

難於登天  
Harder Than Climbing to Heaven:  
Fighter Aviation in the Republic of China Air Force  
(1928-1994)

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By  
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## Introduction

Aviation history tends to be a Western-centric sphere of study - which is hardly surprising: not only did the airplane first fly under the hands of the Wright Brothers in the United States, but in the following years, American and European aviation industries pushed the boundaries of aeronautics further than ever before thought possible. Over decades of research, these Western-centric tendencies resulted in numerous volumes written on the the wartime exploits of the British Royal Air Force, German *Luftwaffe*, the air wars over Korea and Vietnam (from the American perspective of course), as well as enough service histories regarding the United States Army Air Force (USAAF) and United States Air Force (USAF) to fill entire libraries.

Established in 1920 and having seen major combat during WWII, the Republic of China Air Force (ROCAF) enjoys a colorful and storied history that continues to the present day. However, these histories are not widely understood or accessible in the West, in spite of a wealth of knowledge made available by historians in China and Taiwan. This paper aims to serve as a comprehensive investigation into the ROCAF's history, and also to make available several excerpts from never-before-translated Chinese texts to expand the list of available texts on the subject in English.

There are two exceptions to the lack of English-language texts concerning the ROCAF, two separate groups of airmen who flew and fought under the Nationalist Chinese flag that have enjoyed attention in military history spheres: The First American Volunteer Group (AVG), better known as the legendary "Flying Tigers" from World War Two, are chronicled in Daniel Ford's *Flying Tigers: Claire Chennault and His American Volunteers, 1941-1942*,<sup>1</sup> which carefully

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<sup>1</sup> Daniel Ford, *Flying Tigers: Claire Chennault and His American Volunteers, 1941-1942* (Washington, D.C.: Smithsonian Institution Press, 1991).

recounts the necessity, formation, and combat exploits of the Flying Tigers during their seven months of combat. Osprey's *Aircraft of the Aces* series also includes two volumes that serve as references to the Flying Tigers: *American Volunteer Group 'Flying Tiger' Aces*<sup>2</sup> by Terrill J. Clements, and *P-40 Warhawk Aces of the CBI* by Carl Molesworth.<sup>3</sup> Typical of Osprey reference books, *'Flying Tiger' Aces* and *P-40 Warhawk Aces of the CBI* provide in-depth accounts of these pilots' combat accounts, while providing ample photographic references and full-color profiles showing different paint schemes and markings unique to each particular airman featured.

Other groups that have been the subject of English texts are the ROCAF's Cold War surveillance crews who flew countless missions for the CIA: the Black Cats and Black Bats. Chris Pocock, with the help of Taiwanese aviation historian Clarence Fu, has written a fantastic account on the Black Bats. *The Black Bats: CIA Spy Flights over China from Taiwan, 1951-1969* chronicles the formation of the covert CIA/ROCAF collaboration unit, the missions they flew, and their service history.<sup>4</sup>

As such, due to the availability of existing works that explore the Flying Tigers and ROCAF surveillance squadrons, I instead choose to focus on the ROCAF's unsung fighter and fighter-reconnaissance pilots, who military history spheres have largely ignored. My decision not to cover the Black Bats and Flying Tigers in this paper is not to downplay their importance, but rather to allow this work to stand alongside the works of Ford and Pocock. This paper aims to fill the gaps they left, using memoirs of pilots such as Hua Xijun, who flew fighters in the ROCAF for over twenty years, in conjunction with the works of Taiwanese and American historians. I hope to will shed light on the Nationalist Chinese Air Force's exploits throughout history,

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<sup>2</sup> Terrill J. Clements, *American Volunteer Group 'Flying Tiger' Aces* (Oxford: Osprey Publishing, 2000).

<sup>3</sup> Carl Molesworth, *P-40 Warhawk Aces of the CBI* (Oxford: Osprey Publishing, 2000).

<sup>4</sup> Chris Pocock, *The Black Bats: CIA Spy Flights over China from Taiwan, 1951-1969* (Atglen, Penn.: Schiffer Publishing Ltd., 2010).

spanning a 71-year period between 1920 and 1991. This work will explore every front-line fighter fielded by the ROCAF, beginning with Hawk III biplane fighters in the second Sino-Japanese War and closing with the introduction of Taiwan's very own Indigenous Defense Fighter, a supersonic multi-role aircraft named after former ROC president Jiang Jingguo.

Moreover, these memoirs by ROCAF pilots and historians include personal experiences that describe the missions and operation tempo during the tense years of the Cold War: the stress of flying Combat Air Patrol (CAP) sorties over the Taiwan Strait,<sup>5</sup> the exhilarating feeling of receiving new fighter jets (and the subsequent training process that comes with each transition between aircraft models),<sup>6</sup> and of course, aerial combat against the PLAAF.<sup>7</sup> These memoirs also offer insights riddled with minutia. For example, Huang Rongde, a former ROCAF "Thunder Tigers" demonstration team pilot, compares how two different variants of the Northrop F-5 behave and handle while performing aerobatics.<sup>8</sup> Such detailed firsthand accounts are necessary to understand a military force, especially regarding air forces. By including such detailed memoirs, we can put readers in the cockpits of these fighter aircraft, helping them understand the relationship and precision between man and machine that sets aerial combat apart from other forms of modern warfare. Furthermore, this work aims to make clear the distinction of the ROCAF, including the historical and political forces that set it apart from its contemporaries.

Within the English-language spheres of aviation history, names such as Saburo Sakai, Erich Hartmann, Gregory "Pappy" Boyington, and Johnnie Johnson are well-known and revered. I've had many a conversation with fellow aviation historians where we compare the our own

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<sup>5</sup> Hua Xijun, "An Interview with General Hua Hsi-Jun," in *US MAAG-Taiwan: An Oral History* (Taipei: Military History and Translation Office, Ministry of National Defense, 2008).

<sup>6</sup> Xiongfei Li (李雄飛), *My Air Force's Entering A New Era: F-84 Thunderjet* (我空軍一個新時代: F-84 雷霆機縱橫臺灣) (Taipei: Self-Published, 2013).

<sup>7</sup> Pan Chenghu, "An Interview with General Pan Cheng-Hu," in *US MAAG-Taiwan: An Oral History* (Taipei: Military History and Translation Office, Ministry of National Defense, 2008).

<sup>8</sup> Rongde Huang, *Memoirs of a General* (Taipei: Self-Published, 2017).

familiarity with these pilots with that of baseball fans and the batting averages and stats of their favorite players. In fact, most amateur aviation fans can rattle off facts and figures with ease: “Erich Hartmann? Easy. Leading *Luftwaffe* ace of the war. He flew Messerschmitt 109s and scored 352 victories, mainly on the Eastern Front against Soviet pilots with less training and flying inferior aircraft.”

On the other hand, Chinese pilots, in spite of fighting on the front lines long before some of their American and European WWII counterparts even first climbed into a fighter cockpit, hardly get any recognition or mention within the Western-centric spheres of military and aviation history. Gao Zhihang and Art Chin, for example, successfully flew antiquated biplane fighters against numerically and technologically superior Imperial Japanese Army and Navy aircraft, feats worthy of recognition. In the years following World War Two, ROCAF pilots continued to serve dutifully, keeping in close contest with the initially more modern Communist PLAAF in the early days of the Cold War, before re-equipping with American jets and regaining the upper hand, which they maintained, throughout the Cold War. During the Taiwan Strait Crisis of 1958, ROCAF fighter pilots proved their superiority over the PRC’s pilots, scoring uncontested aerial victories and setting an impressive 31:1 kill ratio against PLAAF MiGs.<sup>9</sup>

Full translations of the Chinese-language excerpts cited will be included as references to encourage further study of the ROCAF by English-language readers, and I hope to inspire more military and aviation historians not only to turn their attention outside of the West, but to also explore the fabled histories surrounding their own heritage. Collectively, military and aviation history circles would benefit from increased worldliness, expanding our own scopes beyond the beaches of Normandy and the tides of Guadalcanal.

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<sup>9</sup> Hua, “An Interview with General Hua Hsi-Jun,” 145.

## **Part One: The War of Resistance**

*By the time the Second Sino Japanese War broke out in 1937, the ROCAF was equipped with a variety of aircraft from different countries, including Great Britain, Germany, and the United States. The wartime ROCAF flew many different types of missions, and even utilized their long-range bombers to drop propaganda leaflets over Tokyo.*

The ROCAF, formally established as the ROC Aviation Ministry in 1920, would not have existed without the Central Aviation School that produced the pilots on which it relied in the desperate days early in the war. Pivotal to the founding of the ROCAF, the Central Army Academy's Aviation Class, established in 1928, served as the basis for what later became the Central Aviation School, and finally, the ROC Air Force Academy. Prior to this, Chinese military aviation consisted primarily of provincial air forces controlled by warlords. Interestingly enough, some of these warlord air forces are notable in their own regard.

Zhang Zuolin, Manchuria's ruling warlord, equipped his air force utilizing Western arms dealers throughout the 1920s. Among them were a prominent French importer by the name of Boixo Feres, who sold the Manchurians 20 World War One-vintage Breguet 14 biplane bombers with 3000cc Renault engines in 1923. The Manchurian Air Force saw extensive action in combat against rival warlord armies in 1922 and 1924, and by the late 1920s, was the largest in China. Another noteworthy warlord air arm was that of Chekiang Province, if only for the fact that its pilots were commanded by Etienne Tsu (Cu Binlou), a French-educated Shanghai native who developed an interest in aviation and flew combat with the French *Aeronautique Militaire* during World War One, scoring three confirmed aerial victories against German aircraft and observation balloons. Furthermore, Tsu is also credited with forcing down two German aircraft, which

according to some historians, would make him an ace (a pilot having scored five or more aerial victories).<sup>10</sup>

With the Japanese invasion of Manchuria in 1931, war became imminent. Initially incapable of taking on the Japanese Kwantung army on the battlefield, the Chinese central government under Chiang Kai-Shek expedited the reformation and modernizing of its armed forces. Advisors from Germany arrived to train the Chinese Army, and these units eventually became the 36<sup>th</sup>, 87<sup>th</sup>, and 88<sup>th</sup> Divisions that served as the National Revolutionary Army's elite shock troops during the later campaigns in Shanghai and Nanking. Meanwhile, American advisors helped to train Chinese pilots at the Central Aviation Academy, many of whom saw combat against the Japanese during the first desperate years of the war.

After this period of reorganization, the Chinese Air Force incorporated various air squadrons from the provinces into its existing ranks. This resulted in them fielding one of the most colorful flotillas of aircraft ever to be used in combat, ranging from World War One-era surplus types to contemporary pursuit fighters and medium bombers from the United States and Germany. The backbone of China's fighter squadrons consisted of Curtiss Hawk fighters purchased from the United States.

