

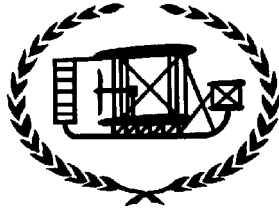
AIR POWER

History

SPRING 2004 - Volume 51, Number 1

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AIR POWER *History*

The Journal of the
Air Force Historical Foundation
Spring 2004 Volume 51 Number 1

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Air Power History (ISSN 1044-016X)

is produced in March, June, September,
and December by the Air Force Historical
Foundation.

Prospective contributors should consult the
GUIDELINES FOR CONTRIBUTORS at
the back of this journal. Unsolicited manu-
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bility for any damage to or loss of the man-
uscript. The Editor reserves the right to
edit manuscripts and letters.

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or changes of address should be addressed
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Periodicals postage paid at Lexington, VA
24450 and additional mailing offices.

Postmaster: Please send change of
address to the Circulation Office.

The year 2004 marks the golden anniversary of Air Force missile and space programs. We focus this fiftieth anniversary celebration by honoring the architect of that momentous achievement—General Bernard A. Schriever. (See page 36.)

Juxtaposing former Defense Secretary McNamara's interview (in the Winter 2003 issue), that dealt with strategic bombing in World War II, we present a reassessment of one target group—Japan's oil refineries and oil storage facilities. Emanuel Horowitz, himself a veteran of the 315th Bomb Wing, examines in painstaking detail the conventional view that no suitable target remained. (See page 26.)

Our Moscow correspondent, Viktor Kulikov, continues his series on Tsarist Russian aviation with his article on British aircraft in Russia. The rare photos included are superb, and certainly “worth the price of admission.” (See page 4.)

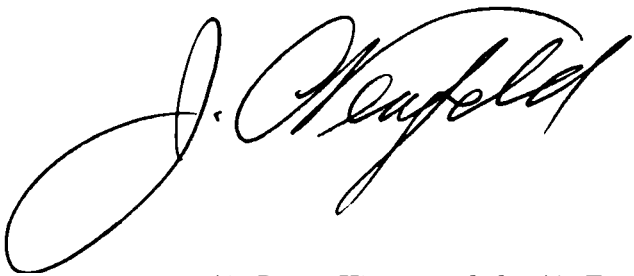
Many air history enthusiasts are familiar with the roles played by H-5 and H-12 helicopter crews in search and rescue operations during the Korean War. Forrest Marion adds to the literature with his informative article on the roles played by crews flying the SB-17 and SB-29 converted bombers. (See page 16.)

Jack Waid helps preserve Air Force heritage in two ways: first, by personally collecting samples of the service uniform, he has filled a void in preservation; second by displaying the uniforms and writing about them, he hopes to expand his activities and sensitize others to this important undertaking. (See page 44.) If you have any artifacts to contribute, or simply wish to cheer him on, contact SSgt. Waid, through the “Letters to the Editor” address. (See page 2.)

In this issue, we continue to tackle the profusion of new books on air power that appear regularly. A handful of the reviews concern books on advanced technology, rockets, and space. A second grouping concerns individual aircraft. The heavyweight, however, is former Secretary of State Henry Kissinger's 630-plus-page tome, dealing with our exit from the Vietnam War.

The departments section features Bob Dorr's “History Mystery,” and the traditional offering of “Letters, News, Notices, Reunions, and Events.” As promised, we have profiled C. R. “Dick” Anderegg, the new Director of Air Force History. (See page 67.)

We would like to hear from more of our readers on any burning or smoldering issues in air power history—especially space history. Write an article, a letter, volunteer to review a book, or write to General Nelson, the Air Force Historical Foundation's president, suggesting ideas as he drafts a new strategic plan. Be bold—push that envelope!



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British



Aircraft in Russia



Viktor P. Kulikov

(Overleaf) Fairey IIIc sea-plane (nr. 2233) at Oranienbaum, winter 1922. (All photos courtesy of the author.)

