.<sup>29</sup>

**Table 2: Golden Helmet Competition**

Year/Month	Competition	Number of Participants	Number of Units	Number of Winners
2011/Nov	1st	Unknown	Unknown	10
2012/Nov	2nd	108	10+ brigades & regiments	11
2013/Nov	3rd	123	Unknown	9
2014/Sep	4th	170	20 brigades & regiments	6
2015/Nov-Dec	5th	160	Unknown	12
2016/Dec	6th	150	Unknown	6
2017/Nov	7th	100	16 brigades	6
<b>TOTAL</b>				<b>60</b>

The *Golden Helmet* competition has evolved in a few key respects since its first iteration in 2011. Reflecting the PLAAF’s aim to make training more reflective of actual-combat air battles, the rules of the *Golden Helmet* competition have expanded to include not only air battles between aircraft of the same model but also those between different models; “one-on-one” aircraft confrontation as well as formation-to-formation confrontation; and scorekeeping competition as well as “hit-to-bring-down fight.”<sup>30</sup> Over the past seven years, the competition has gradually eliminated restrictions that were discordant with conditions expected during actual combat and increased autonomy so that pilots could focus on sharpening their skills and end “nanny-style” preparations (“保姆式”准备).<sup>31</sup> In 2011, the first competition incorporated “free-air combat”<sup>32</sup> and eliminated the difference in altitude for horizontal maneuvers in aerial combat, which is considered an advanced training level by the United States Air Force.<sup>33</sup>

In 2015, the competition incorporated dissimilar aircraft confrontations, breaking with the practice of organizing similar aircraft confrontations for small team competitions.<sup>34</sup> This represented a significant step toward more realistic air combat training. In 2016, for the first time, the “Red Force” was officially designated as the offensive side and the “Blue Force” as the defensive side, whereas previously the colors were only used to differentiate between the two sides. This change led the participants to shift their mission objective from “shooting down the opponent” (击落对手) to “completing the mission” (完成任务).<sup>35</sup> Finally, in 2017 the competition included an evaluation of four-aircraft close-quarters air combat, a reduction in unencrypted commands, an emphasis on the role of the lead aircraft, an elimination of restrictions on

what some aircraft can carry externally, as well as limitations on jamming by those aircraft.<sup>36</sup> Chinese media reported that these changes greatly reduced the gap between the competition and actual combat. According to Sun Mingxing, director of the PLAAF Staff Department's Training Bureau, the *Golden Helmet* competition has "become a model for combat-realistic Air Force military training, as well as an important guide for improving the capabilities needed for victory in the new era."<sup>37</sup>

Regarding the training value of the competition, *Golden Helmet* provides a platform for assessing existing tactics and combat methods and for making recommendations for adjustments or creating new ones. China's development and employment of an air combat maneuvering instrumentation (ACMI) system has propelled the PLAAF's tactical training forward over the past decade. The PLAAF has utilized monitoring systems, such as the Flight Parameter Recording System or "*feican*" (飞参), on aircraft and in control towers to measure and record information about the aircraft since the early 2000s.<sup>38</sup> These systems enable more realistic air combat training by providing a safer training environment for pilots and accurately documenting a training event in its entirety. Such a detailed account of who did what and when enables a factual, constructive assessment of pilot performance and leads to improved capabilities. This technology is particularly useful for evaluating training events like *Golden Helmet*. According to one media report, the *Golden Helmet* evaluation process resulted in a series of shifts in thinking on aerial combat, and repeated aerial confrontations taught numerous tactics and combat methods, which assisted the PLAAF in its move toward becoming "an all-area operation modernized strategic service."<sup>39</sup>

The PLAAF's implementation of free-air combat has been a gradual process and has apparently not yet reached the point where pilots are allowed to maneuver at will. However, the PLAAF appears to be moving toward more pilot autonomy. For example, Chinese media reported that after a major loss in air-to-air combat, Ji Chao (季超), a Southern TCAF air brigade deputy chief of staff, concluded that without proficient flying capability and the most effective tactics and combat methods, the advanced capabilities of the aircraft do not guarantee success.<sup>40</sup> According to Ji, it was like "driving a race car on a road with a speed limit."<sup>41</sup> In 2016, Ji completed his flight transition for a new domestically manufactured aircraft and was selected to participate in the *Golden Helmet* competition. To prepare for the competition, Ji created a few sets of new tactics and combat methods, and despite incomplete radar intelligence, used his deductions to identify the targets and switched his

tactics while engaged with his rival. He won with a score of 22:0 and 32:0 and was awarded a *Golden Helmet*.<sup>42</sup>

This report indicates that in some cases pilots are being given more latitude to make adjustments to set tactics and combat methods. Historically, when pilots received a new tactic or combat method that were incorporated in a set of regulations, they were not allowed to make any changes without prior approval. Although Ji “created” a new set of tactics and combat methods that he used during the competition, it does not necessarily mean they were officially sanctioned for use throughout the force. Typically, if a new maneuver is successful, it is then assigned to either an operational unit or one of the Test and Training Bases for further review and approval before it is written into a regulation and distributed to all units for implementation. This process can take several months to a year, or more in some cases.

In addition to assessing and developing tactics and combat methods, the competition helped the PLAAF identify shortcomings in equipment and pilot capabilities. One article reported that during *Golden Helmet-2016*, gaps were identified in the performance of the aircraft radar, electronic warfare, missile, and intelligence systems, which directly affected the formulation and implementation of tactics and combat methods. When discussing these problems, Wang Wei (王玮), the assistant to the chief of staff of an aviation division in the Eastern TCAF, asserted that combat methods should not be developed merely by studying an opponent and idealizing capabilities, without taking into account each aircraft’s strong points and weaknesses, as this does not assure success in actual battle.<sup>43</sup> The same article indicated the following pilot shortcomings were observed during the competition: the inability to devise stratagems and a lack of innovation or initiative; the inability to study and grasp the performance features of the weaponry and equipment, which caused some individuals to implement tactics in a haphazard manner without sufficient flexibility and adaptability; and weakness in psychological qualities, which negatively affected some pilots’ performance during the contest, although they can keep their performance stable under “normal conditions.”<sup>44</sup>

### **Golden Helmet-2017**

*Golden Helmet-2017* commenced on 1 November and concluded on 10 November 2017. Sixteen Air Force air brigades and nearly 100 pilots from the five TCAF’s competed in air combat confrontations for six *Golden Helmet* awards and one *Skyhawk Cup*. One article indicated that participating units sent new and younger pilots to participate, focusing on the training value

of the competition rather than the final results.<sup>45</sup> Chinese media reported that several types of Chinese designated “third-generation”<sup>46</sup> fighter jets, including J-10s, J-11s, and JH-7s, participated in the competition.<sup>47</sup> Although second-generation fighters, including J-7s and J-8s, participated in earlier competitions, they apparently no longer participate. According to one source, the J-20 fighters will join the competition in the future, when their number in service increases.<sup>48</sup> It typically takes two years to achieve initial operational capability (IOC) after the first aircraft are assigned to an operational unit.<sup>49</sup> According to Sun Mingxing, director of the PLAAF Staff Department’s Training Bureau, *Golden Helmet-2017* was the first test of PLAAF aviation units since the organizational reforms, and for some aviation brigades, it was their first important mission since the reorganization.<sup>50</sup> The competition examined coordinated combat actions among teams as well as weapons and equipment performance during unknown situations and under unknown electromagnetic conditions.

One Chinese media report advised that *Golden Helmet-2017* aimed to evaluate the following skills, which are viewed as necessary combat capabilities: pilot’s ability to conduct dissimilar-aircraft confrontations; win a war under unknown situations and unknown electromagnetic conditions; take coordinated combat actions between a formation, AEW aircraft, and a command post in the control tower; and carry out information-firepower integrated operations.<sup>51</sup> Another commentary on the competition discussed how future aerial combat is likely to take place over a maritime battlefield or in a CEME, which could result in battles being fought with no or interrupted information from the aircraft’s data link. Therefore, it is necessary to study and solve “difficult questions,” including how to self-reliantly search targets, close in on enemy aircraft, engage in a dogfight, and dodge attacks without timely and adequate data support.<sup>52</sup>

One article noted that the competition had shifted its training mentality, emphasizing that “winning against the enemy is more important than winning against teammates” and shifting away from “observing teammates practice” to “observing the enemy’s practice.”<sup>53</sup> In addition, Xu Liqiang, commander of a Northern TCAF air brigade that has participated in every *Golden Helmet* competition, stated that, “If one wishes to avoid defeat, one must constantly research the battlefield environment, operational opponents, and equipment performance.”<sup>54</sup> These reports did not specifically refer to potential foreign “enemies” or “opponents”; however, another commentator noted that dissimilar-aircraft confrontations in the *Golden Helmet* competition were

designed to train Chinese fighter pilots to gain experience against aircraft such as Su-30 and US-made F-15 fighters.<sup>55</sup> This indicates the PLAAF is studying potential foreign competitor aircraft, but it is unclear if foreign tactics are being incorporated into dissimilar aircraft training.

To increase the intensity and difficulty of the competition in 2017, close-air battle confrontation was added, in addition to medium-range air combat confrontation.<sup>56</sup> In addition, the pilots reportedly received fewer orders from the ground-based command posts, enabling them to make more independent decisions during the competition.<sup>57</sup> The role of AEW “airborne command posts” during the competition, however, is unclear. Restrictions on some fighter jets' external payload and their jamming capabilities were lifted, enabling units to freely determine the amount of payload based on their tactical needs.<sup>58</sup> Chinese media reported that the focus of the exercise had shifted from determining success or failure in the air to emphasizing victory through system-of-systems operations. Additionally, the combat teams participating in the 2017 competition reportedly received “strong rear support” from an improved operational command information system, an air combat post-assessment system, and a “highly effective” equipment support mechanism.<sup>59</sup>

The winners of *Golden Helmet-2017* were selected from the three units that made it to the final round and were determined by the overall scores of the formation and the completion of tasks.<sup>60</sup> This featured “two-on-two” engagements between fighters of the same type or different types, which reportedly required “teamwork” to win.<sup>61</sup> In the end, a total of six pilots each from the Southern, Northern, and Western TCAFs, respectively, won *Golden Helmet* awards and a Northern TCAF air brigade won the *Skyhawk Cup* for the top performing brigade.<sup>62</sup> *Golden Helmet* award winners included Liu Zhankun (刘占坤), a deputy chief of staff of a Western TCAF aviation brigade.<sup>63</sup>



# Golden Dart (金飞镖) Competition

The *Golden Dart* competition, which was first held in 2014, is another high-profile military contest designated as one of the PLAAF's four key training brands. Both the *Golden Dart* and *Golden Helmet* competitions are described as “one-on-one’ competitive tactical and technical exams.”<sup>64</sup> However, unlike the *Golden Helmet* competition, which focuses on air-to-air engagement, the *Golden Dart* competition focuses on air-to-ground attack by attack and bomber aircraft.<sup>65</sup> According to the PLAAF Headquarters’ Staff Department’s Training Bureau, the *Golden Dart* competition aims to improve troops’ offensive air war-fighting capabilities.<sup>66</sup> The competition integrates information on attack and defense, system confrontation, electromagnetic environment and other elements.<sup>67</sup> The PLAAF awards the highest honor of the competition, the *Golden Dart* award, to the top aircrews who excel in “defense-line penetrating and shock attack operations.”<sup>68</sup> One Chinese media report defines the assessment criteria for the *Golden Dart* competition as “aiming only once, firing only once, and zero mark if the first attack misses the target.”<sup>69</sup>