Designated F11C Goshawk by the United States Navy, the Curtiss Hawk II had a Wright R-1820-04 "Cyclone" radial engine rated at 710 horsepower for a maximum speed of 202 miles per hour. Armament consisted of two .30 caliber machine guns firing through the aircraft's propeller arc. The first Curtiss Hawk II arrived in China on March 7, 1933. Following this initial purchase, the Chinese Air Force received 18 more Hawk IIs between March 15 and May 8, 1933, and finally, between June 19 and July 19, 1933, the CAF received 17 more Hawk IIs. The final

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<sup>10</sup> Raymond Cheung, *Aces of the Republic of China Air Force* (Oxford: Osprey Publishing, 2015), 8.

delivery of these fighters arrived in China between August 14 and September 1, 1933. In total, 50 Hawk IIs made their way to China.<sup>11</sup>

In 1936, prompted in part by increased Japanese presence in Manchuria, China procured the Curtiss Hawk III, essentially an improved version of the Hawk II featuring retractable landing gear and an updated Wright R-1820 engine, the R-1820-4 rated for up to 770 horsepower. This increase in streamlining and power gave the Hawk III a maximum speed of 225 miles per hour, a substantial increase over that of the Hawk II. Armament still consisted of two .30 machine guns, but the Hawk III also had hard-points for up to 500 lbs of ordnance. China's first Hawk III arrived on March 19, 1936. 71 more Hawk IIIs arrived between May 1 and August 7 of that year, with the final 30 being delivered by June 7, 1938. All in all, the CAF received 102 Hawk IIIs, 90 of which were assembled by the Central Aircraft Manufacturing Company (CAMC) in Hangzhou.<sup>12</sup>

By 1937, the CAF had about 600 aircraft. Of these, 305 of these were fighter planes, and the remainder were a myriad of reconnaissance planes, light bombers, and about 20 medium bombers. Following the United States Army Air Forces' structuring thanks to the direction of General Claire Chennault who served as its primary aviation advisor, the CAF organized their force into nine groups, divided into Bomb Groups (BG), Pursuit Groups (PG), and Air Groups (AG). The 4<sup>th</sup> and 5<sup>th</sup> PG, as well as the independent 7<sup>th</sup> and 29<sup>th</sup> Pursuit Squadrons (PS), flew the Hawk III. The 3<sup>rd</sup> PG, consisting of the 8<sup>th</sup> and 17<sup>th</sup> PS, were respectively equipped with approximately 15 Italian Fiat CR.32 and 11 American Boeing 281 fighters (which were

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<sup>11</sup> Håkan Gustavsson, *Sino-Japanese Air War* (Stroud: Fonthill Media, 2016), 24.

<sup>12</sup> Gustavsson, *Sino-Japanese Air War*, 25.

originally ordered for the Guangdong warlord). Obsolete Hawk IIs found their way to second-line duties at the 5<sup>th</sup> PG, as well as the Flying Schools.<sup>13</sup>

The 8<sup>th</sup> Air Group consisted of three squadrons of bombers. The 10<sup>th</sup> Bombing Squadron flew six Italian Savoia S.72 tri-motor bombers, all of which were by this point in poor condition and only suitable for use as transports. The 19<sup>th</sup> BS on the other hand, was equipped with six German-made Heinkel He-111A-0 medium bombers, an earlier variant of a premier *Luftwaffe* bomber of the war. Purchased in 1935 by the aviation command of Guangdong Province, these early Heinkels, powered by BMW engines, underperformed by *Luftwaffe* standards. Equipped with American Martin 139WCs (B-10s in USAAF service), the 30<sup>th</sup> BS consisted of nine aircraft. Altogether the Chinese Air Force never fielded more than 21 medium bombers at a time.<sup>14</sup>

The remaining Bomb Groups and Recon Groups consisted of scouting aircraft and light bombers. Of these, the 2<sup>nd</sup> BG, equipped with Northrop Gamma 2Es, saw extensive (and notorious) action, being famously sortied on August 14, 1937 against the Japanese flagship *Izumo* off the coast of Shanghai. Unfortunately, due to poor weather conditions and training, bombs from these Northrop Gammas killed around 3,000 civilians in the Shanghai International Settlement. Little damage was actually inflicted to the *Izumo*, as two of the four bombs intended for the ship exploded on Nanking Road, a popular street for shoppers, with the remaining two in front of the Great World Amusement Centre in Edward VII Avenue.<sup>15</sup>

Responding to the Chinese air raid on the *Izumo*, the Imperial Japanese navy sortied nine Mitsubishi G3M Model 11 medium bombers to attack the CAF airbases around Shanghai. The G3M bombers prescribed to the 1930s *schnellbomber* (fast bomber) doctrine. The idea behind the *schnellbomber* was for a strategic bomber to be fast enough to evade interception from

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<sup>13</sup> Gustavsson, *Sino-Japanese Air War*, 30.

<sup>14</sup> Gustavsson, *Sino-Japanese Air War*, 31.

<sup>15</sup> Dick Wilson, *When Tigers Fight* (New York: The Viking Press, 1982), 35.

enemy fighters, thus able to penetrate air defenses. The German *Luftwaffe* successfully pioneered this theory using their *Condor Legion* to devastating effect over Guernica during the Spanish Civil War, and the Japanese anticipated similar success with their new fast bombers over China.

The nine G3Ms lumbered towards Hangzhou, spotted by Chinese forward observers. Thankfully, CAF Colonel Gao Zhihang, who happened to be at the Hangzhou after ferrying a Hawk III to the base, rose to meet them in his biplane fighter. Because they were skimming the ground at low altitude, hoping to catch the Chinese off guard, the Japanese bombers were easy to catch, at a mere 300 meters. After dropping their bombs (and inflicting little damage to the air base), the Mitsubishi bombers came under fire from the Chinese fighters. Closing in to incredibly short range before opening fire, Gao and his fighter pilots claimed three Japanese bombers shot down by the end of the day, to no losses of their own.<sup>16</sup> Due to the overwhelming victory of the ROCAF against the Japanese forces in such a desperate time, August 14 came to be proclaimed as Air Force Day in the Republic of China and is still celebrated in Taiwan to this day.

However, these lucky initial engagements were few and far between. As China lacked the ability to manufacture warplanes of its own, the essentially “imported” CAF could not successfully wage a war of attrition against the Japanese war machine. As a result, by September 2, 1937, having suffered irrecoverable losses, the CAF had only 141 operational aircraft left in service.<sup>17</sup>

Help arrived in mid-September in the form of a Soviet resolution to deliver 225 combat aircraft to China, in addition to volunteer pilots and support crews from the Soviet Union, scheduled to arrive in China later. 62 Polikarpov 1-15bis biplane fighters, 93 Polikarpov I-16 monoplane fighters, and eight Polikarpov UTI-4s (two-seat trainer variant of the I-16), in

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<sup>16</sup> Cheung, *Aces of the Republic of China Air Force*, 15.

<sup>17</sup> Gustavsson, *Sino-Japanese Air War*, 32.

addition to 62 Tupolev SB-2 bombers made up the initial batch of aircraft. The Soviet volunteer units also encompassed maintenance crews and support staff, and so a typical Soviet squadron in China consisted of 31 aircraft and around 100 men. The 9<sup>th</sup> and 11<sup>th</sup> Bomb Squadrons of the 2<sup>nd</sup> Bomb Group wasted no time in re-equipping to the new Tupolev bombers in September, and on September 25, orders came from the CAF Aviation Committee for the 4<sup>th</sup> Pursuit Group to transfer all of their remaining Hawk IIIs to the 5<sup>th</sup> PG, and to re-equip with the I-15s and I-16s.<sup>18</sup>

The CAF found itself withered down to a mere 60 aircraft as of October 28, 1937, of which only nine were fighters. Nanjing fell to the Japanese on December 13, 1937, and the Japanese high command hoped the loss of their capital could collapse the Chinese Central Government. Instead, Chiang Kai-Shek proceeded to relocate further westward to Wuhan, and later, Chongqing. Despite their heavy losses, the Chinese proved their willingness to continue fighting, and in December, 1937, help arrived in the form of Soviet volunteer pilots, following a period of training and aircraft familiarization. By December 18, a visiting American pilot from Guangdong wrote to his colleagues that “there were already 50 brave Soviet aviators in the skies over China, who’d shot down 11 Japanese aircraft in their first battles.”<sup>19</sup>

February, 1938 marked the combat debut of the CAF’s British-made Gloster Gladiator fighters, which replaced the damaged Hawk IIIs from the 28th and 29th Pursuit Squadrons. On February 24, the IJN seaplane carriers *Notoro* and *Kinugasa Maru* launched 13 Nakajima Type 95 (E8N) seaplanes against Nanshiung air base. The CAF responded by scrambling 12 Gladiators from the 28th and 29th Pursuit Squadrons. Among them was the vice commander of the 28th Pursuit Squadron, a Peruvian-Chinese American pilot named Art Chin. Born in Portland, Oregon and spurred to fight for China upon reading of the Japanese invasion of Manchuria, Chin

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<sup>18</sup> Gustavsson, *Sino-Japanese Air War*, 35.

<sup>19</sup> Gustavsson, *Sino-Japanese Air War*, 33.

made his way to his mother nation and ultimately found himself flying with the Guangdong Provincial Air Force just before its integration into the CAF.

Chin was a seasoned combat pilot, already having scored two victories against Japanese G3M bombers in a Hawk II with the 28th PS. Spotting nine E8Ns at 6,000 feet near Huguo, he signalled to the other four Gladiators to begin their attack. Less maneuverable and slower than the British biplane fighters, the E8N crews attempted to shake their Chinese aggressors to no avail. After around 30 minutes of air combat, Chin shot down one of the seaplanes. This battle resulted in the Chinese pilots claiming five Japanese seaplanes destroyed at the cost of two Gladiators.

Although only two of the E8Ns went down during the battle, the three others either crashed or were so badly damaged that the Japanese navy wrote them off as losses. Art Chin ended the war credited with 8.5 victories, 6.5 of which were scored in the Gloster Gladiator. He later suffered serious injuries in combat, but after recovering, flew cargo planes over the “Hump” across the Himalayas to supply Allied forces in Southwestern China.<sup>20</sup>

On May 20, 1938, four years before Jimmy Doolittle led sixteen American B-25B Mitchell bombers on a daring raid against Tokyo, two Chinese Martin 139 bombers prepared to strike the Japanese homeland. However, these bombers were loaded not with bombs, but with propaganda leaflets, intended to raise the consciousness of the Japanese people to the atrocities that their military committed in China.

At 11:48 PM local time, Martin bombers No. 1403 and 1404 sortied from Ningbo towards Kyushu. Cruising over Nagasaki at about 11,500 ft. at 2:45 am, the bombers scattered leaflets over the city (which was not blacked-out, as the Japanese did not realize there was an air raid in progress). Shortly afterwards, the Chinese airmen dropped a flare bomb and began their

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<sup>20</sup> Cheung, *Aces of the Republic of China Air Force*, 20.

secondary intelligence-gathering mission, triggering the Japanese to quickly extinguish their city lights. The Martin bombers then proceeded to drop leaflets over Kurume and Saga: they never encountered any proper anti-aircraft fire, save for a handful of shots fired from Japanese warships anchored along the coastline.<sup>21</sup>

One of the largest dogfights of the war developed in the skies over Wuhan on May 31, 1938, when Japanese bombers launched attacks on CAF fighter bases defending their capital. Chinese spotters reported large numbers of Japanese aircraft, totalling around 139 by midday. At noon, 18 bombers and 39 fighters approached Wuhan, prompting 49 Chinese fighters to intercept them. Of these pilots, 31 were Soviet volunteers.

Nikolay Grigoryevich Kozlov, a Soviet pilot in the cockpit of an I-15bis, engaged a large group of Mitsubishi A5M fighters around 20 km east of the Wuhan airbase. Hot in pursuit of an A5M that was itself pursuing his flight leader, K.T. Opasov, Kozlov gave a burst into the Japanese aircraft, which began tumbling into the ground. The faster I-16 monoplanes attacked from the sun as the battle developed, throwing the Japanese, already distracted in a dogfight with the I-15 biplanes, into disarray. The Soviet volunteers claimed six victories, to the loss of one of their own. In total, Chinese Air Force fighters shot down fourteen Japanese aircraft on May 31, 1938, while losing only one Chinese and one Soviet pilot.<sup>22</sup>

Between May and August of 1938, thirty Curtiss Hawk 75Ms arrived in China, received by the 25th PS. These pilots were trained by General Chennault himself, who personally oversaw the procurement of the new aircraft through.<sup>23</sup> The Hawk 75M was one of Curtiss' export models of their P-36, which equipped the United States Army Air Corps (USAAC) at the time. An all-metal monoplane equipped with a pair of .50 caliber machine guns and capable of speeds up to

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<sup>21</sup> Gustavsson, *Sino-Japanese Air War*, 35.

<sup>22</sup> Gustavsson, *Sino-Japanese Air War*, 40.