[BEFORE] WORLD WAR I, THE TSARIST RUSSIAN GOVERNMENT BEGAN PURCHASING AIRCRAFT FROM GREAT BRITAIN

BY THE END OF THE 1920S, BRITISH AIRCRAFT WERE BEING FULLY REPLACED BY INDIGENOUS TYPES

(Right) Refueling of the U.1 trainer at a Soviet flying school.

(Below) Albemarle with Red stars.

During the years immediately preceding World War I, the Tsarist Russian government began purchasing aircraft from Great Britain and France, a practice that continued throughout the war. While Russia received most of its aviation equipment from France, Britain was represented by many important types of aircraft and engines. Shipments of aircraft, as well as every sort of military equipment, were carried by merchant ships from ports in France and Britain to the mostly ice-free port at Archangel on the White Sea.

Soon after the Bolshevik "October" Revolution, of November 7, 1917, most of the Russian army and navy aviation equipment passed into Red hands, forming the foundation for the new Red Air Fleet. During the Civil War in North and South Russia, the Reds would face British RAF aviation detachments brought in to support the Whites. In North Russia, the British formed Slavo-British aviation units (*Slavyano-Britansky otryad*), that operated from rough airfields near Archangel. As the Civil War progressed in both regions, numbers of enemy aircraft and their crews were captured by Red troops. Even after the end of the Civil War, many foreign aircraft remained in the inventory of the Red Air Fleet. These included previously captured and newly purchased planes from British, French, German, and Italian companies.

By the end of the 1920s, British aircraft were being fully replaced by indigenous types. During the 1930s, some second-hand British planes occasionally appeared in the USSR. In 1940, during the Red Army's occupation of Estonia, Latvia and Lithuania, their air forces were seized, and about 100 obsolescent British aircraft fell into Red hands. Only a few of them were ever used by the Soviet Air Force (*VVS RKKA*). In June 1941, the Germans launched their offensive into Russia. Soon the British government began delivering military equipment to the USSR. Supplies included British or U.S. built fighters and bombers, which substantially helped the Soviets defeat the *Luftwaffe* and stem the German tide. After 1945, numbers of these foreign aircraft continued in service. In fact British Spitfires remained in air defense units until the early 1950s. Although some

U.S. planes were captured in different local wars and sent to evaluation test centers, after World War II no British planes fell into Soviet hands. Today, in Russia, only British aircraft are displayed at museum expositions and international airports. British aircraft that saw service in Russia are listed below, alphabetically by type.

Armstrong Whitworth

Some Siskin IIA fighters were captured by Soviet troops in Estonia. Since they were all obsolete they went to the scrap heap at once.

In 1943, eleven Albemarle transports made successful flights from Scotland to Vnukovo airport, near Moscow, the first landing on March 3. Most of the Albemarles were accepted by the 3d Regiment of the 1st Transport Division (10th Guards Division). The 65th Regiment of Naval Aviation (*Izmailovo-Moscow*) had four aircraft. As transports the Albemarles were criticized by crews because of their inadequate carrying capacity and low reliability. Within six months two aircraft were destroyed in crashes and two others damaged. Later, all airworthy Albemarles served at Levanevsky flying school (Bezenchuk, later Nikolaev) as bomber-trainers. By summer of 1945, the last Albemarles had disappeared from Russian skies.

AVRO

The AVRO 504K two-seat biplane first appeared in Russia during the 1920s, when some machines entered service in the Don air detachment of General Wrangel's White forces and the 2d air detachment of the White Volunteer Army. They took part in anti-Bolshevik fighting in South Russia. Some were captured by the Reds. In 1922, Soviet Russia bought a batch of AVRO 504Ks (on wheels) and AVRO 504Ls (on floats) from Great Britain. Soviet factories copied this plane as the U-1 (AVRO 504K) and MU-1 (AVRO 504L). The U-1s served as military trainers until 1932. Civil air clubs flew U-1s until 1935. Thousands of Soviet



A Muscovite, Viktor P. Kulikov graduated from Urals University. For the past twenty years, he has been researching and writing the history of Russian aviation of the World War I period. Mr. Kulikov's articles, Sikorsky's Fighters, Aeroplanes of Lebedev's Factory, and Soviet Ship-Based Reconnaissance, 1920s-1950, appeared in the Winter 2000, Winter 2001, and Spring 2003 issues of this journal, respectively.