Although often compared to the *Golden Helmet* competition in terms of status and prestige, the *Golden Dart* competition has not received as much coverage by Chinese media. Based on the limited information available, it appears that the timing of the competition varies each year. Whereas the first competition was held around September 2014, immediately following the *Golden Helmet* competition, in 2016 the competition was held in July, prior to the *Golden Helmet* competition, which was held in December. The most recent iteration was held in April 2018. It also appears that the competition



changes location each year. Thus far it has been held in the Western, Eastern, and Northern TCs. According to one report, the *Golden Dart* competition “takes place on a ‘battlefield’ that ranges from desert to the hills and sea.”<sup>70</sup> In 2014, it was held at the Dingxin Test and Training Base. In 2015, it was held for the first time over water off the east coast of China. In 2016, it was held somewhere in east China, likely in Zhejiang.<sup>71</sup> In 2018, it was held in Changchun in Jilin Province.<sup>72</sup> Finally, it is not clear how many aircrews have won the *Golden Dart* award. Conflicting information indicates a total of between 17 to 25 crews won during 2014 and 2015;<sup>73</sup> and some pilots, such as Chen Quanlong (陈权龙) and Wang Li (王立) from an unidentified Eastern TC (formerly Nanjing MRAF) air regiment, have won both the *Golden Dart* and *Golden Helmet* award.<sup>74</sup> Information concerning *Golden Dart-2016* and *Golden Dart-2018* is detailed below. No further information was found for the 2014, 2015, or 2017 competitions.

### **Golden Dart-2016**

The *Golden Dart-2016* competition kicked off on 21 July 2016 in east China.<sup>75</sup> Chinese media reported that “this defense and assault military competition featured hundreds of pilots from dozens of air brigades and regiments from all five TCAFs.”<sup>76</sup> The *Golden Dart* competition likely serves similar purposes as the *Golden Helmet* competition, namely serving as a training platform to assess and refine tactics and combat methods for bomber and assault aircraft, as well as an opportunity to evaluate equipment and personnel capabilities in an environment that more closely resembles what is expected during combat operations. It was reported that *Golden Dart-2016* incorporated live ammunition and the application of new weapons, as well as surveillance and strike drones, early warning aircraft, jammers, and other air support troops, including security police, ground navigation, electronic warfare, radar, meteorology, air traffic control, and battlefield engineering units.<sup>77</sup> This likely reflects the PLAAF’s desire to utilize training events to develop integrated system-of-systems capabilities that focus on operating in informatized conditions, not just on honing individual aircrew skills.

### **Golden Dart-2018**

Over 200 fighter pilots from “dozens” of combat units participated in *Golden-Dart 2018*, which began on 19 April 2018 in the Northern TC in Changchun, Jilin Province. According to Chinese media reports, PLAAF

attack aircraft and bombers participated in the competition, including J-7, J-8DF, J-10A, Su-30, J-10C, and J-20 fighters and H-6H bombers.<sup>78</sup> The competition aimed to test the pilots' defense penetration and assault tactics while flying at low altitudes as well as their abilities to quickly locate targets in complex environments and conduct continuous attacks with different weapons.<sup>79</sup> An officer with the PLAAF training bureau advised that during the competition, participating pilots first broke through enemy air defense systems (penetration) and then launched attacks with live ammunitions against enemy land/sea targets (assault).<sup>80</sup> To simulate a more realistic wartime environment, *Golden-Dart 2018* was held both during the day and at night and featured information defense and offense and confrontations between systems in an electromagnetic environment. According to one report, the competition tested the functions of fighter aircraft under extreme conditions and improved pilots' abilities to control their weapons.<sup>81</sup>

# Blue Shield (蓝盾) Exercise and Golden Shield (金盾) Competition

The *Blue Shield* (蓝盾) exercise is designed to test the capabilities of the PLAAF's ground-based air defense forces, specifically SAMs and supporting radar and information systems. First held in 2002, the exercise has evolved over the years from the training of firepower elements via target shooting, to the training of tactical units via base-focused exercises, to the present training of a combat operations system via live-forces, live-fire confrontations at deployed locations.<sup>82</sup> According to Senior Colonel Shen Jinke (申进科) who is the PLAAF's news spokesman, the *Blue Shield* exercise is "an actual-combat air defense antimissile training mode formulated for the ground-based air defense force to adapt to new threats in the air and space and to changes in the modes of operation, and it has become one of the four key brands in actual combat training of the Air Force."<sup>83</sup> Based on the requirements for a combined air defense antimissile campaign that focuses on reconnaissance, strikes against incoming threats, protection, and other complex integrated training topics, the *Blue Shield* exercise is an important platform to test and enhance the PLAAF's air defense and anti-missile operational capabilities.<sup>84</sup>

Of note, although the PLAAF's antiaircraft artillery (AAA) branch has historically been considered a key component of the PLAAF's air defense force along with SAMs and radar units, it does not appear that this branch has been included in any of the competitions. Furthermore, there is little mention of AAA forces in the PLAAF's official newspaper, *Air Force News*. During the late 1980s, the PLAAF's goal was to combine at least some of its SAM and AAA regiments into air defense composite divisions (防空混成师), but the program apparently did not move forward in the 1990s.<sup>85</sup> As a result, it appears that today the PLAAF has only one composite air defense

division located near Tianjin. The composite division has subordinate SAM and AAA regiments, each of which have subordinate battalions. Although a few separate AAA brigades exist, such as one in the Eastern TCAF,<sup>86</sup> it appears that, while some AAA companies are being incorporated into SAM brigades or air defense brigades,<sup>87</sup> most AAA units are being abolished. The lack of AAA participation in *Blue Shield* and the lack of coverage in the media, combined with the increasing number of shoulder-fired SAMS (MANPADS) and other low-altitude SAMs, seems to indicate that the AAA branch is rapidly disappearing, though a small number of AAA units continue to exist.<sup>88</sup>

While it appears that in previous years the *Blue Shield* exercise was held only once per year, in 2017 there were two iterations. The first was held in the spring at the PLAAF's training base near the Bohai Gulf, and the second was held in the fall at the Dingxin Test and Training Base. Furthermore, in 2017 the *Blue Shield* training brand expanded to include a military skills contest called the *Golden Shield* (金盾) competition, with the top battalion earning the *Golden Shield* award.<sup>89</sup> Both iterations of *Blue Shield-2017* received more coverage in the Chinese media than in previous years, likely due to the new *Golden Shield* competition.

### **Golden Shield Competition**

As with the *Golden Helmet* award for fighter and attack pilots, the *Golden Shield* award is described as the “top honor” for PLAAF SAM units. The inaugural *Golden Shield* competition was based on the international *Keys to the Sky* competition model, which China had participated in as part of Russia's 2016 International Army Games.

Held from 30 July to 13 August 2016, the games featured 23 field, air, and sea training competitions at 20 training grounds across Russia.<sup>90</sup> China was one of 19 countries to participate, and Chinese media reported that this was the first time PLAAF SAM crews went abroad to participate in the “military Olympics.”<sup>91</sup> Such international military competitions provide the PLAAF with an opportunity to learn from other militaries, and insights gained from these events shape the PLAAF's combat training reforms. Chinese news media reported that during the *Keys to the Sky* competition, one member of the Chinese delegation, Zhan Shaojie (战少杰), who was the commander of a Northern TCAF SAM battalion, was specifically tasked to “watch and learn,” and he “shuttled back and forth carefully observing every little detail of the competition.”<sup>92</sup>

According to Yang Xuefeng (杨学锋), director of the PLAAF Headquarters' Staff Department's Ground Air Defense Bureau, the PLAAF, with the approval of the Air Force Party Committee and senior officers, developed the *Golden Shield* competition by taking five events from the *Keys to the Sky* competition, increasing their difficulty and expanding them to include 12 actual-combat type events focused on improving the modern air raid operations capabilities of SAM units.<sup>93</sup> The 12 events included nighttime maneuvers and operations and live-fire counter strikes, which were described as “closely linked to core capabilities and areas of weakness in [the PLAAF’s] air and missile defense.”<sup>94</sup> The *Golden Shield* competition emphasized operations in a CEME, reflecting the difficulty of confrontations in unknown conditions. According to Yang, the competition “uses training with live munitions to develop first-class equipment, cultivate first-class personnel, and temper a first-class military.”<sup>95</sup> Unlike the *Golden Dart* competition, the aviation units that participate in the *Golden Shield* competition serve only as the “Blue Force” opposition force and as targets. They do not compete for any awards.

Interestingly, Chinese media reported that early in the planning of the *Golden Shield* competition, the Air Force staff decided to solicit bids to supply equipment for the event on the open market rather than via internal military channels. As a result, several civilian high-tech enterprises won bids to supply equipment, including infrared night vision equipment, equipment to ensure “communication while on the move” for battlefield command, and advanced drones simulating various kinds of targets executing air raids.<sup>96</sup> After the exercise, one regiment commander commented that “military use of civilian equipment played a crucial, materially supportive role in units breaking the bottleneck of night training and night combat operations.”<sup>97</sup>

### **Blue Shield-2017**

There were two iterations of *Blue Shield* in 2017, the first of which was held in April at the PLAAF’s training base near the Bohai Gulf. Six SAM units and several aviation units from three TCAFs participated in the exercise, which focused on carrying out air-ground confrontation drills and lasted over ten days.<sup>98</sup> Participating units competed in 12 events designed to “test the units’ actual combat-oriented training results and enhance their capabilities for “system-vs-systems” operations.”<sup>99</sup> These included operational command, air-ground confrontation, nighttime maneuver, live-ammunition

counterstrike, driving special vehicles (e.g. transporter erector launchers / TELs), firing of small arms and light weapons, military physical fitness, and others. The top missile battalion received the *Golden Shield* award. In addition, seven combat logistics groups and four individuals received the PLAAF's *Blue Shield Elite Troop* award. This was the first time the PLAAF gave these awards. The winner of the first *Golden Shield* award was a battalion from the Central TCAF commanded by Qiu Lianlong (邱连龙).<sup>100</sup>

Chinese media reported that *Blue Shield-2017* had increased in difficulty from previous exercises. Specific aspects of increased difficulty included changing how the SAM units moved from one location to another, which required setting up the SAMs in a timely manner before the air attack began. In addition, flight paths, directions and time of attacks, as well as the total number of attacking aircraft organized into flight formations and their altitudes, were all unknown, which increased the difficulty of counterstrike. Finally, the exercise was held in an area unfamiliar to the participants and was conducted “fully back-to-back,” which typically means both the “Red Force” and the “Blue Force” were operating independently with no knowledge of what the other side had been told.<sup>101</sup>