<sup>23</sup> Molesworth, *P-40 Warhawk Aces of the CBI*, 9.

320 miles per hour thanks to its Pratt and Whitney R-1830 engine, the Hawk 75M was an incredibly potent fighter in the right hands.<sup>24</sup>

Both the 25th and 18th Pursuit Squadrons eventually were re-equipped with the new American monoplanes, and the 25th's Hawks saw action for the first time on August 18, 1938. Tang Pusheng, the 25th PS's squadron commander, led three Hawk 75Ms and seven I-15bis craft to intercept three flights of nine Japanese planes attacking Hengyang. Catching a group of nine Japanese aircraft by surprise, Tang dove upon them and destroyed one. The other eight Japanese bombers started opening fire on the Hawks, now following their squadron leader into combat. Tang's own aircraft sustained multiple hits from the bombers' gunners and went down in flames, killing him. Another Japanese aircraft was damaged, but the two other Hawk 75s crash landed. The final tally for this engagement was three Chinese pilots killed in air combat, one seriously wounded, and one killed on the ground, for one Japanese bomber (Tang's victory) destroyed.<sup>25</sup>

Such was the brutal back-and forth of aerial combat over China during the early years of the Sino-Japanese War, which later snowballed into the Pacific Theater of World War Two. Although the CAF sometimes inflicted heavy damage against Japanese bombers, the Chinese Army failed to regain ground against the Japanese onslaught, forcing the CAF to fight defensively, effectively waging a guerilla war using their limited resources.

Soviet Volunteer pilots and ground crews withdrew from China by the beginning of 1940, following disagreements between Stalin and Chiang Kai-Shek resulting from the lack of Nationalist support to the Communist 8th and New 4th Armies. Turning to the United States after the withdrawal of Soviet forces from China, Chennault formed the First American

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<sup>24</sup> Lionel Persyn, *P-36 Hawk Aces of WWII* (Oxford: Osprey Publishing, 2005), 11.

<sup>25</sup> Gustavsson, *Sino-Japanese Air War*, 81.

Volunteer Group in the Winter of 1940-41 purchasing 100 Curtiss Hawk 81A-2 fighters and recruiting 100 pilots covertly from the United States Army, Navy, and Marine Corps.

The Hawk 81A-2 was yet another continuation of Curtiss' Hawk series of fighters, of which China was a fierce customer. Sporting a new liquid-cooled Allison V-1710 engine producing 1,500 horsepower at maximum power output, the Hawk 81A-2 had a maximum speed of 366 mph and was armed with two .50 caliber machine guns, in addition to four wing-mounted .30 caliber guns. The AVG began training in Rangoon by July of 1941. Thanks to his years of experience flying and fighting against the Japanese, Chennault possessed a wealth of knowledge on their aircraft and tactics. However, his pilots needed time to learn these tactics, in addition to training with the new aircraft. Thus, the "Flying Tigers" did not see action until December of 1941.<sup>26</sup>

By mid-1941, the CAF's fighter and bomber groups were mostly re-equipped with Soviet warplanes - Polikarpov I-15bis's, I-16s, and I-153s made up the bulk of the Pursuit Squadrons, while Tupolev SBs and Ilyushin DB-3s formed the backbone of the CAF bombers. However, due to their mounting losses and lack of supplies, the Chinese Air Force was ill-equipped to fight in any real capacity. Furthermore, the Japanese Mitsubishi A6M "Zero" fighter first appeared over China in August, 1940. The Zero was leagues ahead of anything the CAF could muster, including the Hawk 75s and cannon-equipped Polikarpov I-153s, and its appearance over Chongqing intimidated the Chinese into refusing to intercept Japanese bombers whenever a fighter escort was present. For the most part, isolated from support and short on planes and pilots, the Chinese Air Force was in shambles.

The bombing of Pearl Harbor and subsequent American entry into the war saw a glimmer of hope for the Chinese Air Force. Finally ready for combat following months of training and

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<sup>26</sup> Molesworth, *P-40 Warhawk Aces of the CBI*, 34.

exercises to put Chennault's new tactics to the test, the AVG saw extensive action from December 1941 to early June of 1942, when they became absorbed by the United States Army Air Force's (USAAF) 23rd Fighter Group.

Following Japan's advance into Burma and Southwest China in May 1942, remnants of the Chinese army and air force, supported by the AVG, successfully ground their offensive to a halt at the Salween river. Starting in early 1943, the United States provided the CAF with new fighters to replace the aging 1930s-vintage Soviet Polikarpov pursuits making up the bulk of the Chinese pursuit groups. Among them were Vultee's P-66 Vanguard and Republic's P-43 Lancer.

Based on their BT-13 "Valiant" advanced trainer, Vultee's P-66 was relatively well-regarded by pilots due to having good handling. Although the P-66 was impressively fast - with a maximum speed of 340 mph, and a decent armament of four .50 caliber machine guns that were more than adequate for taking on lightly-armored Japanese warplanes, it lacked the agility to engage in turn-fighting dogfights against Japanese Nakajima Ki-43 *Hayabusa* and Ki-44 *Shoki* fighters that became its primary rivals. Furthermore, the Vanguard was also often mistaken for Japanese fighters due to similarities between the shape of the aircrafts' engine cowlings and wings. Ultimately, the P-66s did little in the air war over China.<sup>27</sup>

In fact, the type scored only a single aerial victory against the Japanese: On June 6, 1943, 11th Fighter Group squadron leader Hu Chuangru shot down a Ki-48 bomber. Hu's son later became an F-104 Starfighter pilot in the ROCAF, and is credited with an aerial victory over a PLAAF MiG-19 on January 13th, 1967. The two are the only father-son pair in ROCAF history to have both scored kills.<sup>28</sup>

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<sup>27</sup> Cheung, *Aces of the Republic of China Air Force*, 80.

<sup>28</sup> Cheung, *Aces of the Republic of China Air Force*, 80.

Republic's P-43A Lancer, was by all accounts a terrific fighter: it boasted fantastic high-altitude performance compared to the AVG's Hawk 81A-2s, thanks to the aircraft's turbo-supercharged Pratt and Whitney R-1830-SC2G engine generating 1,200 horsepower. AVG pilot Robert Lee Scott Jr. photographed the peaks of Mt. Everest from 44,000 feet. in a P-43A, a testament to the fighter's respectable ceiling. The initial order of P-43As was actually meant not for the CAF, but the American Volunteer Group. After initial testing and in spite of his pilot's adoration of the aircraft's performance (in addition to the better high altitude performance to their Hawk 81A-2s, the Lancers boasted a better roll rate and were less susceptible to damage due to their radial engines that lacked the vulnerability of the Hawks' in-line engines and radiators), Chennault ultimately rejected the Lancers for service due to their fuel tanks' tendency to leak and questionable pilot protection.<sup>29</sup>

Unfortunately, the Lancers arrived in China with little documentation in the way of service manuals or pilots notes. They were vastly different than the CAF's existing Curtiss Hawks, with unfamiliar technology and equipment that were unknown to Chinese crewmen. Furthermore, the very same reasons that Chennault rejected the aircraft for his American pilots soon re-surfaced against the Chinese. The leaking fuel tanks were susceptible to in-flight fires, and both CAF Captain Chen Shenhsing and Major Cheng Shaoyu were killed when their Lancers caught fire in training. Both Chen and Cheng survived the harrowing ordeal of dogfighting Japanese A6M Zeroes in antiquated biplane fighters, only to lose their lives in P-43A-related accidents. However, the Lancer continued to be well-regarded due to its high-altitude performance, and saw use with both the CAF and USAAF as a reconnaissance aircraft until late 1943.<sup>30</sup>

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<sup>29</sup> Cheung, *Aces of the Republic of China Air Force*, 75.

<sup>30</sup> Cheung, *Aces of the Republic of China Air Force*, 76.

On October 1, 1943, the activation of the Chinese American Composite Wing marked a change of pace for the Chinese Air Force as a fighting force. The CACW consisted of both USAAF and CAF pilots, aircrew, and ground crewmen, and perhaps more importantly, integrated them into the same squadrons to maximize unit cohesion. Another groundbreaking feature of the CACW was its standardization of the Curtiss P-40N for both American and Chinese pilots, which eased logistics in the Chinese theatre. The CACW also incorporated a group of North American B-25 Mitchell medium bombers, of which included not only the B-25J, the standard bomber variant, but also the B-25D and B-25H, which were dedicated strafing and ground-attack aircraft. The B-25H came equipped with a 75mm gun in its nose, in addition to eight forward-firing .50 caliber machine gun, making it devastating against lightly-armored Japanese vehicles.

The primary fighter employed by the CACW was also the final and most numerous variant of the Curtiss Hawk, the P-40N Warhawk or Hawk 87M. Equipped with an Allison V1710-81 engine that took it to speeds up to 378 mph, the P-40N was also the fastest iteration of the Warhawk. After years of fighting against the lightly armored Japanese army fighters, USAAF and CAF pilots learned to exploit their aircraft's advantages. Contrary to popular belief, the P-40N was actually perfectly capable of engaging the agile Japanese *Hayabusas*, *Zero-sens*, and *Shokis* on even terms.

Pilots found that the P-40 was actually very maneuverable - more so than the P-38s that largely replaced them in USAAF service later in the Pacific. While Japanese fighters could outturn Warhawks at slower speeds, American and Chinese pilots discovered that their fighters could actually outturn the Japanese at higher speeds. Upwards of 275 mph, a Warhawk could easily outroll a Zero, and in a turning fight, by dropping the aircrafts' noses towards the ground

to increase their airspeed, CACW pilots could push their P-40s into a combination of a nose-down vertical turn with a bank turn, a technique called the “Low Yo-Yo,” allowing them to get into favorable firing positions to win dogfights.<sup>31</sup>

Against all odds, the CAF remained in the fight in the tumultuous years from 1937-1941. Following the activation of the CACW and subsequent Allied counter-offensive to reclaim Burma and China, the CAF, virtually decimated, miraculously sustained its existence until the advent of newfound support from the United States and Great Britain, and found itself on the winning side of their War of Resistance. What was simply the third or fourth year of war for the Western powers signalled upwards of eight years of constant fighting for the battle-weary Chinese forces, and by 1944, the CACW’s Warhawks dominated the skies over China. Interestingly, it seems as if the Chinese Air Force’s triumphant victory in the face of guaranteed defeat was predicted long before the advent of flight, through Sun-Tzu’s own writings in the legendary *Art of War*. “Throw your soldiers into positions whence there is no escape,” writes Sun Tzu, “and they will prefer death to flight. If they face death, there is nothing they may not achieve.”<sup>32</sup>

## **Part Two: Hand-Me-Downs**

*Following the end of the War of Resistance, the Chinese Civil War broke out. Although the ROCAF enjoyed superior training and equipment over the PLAAF, the ROC lost favor with the Chinese population with the rise of Mao Zedong and lost the war, in spite of their superior air power. The ROCAF at this time consisted mainly of surplus USAF fighters left over from WWII.*

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<sup>31</sup> Molesworth, *P-40 Warhawk Aces of the CBI*, 6.

<sup>32</sup> Sun Tzu, *The Art of War*, trans. Lionel Giles (1910), XI.23, <http://classics.mit.edu/Tzu/artwar.html> (accessed March 1, 2019).

*Although they also had some Canadian Mosquito fighter-bombers, these were nearing the end of their airframe lives and could not be feasibly fielded.*

By the latter stages of WWII, the CAF (soon to be referred to as the ROCAF in order to make a distinction between the Nationalist Air Force and the Communist Chinese People's Liberation Army Air Force) was widely equipped with North American P-51D and P-51K Mustangs,<sup>33</sup> which themselves replaced the aging Curtiss P-40E, K, M, and N model Warhawks that served dutifully against the Japanese.<sup>34</sup>

The Chinese Civil War, fought between 1946 and 1950, was won on the ground, and heavily influenced by the political battlefield, perhaps even more so than a physical one. Mao Zedong's Communists, having grown in numbers since the end of WWII, continued to gain popularity with landless peasants from the Chinese countryside, promising them prosperity following a victory against Chiang's Kuomintang forces. Defections from the Nationalist to the Communist militaries were rampant and by 1949, the PRC had all but won the war following a series of decisive victories. Although the Communists had pilots trained in the USSR since the 1930s, they lacked proper organization and adequate equipment to be operational in any real capacity during the Civil War. Thus, no real aerial combat occurred between ROC and PRC aircraft during the Chinese Civil War.