(Top) The MU-1 seaplane.



(Above) The AVRO Bebe light plane at the Moscow flying school.

pilots were trained on this type. The first U-1s were built at GAZ-5 aircraft plant. Beginning in 1923, production was transferred to the "Red flyer" plant at Petrograd. Production ceased in 1931 after 664 U-1s and MU-1s had been built. In 1931, takeoff rockets were tested on a U-1 by S. Mukhin. The MU-1 seaplane was built from 1924 to 1930, with seventy-three delivered. As a military seaplane trainers, they served until 1934.

Another AVRO aircraft that appeared in Russia in 1922 was the Bebe light plane, with the 35-hp Green engine. Two of them were purchased for evaluation. From March 9-27, Soviet pilot E. Gvaita flew from England to Moscow. Later these machines were accepted by the Moscow flying school.

There were two ex-Lithuanian AVRO 626 trainers that were never used by the VVS RKKA. However, one captured AVRO Anson I was transferred to an air squadron attached to the 2d Rifle Corps.

By the end of World War II, Soviet naval aviation used two Lancaster four-engined bombers. In 1944, an RAF heavy bomber wing flew from Yagodnik airfield, near Archangel, and bombed the German

(Below) A Lancaster bomber converted to transport configuration, 16th Transport detachment, 1945.

(Right) The Bristol Boxkite trainer.



battleship *Tirpitz*. Six Lancasters were forced to land on Soviet territory. One damaged machine was repaired and returned to Great Britain. Later, White Sea flotilla aviation workshops (Kegostrov) repaired two other Lancasters. Chief engineer Kir'yanov was given the task of modifying them from bombers to transports. Wrecked noses were replaced by transparent blisters. All armaments was deleted. Both machines retained the RAF camouflage scheme, but with Red stars added. Soviet Lancasters flew with a four- or five-man crew, including one or two pilots, a navigator, and two engineers. Lancaster "01" (on-board code) was received by the 16th Transport detachment, with pilot V. Evdokimov and navigator V. Andreyev. From the end of January 1945, the aircraft was used on antisubmarine patrols, ice reconnaissance, and transport duties in the Arctic region. In August 1945, this Lancaster flew to the Pacific coast, but was stopped at Krasnoyarsk until V-J Day. From summer of 1946, Lancaster "01" served at the military engineer school at Riga. Its fate is unknown.

The second converted Lancaster "02" (on-board code) was delivered to the 70th Transport Regiment of the Northern Fleet, with pilot I. Doubents. After this unit was disbanded, Lancaster "02" served with the 65th Regiment (Special Duty-Moscow). During a ferry flight, "02" suffered substantial damage in landing and was scrapped. Thus ended the brief flying career of the Soviet Lancasters.

Blackburn

During the spring of 1923, Soviet Russia bought two Blackburn Swifts for aerial torpedo trials. The large one-engine machines had no armament. Both aircraft were converted to two-seaters by repositioning the engine forward. Two torpedo types were used during the trials, type 1912 (for surface ships) and type 1910/15L (shortened, for submarines). Due to repeated failures with 1910/15L torpedoes, that exhibited some structural problems, priority was assigned to the 1912 type, which was converted into the first Soviet aerial torpedo TAN-12.

Bristol

The Bristol Boxkite was the first British airplane in Russia. It was a sealed-up copy of the French Henri Farman biplane, powered by a 70-hp Gnome engine. Russia's military department pur-





(Above) The Bristol F.2B with a Red fighter unit, 1920.

(Right) Military pilot Ivan Yuzhak (in center) with his DH-4, winter 1919-1920.

chased nine Bristol Boxkites for use as trainers at the Gatchina and Sevastopol during 1911-1913.