According to the Chinese media, multiple types of Chinese designated third-generation combat aircraft equipped with jamming equipment comprised the “Blue Force” formation, which carried out a low-altitude assault on the “Red Force” missile position. Furthermore, in order to practice penetration and assault, each formation of attack aircraft independently planned their approach and conducted attacks against each SAM site, applying the appropriate tactics for each attack. Operational tasks for the ground-based air defense forces centered on maneuvering to lay ambushes and organizing counterstrikes. As such, various “Red Force” SAM units closely cooperated to quickly acquire targets and implement simulated attacks.<sup>102</sup> Given that at least some of the SAM units had just moved to a new location and both sides were maneuvering at the same time without knowledge of the other side in advance (i.e., unscripted), exercise participants had to make rapid decisions in order to complete their tasks.<sup>103</sup>

According to one military news program, the training objectives of *Blue Shield-2017* were to standardize and unify operational procedures, train and improve the commanders' command and strategizing skills, and enhance the entire SAM units' overall cooperation and coordination capabilities of the “whole battalion acting as one rifle.”<sup>104</sup> The exercise emphasized honing

ground-based air defense units' overall capabilities for "system-of-systems" confrontation. According to spokesman Yang Xuefeng, when preparing for the exercise, prominence was given to capabilities, system-of-systems drills, verification of equipment capabilities and innovation, as well as requirements for the opponents and targets in the exercise. Tactical drills, drills covering high-, medium-, and low-altitude airspaces, and all-aspect assaults from various directions were conducted to hone the ground-based air defense units' overall capabilities for 'system-of-systems' confrontations.<sup>105</sup>

### **Blue Shield-2017S**

The second iteration, *Blue Shield-2017S*, was held in the late fall of 2017 at the PLAAF's Dingxin Test and Training Base and lasted 20 days. Six missile units from the Eastern, Northern, and Central TCAFs competed in *Blue Shield-2017S* for the *Golden Shield* Award. As in the first iteration, the competition featured 12 events, including air-ground confrontations, nighttime maneuvers and operations, and live-fire counter strikes. Participating units utilized railway transportation and motorized maneuvers to travel 1,000 kilometers to an unfamiliar environment in Gansu,<sup>106</sup> where they carried out live-fire strikes soon after arriving at the exercise field.<sup>107</sup> Chinese media reported that this part of the competition, referred to as "striking upon deployment," was designed to test the forces' capabilities for long-range maneuvers and operations and handling contingencies.<sup>108</sup>

Chinese media reported that during the competition, the six missile battalions were divided into three groups of two that competed to strike the same airborne target. The objective was to live-fire FN-6 shoulder-fired missiles (MANPADs)<sup>109</sup> against drones simulating armed helicopters launching surprise attacks.<sup>110</sup> This event was meant to assess the SAM battalions' key abilities to use FN-6 missiles for air defense in times of war. The "Blue Force" consisted of aviation units with multiple aircraft that conducted attacks at low altitudes from multiple directions and in several waves of flight formations both during the day and at night. Intervals between waves of targets were very short, reportedly less than one minute. During the training, the "Red Force" had to prioritize and engage targets, which tested the SAM battalions' ability to counter saturation attacks from multiple targets and in multiple directions.<sup>111</sup>

The final round of the *Blue Shield-2017S* competition featured one SAM unit from the Northern TCAF and one from the Central TCAF, which

faced target drones simulating cruise missiles, stealth aircraft, and Chinese designated third-generation combat aircraft conducting a saturation attack from multiple directions and in multiple waves in a CEME. At the conclusion of the competition, the SAM battalion from the Central TCAF was awarded the *Golden Shield*.<sup>112</sup>



# Red Sword (红剑) Exercise

Since at least 2009, the PLAAF has conducted the *Red Sword* exercise annually in November at the Dingxin Test and Training Base in the Gobi Desert; as of yet, it has not overlapped with the *Golden Helmet* competition, which has also been held at Dingxin. Unlike the three other brands, which are based on competitions and awards, it does not appear that any units participating in *Red Sword*, which is solely an exercise, receive any comparable awards. *Red Sword* is a campaign-level<sup>113</sup> system-of-systems confrontation exercise conducted in a complex, multidimensional battle space that involves PLAAF fighters, attack aircraft, AEW, reconnaissance aircraft, radars, and SAMs.

The PLAAF has been tasked to build a force that is capable of not only fighting but also winning wars. To make this goal a reality, and ensure units are prepared for the challenges of modern warfare, training events must move beyond heavily scripted scenarios. This is a key factor behind the PLAAF's efforts to increase the level of realism in *Red Sword*, which is aimed at "solving key and difficult problems of actual combat."<sup>114</sup> Chinese media reported that *Red Sword* exercises have continually advanced in their level of realism, accomplishing a transformation from tactics to campaigns, from a single branch or aircraft type to multiple branches and multiple types of aircraft, and from traditional training to informatized training.<sup>115</sup> One article reported that, over time, the exercise has evolved from a pattern of "confrontation drills with one type of aircraft under simple conditions" to that of "confrontation drills with multiple types of aircraft and multiple arms in a CEME" to the current pattern of "system-of-systems confrontation drills involving all elements under unknown conditions."<sup>116</sup> *Red Sword* has become the PLAAF's "signature actual-combat training that contains

the most elements of war,”<sup>117</sup> combining *Golden Helmet* opposition-force air combat, *Golden Dart* assault and penetration and *Blue Shield* air defense and anti-missile operations.<sup>118</sup>

As of 2016, the *Red Sword* exercise has followed the new Base-brigade structure instituted for organizing and commanding operations, which allows for the implementation and exploration of regional air defense organizations.<sup>119</sup> During the reorganization, the PLAAF’s shift to an air brigade structure for fighter and ground attack aircraft required significant shifts of personnel, which impacted the PLAAF’s command, control, and coordination structure. The *Red Sword* exercise allows the PLAAF to build trust within and between unit components and test the effectiveness of the new structure across multiple branches.

### **Red Sword-2016**

*Red Sword-2016* was held in November in the Gobi Desert, where dozens of PLAAF units and nearly 100 combat aircraft from two TCAFs engaged with each other in a live-fire system-of-systems confrontation drill.<sup>120</sup> During the exercise, combat aircraft of various types, land-based radar, and SAM units worked together in a coordinated manner to test combat patterns, which included joint reconnaissance, fire strikes, and joint air defense operations.<sup>121</sup> Chinese media reported that J-10 fighters, JH-7 fighter bombers, KJ-200, KJ-500, and KJ-2000 AEW aircraft participated in the exercise. Notably, no reference to participation by any AAA units was found. *Red Sword-2016* was described as a “joint<sup>122</sup> exercise of the largest scale ever conducted by the PLAAF, representing its highest simulated actual-combat standard,”<sup>123</sup> and “the first campaign-level, all key elements system-of-systems confrontation under unknown conditions that PLAAF units have organized since the new leadership and command structure went into operation in early 2016.”<sup>124</sup>

According to Chinese media reports, *Red Sword-2016* provided the opportunity to test several new training and combat methods suited for informatized conditions in an environment that closely resembled actual combat. These included joint reconnaissance, defense penetration and shock attack, and air defense and anti-missile operations.<sup>125</sup> During the exercise, different types of combat elements, such as aviation forces, SAM troops, and radar troops, were assigned to the Red and Blue Forces in balanced proportions.<sup>126</sup> One example of increased realism in *Red Sword-2016* was that units were no longer provided intelligence information that would not be provided in wartime, meaning that when a unit entered an “enemy occupied area,” it had to fight in an environment

with no ground intelligence support.<sup>127</sup> According to Jing Jianfeng (景建峰),<sup>128</sup> who was the overall director (总导演) for the exercise, the exercise emphasized “mission, system-of-systems, electromagnetic conditions, unknown scenarios, confrontation, and assessment. There was no play script, no rehearsal, and no provision to the troops of intelligence and information, because that will never be available in wartime. The drill was conducted “back-to-back,” based on actual-combat conditions, to comprehensively test and verify the troops’ operational command capability and training standards.”<sup>129</sup>

Yu Yunfei, who was the director of combat operations in the exercise, advised that *Red Sword-2016* was organized based on actual-combat training, with an exercise flow of “explanation, research, action, and practice,” whereby:<sup>130</sup>

- Explanation of theory: relevant experts from academic institutions went to the TCAFs where the Red and Blue Forces were stationed and presented tailored lectures on theory
- Tactical research: the two sides used group training to conduct tactical research, focusing on training to proficiency
- Setting up situations: participants utilized simulation training resources of academic institutions and various training bases and deployed forces online to conduct simulations and wargaming confrontations
- Training exercises by echelon and category: participants conducted focused training, such as exams in mobility and setting up in the field, and finally, they conducted exercises with live, opposition forces.

Chinese media reported that when planning for *Red Sword-2016*, the exercise directorate analyzed over 20 ‘local wars’<sup>131</sup> fought by foreign armed forces and researched topics on actual-combat training to identify the mechanisms by which to win informatized warfare. Furthermore, the exercise incorporated the testing and measurement of weapons and equipment, to evaluate their performance in an environment similar to actual combat. *Red Sword-2016* represented a joint effort by PLAAF Headquarters, academic institutions, units, bases, and manufacturers, which reportedly formed a cycle in campaign training that integrated operations, testing, and training, and drove an overall improvement in generation of PLAAF combat power.<sup>132</sup>

According to one media report, unlike a “one-on-one” competitive tactical and technical exam, such as the ones for *Golden Helmet* (pilot skills) and *Golden Dart* (penetration of defenses to attack a target), the *Red Sword* exercise is organized to evaluate more than just “winning and losing” and “point scores.”<sup>133</sup>

Based on the idea that actual-combat training should be used to identify problems and develop capabilities, scoring rules were reportedly established to ensure that accomplishing a combat task weighed more heavily than shooting down one or two “enemy” aircraft. For example, during *Red Sword-2016*, one air brigade, which was widely known for its strong abilities in air combat, did not receive a high point score after shooting down “enemy aircraft” during a multi-wave saturation attack by the Red Force, because a key location had been attacked and the brigade had failed in its mission. The grading system demonstrated that in system-of-systems confrontations, rather than focusing on shooting down individual “enemy aircraft”, it is important to select high-value targets, such as successfully attacking the opponent’s combat support aircraft or knocking out a surface-to-air missile site.<sup>134</sup>

Chinese media also reported that during the exercise there were specific time periods set aside for the process of self-evaluation and peer evaluation. According to Gu Shengdong (顾盛冬), from the PLAAF Headquarters’ Staff Department’s Training Bureau, for the first three days of the exercise, at the conclusion of each day, both the Red and Blue sides organized “self-critical discussion and reflection” sessions.<sup>135</sup> This review process reportedly enabled participating units to fully digest problems encountered and further revise and improve their combat plans for the next part of the exercise. It was further reported that midway through the exercise, both sides withdrew from the battlefield to their respective camps where they conducted additional self-critique and received feedback from the evaluation team. This indicates the PLAAF is making some progress toward providing personnel with honest and impartial feedback, a necessary step to improve combat effectiveness and an area where the PLAAF has struggled in the past. The second half of the exercise featured more live-forces confrontations, where a combat task was assigned and then the exercise proceeded for two days and nights per the course of combat operations. It was reported that through the evaluation process “participants advanced a step with every battle fought,” which “gradually led to the generation of capabilities.”<sup>136</sup>