However, ROCAF fighter pilots would soon get to scratch their itch to fight. Taking off from Taiwan, where the ROC government was now centered, a flight of two Lockheed F-5 Lightnings (reconnaissance variants of the venerable P-38 fighter from WWII) spotted the first

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<sup>33</sup> The P-51K was essentially a P-51D with a larger propellor, and built in a different factory than the standard D model.

<sup>34</sup> The First American Volunteer Group flew the Hawk 81A-2, which was designated as "P-40B" in American service, and called "Tomahawk IIA" by the British RAF. These were largely replaced by later P-40Es, when the United States entered the war.

Russian-supplied Mikoyan-Gurevich MiG-15 jet fighters on the tarmac at the Shanghai air base on April 28, 1950. The PLAAF spotted the two piston-driven reconnaissance fighters and dispatched their new jets - flown by Russian pilots - to intercept them. Captain Kalinikov shot down one of the fleeing Lightnings, scoring the first-ever aerial victory for the Russian jet fighter. This sighting by ROCAF F-5s marked the West's first glimpse at the new Soviet fighter, which would (in both Chinese and North Korean service) soon see extensive action against British and American jets over Korea.

With the appearance of jet fighters over the Taiwan Strait, the ROCAF found itself at an extreme disadvantage. Their front-line fighter, the North American P-51, had a maximum speed of 450 mph. The jet-powered MiG, on the other hand, could fly at blistering speeds of up to 700 mph. In aerial combat, speed is incredibly important - it dictates a pilot's ability to engage and disengage, and contributes to the amount of potential energy an aircraft can exploit in a dogfight.

Following the PRC's involvement in the Korean War, the United States promised to continue their support to the ROC, establishing the Military Advisory Assistance Group (MAAG) Taiwan in 1951. The first fighters to emerge from this program were the P-47 Thunderbolts that arrived in Taiwan in 1952. The principal variant of the Thunderbolt in Chinese service, the P-47N, boasted a 2,800 horsepower Pratt and Whitney R-2800 engine equipped with a supercharger that greatly enhanced the aircraft's high-altitude performance. The P-47N also had a lengthened dorsal fin that made the aircraft more stable. Equipped with a respectable armament of eight .50 caliber machine guns, and with under-wing pylons to carry a variety of rockets and bombs, P-47s packed a powerful punch.

ROCAF Chief of Staff General Hua Xi-jun, who cut his teeth flying P-47s during this period, noted that while the Thunderbolts were designed to fly and fight at high altitudes, they

were sluggish at lower altitudes - but very sturdy and resilient to damage, compared to the Mustangs they replaced. In one case, a P-47 of the 11<sup>th</sup> Group, ROCAF was hit in the tail fin by a MiG's cannon fire and yet still safely returned to Hsinchu air base in Taiwan.<sup>35</sup>

Moreover, in spite of their inferiority in speed, the P-47s were more maneuverable and had better fuel efficiency at low altitude. Thus, ROCAF pilots flew their Thunderbolts low over the Taiwan Strait, where Chinese MiGs would consume fuel too quickly to remain combat effective. Hua also mentions that the PRC's aircraft were mostly directed by ground radar stations, which had a limited operating radius.<sup>36</sup> This meant that their warplanes rarely flew out to sea, giving the ROCAF dominance over the strait. Due to the short operational range of PAAAF jet fighters, most of the ROCAF's missions were air-to-ground attacks carried out against PLA naval and ground forces amassing along the coast of mainland China. Even before the ROCAF's procurement of Thunderbolts in 1952, its pilots had started flying alert missions in April and May of 1950.<sup>37</sup>

Alert missions required pilots to take off at moment's notice, and squadrons (squadrons would fly alert missions on a rotating basis) responsible for flying them were to finish pre-flight preparations each day before dawn. For alert squadrons to be combat-ready, pilots got out of bed an hour earlier than usual to hurry to the alert room located at the end of the runway. Ground crews had it even worse: for the aircraft to be ready as soon as possible, they had to complete pre-flight checks even before their pilots arrived. All alert pilots were to be in their flight suits at all times, and had to take off within thirty minutes of their orders.

Against all odds, ROCAF P-47s, thanks to superior airmanship, tactics, and combat readiness of their pilots and ground crews, successfully held the line against Communist Chinese

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<sup>35</sup> Hua, "An Interview with General Hua Hsi-Jun," 145.

<sup>36</sup> Hua, "An Interview with General Hua Hsi-Jun," 144.

<sup>37</sup> Hua, "An Interview with General Hua Hsi-Jun," 147.

jets until MAAG finally supplied the ROC with newfangled jet fighters of its own. Thus began a period of ROCAF history in which their pilots successfully defended their island against the PLAAF, claiming air superiority over the Taiwan Strait.

### **Part Three: Thunderjets and Sabre Rattling**

*With the establishment of MAAG Taiwan in 1951, the ROCAF started receiving military aid from the United States in the form of aircraft, equipment, and most importantly, training. This lasted until 1979, and throughout the MAAG period, the ROCAF began to take shape into what it is today. The United States sought to remove any offensive capabilities of the ROCAF, instead encouraging officials to focus on the branch's defensive and interception capabilities - similar to the USAF's own Tactical Air Command that patrolled the skies for Soviet bombers.*

June 16, 1953 is a date to remember in ROCAF history. As famously stated by ROC Chief of Staff Zhou Zhi-rou: “[June 16, 1953] is the day that the ROCAF finally sputtered out of the piston-engine era, into the jet age.”<sup>38</sup>

Although the ROCAF inventory included jet-powered Lockheed T-33 Shooting Stars prior to June 16, these served as trainers helping pilots to streamline the transition from piston-engine-powered propeller-driven aircraft to modern, high speed fighter jets. The ROCAF's first real jet fighters arrived in Taiwan on June 15, 1953, “handed over” by Americans from Okinawa. Taiwanese historian Li Xiongfei writes:

Without a cloud in the sky, and a sun bright as can be, the first batch of Republic

F-84G Thunderjets left Okinawa late in the morning and streaked straight towards

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<sup>38</sup> Xiongfei Li (李雄飛), *My Air Force's Entering A New Era: F-84 Thunderjet* (我空軍一個新時代: F-84 雷霆機縱橫臺灣) (Taipei: Self-Published, 2013), 3.

Taiwan. Shortly after 1PM, the F-84s landed at Tainan air base. Upon hearing the whine of new jet engines, base personnel rushed to the scene, astonished by the sight of these sleek new jet-powered airplanes. Gleaming in silver metal and leaving behind dark grey trails of smoke, the F-84s captured everyone's attention. The ROCAF planned a reception ceremony for the new aircraft on the following day, and maintenance crews scrambled to service and repaint the Thunderjets in their new ROCAF markings.

Prior to the arrival of these F-84s, these maintenance crews also went to Japan to undergo a course specific to their new jet. Armed with wealths of knowledge on how to refuel, repair, and service these aircraft, they became affectionately known as “nannies of the F-84 fleet.” By the morning of June 16, the new jets were lined up neatly on the ramp at Tainan, freshly repainted with the “blue-sky, white-sun” emblem of the ROCAF, ready for the arrival of VIPs.

At 2:00 in the afternoon of the 16th, the head of the US Military Advisory Corps arrived at the airport, followed by more than 40 Chinese and foreign news reporters, who arrived on a special plane from Taipei. There were several notable figures present, including the ROC chief of staff Zhou Zhirou, ROCAF Chief of Staff Wang Shuming, Joint Service Chief Huang Zhenju and even future president Jiang Jingguo, then serving as the director of Political Affairs. Other VIPs included the Chairman of the Strategic Committee Advisory He Ying-qin, liaison to the US Embassy Zhong Hua-De, as well as dozens of officers from the ROCAF's headquarters and the US MAAG.

Although the handover ceremony was originally planned for 4:00 PM, it got delayed by another hour, as everyone, excited about the new jets, crowded around them. Eventually, ROCAF flight leader Tsai climbed into the back seat of a T-33 trainer, with USAF Colonel and WWII ace James B. Morehead in the front seat. Observers noted that Morehead was not wearing a pilot's G-Suit, but only a flight suit with a white helmet. Tsai and Morehead flew in their T-33 for about a half hour, before coming in for a landing. Upon touchdown, Tsai climbed down from the Shooting Star. Although shaken to his core by unfamiliarity and novelty of his first flight in a jet fighter, he was filled with excitement.

Chief of Staff Zhou Zhirou and US Embassy liaison Zhong Huade each then climbed into two respective T-33s. Zhou wore his military dress uniform, embroidered with four stars, under a light green G-suit. He smiled as he hopped into the back seat of the Shooting Star. In the front seat sat ROCAF Major Leng Peishu. Leng was known for being a daredevil pilot - he flew the Shooting Star at 20,000 feet for half an hour, before quickly diving to 8,000 feet and making a slow aileron roll over the airbase. Unsure of how Zhou would react to such a maneuver, members of the crowd shook their heads, expecting Leng to be reprimanded for his brash behavior. To their astonishment, when the T-33 landed, the Chief of Staff beamed with excitement, warmly praising Leng for his aerobatic skills.

Like a giddy young school boy egging on his friends to try the new ride at the amusement park, Zhou encouraged He Yiqing and Jiang Jingguo to take flights in the jets. As the second T-33 landed and came to a stop on the tarmac,

Zhong Huade shook hands with his pilot, Major Guo Rulin, also evidently pleased with his experience. He smiled, exclaiming “Wonderful!” several times.<sup>39</sup>

Designed and built by the same Republic Aviation Corporation behind the mighty P-47 Thunderbolt, the F-84 Thunderjet was a robust fighter-bomber. Its Allison J-35 turbojet engine generated up to 5,560 lbs of thrust, propelling the aircraft up to 622 mph. This was a vast departure from the performance of existing piston-powered fighters making up of the ROCAF’s fighter arm, and so it is no surprise then, that the sheer amount of detail that Li uses to describe the ROCAF’s first exposure to jets is exhilarating - his focus on the experiences of pilots, political figures, and how they react to their T-33 joyrides speaks volumes towards the excitement that the ROC felt in receiving their first modern jet fighters. Gone were the days of trying to utilize the advantages of their piston-engine-powered P-47 Thunderbolts against PLAAF MiG-15s - with the introduction of their own jet fighters, the ROCAF finally felt better equipped to fight the Communists on more equal terms.

One recurring theme in the ROCAF’s history is their constant making do with inferior equipment. In fact, the entirety of the Second Sino-Japanese War was virtually fought with inferior aircraft - had it not been for the tenacity of Chinese pilots, who miraculously held off against the Japanese for long enough to stave off their total destruction, Japan could have easily maintained the air supremacy that they gained over China in 1940. However, the arrival of the F-84s to Taiwan marked a new chapter in the ROCAF’s history - one that put an end to the ROCAF’s tradition of flying biplanes against Japanese Zeros, and piston-engine-powered P-51s and P-47s against PLAAF MiG-15s.

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<sup>39</sup> Li, *My Air Force’s Entering A New Era*, 3.

On July 4, 1955, WWII veteran Tsang Hsilan, encountered MiGs while leading a flight of F-84Gs. Compared to Thunderjets, the Chinese MiG-15bis fighters were slightly faster and boasted a better rate of climb, so Tsang allowed them to make their first pass on his formation, waiting for the Communist fighters to overshoot. When one did, he let out a burst from his .50 caliber machine guns, sending it diving away, trailing smoke. There's some debate whether or not this MiG was actually shot down, and ultimately Tsang was not awarded the victory due to lack of confirmation.<sup>40</sup>

However, the contribution he made to the ROCAF in F-84s far transcends any possible aerial victory Tsang could have scored in combat. In 1954, Tsang received a promotion to Colonel and received command of the ROCAF's 1<sup>st</sup> Fighter Group, overseeing the group's conversion to the then-new F-84. Looking to promote the ROCAF outside of Taiwan, Tsang helped organize the very first Thunder Tiger Aerobatics Team. He hand-selected the most skilled pilots in the 1<sup>st</sup> FG to tour the United States, and through the use of good public relations, the tour won respect and support for the ROCAF stateside. This publicity eventually led to the transfer of newer and more advanced jet fighters to Taiwan.<sup>41</sup>

The first and only confirmed victory by a ROCAF F-84 Thunderjet during the type's relatively short front-line service life was scored by Ouyang Yifen on July 21, 1956 against a PLAAF MiG-15.<sup>42</sup> Although the F-84G was phased out following the arrival of new North American F-86F Sabres in December of 1954, the RF-84F Thunderflash, a reconnaissance variant of the Thunderjet, soldiered on until 1959, when it too was replaced by the McDonnell RF-101A Voodoo.<sup>43</sup>

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<sup>40</sup> Cheung, *Aces of the Republic of China Air Force*, 86.

<sup>41</sup> Cheung, *Aces of the Republic of China Air Force*, 86.

<sup>42</sup> Chenghu, "An Interview with Air Force Pilot Pan Cheng-Hu," 185.

<sup>43</sup> Ronald Easley, "Taiwan and the RF-101A Voodoo," *The Fighter Writer*, February 2, 2016,

Ultimately, the F-84 might have been short-lived in the ROCAF, but its years of service mark a shift in the narrative, from a motley crew of well-trained pilots and ground crews making do with inferior equipment, to a world-class fighting force flying modern aircraft, all the while catching the attention of the Western world. The ROCAF was no longer the underdog with the inferior equipment, but rather the new challenger in the boxing ring, eager for a good fight.

The cocky pilot who impressed Chief of Staff Zhou Zhirou with T-33 aerobatics during the ROCAF's F-84 reception ceremony, Leng Peishu scored his first confirmed victory during World War Two on July 11, 1944. Assigned to the 29<sup>th</sup> Fighter Squadron of the 5<sup>th</sup> Fighter Group flying a P-40N Warhawk on a mission escorting four-engine B-24 Liberator bombers on a raid over Sinshih, Leng intercepted a pair of Japanese Ki-43-II *Hayabusa* fighters from the 48<sup>th</sup> Sentai. He shot down one of the Ki-43s, beginning an impressive career in the ranks of the ROCAF.<sup>44</sup>

Although he dutifully served through the remainder of the war, and eventually as the deputy commander of the 5<sup>th</sup> Fighter Group when they made their conversion to the North American F-86F Sabre in January, 1955, Leng's greatest contribution to the ROCAF was perhaps his translation of *No Guts, No Glory*, an air combat manual written by United States Air Force Major Fred Blesse following the Korean War.

In 1955, Major Blesse toured Asia with other veteran Korean War pilots to promote *No Guts, No Glory*, lecturing budding air forces on fighter tactics. One of the 12 squadrons Blesse visited was the 5<sup>th</sup> Fighter Group at Taoyuan Air Force Base. Leng himself led two of his best pilots against Blesse in mock combat. Blesse was impressed by the Taiwanese pilots, citing that

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<http://fighterwriter101.blogspot.com/2016/02/taiwan-and-rf-101a-voodoo.html> (accessed March 1, 2019).

<sup>44</sup> Cheung, *Aces of the Republic of China Air Force*, 87.

“In general, except from one squadron in Itazuke, Japan, the Chinese squadron on Taiwan, and one squadron in Korea, the units were unprepared for air-to-air combat.”<sup>45</sup>

Asking to borrow a copy of *No Guts, No Glory* one night, Leng quickly set to work with three of his best English-speakers to painstakingly translate the book to Chinese. They spent all night on this undertaking, and Leng’s translation of the book eventually became widely distributed among ROCAF pilots, who absorbed every word and took the combat experience of Blesse and the USAF to heart. It certainly gave them boosts of confidence, as Blesse chronicled how he and his fellow pilots flew and fought in the F-86 against North Korean and PLAAF MiG-15s - the same type of enemy aircraft that the ROCAF would encounter.<sup>46</sup>

As the F-86’s performance was better than that of the T-33, ROCAF pilots enjoyed flying them. Their short noses and backswept wings endowed the pilots much better visibility in addition to an improved flight control system that was hydro-mechanical, with horizontal tails that moved in sync with the elevators, known as a “flying tail.” The “flying tail” made F-86s more maneuverable than P-51s. USAF pilots who took part in the Korean War flying F-86s agreed that these improved control surfaces were one of the reasons they could defeat the MiGs-15.<sup>47</sup>

The F-86 Sabre had a host of advantages over the older F-84, and even the Russian-built MiG-15s. In addition to good visibility and a flying tail, the aircraft also came equipped with a radar gunsight, which allowed pilots to pull off more accurate shots in air-to-air combat.

The F-86’s gunsight provided the pilot with information on distance from their target. As long as the pilot could aim the ring sight at the target, the aircraft’s radar could to provide them with the enemy plane’s speed and bearing angle, and the lead could be automatically calculated

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<sup>45</sup> Cheung, *Aces of the Republic of China Air Force*, 89.

<sup>46</sup> Cheung, *Aces of the Republic of China Air Force*, 89.

<sup>47</sup> Hua, “An Interview with General Hua Hsi-Jun,” 153.

by the gunsight. As long as the pilots could aim the sight ring steadily at their targets, their rounds would make their mark.<sup>48</sup>

1958 was an eventful year for both PLAAF and ROCAF pilots. Clashes between ROC and PLA artillery batteries in August that culminated on the 23<sup>rd</sup>, known today in China and Taiwan as the “823 Artillery War”, prompted several encounters between ROCAF Sabres and PLAAF MiGs. On August 14, PLAAF aircraft penetrated the airspace over Matsu, off the Fujian coast of Taiwan, and were quickly intercepted - then shot down - by ROCAF F-86s. On August 20 and 22, PLAAF aircraft again attempted to penetrate Matsu. They paid the price: many were shot down. Hua attributes the success of ROCAF pilots during these dogfights to Leng’s translation of *No Guts, No Glory*: “The book boosted the morale of the pilots [so much that] many of us became eager to fight against MiGs.”<sup>49</sup>

Luckily for Hua and other F-86 pilots, the ROCAF received its first batch of AIM-9 Sidewinder heat-seeking missiles in July of 1958. These missiles honed in on heat signatures from the exhausts of their targets, and so could not discriminate against friendly or enemy aircraft. Thus, the ROCAF deployed them very carefully - the Sidewinders finally saw combat in September of 1958.

The combat debut of the AIM-9 is one of the few post-war ROCAF stories that Raymond Cheung discusses in detail. He describes the events of September 24, 1958 from the perspective of Leng Peishu, who was in fact, flying an F-86 in combat on that day:

During the 1958 Taiwan Strait Crisis the 11<sup>th</sup> Fighter Group made the first ever use of guided missiles in air-to-air combat on 24 September. Before the mission in question, Leng was asked if he would like to be one of the four AIM-9

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<sup>48</sup> Hua, “An Interview with General Hua Hsi-Jun,” 154.

<sup>49</sup> Hua, “An Interview with General Hua Hsi-Jun,” 156.

Sidewinder “shooters.” He declined. Instead, as the overall commander of the mission, he would lead a flight to cover the missile-carrying Sabres. The operation proved to be a complete success. When a flight of contrail-pulling Sabres at high altitude drew out the enemy fighters, four Sidewinder-armed Sabres waiting below them were able to get clear shots on two flights of PLANAF (People’s Liberation Army Navy Air Force) MiG-15bis. The Sidewinder shooters claimed four jets shot down. The PLA admitted to losing two MiGs and one pilot, with a second pilot surviving ejection. A third MiG was damaged but managed to return to base. Whilst all this was taking place, two ROCAF RF-84Fs slipped in and out of Chinese airspace at low altitude, completing their missions without being intercepted.<sup>50</sup>

The introduction of the Sidewinder-equipped F-86 Sabre marked a first in ROCAF history: the first instance where the ROCAF possessed a weapon far superior to those of its enemies. Coupled with advanced tactics taught to ROCAF pilots from Korean War veterans with invaluable experiences in jet combat, the ROCAF could simply sweep the skies of PLAAF MiGs, as it proved so during the 1958 Strait Crisis.

Lieutenant General Pan Chenghu, a veteran of both WWII and the Chinese Civil War, recalls the 1958 air battles very vividly, having served as Head of the Air Force Division at the Combined Operations Center during the “823 Artillery War.” “During the 12 air battles [that occurred] from August 14 to October 10,” he writes, “the ROCAF shot down 32 Communist aircraft while losing only one from our side.”<sup>51</sup> This kill total, greatly helped with the

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<sup>50</sup> Cheung, *Aces of the Republic of China Air Force*, 90.

<sup>51</sup> Pan, “An Interview with Air Force Pilot Pan Cheng-Hu,” 188.

introduction of advanced fighter tactics thanks to Leng Pei-Shu's translation of Blesse's *No Guts, No Glory* (and subsequent distribution of the book), as well as the introduction of the Sidewinder missile to combat squadrons, is the basis of the 31:1 kill ratio often cited by historians for the ROCAF's F-86 Sabres. In comparison, the United States Air Force's F-86s enjoyed an already respectable 8:1 kill ratio over North Korean and PLAAF MiGs during the Korean War.

The September 24 dogfight was a moment of pride for the ROCAF, and it shows through every volume of history written that touches on the time period. Though the rest of his book revolves around the Second World War, Raymond Cheung goes in-depth through the lens of Leng Pei-Shu in describing the dogfight. Pan and Hua also vividly describe the day's events from the perspective of the ROCAF, and all three accounts seem to point towards the same thing conclusion: September, 1958, when the world's eyes were turned on them, when it mattered the most, the ROCAF performed admirably and secured their place in history.

Following the "823 Artillery War," and the loss of two F-84Gs to PLAAF MiG-17s on July 29, 1958, MAAG decided that the ROCAF's F-84s were inadequate against the PLAAF's MiG-17s. While the Thunderjets could hold their own - even at a disadvantage - against the earlier MiG-15s, the MiG-17s were faster and had a higher rate of climb. Under these circumstances, the Pentagon ceded to the demands of MAAG and ordered six twin-seat F-100F Super Sabre to be delivered to the ROCAF in October, 1958.

The first supersonic fighter in ROCAF service, the North American F-100 Super Sabre could break the sound barrier in level flight. With a wing swept back at a steeper angle than that of the F-86, and a powerful Pratt and Whitney J-57 turbojet fitted with an afterburner that produced up to 16,000 pounds of thrust, the Super Sabre could climb to 50,000 feet in less than two minutes and had a maximum speed of 864 mph.

Needless to say, ROCAF pilots were stunned at the performance of their new fighters when they began instruction in the twin-seat F-100Fs in 1959. Neither the F-84 or F-86 had afterburning engines, and needless to say, the improvement in acceleration was noticeable during the transition from the Thunderjet and Sabre to the Super Sabre. After a hand-picked selection of nine pilots received instructor training in the twin-seat F-100F variant, the six twin-seat fighters were returned to the United States. Lieutenant Colonel Chen Yan-Ling, one of the initial instructor pilots, felt that had the ROCAF operated the Super Sabre a year earlier, their combat records against the PLAAF that September would have been even more lopsided.