### **Red Sword-2017**

The *Red Sword-2017* confrontation training exercise was held in the Gobi Desert beginning 28 November 2017. It involved nearly 100 combat aircraft of various types, including KJ-2000, KJ-500 and KJ-200 AEW and reconnaissance systems, J-11 fighter jets, H-6K bombers, as well as various branches, including radar units, SAM units, and electronic countermeasure units, which carried

out combat-realistic “system-of-systems” confrontations between Red and Blue forces.<sup>137</sup> One pilot commented, “it is not a battle of individual soldiers but rather of system-of-systems operations. We are integrated into a system and we use the system to strike enemy targets.”<sup>138</sup> Chinese media reported that during the exercise, forces carried out operations in real time to explore new models for confrontations between regional air defense bases under the new organizational structure.<sup>139</sup>

Leading up to the exercise, one air brigade specifically prepared to operate in an electromagnetic environment and in complex weather operations, while focusing on the importance of information in system-of-systems combat and integrating different systems.<sup>140</sup> Additionally, Hou Chao (侯超), a staff officer from a Southern TCAF regiment that participated in the exercise, described combat data as “the ‘blood’ to keep the system operating smoothly” and “the key to success.”<sup>141</sup> Hou further noted that the selection of tactics, combat methods, targets for strikes, evaluations for battlefield situations or logistics support, the use of weapons and ammunition, and the evaluations of combat performance were all based on combat data.<sup>142</sup>

One report indicated that *Red Sword-2017* saw early warning and command “move from the ground to the sky,” which resolved issues pertaining to intelligence acquisition and command and control, as well as reinforcement and support in long-range operations.<sup>143</sup> This likely referred to a shift away from ground-based radar and control platforms to AEW&C. According to Liu Jie, a JH-7 pilot and commander of a “Blue Force” detachment, the command and control system was equipped with new early warning and command platforms, which played a crucial role in the exercise, enabling pilots tasked with protecting strategic places to use data links established by the early warning systems to be aware of battlefield situations in real time.<sup>144</sup> Meanwhile, under the command and guidance of airborne early warning systems, the Red Force's assault group coordinated efforts with jamming aircraft and ground-based air defense forces to breach the Blue Force's air-ground defense net.<sup>145</sup>

The use of AEW&C systems in *Red Sword-2017* represents an important advancement in PLAAF training. Historically, PLAAF air combat training was limited to highly scripted scenarios that were directed by the unit commander from the control tower. Personnel in AEW&C aircraft were not allowed to communicate directly with a pilot. This began to change around 2011 when the PLAAF began using the term “free-air combat.” Although pilots were still required to follow the training guidance set forth in their various regulations, they engaged in aerial intercepts that were not completely pre-scripted.<sup>146</sup> Another key

change occurred in late 2012 when the PLAAF began allowing controllers on the KJ-200 and KJ-2000 AEW&C aircraft to interact directly with combat pilots in the air.<sup>147</sup> Furthermore, once an engagement began, pilots no longer received step-by-step instructions from a flight controller in the control tower, command post, or AEW&C aircraft; although flight controllers could provide pilots initial guidance and vectoring into the engagement zone.<sup>148</sup>

Chinese media reported that electromagnetic jamming was integral to the exercise and reconnaissance, counter-reconnaissance, jamming and counter-jamming occurred throughout.<sup>149</sup> Furthermore, commanders of both the Red and Blue Forces used their command information systems to give commands and guidance to various armed branches and multiple types of aircraft. Depending on developments of the confrontations, combat elements launched feigned attacks against airborne targets or carried out attacks against ground targets. According to Wang Zhuoping, “Blue Force” commander, during the exercise commanders and participating forces “improved a great deal in terms of combat planning, operational control, consolidating elements, coordinating different teams, as well as handling situations.”<sup>150</sup> Of note, Chinese media also reported in 2017 that the *Red Sword* exercise had introduced a “third party” to simulate the enemy.<sup>151</sup> If this “third party” enemy force employed foreign tactics, as opposed to simply using PLAAF tactics, it would be a notable evolution in PLAAF training.

According to Li Yan, head of the evaluation team for attack impacts, during *Red Sword-2017* evaluators “paid more attention to the percentage of accomplished missions, the effective rates of fired weapons, the forces’ casualties and damages in battle, and the efficiency of weapons carriage.”<sup>152</sup> Furthermore, evaluators utilized “big data processing” to identify points affirming combat capabilities and used objective data to provide feedback in real time.<sup>153</sup> Finally, rather than focusing on which side won, the evaluation process guided the forces to shift from studying their opponents in confrontations to studying “real enemies” and focusing on areas of weakness rather than on outcomes and scores.<sup>154</sup> This is further evidence of the PLAAF’s efforts to improve constructive feedback during training events.

# Conclusion

Over the past decade, the PLAAF has fielded increasingly modern and capable equipment and weapon systems. However, its ability to prevail in informatized, high-intensity combat in a CEME is not a foregone conclusion. A world-class air force requires not only modern equipment but also highly-trained personnel who can adapt to tactical scenarios in a combat environment and perform sustained combat operations at home and in deployed locations. Historically PLAAF training consisted of heavily scripted events that provided opportunities for units to perform in front of senior leadership but did not adequately prepare the force for the challenges of modern combat. In contrast, present training is expected to be oriented toward “actual combat” and result in the ability to “fight and win.” Recent improvements in PLAAF training have focused primarily on reducing the gap between training scenarios and what is expected under actual combat conditions, as well as developing “system-of-systems” capabilities that would enable truly joint combat operations.

The annual PLAAF training events described in this report each serve a different purpose and were designed with specific components and training goals in mind. As described above, the *Golden Helmet* competition focuses on air-to-air combat, featuring “one-v-one” and “two-v-two” engagements between similar and dissimilar aircraft, which are designed to improve and assess pilots’ skills and capabilities in combat conditions. The *Golden Dart* competition focuses on air-to-ground attack by attack and bomber aircraft and aims to improve troops’ offensive air war-fighting capabilities. The *Blue Shield* exercise, which as of 2017 includes a competition for the *Golden Shield* award, is designed to test the capabilities of the PLAAF’s ground-based air defense forces, specifically SAMs and supporting



radar and information systems. Finally, the *Red Sword* exercise is a campaign-level, system-of-systems confrontation drill conducted in a complex, multidimensional battle space that involves PLAAF fighters, attack aircraft, AEW, reconnaissance aircraft, radars, ECM units, and SAMs. It provides a platform to test training and combat methods suited for informatized conditions in an environment that closely resembles actual combat and is formulated to comprehensively test and verify the troops' operational command capability and training standards.

The frequent reports in Chinese media and commentary by key personnel and military experts about the success of the four key training brands underscore the value the PLAAF places on these training events. One report in 2017 went so far as to state that the “four key actual combat-oriented training brands epitomize the PLAAF’s strategic transformation.”<sup>155</sup> Furthermore, according to the PLAAF Chief of Staff, after five years of development, the four key training brands are not “only similar to actual combat, but have also paved a road of victory in training for war.”<sup>156</sup> Given their growing prominence, the four key training brands present an opportunity to assess the PLAAF’s progress along the path toward becoming a modern “strategic air force.” The PLAAF has gradually increased the complexity of each of the four key training brands since their inception and will likely continue to include more complex components in the future as it moves toward completely unscripted training. It has also developed new evaluation criteria that emphasize achieving actual effects and identifying areas of weakness and has improved the process for providing constructive feedback during training events. The PLAAF is taking concrete steps, albeit incremental, to raise training to the next level, which has likely advanced the PLAAF’s operational effectiveness.

The evolution of the four key training brands in recent years reflects the PLAAF leadership’s commitment to remedy longstanding training deficiencies. One question that remains, particularly as it relates to the *Golden Helmet*, *Golden Dart*, and *Golden Shield* competitions, is whether the units involved are spending a majority of their time each year “training for the test” so that they can win an award, as opposed to focusing on actual training requirements under the revised OMTE. Additionally, as the PLAAF further professionalizes its training, a key test of its future combat capability will be how well it integrates with other components in the joint arena. In their current form, the four key training brands emphasize specific PLAAF core competencies, but do not provide opportunities to develop joint interoperability. The PLAAF’s ability to develop and execute realistic training that truly boosts combat capability across the joint force will determine, at least in part, both the pace of its modernization and the extent of its role in China’s future national security and military strategy.



# Appendix A:

## Air Defense Zones

A review of available PLAAF and PLA dictionaries, encyclopedias, journals, books, and media reports indicates that the PLA and PLAAF will engage enemy aircraft in defense zones and air defense zones. According to the PLA's military dictionary:

- A defense zone is an area in which units with defensive combat missions are responsible for safeguarding against or resisting enemy offensives.<sup>157</sup>
- An air defense zone is the space where aviation and air defense forces conduct their air defense missions.<sup>158</sup>

The PLAAF conducts what it calls “tactical coordination” within the air defense zone between its aviation and air defense forces and with Navy and Army air defense forces. According to the PLAAF's encyclopedia,

*Air force combined-arms tactical coordination consists of separating airspace, targets, altitude, directions, and time. Airspace separation is the primary means, with the others serving as secondary means. Air force joint tactical coordination with the Navy and Army consists of establishing a joint command organization and separating forces by combat phases, combat missions or tasks, and combat direction or area.*<sup>159</sup>

As early as 2003, the PLAAF began creating “tactical training coordination zones” with other services in at least the Jinan and Nanjing Military Regions. PLAAF units reportedly use the zones to conduct combined-arms training between PLAAF aircraft and SAMs/AAA, as well as joint training with naval vessels and ground force air defense units.<sup>160</sup>

Although the PLA and PLAAF have apparently created air defense zones, a review of PLA and PLAAF media reports do not provide any specific information about how the PLAAF's aviation and air defense forces coordinate with each other or with the other services in these zones.

## Appendix B: Terminology

Chinese official media is not consistent in how it identifies each of the four key training brands (四大品牌) in Chinese or English, as shown below. It should be noted that *Golden Dart* and *Golden Helmet* are considered competitions or contests, while *Blue Shield* and *Red Sword* are considered exercises. Additionally, the PLAAF has generically referred to them in English as the “four large exercises.”<sup>161</sup>

- *Golden Helmet* (金头盔)
    - Chinese:<sup>162</sup> 自由空战比武; 自由空战竞赛性考核; 争夺战; 对抗空战竞赛性考核; 比武竞赛/比武; 自由空战对抗比武; 空战比武
    - English:<sup>163</sup> *Golden Helmet* freestyle fighting exercise
  - *Golden Dart* (金飞镖)
    - Chinese:<sup>164</sup> 突防突击竞赛性考核; “金飞镖”之战;
    - English: land attack exercise<sup>165</sup>; offense and assault military competition;<sup>166</sup> military competition<sup>167</sup>
    - English: freestyle fighting exercise<sup>168</sup>; air battle contest and competitive air battle contest<sup>169</sup>; air battle tactics competition<sup>170</sup>; competition<sup>171</sup>; contest<sup>172</sup>; air combat examination contest<sup>173</sup>
  - *Blue Shield* (蓝盾)
    - Chinese: 金盾牌比武; 金盾牌比武竞赛; 蓝盾演习
    - English: aircraft and missile defense exercise<sup>174</sup>; *Golden Shield* Competition; *Blue Shield* exercise<sup>175</sup>
- Red Sword* (红剑)
- Chinese:<sup>176</sup> 空军红剑体系对抗演习; “红剑”体系对抗; 体系对抗演练
    - English: advanced aerial combat exercise<sup>177</sup>; systemic (i.e., system-vs-system) confrontation exercise<sup>178</sup>



# Endnotes

- <sup>1</sup> In May 2004, the CMC adjusted the PLA's "Military Strategic Guidelines." During this process, the CMC authorized the PLAAF to have its first-ever service-specific strategy as part of the PLA's "Active Defense" strategy within the "Military Strategic Guidelines." The announcement coincided with the First Plenum of the PLAAF's 10th Party Congress. The CMC approved the strategy at the same time that it authorized the first PLAN, PLAAF, and Second Artillery commanders to be added to the CMC as "policy promotions." See "Science of air force strategy" ["空军战略学"] in Yao Wei, ed., *Chinese Air Force Encyclopedia* [中国空军百科全书]; Beijing, Aviation Industry Press, November 2005, Volume 1, p. 57. According to Hong Kong press reports, the CMC's approval was timed to coincide with the First Plenum of the PLAAF's 10th Party Congress in May 2004. See "From Supportive Service to Strategic Air Force: Major Change in China's Air Force Buildup Thinking," *Hong Kong Feng Huang Wang*, 28 June 2004.
- <sup>2</sup> According to Chase and Garafola, "Some of the most important changes propelling the PLAAF's transformation into a 'strategic air force' concern its strategy and missions. See Endnote 2 for further information.
- <sup>3</sup> Michael S. Chase and Cristina L. Garafola, "China's Search for a 'Strategic Air Force,'" *Journal of Strategic Studies*, Routledge Taylor & Francis Group, 2015. According to Chase and Garafola, "Some of the most important changes propelling the PLAAF's transformation into a 'strategic air force' concern its strategy and missions. Chinese sources indicate that the PLAAF began informal work on its strategy in the mid-1990s, presumably after recognizing that the lack of a service-specific strategy and its limited offensive capabilities prevented it from moving beyond its traditionally subordinate role. According to the *Chinese Air Force Encyclopedia*, in a 1999 speech to commemorate the PLAAF's 50th anniversary, Jiang Zemin called for the PLAAF to 'prepare struggle to build a powerful, modernized air force that is simultaneously prepared for offensive and defensive operations'. In 2004, this idea was incorporated into the PLAAF's first ever service-specific strategic concept, which called on it to 'integrate air and space and be simultaneously prepared for offensive and defensive operations.' The term 'strategic air force' had already been in use for several years when it appeared for the first time in a Chinese defense white paper in 2008." Zhu Hui, ed., *Strategic Air Force* [战略空军], Beijing: Lantian Press, July 2009. Kenneth Allen and Jana Allen, "Chinese Air Force and China Security" in Lowell Dittmer and Maochun Yu, eds., *Routledge Handbook of Chinese Security*, London: Routledge Press, May 2015.
- <sup>4</sup> Meng Xiangqing, "Chinese Dream Includes Strong PLA," *China Daily* in English, 8 October 2013, p. 9, accessed at [http://www.chinadaily.com.cn/opinion/2013-10/08/content\\_17012886\\_2.htm](http://www.chinadaily.com.cn/opinion/2013-10/08/content_17012886_2.htm).
- <sup>5</sup> "Chinese President Urges Stronger Air Force," *Xinhua Wang* [ ] in English, 14 April 2014, accessed at [http://news.xinhuanet.com/english/china/2014-04/14/c\\_133261588.htm](http://news.xinhuanet.com/english/china/2014-04/14/c_133261588.htm).
- <sup>6</sup> This can sometimes be translated as "trademark" or "brand name". The exact translation may not matter much, but seems to signify the unique nature of these events, compared with typical training.

- <sup>7</sup> “Military representatives talk about the Air Force’s actual-combat training,” [“军队代表畅谈空军实战化训练”], *Xinhua Wang* [新华网], 11 March 2018, accessed at [http://www.xinhuanet.com/mil/2018-03/11/c\\_129827188.htm](http://www.xinhuanet.com/mil/2018-03/11/c_129827188.htm).
- <sup>8</sup> CASI has already published the following papers that address some aspects of the four key training brands: Michael S. Chase, Kenneth W. Allen, and Benjamin S. Purser, III, “Overview of PLA Air Force ‘Elite Pilots,’” RAND, 2016, and Cristina L. Garafola and Timothy R. Heath, “The PLAAF’s First Steps Toward Becoming an Expeditionary Air Force,” RAND, 2017. See also Nathan Beauchamp-Mustafaga, “The Four Key Training Brands’ Framework: Aligning PLAAF Training to the 2014 Military Strategic Guideline,” paper presented to the Fifth Global International Studies Conference of the World International Studies Committee (WISC) in Taipei, Taiwan, April 2017.
- <sup>9</sup> From “Military Report” [ ], Beijing CCTV-7, 12 November 2016.
- <sup>10</sup> Lu Donghui [陆冬辉], “‘Golden Helmet’ pilot opposition air combat experience” [“金头盔飞行员对抗战斗经验”], *Air Force News* [空军报], 12 July 2016, p. 3.
- <sup>11</sup> Peter Kay, “For the first time, the naval air force sent pilots to participate in the air force contest,” *China Military Online* micro letter public, 12 December 2017, accessed at <http://www.sangbe.com/article/152295.html>.
- <sup>12</sup> *Golden Helmet* winner Wang Zhonghua (王仲化), who is a Su-30 pilot assigned to the Cangzhou Test and Training Base’s “Blue Force,” participated in the 2014 Aviadarts competition. No author, “中国飞行员训练水平高技术过硬获俄军大将点赞,” 27 July 2104, accessed at <http://mil.news.sina.com.cn/2014-07-27/1357792382.html>.
- <sup>13</sup> See CASI’s “Brigadization of the PLA Air Force,” May 2018 for more information.
- <sup>14</sup> Kenneth Allen, “PLA Air Force Organizational Reforms: 2000-2012,” in Kevin Pollpeter and Kenneth Allen, eds., *The PLA as Organization v2.0*, Defense Group Inc., 2013.
- <sup>15</sup> In 2004, the PLA added the commanders of the Navy, Air Force, and Second Artillery (now Rocket Force) as members of the CMC. At that time, the four General Departments served as the Army Headquarters. Prior to the 19th Party Congress in November 2017, the PLAAF commander, Ma Xiaotian, and Navy commander, Wu Shengli, were replaced as Commanders but both remained on the CMC. However, when they retired at the time of the 19th Party Congress, neither of their successors were added to the new CMC, which now has two vice chairmen and only four members. In addition, the former commander of the Rocket Force, Wei Fenghe, became the Defense Minister and remained as a CMC member, but his successor as Rocket Force commander was also not added to the new CMC. Finally, in early 2016 the PLA created a new PLA Army (PLAA) Headquarters, but the new commander was not added to the CMC.
- <sup>16</sup> Xu Tongxuan [徐同宣], “It Is Particularly Essential to Step Up Military Training and Combat Readiness in Times of Reform and Tackling Tough Issues – Sidelights on the PLA Air Force’s 2016 Military Training Conference” [“越是改革攻坚越练兵备战 – 空军2016年度军事训练会议侧记”], *Air Force News* [空军报], 6 January 2016, p. 1.
- <sup>17</sup> Zhao Lei, “PLA Air Force making exercises more realistic,” *China Daily* in English, 5 May 2017, accessed at [http://www.chinadaily.com.cn/china/2017-05/05/content\\_29211275.htm](http://www.chinadaily.com.cn/china/2017-05/05/content_29211275.htm).
- <sup>18</sup> Michael S. Chase, Kenneth W. Allen, and Benjamin S. Purser, III, 2016. Lu Donghui [陆冬辉], 2016.
- <sup>19</sup> Zhang Yuqing [张玉清] and Zhang Mimi [张汨汨], “Golden Helmet’ Competition Pushes for Air Force’s Combat-Realistic Military Training Ahead Into a New Age” [“金头盔比武推动空军实战化军事训练迈进新时代”], *Xinhua Wang* [新华网], 12 November 2017, accessed at [http://www.xinhuanet.com/mil/2017-11/12/c\\_1121943126.html](http://www.xinhuanet.com/mil/2017-11/12/c_1121943126.html). Michael S. Chase, Kenneth W. Allen, and Benjamin S. Purser III, 2016.
- <sup>20</sup> *Golden Helmet* winner Wang Zhonghua (王仲化), who is a Su-30 pilot assigned to the Cangzhou Test and Training Base’s “Blue Force,” participated in the 2014 Aviadarts competition. No author, “中国飞行员训练水平高技术过硬获俄军大将点赞,” 27 July 2104, accessed at <http://mil.news.sina.com.cn/2014-07-27/1357792382.html>.
- <sup>21</sup> The number of participants identified to date include: 2011 (Unknown), 2012 (108), 2013 (123), 2014 (170), 2015 (160), 2016 (150), and 2017 (100).