In total, the ROCAF received 119 F-100As and 14 F-100Fs. The F-100As were later retrofitted to the standard of F-100Ds, modified with AN/APS-54 rear warning radars in their vertical tails and given the ability to carry the AIM-9 Sidewinder missile. F-100s equipped ROCAF squadrons until the late 1970s.<sup>52</sup>

The transition from propeller-driven piston-engined fighters to jets in the 1950s marked a radical shift in ROCAF history. More than a decade after the end of the second World War, the ROCAF finally found itself equipped with the latest state-of-the-art weapons and equipment in the form of supersonic fighter jets with air-to-air missiles.

Every sonnet has a volta—a shift in thought, a change of pace—and the 1950s were a volta for the ROCAF. In less than a decade, ROCAF pilots, beginning the 1950s flying Republic P-47 Thunderbolts, found their way into jet-powered F-84 Thunderjets in 1953, then swept-winged F-86 Sabres by 1955. By the time the supersonic F-100 Super Sabre became the mainstay of the ROCAF in 1959, the ROC's fighter pilots proved to not only their PRC counterparts, but the world, that they could defeat their opponents in no-holds-barred aerial combat, and that they

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<sup>52</sup> Wang Lizheng (王立楨), *The Time Has Come to Look Back: General Chen Shen-Ling's Lifetime Review* (回首來時路: 陳桑齡將軍一生戎馬回顧) (Taipei: 上優文化, 2009), 265.

were as ready as any other first-rate air force to make use of the most sophisticated weapons and aircraft available.

#### **Part Four: Starfighters of Alishan**

*Following the end of the MAAG program, the ROCAF was desperate to expand the service life of the F-104 and F-5 fighters in their inventory. They resorted to buying surplus F-104 airframes from Japan, Canada, and other Starfighter operators, and obtained permission from the US government and Northrop to build the F-5E under license at AIDC. This began a relationship between the United States defense industry and the ROCAF.*

The first Mach 2 capable supersonic fighter adopted by the ROCAF, the F-104 Starfighter heralded yet another period in the air force's history. Designed by legendary Lockheed engineer Clarence "Kelly" Johnson using feedback from fighter pilots from the Korean War, the Starfighter was a true point-defense interceptor, capable of blistering speeds and incredible altitudes.

The ROCAF's first exposure to the F-104 took place during the "823 Artillery War" in August, 1958. Upon realizing the disparity of airpower between the ROC's F-84s and F-86s with the PRC's MiG-17s - and possibly brand-new Russian-supplied MiG-19s, the USAF loaded 12 F-104As from the 83rd Fighter Interceptor Squadron on C-124 transport aircraft in Hamilton Field, CA. They arrived at Taoyuan Air Force Base, just outside of Taipei on September 10. As hostilities around Jinmen (Quemoy) simmered down, culminating with a ceasefire agreed upon on October 6, the USAF Starfighters never engaged in air-to-air combat with any Chinese MiGs. ROCAF pilots, however, looked on in awe at the rocket-shaped F-104s. At the time the newest air superiority fighter in the United States' arsenal, the F-104 was still shrouded in mystery to the

ROCAF's fighter pilots - for they knew that it was capable of flying at double the speeds of their F-86s, and that was enough to inspire some jealousy.<sup>53</sup>

Fortunately, MAAG authorized the release of F-104s to the ROCAF, and Project *Alishan*, the codename for the ROCAF's long-term goal to procure Starfighters formally began in 1960. The first F-104As, like the 1958 USAF deployment, arrived at Taoyuan via USAF C-124s on May 26, 1960. The first Starfighter variant operated by the ROCAF, the F-104A was also the lightest: it was a barebones interceptor, equipped with a single 20mm "Vulcan" rotary cannon, fire control system for Sidewinder missiles, and rudimentary radar system. "A" variants relied on ground-based radar centralized at ROCAF air defense command centers to be guided to targets. Because of their rudimentary radar systems, the F-104A could not be flown at night and was utilized solely as a daytime fighter.

However, the simplicity of the "A" variant and the resulting light weight from a lack of sophisticated equipment gave it near mythical climb performance - these Starfighters, climbing at a 45 degree angle, could reach altitudes of 30,000 feet in as little as 90 seconds, compared to the ten full minutes that it took F-86s to reach the same height.<sup>54</sup>

The most unique F-104As among those received by the ROCAF arrived with the 6th batch of the *Alishan* Project (*Alishan Six*). These F-104As came equipped with a modified version of the J79 engine, designated J-79-GE-19, with a total thrust of 17,900 pounds. These engines increased the thrust of the F-104 by 1,900 pounds, reducing the time required to reach Mach 2 from four minutes to two. Moreover, in a "clean" configuration, without any external weapons or fuel tanks, and with a minimal fuel load of 3,000 pounds, the F-104A-19 (as these special

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<sup>53</sup> Clarence Fu, *Service History of the ROCAF F-104* (Taipei: Privately Published, 2000).

<sup>54</sup> Peter A. Davies, *F-104 Starfighter Units in Combat* (Oxford: Osprey Publishing, 2014), 14.

Starfighters were designated by the USAF) had a thrust-to-weight ratio close to one, making them the highest performing of the Starfighter variants.<sup>55</sup>

These F-104A-19s were the only other aircraft in ROCAF history, apart from the Lockheed U-2 spy plane, capable of reaching the edge of the atmosphere. In the 1970s, a series of Sino-US joint exercises took advantage of these F-104A-19s. In order to train their reconnaissance crews to grow accustomed to evading interception, the USAF sent RB-57 high-altitude reconnaissance aircraft from Kadena Air Base, southwards through the Taiwan Strait. Rising to meet them at around 60,000 feet were ROCAF F-104A-19s, simulating potential Soviet interceptors.<sup>56</sup>

In order to fly to at extreme high altitudes, A-19 pilots wore high-altitude pressure suits similar to those worn by U-2 pilots and astronauts, and also had to consume pure oxygen for up to a half hour before flying, while allowing their bodies to discharge nitrogen gases. The aircraft were then towed directly to their runway in order to save fuel otherwise consumed by taxiing from their hangars. Immediately after takeoff, the pilots began climbing. Once over seventy thousand feet, the Starfighters decelerated, reaching the limits of their service ceiling, while their pilots experienced states of weightlessness, floating from their ejection seats. ROCAF pilots reported seeing satellites orbiting the earth above them - mere white lights flashing across the sky.

September 1958 would not mark the last aerial victories scored by ROCAF jets against PLAAF MiGs. January 13th, 1967, four F-104Gs encountered a flight of eight PLAAF J-6/MiG-19s over Jinmen. The ensuing melee resulted in the shootdown of two PLAAF fighters - Major Hu Shiling and Captain Shi Beipo claimed a victory, but one Starfighter and its pilot did not return from the fight.

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<sup>55</sup> Fu, *Service History of the ROCAF F-104*, 22.

<sup>56</sup> Yiqiao Li, *F-104* (Taipei: Privately Published, 2007).

In March of 1967, the PLAAF started fielding their domestically-produced versions of the Russian MiG-21, the Chengdu J-7. For the first time, ROCAF F-104s faced a potential opponent capable of matching their speed. In 1968, following a decade of ceding to the ROC's air supremacy, the PLAAF began probing the Taiwan Strait, threatening to cross the centerline into the ROC's domain. The ROCAF Combat Command issued an order to the 3rd Tactical Fighter Group out of Ching Chuan Kang Air Force Base to display a show of force using their F-104A-19s. In the lead plane was Xie Chongke (謝崇科), with Xiao Runzhong (蕭潤宗) as his wingman. The element leader of this flight was Jin Zhengyue (金正岳), with Shi Beibo (石貝波) in the trailing Starfighter. The four pilots changed into their high-altitude pressure suits, inhaled pure oxygen, and boarded their Starfighters, streaking into PRC airspace. The four-plane formation rushed to 90,000 feet, taunting the PLAAF's J-7s, which had absolute service ceilings of 70,000 feet. This formation maneuver displayed to the PRC the excellent airmanship of ROCAF pilots, and the J-7s ceased their probing operations.<sup>57</sup>

The most important variant of F-104 in ROCAF service was the F-104G, of which they received. The "G" variant introduced new avionics and mechanical structures, the most prominent of which was the switch from simple fire control system to a North American Search and Ranging Radar (NASARR) system, featuring two modes of operation: air-to-air and air-to-ground. In air-to-air mode, the NASARR acts as a search radar, capable of both tracking, locking onto air targets, and launch missiles at them. Furthermore, the F-104G also featured a new infrared optical scanner developed by Lockheed positioned in front of the windshield, which provided limited night vision capabilities. When switched to the air-to-ground mode, the

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<sup>57</sup> Li, *F-104*, 1.

NASAAR provided information necessary for dive bombing, distance calibration for low altitude bombing, and state-of-the-art terrain contour rendering functions.<sup>58</sup>

The NASAAR was also coupled with an automatic inertial navigation system that provided a continuous display of the azimuth and distance to a target, giving the F-104G a Tactical Air Navigation System (TACAN), making all-weather flight possible. This Litton LN-3 inertial navigation system was cutting-edge technology for its day, and the F-104 was the first aircraft equipped with it. The ROCAF exploited the all-weather ultra-low-altitude flight capabilities of their F-104G fleet extensively, specifically in the case of their RF-104G tactical reconnaissance aircraft.

The ROCAF first deployed the RF-104G in 1965. The reconnaissance Starfighters, flying low to the ground to avoid detection from the PRC, essentially had free reign over the mainland. Able to slip in undetected, these RF-104Gs were so successful eluding the PLAAF that the ROCAF reportedly started using them rather arrogantly: on multiple occasions, when a pilot returned from a morning sortie with photos that were unsatisfactory, they would simply take off again later that afternoon to photograph the same target with better clarity. In spite of the incredible operation tempo and sortie rate of the RF-104Gs, none have ever been shot down. PLAAF and PLA veterans recall helplessly tracking the Starfighters, but not having the ability to counter them.<sup>59</sup>

Modifying an F-104G into an RF-104G was not at all a difficult task. Essentially, the aircraft's Vulcan cannon was simply replaced with an array of three Maurer KS-67A aerial reconnaissance cameras. The KS-67A camera featured four different focal lengths: 38mm, 76.2mm, 152.4mm, and 304.8mm. With the exception of the Netherlands Air Force (who opted

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<sup>58</sup> Li, *F-104*, 2.

<sup>59</sup> Li, *F-104*, 2.

for a bolt-on photo reconnaissance pod that contained camera externally), most RF-104 operators, including the German *Luftwaffe*, utilized the three-camera array system.

In 1974, the ROCAF upgraded their RF-104Gs, replacing the existing KS-67As with a system referred to as the KS-125. Comprised of two high altitude cameras, the KA-94 and KA-97, the KS-125 could switch between the two depending on the task required. The KS-125 upgrade is unique to the ROCAF's RF-104G fleet: most reconnaissance Starfighters stuck to the older system that consisted of three KS-67As in the gun bay (the Netherlands Air Force's RF-104Gs are another exception, as they use a unique "plug-and-play" photo reconnaissance pod carried externally). According to the USAF's records, the ROCAF received only eight RF-104Gs, all of which were delivered with *Alishan Three*. However, not only were a large number of aircraft simply converted from F-104Gs, after some time, many RF-104Gs were re-configured back to their original fighter specification. The exact number of F-104Gs modified into RF-104Gs over the type's entire service life still ultimately remains unknown.<sup>60</sup>

Because the F-104Gs had a higher takeoff weight than the earlier F-104A thanks to the added systems that expanded their combat capabilities, they had larger main landing gears to support not only the weight, but also the aircraft's higher landing speeds. However, the cost of maintaining the new landing gear complicated things. According to Lockheed and the USAF, the F-104G's tires had to be replaced every six flights due to wear. To make matters worse, not only did the ROCAF desperately needed to replace the tires on their Starfighters, they couldn't afford to budget . Eventually, after careful calculations, comparisons with the original Technical Orders supplied by Lockheed, and endless brainstorming, the ROCAF finally found a solution.