- <sup>22</sup> Chen Xiang [陈翔] and Xu Dongliang [徐东亮], "PLA Air Force's 2014 Annual Fighter Unit Competitive Air Combat Confrontation Evaluations Successfully Completed: Six Pilots Win 'Golden Helmets'; 5 Air Regiments Assessed as Superior Air Combat Units; Seven Personnel Assessed as Outstanding Air Combat Pilots" ["2014年度空军歼击机航空兵部队对抗空战竞赛性考核圆满结束, 6名飞行员赢得'金头盔', 5个航空兵团被评为空战优胜单位, 7人获评空战优秀飞行员"], *Air Force News* [空军报], 22 September 2014, p. 1.
- <sup>23</sup> Zhang Yuqing [张玉清] and Zhang Mimi [张汨汨], 2017.
- <sup>24</sup> Zhang Hao [张浩], Zhang Haishen [张海深], Ding Yibo [丁一波], "Training for Combat – An Eastern Theater Command Air Force air brigade focuses on readiness training at the grassroots level" ["向战而练砺锋刃 - 东部战区空军航空兵某旅坚持扭住战备训练抓基层纪实"], *Air Force News* [空军报], 28 August 2017, p. 3.
- <sup>25</sup> See CASI's "Brigadization of the PLA Air Force", May 2018 for more information.
- <sup>26</sup> Huang Panyue, ed., "Splendid moments in Golden Helmet – 2017 competition," *China Military Online* in English, 21 November 2017, accessed at [http://eng.mod.gov.cn/news/2017-11/21/content\\_4797924.htm](http://eng.mod.gov.cn/news/2017-11/21/content_4797924.htm). Guo Hongbo and Hao Maojin, "PLAAF kicks off 'Golden Helmet 2017' air battle contest," *China Military Online* in English, 3 November 2017, accessed at [http://eng.chinamil.com.cn/view/2017-11/03/content\\_7811945.htm](http://eng.chinamil.com.cn/view/2017-11/03/content_7811945.htm). Xu Yi [许毅] and Wang Zehua [王泽华], "Golden Helmet' Air Combat Confrontation Competition Assessment" *Air Force News* [空军报], 15 November 2017, p. 1.
- <sup>27</sup> Peter Kay, 2017.
- <sup>28</sup> Zhao Haitao [赵海涛] and Zhang Heng [张恒], "Lay Firm Foundation for Joint Training, Deepen Degree of Joint Operation, and Raise Joint Combat Capability; Navy Will Jointly Organize with Air Force Free-Air War Confrontation Drill" ["海军将与空军联合组织自由空战对抗演练"], *Renmin Haijun* [人民海军], 20 August 2014, p. 1. Yin Kunze [殷坤泽], Zhang Heng [张恒], and Zhao Haitao [赵海涛], "A Duel of Heroes -- Eyewitness to the First Navy and Air Force Free Aerial Warfare Confrontation Drill" ["双雄对决, 目击海, 空军首次自由空战对抗演练"], *Renmin Haijun* [人民海军], 1 September 2014, p. 1. Liu Wenping, Zhao Haitao, and Ju Zhenhua, "Flying against a 'Golden Helmet'," *China Armed Forces* magazine in Chinese and English, No. 32, Vol 2, 2015, p. 80-83. Information about the Heroic Eagle Regiment was accessed at [www.baik.com/wiki/海空雄鹰团](http://www.baik.com/wiki/海空雄鹰团). Yin Kunze [殷坤泽], Xu Xiaosai [许小赛], Zhang Heng [张恒], and Zhao Haitao [赵海涛], "Freestyle Air Combat, In Pursuit of the Real Meaning of Fighting Winning Wars – Record of Contemplations on a Certain Regiment of East Sea Fleet Navy Aviation Holding Live Combat Oriented Training" ["自由空战, 寻求大胜仗的真谛: 东航某团开展实战化训练问思录"] *Renmin Haijun* [人民海军], 16 September 2014, p. 2.
- <sup>29</sup> "Games Boosts PLAAF Combat-oriented Military Training," *China Military Online* in English, 14 November 2017. Unfortunately, no single, authoritative list was found for the 63 awards. Three personnel who have won more than one award: Jiang Jiayi (蒋佳翼) has won the award three times, while Xu Liqiang (许利强) and Yan Feng (颜峰) have won the award twice.
- <sup>30</sup> From "Military Report" (军事报道), Beijing CCTV-7, 30 December 2016.
- <sup>31</sup> Xu Yi [许毅], "Flying Toward a Strong Brand for Actual Combat – Observing 'Golden Helmet-2017' and Thoughts on Group Training Principles of Actual Combat" ["飞向实战强品牌-观战'金头盔-2017'暨实战化组训规律思考"], *Air Force News* [空军报], 24 November 2017, p. 3.
- <sup>32</sup> As early as 2003, the PLAAF began to consider breaking away from scripted air-to-air engagements and allowing pilots to at least make recommendations for adjustments. It was not until 2011 that the PLAAF implemented what it calls "pilot autonomy" and "free-air combat." See Endnotes for more details.
- <sup>33</sup> As early as 2003, the PLAAF began to consider breaking away from scripted air-to-air engagements and allowing pilots to at least make recommendations for adjustments. Specifically, a Jinan Military Region Air Force (MRAF) air division equipped with new aircraft [Su-27s] began implementing new combat methods throughout the unit in July 2003, and, over a three-month period flew 100 sorties using the new methods that had already been tested and approved for implementation by the highest level in the PLAAF (*Air Force News* [空军报], 9 October 2003, p. 1). It was not until 2011 that the PLAAF implemented what it calls "pilot autonomy" and "free-air combat." Previously, flight commanders in the tower commanded pilots for "each step and each movement." Now, each pilot has the autonomy from creating their own flight plans to takeoff to landing, including free-air combat, which allows them to conduct actual combat training by having a better understanding of every aspect

- of their aircraft and weapon systems (Wang Jun [王军] and Yue Dechen [岳德臣], "Visit to Shenyang MRAF Air Brigade 3rd Flight Group" ["访问沈空航空兵某旅三飞行大队"], *Air Force News* [空军报], 29 December 2011, p. 2).
- <sup>34</sup> Zhang Yuqing [张玉清] and Zhang Mimi [张汨汨], 2017.
- <sup>35</sup> Xu Yi [许毅], 24 November 2017.
- <sup>36</sup> Zhang Yuqing [张玉清] and Zhang Mimi [张汨汨], 2017.
- <sup>37</sup> Ibid.
- <sup>38</sup> Xue Wenhai and Wang Gang, "Clicking on the Battlefield in the Air," *China Air Force* magazine [中国空军], No.4, 2005, p.36-37.
- <sup>39</sup> Ibid.
- <sup>40</sup> Lei Yu [雷雨] and Yang Wenhui [阳文辉], "Vowed to 'Become the Toughest Steel'" ["誓做'最咬人的钢'"], *Air Force News* [空军报], 8 November 2017, p. 3.
- <sup>41</sup> Ibid.
- <sup>42</sup> Ibid.
- <sup>43</sup> Wang Wei [王玮], "Full Assurance of Success Is Based on Painstaking Study and Deep Reflection" [细研方可稳操胜券], *Air Force News* [空军报], 8 February 2017, p. 3.
- <sup>44</sup> Ibid.
- <sup>45</sup> Xu Yi [许毅], 24 November 2017.
- <sup>46</sup> While western states tend to describe fighter jet generations in terms of capabilities (See John Tripak's, *The Sixth Generation Fighter*, <http://www.airforcemag.com/MagazineArchive/Pages/2009/October%202009/1009fighter.aspx> for examples), the Chinese tend to define them based on year reaching initial operating capability. I.E.. 1st Gen 1950-60s, e.g. J-5, J-6; 2nd Gen 70's-80's, e.g. J-7, J-8; 3rd Gen 90's-2000's, e.g. J-10. J-11; 4th Gen 2010's+, e.g. J-20.
- <sup>47</sup> Huang Panyue, ed., 2017.
- <sup>48</sup> "Focus Today" (近日关注), Beijing CCTV-4, 6 November 2017.
- <sup>49</sup> Based on a survey of articles in PLA *Air Force Daily*, and *People's Navy*, the PLA usually introduces new aircraft by creating a unit from "seasoned pilots" (i.e. with 1,000 flight hours or more). The unit then has to create, from scratch, its Outline of Military Training and Evaluation (OMTE) and all relevant regulations. That process takes about a year, and sometimes more, to accomplish. It typically takes a unit with new aircraft an additional year to reach IOC, meaning that it can sit strip alert and scramble for an operational mission against an adversary, not just a training event.
- <sup>50</sup> Zhang Mimi [张汨汨] and Guo Hongbo [郭洪波], "Sixteen Elite Air Force Aviation Units Compete for 'Golden Helmet' in Gobi Desert of Northwestern China" ["空军16支航空兵劲旅西北大漠角逐'金头盔'"], *Xinbua* [新华], 01 November 2017.
- <sup>51</sup> "Focus Today" (近日关注), Beijing CCTV-4, 06 November 2017.
- <sup>52</sup> Wang Wei, 2017, p. 3.
- <sup>53</sup> Liu Jinyang [刘锦洋] and Li Jianwen [李建文], "Four Key Brands' Training Renowned the Aerospace Battlefield" ["四大品牌'训练享誉空天战场'"], *PLA Daily* [解放军报], 20 May 2017.
- <sup>54</sup> Zhang Yuqing [张玉清] and Zhang Mimi [张汨汨], 2017.
- <sup>55</sup> "Focus Today" [近日关注], Beijing CCTV-4, 06 November 2017.
- <sup>56</sup> Zhang Mimi [张汨汨] and Guo Hongbo [郭洪波], 2017.
- <sup>57</sup> No author, "PLAAF kicks off Golden Helmets 2017," *Asian Defense News* in English, 4 November 2017, accessed at <http://asian-defence-news.blogspot.com/2017/11/plaaf-kicks-off-golden-helmets-2017-2017.html>.
- <sup>58</sup> Zhang Mimi [张汨汨] and Guo Hongbo [郭洪波], 2017.
- <sup>59</sup> Zhang Tao, "Golden Helmet Games Boosts PLAAF Combat-oriented Military Training," *China Military Online* in English, 13 November 2017, accessed at [http://eng.chinamil.com.cn/view/2017-11/14/content\\_7823318.htm](http://eng.chinamil.com.cn/view/2017-11/14/content_7823318.htm).