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<sup>60</sup> Li, *F-104*, 1.

By carefully reducing the aircraft's landing speed and angle of attack by lowering the aircraft's nose while touching down on the runway as gently as possible, ROCAF pilots successfully reduced the stress cycles on the tires of their F-104s, extending their usage from a mere six flights to a total of eleven flights before needing to be replaced.

Interestingly, one of the most groundbreaking evolutions made during the F-104's service life took place within the last decade of its service life. Due to the improvements in the PRC's air defences, the RF-104Gs became compromised, and a gap needed to be filled quickly in order to provide adequate aerial reconnaissance of the PRC, currently in the process of modernizing its armed forces.

In 1984, the ROCAF purchased a pair of Litton PC-201 Long Range Oblique Photography (LOROP) cameras for 500 billion NTD (\$16,237,456 USD at the time), each with a focal length of 1,828mm. Essentially cameras of the same caliber as those found on American spy satellites, the PC-201s were much larger than the cameras previously used on RF-104s. This required equipping RF-104Gs with new elongated radomes to accommodate the larger cameras, resulting in the LOROP-equipped "Stargazers" being nicknamed "Pinocchio." This process of modifying RF-104Gs to accept the elongated LOROP radome became designated as Project *Shi'an* (始安). *Shi'an* RF-104Gs were modified in order to accept the LOROP noses, which were stored in climate-controlled rooms, as the camera equipment was extremely sensitive to moisture.<sup>61</sup>

When it came time to sortie for a mission, service trucks brought the elongated LOROP noses from their climate-controlled storage to waiting radome-less RF-104Gs on the tarmac. On a good day with ideal weather conditions, these cameras could take photographs at ranges

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<sup>61</sup> Li, *F-104*, 2.

exceeding 55 nautical miles at an altitude of 30,000 feet - in fact, when they tested the system, pilots flying *Shi'an* RF-104Gs remarked that they could make out individual tennis balls on the tennis courts at Taipei's Grand Hotel, all the way from the coast off Keelung. As improvement in PLA air defences made it unsafe to penetrate PRC airspace, *Shi'an* RF-104Gs flew along the Chinese coastline, and using the continuous shooting function of the LOROP camera, captured high-resolution photographs of Communist Chinese military installations.

As the ROCAF operated the F-104 into the 1980s, they scoured the market for airframes to maintain their fleet. As the United States Air Force had already phased out their Starfighters, the ROCAF had to look elsewhere, shopping around on the surplus market for used airframes. In total, they received 38 F-104Gs and 27 TF-104Gs from the German Luftwaffe, 15 F-104Gs and three TF-104Gs from Denmark, and 22 F-104Js with five F-104DJs from Japan. As many of them were also past their airframe lifespans, some of the F-104s produced under license in Japan couldn't be made flyable and were instead scrapped for parts. Following a series of accidents due to aging airframes (including structural deterioration culminating in the disintegration of several F-104s in mid-air), the ROCAF gradually decommissioned their Starfighter fleet, anticipating its replacement with new indigenous AIDC F-CK-1 "Ching-Kuo" fighters in the early 1990s.<sup>62</sup>

Most NATO air forces operated the F-104 for around 20 years, with the Japanese Air Self-Defense Force keeping the type in service for 24 years. The ROCAF on the other hand, kept their Starfighters in service for a total of 38 years, almost double the worldwide average. A successful interceptor, air superiority fighter, and reconnaissance platform, the F-104 Starfighter served dutifully in the ROCAF for 38 years. Over this period, ROCAF Starfighters successfully kept the PLAAF at bay: from 1960 to 1998, PRC fighters never dared to cross the centerline of

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<sup>62</sup> Li, *F-104*, 2.

the Taiwan Strait, and not once did air-raid sirens sound in any of Taiwan's cities. The last operational ROCAF F-104 squadron, the 12th Tactical Reconnaissance Squadron of the 5th Tactical Fighter Wing based in Ching Chuan Kang Air Force Base in Tainan, finally retired their RF-104Gs in 1998, making the transition from their "Stargazers" to the RF-5E "Tigereye."

### **Part Five: Zhongzheng, Ziqiang, Jingguo**

*As the ROCAF's F-104 fleet reached the end of its service life, it became apparent that they needed a replacement for this venerable interceptor. As efforts to procure new fighters from the United States deteriorated, the ROC pursued its own indigenous defense fighter to equip its fighter squadrons. The F-CK-1, named for president Jiang Jingguo, and its success prompted the United States to give in and sell the ROCAF more advanced F-16s.*

Not long after ROCAF began Project *Alishan*, they received 115 Northrop F-5A/B Freedom Fighters through the US MAP (Military Assistance Program) in the late 1960s. Around half of these F-5s were diverted to the South Vietnamese Air Force at the height of the Vietnam War, and the rest relegated to reserve units, as the F-104 by then made up the bulk of the ROCAF's fighter force. In total, by 1971, the ROCAF fielded up to 72 F-5As and 11 F-5Bs.

The Northrop F-5A/B Freedom Fighter, conceived as a "lightweight fighter," boasted low operational costs and ease of maintenance over larger, heavier, and more complicated warplanes, making it a prime candidate for exporting to smaller air forces. On February 9, 1973,<sup>63</sup> agreements between the ROC and US governments paved the way for the co-production of 100 F-5E Tiger IIs, updated versions of the Freedom Fighter. This co-production program,

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<sup>63</sup> Wei-Bin Chang, "Northrop F-5E/F Tiger II," *Taiwan Air Power*, April 13, 2008, [www.taiwanairpower.org/af/f5.html](http://www.taiwanairpower.org/af/f5.html) (accessed March 1, 2019).

nicknamed *Hu'an* (Peace Tiger), comprised of both Northrop and the then-state-run Aerospace Industrial Development Corporation (AIDC) in Taiwan.

The first AIDC-built F-5E rolled out from factory doors on October 30, 1974, a day before the 88th birthday of late president Chiang Kai-Shek. As a result, the aircraft was christened *Zhongzheng*, the most widely-used alias of the Generalissimo. The initial production of Project *Hu'an* consisted of 100 F-5Es, a substantial number of fighters, while *Hu'an* batches two through six produced 208 more aircraft in both F-5E and twin-seat F-5F configurations. The final *Hu'an* Tiger II rolled off the AIDC production line on December 9, 1986. In total, the ROCAF fielded 242 F-5Es and 66 F-5Fs. *Hu'an* batch six, stands apart from the the rest as it is the only batch of aircraft throughout the project approved after the Carter administration's establishment of formal relations with the PRC in 1979.<sup>64</sup>

Compared to the fast-climbing high-performance F-104 Starfighter, the F-5E was much slower and lacking high-altitude capabilities. This relegated the aircraft to being used in more conventional fighter and fighter-bomber roles instead of being specifically tasked with interception duties. However, the Tiger II was a highly capable aircraft in its own regard, featuring more expansive air-to-ground capabilities than the F-104, especially following a mid 1980s upgrade to the aircraft that added Litton ALR-46(V) 3 RWRs, Northrop AVQ-27 laser designators and Tracor ALE-40(V)7 chaff/flare dispensers. The F-5Es also acquired the capability to carry AGM-65 Maverick air-to-ground missiles and Paveway II laser-guided bombs, weapons that the F-104G had no provisions to carry.<sup>65</sup>

Unlike the F-104, ROCAF F-5Es have never officially seen combat in ROC service. In 1979, the US and Saudi Arabia became involved in a skirmish between Northern and Southern

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<sup>64</sup> Chang, "Northrop F-5E/F Tiger II."

<sup>65</sup> Jerry Scutts, *Northrop F-5/F-20* (Worthing, UK: Littlehampton Book Services, 1986), 15.

Yemen. In order to pilot and maintain the 12 F-5Es the US sent to Northern Yemen as part of an aid package, the United States sent approximately 80 ROCAF personnel to the Arab nation, and ROC pilots reportedly scored air-to-air victories in the weeks that followed.<sup>66</sup>

Long before their F-104s began disintegrating around them, ranking generals and staff members of the ROCAF knew that their Starfighters needed to be replaced, not only from airframe deterioration, but advancements made in the PRC's own fighter development in the meantime. The ROCAF sought an aircraft capable of launching the AIM-7 Sparrow medium-range air-to-air missile. In the mid 1970s, Northrop began developing the F-20 Tigershark as a private venture with the intention of marketing it towards the ROCAF and other F-5 operators. The Tigershark, essentially an updated Tiger II featuring a far superior General Electric AN/APG-67 radar that enhanced the aircraft's beyond-visual-range (BVR) capabilities, and new engine (a General Electric F404-GE-100 generating 17,000 lbf) that allowed the aircraft to reach Mach 2.<sup>67</sup>

In 1982, the Reagan administration denied the ROC's request to purchase both the General Dynamics F-16 Fighting Falcon and the F-20 Tigershark, as a result of the United States' newfound relationship with China, and as a measure banning the export of aircraft capable of firing the AIM-7 missile. The final nail in the coffin came on August 17, 1982, with the signing of the third joint US-PRC Communique, which promised to gradually reduce arms sales to Taiwan. However, in order to assure Taiwan's security, the Reagan administration authorized a \$240 million license production of 60 F-5E/Fs that finally materialized as *Hu'an* batch six.<sup>68</sup>

In spite of the then-ongoing production and delivery of the final F-5Es and determined to replace both the ROCAF's F-104s and Tiger IIs, AIDC began work on the Indigenous Defense

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<sup>66</sup> Chang, "Northrop F-5E/F Tiger II."

<sup>67</sup> Scutts, *Northrop F-5/F-20*, 88.

<sup>68</sup> Chang, "Northrop F-5E/F Tiger II."

Fighter project on August 28, 1980, following the termination of the Sino-American Mutual Defense Treaty on January 1, 1980. After the third joint US-PRC communique of 1982 that all but doomed the ROCAF's plan to purchase Northrop's F-20, AIDC knew that the future of the ROC's air defense rode on their success.<sup>69</sup>

Luckily, AIDC was no stranger to developing and building military aircraft; their modification of an American T-28 Trojan into the T-CH-1 trainer with the addition of a turboprop engine first flew in 1973, and their most impressive undertaking so far, the AT-3 *Ziqiang* (Self Reliance) trainer, which replaced the venerable T-33 Shooting Star, made its first flight on September 16, 1980. A relatively conventional training aircraft similar in layout to other advanced jet trainers in its class, the AT-3 featured a pair of turbofan engines mounted on either side of its fuselage, a tandem-seat cockpit (for a student pilot and instructor), and a straight wing.

The AT-3s were introduced to the ROC Air Force Academy in 1984, finally phasing out the T-33 Shooting Stars that served to train pilots who flew in every jet fighter thus far throughout ROCAF history, from the F-84 Thunderjet, to the F-104 Starfighter. Additionally, AIDC designed the AT-3 with a secondary light-attack role: the aircraft came equipped with five external pylons, allowing it to carry a complement of bombs, rockets, and even missiles on a pair of wingtip launcher rails. As a testament to their success, AIDC raised a few eyebrows overseas as word of the AT-3 spread: *Aviation Week and Space Technology*, a US-based periodical, featured the AT-3 on the front cover of its June 2, 1986 issue.<sup>70</sup>

However, developing an advanced trainer was worlds apart from a cooking up a front-line fighter. In order to produce a world-class fighter capable of competing with the latest

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<sup>69</sup> Stephen P. Gilbert and William M. Carpenter, *America and Island China: A Documentary History* (Lanham: University Press of America, 1989), 238.

<sup>70</sup> "Taiwanese Trainers Climb in Formation," *Aviation Week and Space Technology*, June 2, 1986, p. 73.

Russian-derived designs from the PRC, AIDC needed expertise from engineers with experience in designing combat aircraft. Thus began the Indigenous Defense Fighter (IDF) program.

The IDF was to be equipped with a pair of turbofan engines producing 8,350 pounds of thrust each - with an afterburner, the fighter was to reach speeds of up to Mach 1.2. In terms of systems and avionics, the IDF needed state of the art fly-by-wire flight controls, a head-up display (HUD), and modern electronic displays for in-flight information in place of dated analog gauges and meters. As technical advice was not restricted under the joint US-PRC communiqués, AIDC contracted a number of US aerospace firms for consultation, namely with aerodynamics, static structural testing, and wind tunnel use. There was no official US government assistance or involvement within the IDF program.<sup>71</sup>

As the IDF program began, it took on a new name: the overarching project as a whole became known as *An Xiang* (Safe Flight). Different aspects of the program were also named: the airframe development project was *Yin Yang* (Soaring Eagle), the engine development project *Yun Han* (Cloud Man), the avionics *Tian Lei* (Sky Thunder), and the air-to-air missiles, *Tian Jian* (Sky Sword). Perhaps most interestingly, the core of the *Tian Lei* project was the GD-53 Golden Dragon radar, development of the Northrop F-20's highly capable General Electric AN/APG-67 radar. Ultimately, although the ROCAF could not purchase the F-20 for themselves due to US sanctions, elements of the F-20, including its radar and avionics, eventually found their way onto Taiwanese aircraft.<sup>72</sup>

*Tian Jian* was another important, yet controversial project that stemmed from the IDF program. While *Tian Jian 1*<sup>73</sup> was a short-ranged infrared air-to-air missile similar to the AIM-9 Sidewinder long in service with the ROCAF, *Tian Jian 2* was a medium-ranged radar-guided air-

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<sup>71</sup> Gilbert and Carpenter, *America and Island China*, 43.

<sup>72</sup> Scutts, *Northrop F-5/F-20*, 89.

<sup>73</sup> Called TC-1, for *Tien Chien*; the ROC's *Tongyong Pinyin* romanizes "J" sounds in Mandarin with "Ch."

to-air missile of the same class as the American AIM-120 Advanced Medium-Range-Air-to-Air-Missile (AMRAAM).<sup>74</sup>

Compared to the AIM-7 “Sparrow” missile that the US prevented the ROC from obtaining, the *Tian Jian 2* was lighter, and faster, and also came equipped with its own active radar, giving it “fire and forget” capabilities. This allowed pilots to fire a TC-2 at an enemy aircraft and instantly switch targets - perhaps firing a second TC-2 or engaging in closer-range dogfights. “Fire and forget” capabilities were a huge improvement over the AIM-7, which had a semi-active radar that required pilots to point their aircraft’s nose towards a target throughout the missile’s entire flight time, using the fighter’s on-board radar to help guide a “Sparrow” to its target.<sup>75</sup>

The IDF made its first flight on May 28, 1989, following almost a decade of development. Three years later, in 1992, an IDF would successfully launch a TC-2 missile, proving not only the effectiveness of the advanced missile, but that if push came to shove, the ROC could find ways to work around the joint US-PRC communiques that were long-believed to dictate its military industry.<sup>76</sup>

However, by 1991, following the collapse of the Soviet Union, the US-PRC dynamic shifted, as the US no longer relied on China as part of their anti-Soviet counter-balancing act in the East. In fact, the US assumed that the PRC might take the opportunity to fill a vacuum of power left by the Soviet collapse, and quickly moved to bolster the defenses of Japan, South Korea, and the ROC in an effort to potentially contain the PRC. As US president George H.W. Bush announced his decision to offer 150 General Dynamics F-16A/B Block 15s to the ROCAF

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<sup>74</sup> Jon Lake, “AIDC Ching-Kuo: The Indigenous Defence Fighter,” *World Air Power Journal*, Volume 26 (Autumn 1996), 21.

<sup>75</sup> Lake, “AIDC Ching-Kuo: The Indigenous Defence Fighter,” 41.

<sup>76</sup> Lake, “AIDC Ching-Kuo: The Indigenous Defence Fighter,” 37.

for \$6 billion USD, the future of the IDF came under fire. Furthermore, the ROCAF also gained approval to purchase 60 Dassault Mirage 2000-5 fighters from France in 1992, along with 480 Magic short-range air-to-air-missiles, 960 MICA medium-range air-to-air-missiles, and support equipment totaling \$4.9 billion USD. The combined purchases of these aircraft whittled down the initial order for IDFs from 256 to 130, and AIDC now found itself with a dwindling market.<sup>77</sup>

Unwilling to back down, their solution was to attack the F-16A Block 15s. As their final subvariant of the F-16A/B, the Block 15s lacked strong air-to-ground capabilities, unlike the IDF, which could carry every variant of the AGM-65 “Maverick” air-to-ground missile left over from the ROCAF’s fleet of F-5Es. Moreover, the IDF came equipped with all-weather capabilities, which AIDC proved with a demonstration featuring an IDF popping out from a valley in the dark, destroying a tank with a “Maverick”, and impressing the ROCAF brass. Finally, the ROCAF began to reconsider their decision to buy F-16s.<sup>78</sup>

Desperately needing this sale to go through to create more jobs and secure much-needed votes, President Bush pushed to make the proposed sale more lucrative to the ROCAF. General Dynamics’ solution, much to the surprise to the ROCAF and chagrin of AIDC, was to “repackage” their latest F-16 variant (that the ROCAF had not even dreamed of purchasing), the F-16C/D Block 50/52, as the “F-16A/B Block 20.” By taking F-16A Block 15 airframes and fitting them with the improved avionics, but slightly downgrading the advanced multi-role capabilities of the F-16C, General Dynamics essentially circumvented the 1982 joint US-PRC communique by staying true to their agreement with China, as the PRC offered surprisingly little resistance due to the fact that the ROC’s “new” F-16s, were, as far as they were concerned, old F-16A models that the US Air Force themselves had long retired. Meanwhile, the ROCAF

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<sup>77</sup> Lake, “AIDC Ching-Kuo: The Indigenous Defence Fighter,” 39.

<sup>78</sup> Lake, “AIDC Ching-Kuo: The Indigenous Defence Fighter,” 40.

received F-16As with combat capabilities comparable to the latest F-16Cs, which was something neither the air force or even AIDC had anticipated. As such, AIDC's attempt to expand the ROCAF's order for IDFs failed.

In 1994, now officially designated F-CK-1 and named after president Jiang Jingguo (*Ching Kuo* in *Tongyong* pinyin), the IDF entered service in the ROCAF. All 131 aircraft were delivered by 2000, destined to share the spotlight with F-16s and Mirage 2000s into the 21st Century. However, it was thanks to AIDC's effective marketing of the IDF in the early 90s that the US agreed to sell the ROCAF more advanced F-16s.<sup>79</sup>

The ROCAF's retirement of the F-5E and F-104 forced AIDC to produce a state-of-the-art fighter within the constraints of American military exports. AIDC answered this call, and proved to both the US and PRC that even in the face of political pressure, the ROC could develop a fighter capable of ultimately fulfilling their own needs. In order to complete their sale to the ROCAF, the United States had to compete with the ROC's own F-CK-1, a fighter so capable that its very availability and existence undermined the United States' own F-16A/B Block 15s, forcing the US State Department and General Dynamics to place a more advanced fighter - one comparable in terms of combat capabilities to the F-CK-1 - in the form of the F-16A/B Block 20 on the bargaining table.

Although the F-CK-1 did not become the sole front-line fighter equipping ROCAF fighter squadrons, its development, combat capabilities, and most importantly, availability, served to defend the skies over Taiwan in a different way: by ensuring not only the procurement of more advanced F-16A/B Block 20s in lieu of the inferior Block 15s that were originally intended for the ROC, but also that the air force's deteriorating F-104s and F-5Es would be

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<sup>79</sup> Lake, "AIDC Ching-Kuo: The Indigenous Defence Fighter," 41.

replaced with aircraft more than capable of maintaining competitiveness over the Taiwan Strait for years to come.

### **Conclusion**

By the mid-2000s, the balance of power between the PRC and ROC shifted towards the People's Republic. Now an unstoppable phenomenon on the global economy, the PRC held considerable "soft-power," enabling it to compete with even the United States. Gone were the days of total air superiority over the mainland and Taiwan Strait, when ROCAF RF-104Gs could sortie twice over the mainland in a day, impervious to the PLA's air defenses. The mystical 31:1 kill ratio of the 1958 Strait Crisis also faded into history, as the once-mighty ROCAF watched its rival, the PLAAF, grow exponentially every decade, adding more aircraft to their operational fleet (the PLAAF can now bring over 1,400 fighters down to bear upon the ROCAF's 285).

The primary role of any air force is to conduct aerial warfare and control a nation's sovereign airspace, and in this sense, the ROCAF successfully performed what was asked of them throughout their history. During the first half of the Second Sino-Japanese War, the ROCAF held their own against the Japanese onslaught, initially relying on the sheer courage and skill of its elite pilots in antiquated and obsolete fighters against the air forces of Imperial Japan. With the help of the United States after 1941, the wartime ROCAF then took the fight to the Japanese, beginning a counter-attack in 1943 that broke through the bloody stalemate of the Chinese theatre and did not stop until the end of hostilities in 1945.

During the Chinese Civil War, however, the ROCAF reigned supreme, as the Communists lacked the means to wage war in the air against them. Unfortunately, thanks to our modern-day hindsight, the Civil War was not one that could be won in the air, but one of

ideologies that the ROCAF ultimately found itself on the losing side of. Forced to retreat to Taiwan with the rest of Chiang's Nationalist Forces. Understandably humiliated, the ROC resolved to defend their island stronghold from the PRC, a role for which the ROCAF was groomed to undertake for the foreseeable future.

From the mid 1950s to the mid 1980s, the ROCAF conducted their interceptor role with deadly efficiency, culminating with the adoption of the Lockheed F-104 Starfighter. The F-104 proved to be the perfect match for the ROC's defensive interceptor-centric doctrine. In their Starfighters, ROCAF pilots could accelerate to incredible altitudes at blistering speeds, stopping the PLAAF in their tracks, while the RF-104 variant enabled the ROCAF to conduct surveillance operations against the PRC.

The F-104's withdrawal from frontline squadrons marked an end to not only the aircraft's service history, but the era of the ROCAF's undisputed superiority over the PLAAF. The years following, riddled with politics involving the aircraft destined to replace the venerable Starfighters, resulted in the ROC proving their prowess not through intercepting PLAAF aircraft, but their ability to domestically produce a fighter so uniquely capable that it not only fulfilled the ROCAF's needs, but did so while circumventing established US-PRC communiqués essentially written to prevent the ROC from obtaining advanced military technology. Furthermore, even after the ROC was finally offered the F-16s it needed, the mere existence of the highly-capable IDF that took both the US and PRC by surprise, encouraged the US to upgrade their F-16 offer from the basic Block 15 to the state-of-the-art Block 20.

Moreover, the tale of the ROCAF is a tragedy, albeit one worth remembering. Forged in the fires of the second world war, the ROCAF evolved into a formidable Cold War air force that helped maintain the sovereignty of the ROC, as it has won every air-to-air engagement against

PRC aircraft. In a tragic sense, following the US's adoption of the PRC as their "One-China," the ROC lost their distinct advantage. In spite of the shift in power against them, the ROCAF, through AIDC's F-CK-1, proved to the world that they would still defend their skies, regardless of political pressure from the US and PRC. Like that of the nation it serves, the ROCAF's history has never been easy.

The Chinese proverb “難於登天” describes an act so difficult and intimidating that it is likened to the impossible feat of climbing to heaven. Ultimately, the ROCAF's history is pockmarked with numerous tales of such difficult achievements, from combating Japanese Zeroes in outdated biplanes, to dogfighting jet-powered MiG-15s in surplus WWII fighters, and developing not only aircraft but also weapons domestically, no longer able to rely on US assistance. And so, undaunted by what their future could hold, the ROCAF will continue its climb towards heaven - an act that its airmen, ground crews, and officers have performed unflappably since its very inception.

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