- <sup>60</sup> Zhang Yuqing [张玉清] and Zhang Mimi [张汨汨], 2017.
- <sup>61</sup> Zhang Tao, 2017.
- <sup>62</sup> Zhang Yuqing [张玉清] and Zhang Mimi [张汨汨], 2017.
- <sup>63</sup> Ibid.
- <sup>64</sup> Xu Yi (许毅), Wei Jiangtao (魏江涛), and Liang Xianglong (梁相龙), "Thoughts on Chinese PLA Air Force 'Red Sword-16' System-of-Systems Confrontation Exercise" ["顺势而变'谋战力'], *Air Force News* [空军报], 29 November 2016, p. 1.
- <sup>65</sup> Michael S. Chase, Kenneth W. Allen, and Benjamin S. Purser III, 2016.
- <sup>66</sup> Huang Panyue ed., "PLA Air Force unveils 'Golden Dart-2016' military competition," *China Military Online* in English, 22 July 2016, accessed at [http://eng.mod.gov.cn/TopNews/2016-07/22/content\\_4699080.htm](http://eng.mod.gov.cn/TopNews/2016-07/22/content_4699080.htm).
- <sup>67</sup> Liu Jinyang [刘锦洋] and Li Jianwen [李建文], 2017.
- <sup>68</sup> From "Military Report" (军事报道), Beijing CCTV-7, 30 December 2016.
- <sup>69</sup> Ibid.
- <sup>70</sup> Liu Jinyang [刘锦洋] and Li Jianwen [李建文], 2017. "Golden Helmet" ["金飞镖"], accessed at <https://baike.baidu.com/item/金飞镖>. Li Qing [李清] ed., "PLA Air Force held its first ground target shooting 'Golden Dart' Competition" ["中国空军首次举行对地攻击'金飞镖'大赛"] *Xinhua Wang* [新华网], accessed at [http://news.xinhuanet.com/photo/2014-10/07/c\\_127069612.htm](http://news.xinhuanet.com/photo/2014-10/07/c_127069612.htm). No Author, "PLAAF Four Key Training Brands: Red Sword, Blue Shield, Golden Helmet, Golden Dart," ["中国空军'四大品牌': 红剑, 蓝盾, 金头盔, 金飞镖"], 12 May 2017, accessed at [http://news.ifeng.com/a/20170512/51084986\\_0.shtml](http://news.ifeng.com/a/20170512/51084986_0.shtml).
- <sup>71</sup> Lu Guanqiong [卢冠琼], "PLA Air Force 2015 'Golden Dart' Competition will be held over water for the first time" ["中国空军2015'金飞镖'比武将首次在上海上方向组织"], *China Youth Net*, 9 September 2015, accessed at [http://news.youth.cn/gn/201509/t20150909\\_7094102.htm](http://news.youth.cn/gn/201509/t20150909_7094102.htm).
- <sup>72</sup> Yao Jianing, ed., "PLA Air Force pilots chase 'Golden Dart'," *China Military Online* in English, 19 April 2018, accessed at [http://english.chinamil.com.cn/view/2018-04/19/content\\_8009028.htm](http://english.chinamil.com.cn/view/2018-04/19/content_8009028.htm).
- <sup>73</sup> Li Jianwen [李建文], "Golden Helmets' and 'Golden Dart' pilots of the Chinese Air Force" [中国空军飞行员涌现一批'金头盔' '金飞镖'], PLAAF website [中国空军], 8 September 2015, accessed at [http://kj.81.cn/content/2015-09/08/content\\_6671958.htm](http://kj.81.cn/content/2015-09/08/content_6671958.htm). "PLA Air Force made great strides in actual-combat training," 7 May 2017, accessed at <http://news.163.com/17/0507/03/CJQ7CDG600018AOP.html>.
- <sup>74</sup> Niu Ruili [牛锐利] and Lu Hui [卢辉], "Golden Helmet: the Ultimate Competition," ["巅峰对决'金头盔'"] PLAAF website [中国空军], 30 December 2015, accessed at [http://kj.81.cn/content/201512/30/content\\_6837163.htm](http://kj.81.cn/content/201512/30/content_6837163.htm).
- <sup>75</sup> Huang Panyue, ed., 2016.
- <sup>76</sup> Yang Chenxiu [杨宸琇], "Golden Dart- 2016': Combat Aircraft carried out precision strikes at low altitude despite the fog" ["金飞镖-2016': 战机低空穿雾实施精准火力打击], *CCTV Military*, 25 July 2016, accessed at [http://military.cnr.cn/jstp/jstph/20160725/t20160725\\_522775812.html](http://military.cnr.cn/jstp/jstph/20160725/t20160725_522775812.html).
- <sup>77</sup> Huang Panyue, ed., 2016.
- <sup>78</sup> Huang Panyue ed., "Camera records moments of Golden Dart - 2018 competition," *China Military Online* in English, 27 April 2018, accessed at [http://eng.mod.gov.cn/news/2018-04/27/content\\_4811595.htm](http://eng.mod.gov.cn/news/2018-04/27/content_4811595.htm); "The Chinese Air Force's recent annual exercise 'Golden Dart 2018' honed pilots' real combat capabilities," *CCTV* video, accessed at <https://www.youtube.com/watch?v=lmzKvhAGz-M>.
- <sup>79</sup> Yao Jianing, ed., 2018.
- <sup>80</sup> Yao Jianing, ed., 2018.
- <sup>81</sup> "The Chinese Air Force's recent annual exercise 'Golden Dart 2018' honed pilots' real combat capabilities," *CCTV* video, accessed at <https://www.youtube.com/watch?v=lmzKvhAGz-M>.
- <sup>82</sup> Xu Yi [许毅], "What Is the Gold Content of the 'Golden Shield' Award? On-the-Scene Report from the First Round of Competition in Air Force Exercise '-17' (Part 1)" ["金盾牌'含金几何:空军'蓝盾-17'演习首期比武竞赛观战报告(上篇)], *Air Force News* [空军报], 24 April 2017, p. 3a.

- <sup>83</sup> Zhang Yuqing [张玉清] and Zhang Lei [张雷], “Chinese Air Force Accelerates Air-Defense Antimissile Capability Construction, Forms Combat System That Integrates Long, Medium and Short Ranges With High, Medium and Low Altitudes” [“空军地面防空兵在创新驱动发展中形成了远中近程,高中低空相结合的作战体系”], *Xinhua* [新华], 28 August 2016.
- <sup>84</sup> Zhang Yuqing [张玉清] and Zhang Lei [张雷], 2016. From “Military Report” ( ), Beijing CCTV-7, 30 December 2016.
- <sup>85</sup> *China Air Force Encyclopedia* (中国空军百科全书), Vol 1, p. 239. Interview with the PLAAF commander in 1989. Yu Xuelin [于学林], “Air Defense Composite Division” [“防空混成师”], PLAAF Website [中国空军], 9 December 2012, accessed at [http://kj.81.cn/content/2012-12/09/content\\_5133418.htm](http://kj.81.cn/content/2012-12/09/content_5133418.htm). Li Jianwen [李建文] and Zhang Lei [张雷], “A mixed division of the PLA Air Force called into assistance for the traumatic Tianjin explosion” [“现场惨烈: 空军混成师官兵救援天津爆炸”] *Xinhua Wang* [新华网], 13 August 2015, accessed at [http://news.xinhuanet.com/mil/2015-08/13/c\\_128125593.htm](http://news.xinhuanet.com/mil/2015-08/13/c_128125593.htm). No author, “The PLA Air Force” [“中国人民解放军空军”], accessed at <http://blog.renren.com/share/258202258/620581832>.
- <sup>86</sup> Zhu Xiaobing [朱笑冰] and Ding Yibo [丁义波], “Eastern Theater Command Air Force Certain Base Establishes a Long-term Grassroots Mechanism” [“东部战区空军某基地建立帮建基层长效机制”], *Air Force News* [空军报], 7 December 2017, p. 1.
- <sup>87</sup> Wang Chenpeng [王晨鹏] and Wen Chen [文晨], “Northern TCAF Radar Brigade Organizes Billet Training for Newly-transferred Personnel” [“北部战区空军雷达某旅组织转隶人员岗前集训”], *Air Force News* [空军报], 26 July 2017, p. 2 for information concerning a Northern TCAF AAA brigade. Guo Yuanlin [郭源霖] and Shao Lei [邵蕾], “Central TCAF SAM brigade provides personnel training” [“中部战区空军导弹某旅引导官兵明责知进缩短适应期”], *Air Force News* [空军报], 15 June 2017, p. 2, concerning a AAA company subordinate to a Central TCAF SAM brigade.
- <sup>88</sup> Zhu Xiaobing [朱笑冰] and Ding Yibo [丁义波], 2017.
- <sup>89</sup> From “Military Report” (军事报道), Beijing CCTV-7, 15 April 2017.
- <sup>90</sup> Ria Novosti and Evgeny Biyatov, “Russia, China teams leading after 6 days of Army Games 2016,” 5 August 2016, accessed at [https://www.rbth.com/news/2016/08/05/russia-china-teams-leading-after-six-days-of-army-games-2016\\_618359](https://www.rbth.com/news/2016/08/05/russia-china-teams-leading-after-six-days-of-army-games-2016_618359)
- <sup>91</sup> Ria Novosti and Evgeny Biyatov, 2016. Xu Yi [ ], 24 April 2017.
- <sup>92</sup> Xu Yi [ ], 24 April 2017.
- <sup>93</sup> Ibid.
- <sup>94</sup> From “Military Report” (军事报道), Beijing CCTV-7, 29 October 2017.
- <sup>95</sup> From “Military Report” (军事报道), Beijing CCTV-7, 27 October 2017.
- <sup>96</sup> Xu Yi [许毅], 24 April 2017.
- <sup>97</sup> Ibid.
- <sup>98</sup> From “Military Report” (军事报道), Beijing CCTV-7, 04 May 2017. The event was also identified simply as Blue Shield-17.
- <sup>99</sup> From “Military Report” (军事报道), Beijing CCTV-7, 15 April 2017.
- <sup>100</sup> Xu Yi [许毅], 24 April.
- <sup>101</sup> From “Military Report,” (军事报道), Beijing CCTV-7, 15 April 2017.
- <sup>102</sup> From “Live News,” Beijing CCTV-Xinwen, 16 April 2017.
- <sup>103</sup> Ibid.
- <sup>104</sup> From “Military Report” (军事报道), Beijing CCTV-7, 15 April 2017.
- <sup>105</sup> Ibid.
- <sup>106</sup> PLAAF units normally train at the same training area near their home unit. When a unit deploys to a different location to conduct training, even if they have been there before, then the term “unfamiliar” is typically used in Chinese media reports. In most cases, even if some personnel in the unit have been to the location before, it is still “unfamiliar” to most new personnel.
- <sup>107</sup> From “Live News,” Beijing CCTV-Xinwen, 13 October 2017.

- <sup>108</sup> From “Military Report” (军事报道), Beijing CCTV-7, 27 October 2017.
- <sup>109</sup> The FN-6 or Feinu-6 is a third-generation passive infrared homing (IR) man portable air defense system (MANPADS).
- <sup>110</sup> Accessed at <https://www.globalsecurity.org/military/world/china/fn-6.htm>.
- <sup>111</sup> From “Military Report” (军事报道), Beijing CCTV-7, 27 October 2017.
- <sup>112</sup> From “Military Report” (军事报道), Beijing CCTV-7, 29 October 2017.
- <sup>113</sup> It is assessed that *Red Sword* is most likely a Theater Command level exercise but it is not managed by the TCs. It is most likely managed by PLAAF HQ because it crosses boundaries and involves multiple units from different TCAFs.
- <sup>114</sup> Xu Yi (许毅), Wei Jiangtao (魏江涛), and Liang Xianglong (梁相龙), 2016. From “Military Report” (军事报道), Beijing CCTV-7, 29 November 2016. *Red Sword-2016* is also noted as *Red Sword-16* in some articles.
- <sup>115</sup> Xu Yi (许毅), Wei Jiangtao (魏江涛), and Liang Xianglong (梁相龙), 2016.
- <sup>116</sup> Guo Yunfei (郭云飞), “Combat Drums and Bugles Sound Again over the Vast Desert - Accounts of Involvement in the ‘Red Sword-16’ System-of-Systems Confrontation Exercise by Exercise Participants” [“大漠又闻鼓用声; ‘红剑-16’体系对抗演习参演手记”], *Air Force News* [空军报], 2 December 2016, p. 3.
- <sup>117</sup> Ibid.
- <sup>118</sup> Yang Jun [杨军] and Yao Chunming [姚春明], “Direct the Blue Force and Practice the Red,’ focus on system-of-systems opposition-force combat all the way through – the Air Force ‘Red Sword-2017’ system-of-systems opposition-force exercise explores the way to integrate forces for combat” [“导蓝练红, 注重体系, 全程对抗- 空军 ‘红剑-2017’ 体系对抗演习探索作战融合之道”], *Air Force News* [空军报], 5 December 2017, p. 4.
- <sup>119</sup> From “Military Report” (军事报道), Beijing CCTV-7, 29 November 2016.
- <sup>120</sup> From “Military Report” (军事报道), Beijing CCTV-7, 17 November 2016; Li Guowen [李国文] and Deng Lekun [邓乐坤], “PLAAF ‘Red-Sword 16’ Exercise Model Fires Off” [“空军‘红剑-16’体系对抗硝烟浓”], *Air Force News* [空军报], 27 November 2016, p. 1.
- <sup>121</sup> From “Military Report” (军事报道), Beijing CCTV-7, 30 December 2016.
- <sup>122</sup> It appears the Chinese use of the term “joint” in this context refers to what the U.S. would call ‘combined arms,’ rather than two or more services.
- <sup>123</sup> Ibid.
- <sup>124</sup> Xu Yi [许毅], Wei Jiangtao [魏江涛], and Liang Xianglong [梁相龙], 2016.
- <sup>125</sup> From “Military Report” (军事报道), Beijing CCTV-7, 12 November 2016.
- <sup>126</sup> Ibid.
- <sup>127</sup> Xu Yi [许毅], Wei Jiangtao [魏江涛], and Liang Xianglong [梁相龙], 2016.
- <sup>128</sup> It is not clear what Jing Jianfeng’s permanent billet was at the time of the exercise; he was, however, the commander of the 29th Fighter Division in Quzhou, Zhejiang Province, in 2015. He received a rank promotion from senior colonel to major general in January 2017. Zhang Jiansong and Zhu Zhanghu, “The PLA Air Force holds rank promotion ceremony for new generals,” *Kongjun Bao*, 18 January 2017, p. 1.
- <sup>129</sup> From “Military Report” [军事报道], Beijing CCTV-7, 12 November 2016.
- <sup>130</sup> Xu Yi [许毅], Wei Jiangtao [魏江涛], and Liang Xianglong [梁相龙], 2016.
- <sup>131</sup> In the PLA lexicon, ‘local war’ (局部战争) refers to a limited war in which the purpose, means, and scale take place in a local area, as opposed to ‘world war’ (世界大战) or ‘total war’ (全面战争). See *PLA Military Terminology* (中国人民解放军军语), Beijing: Academy of Military Science Press, December 2011, p. 46.
- <sup>132</sup> Ibid.
- <sup>133</sup> Ibid.
- <sup>134</sup> Ibid.

- <sup>135</sup> Ibid.
- <sup>136</sup> Ibid.
- <sup>137</sup> From “Military Report” (军事报道), Beijing CCTV-7, 28 November 2017. Photo report by Yang Jun, “PLA Air Force Holds ‘Red Sword-2017’ in Deep Desert,” *China Military Online* in English, 29 November 2017.
- <sup>138</sup> From “Military Report,” (军事报道), Beijing CCTV-7, 29 November 2017.
- <sup>139</sup> Ibid.
- <sup>140</sup> Liao Qirong [廖启荣] and Wang Boqian [王博仟], “Apply the principles, reinforce the mindset of system-of-systems combat – an Eastern TCAF air brigade explores the principles for opposition-force combat training” [“运用规律, 强化体系作战思维 - 东部战区空军航空兵某旅探索体系对抗演训规律纪实”] *Air Force News* [空军报], 5 December 2017, p. 3.
- <sup>141</sup> Zeng Ke [曾科] and Xie Ruofei [谢若飞], “Overcome the data adaptability problem – a Southern TCAF air regiment complies with the principles and uses combat data to improve its system-of-systems combat capability” [“克服数据的‘水土不服’ - 南部战区空军某团遵循规律善用作战数据提升体系作战能力”], *Air Force News* [空军报], 5 December 2017, p. 3.
- <sup>142</sup> Ibid.
- <sup>143</sup> From “Military Report” (军事报道), Beijing CCTV-7, 29 November 2017.
- <sup>144</sup> Ibid.
- <sup>145</sup> Ibid.
- <sup>146</sup> *PLA Aerospace Power: A Primer on Trends in China’s Military Air, Space, and Missile Forces*, CASI, 2017, [http://www.airuniversity.af.mil/Portals/10/CASI/documents/Research/PLAAF/CASI\\_Primer%202017.pdf](http://www.airuniversity.af.mil/Portals/10/CASI/documents/Research/PLAAF/CASI_Primer%202017.pdf).
- <sup>147</sup> Cheng Fuming, Fu Xuecheng, and Guo Huarong, “Airborne ‘Command Post,’” *China Air Force*, 2013-01, p. 39-43.
- <sup>148</sup> *PLA Aerospace Power: A Primer on Trends in China’s Military Air, Space, and Missile Forces*, CASI, 2017, accessed at [http://www.airuniversity.af.mil/Portals/10/CASI/documents/Research/PLAAF/CASI\\_Primer%202017.pdf](http://www.airuniversity.af.mil/Portals/10/CASI/documents/Research/PLAAF/CASI_Primer%202017.pdf).
- <sup>149</sup> From “Military Report” (军事报道), Beijing CCTV-7, 29 November 2017.
- <sup>150</sup> Ibid.
- <sup>151</sup> Liu Jinyang [刘锦洋] and Li Jianwen [李建文], 2017.
- <sup>152</sup> From “Military Report” (军事报道), Beijing CCTV-7, 28 November 17.
- <sup>153</sup> Ibid.
- <sup>154</sup> Ibid.
- <sup>155</sup> From “Military Report” (军事报道), Beijing CCTV-7, 4 May 2017.
- <sup>156</sup> Liu Jinyang [刘锦洋] and Li Jianwen [李建文], 2017.
- <sup>157</sup> *Military Terminology of the Chinese People’s Liberation Army*, Beijing: Academy of Military Science Publishing House, September 1997, p. 88.
- <sup>158</sup> *Military Terminology of the Chinese People’s Liberation Army*, Beijing: Academy of Military Science Publishing House, September 1997, 24. Li Chao, “Air Defense Zone,” in Yao Wei, ed. *China Air Force Encyclopedia*. Beijing, Aviation Industry Press, November 2005, p. 173.
- <sup>159</sup> Du Jinwang, “Air Force Tactical Coordination,” in Yao Wei, ed. *China Air Force Encyclopedia*. Beijing, Aviation Industry Press, November 2005, p. 116.
- <sup>160</sup> “Jinan MRAF Air Division and Naval Flotilla Conduct Joint Training,” *Air Force News* [空军报] in Chinese, 27 May 2003, p. 1. Wei Liping, “Nanjing MRAF Units Organize Multi-Service and Branch Joint Opposition-Force Exercise,” *Air Force News* [空军报] in Chinese, 2 September 2004, p. 1. Chen Minglin and Xu Tongxuan, “Jinan Military Region Air Force Division Conducts Integrated, Opposing-forces Joint Training with Neighboring Units,” *Air Force News* [空军报], in Chinese, 19 September 2006.
- <sup>161</sup> Zhao Lei, 2017.

- <sup>162</sup> “Hundreds of Elite Pilots participated in the competition in the desert, Jiang Jiayi won the ‘Golden Helmet’ for the third time” [“空军上百精英飞行员大漠对抗 蒋佳翼三夺金头盔”], 1 February 2016, accessed at <http://military.china.com/important/gundong/11065468/20160201/21386349.html>. Niu Ruili [牛锐利] and Lu Hui [卢辉], 2015. No author, “2015 PLA Air Force ‘Golden Helmet’ competition concluded, elite division used Su-30 to win the competition” [“2015空军金头盔争夺战落幕 王牌师用苏30夺冠(图)”], 29 December 2015, accessed at [http://www.wokeji.com/military/zgjd/201512/t20151230\\_2102183.shtml](http://www.wokeji.com/military/zgjd/201512/t20151230_2102183.shtml). Li Jianwen [李建文], 2015.
- <sup>163</sup> Zhao Lei, 2017.
- <sup>164</sup> No author, “PLA Air Force ‘Golden Dart’ Competition began, Q-5 competed alongside Su-30” [“中国空军金飞镖大赛开战 强5与苏30同场竞技”], 25 July 2016, accessed at <http://mil.sohu.com/20160725/n460832855.shtml>. Yang Chenxiu [杨宸琇], 2016. Li Jianwen [李建文] and Yang Weike [杨伟科], “PLA Air Force Five Theater Commands’ dozens of aviation regiment competed for ‘Golden Helmet’” [“五大战区空军数十个航空兵旅团争夺‘金飞镖’”], 21 July 2016, Xinhua Wang [新华网], accessed at [http://news.xinhuanet.com/photo/2016-07/22/c\\_129169599.htm](http://news.xinhuanet.com/photo/2016-07/22/c_129169599.htm).
- <sup>165</sup> Zhao Lei, 2017.
- <sup>166</sup> Huang Panyue, ed., 2016.
- <sup>167</sup> Ibid.
- <sup>168</sup> Zhao Lei, 2017.
- <sup>169</sup> Li Jiayao, “PLAAF kicks off ‘Golden Helmet 2017’ air battle contest,” *China Military Online* in English, 3 November 2017, accessed at [http://eng.chinamil.com.cn/view/2017-11/03/content\\_7811945.htm](http://eng.chinamil.com.cn/view/2017-11/03/content_7811945.htm).
- <sup>170</sup> Huang Panyue, ed., 2017.
- <sup>171</sup> No author, “Air Force Held Golden Helmet 2015 Competition” [“空军展开2015年度金头盔比武竞赛”], CCTV, 5 December 2015, accessed at <http://v.ifeng.com/mil/mainland/201512/01d2cb3e-9c18-433c-bf7d-d46ae4d0d6c1.shtml>. Hu Xiaoyu and Yang Jin, “The Inspiration of a Two-Time Winner,” *China Armed Forces* in English and Chinese, No. 1, Vol. 19, 28 February 2013.
- <sup>172</sup> Hu Xiaoyu and Yang Jin, 2013.
- <sup>173</sup> Zhang Xuefeng, “Aiming Higher in Combat,” *China Armed Forces* in English and Chinese, No. 28, Vol. 4, 2014.
- <sup>174</sup> Zhao Lei, 2017.
- <sup>175</sup> Huang Panyue ed., “Surface-to-air missile system in ‘Blue Shield-2017’,” *China Military Online* in English, 19 April 2017, accessed at [http://english.chinamil.com.cn/view/2017-04/19/content\\_7568698.htm](http://english.chinamil.com.cn/view/2017-04/19/content_7568698.htm).
- <sup>176</sup> No author, a blog “PLA Air Force ‘Red Sword’ System of Systems Opposition-Force Exercise” [“解放军空军红剑体系对抗演习”], 17 January 2017, accessed at [http://bbs.tiexue.net/post\\_12421037\\_1.html](http://bbs.tiexue.net/post_12421037_1.html).
- <sup>177</sup> Zhao Lei, 2017.
- <sup>178</sup> Liu Xin, ed., “In pics: Air Force conducts ‘Red Sword-2016’ training exercise,” *Xinhua Wang* in English, 18 January 2018, accessed at [http://news.xinhuanet.com/english/photo/2017-01/18/c\\_135993253.htm](http://news.xinhuanet.com/english/photo/2017-01/18/c_135993253.htm).