The well known Bristol F.2B fighter made its first appearance in Russia, serving in White air detachments towards the end of the Civil War in 1920. It was powered by a 275-hp Rolls Royce Falcon III engine. Some were captured by the Reds. Later Soviet Russia bought two F.2Bs from Great Britain for evaluation. By June 11, 1925, one still served in the 4th Independent Squadron (Western Military District), while a second served with the 2d Squadron (Ukraine Military District). Later all F.2Bs were concentrated at flying schools.

Russian archive papers mention the existence of a "Bristol plane with 80 hp Gnome engine," flown in May 1916 by Ensign (*Praporshchik*) Gotrnan of the 27th Corps air detachment. Presumably, it was a Bristol Scout. Ex-Latvian and ax-Lithuanian Bristol Bulldog II fighters were not used by the VVS RKKA.

De Haviland

During the Civil War, White forces in South Russia received D.H.4 and D.H.9 biplanes as British military aid. In 1920, Red troops captured some damaged D.H.4 two-seat reconnaissance planes with 375-hp Rolls Royce Eagle VIII engines. One airworthy aircraft was completed from parts of



these machines. Earlier, in the autumn of 1917, the Dux aircraft factory obtained D.H.4 production drawings from De Haviland. But revolution and economic crisis prevented any production. Later, N. Polikarpov, the famous Soviet aircraft designer, mated concepts of the D.H.4 and D.H.9 and produced his R-series. After the Civil War, some foreign engines were sent from Archangel warehouses to Moscow. The first Soviet D.H.4s were powered by FIAT A. 12, Siddley Puma and German Daimler engines. Due to the use of rather poor raw materials and parts, Soviet biplanes were heavier and slower. During 1920-1921, the GAZ-1 aircraft plant (former Dux) delivered twenty D.H.4, with 240-hp FIAT A.12 engines.

Ten D.H.4s, with 400-hp Liberty engines, were captured by the Red Army in South Russia. One was tested at the Scientific-Research Airfield (NOA) at Moscow. In the Crimea the Red Army also captured some D.H.9s with Liberty engines. One was tested at NOA. Soviet authorities decided to produce the type in Russia. The R-1 plane was an unlicensed D.H.9a modified for Soviet technology. During 1922-1923, Soviet factories produced 100

(Below) A Russian-built D.H.4 with FIAT A-12 engine.

(Right) The R-1 aircraft with the 30th squadron at Moscow's central airfield, March 23, 1928.



(Top) D.H.34 commercial airliner at Moscow's central airfield.

(Second from top) The Mosquito B.IV in the USSR.

(Third from top) A Mosquito landing crash.

D.H.9s with Daimler engines. Some D.H.9 airframes were mounted with different types of power plants. From 1923, the GAZ-1 factory began production of D.H.9s, with 260-hp Siddley Puma engines, with 130 being delivered. Most R-1s had M-5 engines (Soviet built Liberty). Mass production finally ceased in 1931. Factories No. 1 and No. 10 built thousands of R-1s.

In 1923 the Soviet Union bought one D.H.34 commercial liner, with 450 hp Napier Lion engine for evaluation. In 1924, this plane "No. 33" was tested at NOA, then it was transferred to UVVS (Administration of the Air Force) training squadron. In 1925, the plane was sent to the 1st Independent heavy detachment, which used it as a bomber-trainer.

In 1924 one D.H.53 single-seat light aircraft, with a 20-hp Blackburn engine was bought for evaluation as the Soviet government wanted to produce its own planes of this type.

One D.H.60 Moth was captured in 1940, but was not used by the Soviets. In 1940, Baltic states civil aviation had two D.H.89Ms. Following the Soviet occupation, these planes were transferred to GVF (Soviet civil aviation) Pribaltic Division. During early summer of 1941, GVF operated the D.H.89M on the Moscow-Riga route.

In 1936 one D.H.84 Dragon twin-engine biplane was shipped to the USSR from Spain as a gift from the Spanish Communist Party, and was tested at NII VVS (Air Force Test Center).

On April 19, 1944, a Mosquito B.IV (DK 296), with a Soviet crew, took off at Errol air base in Scotland and flew to Vnukovo near Moscow. It was the only Mosquito the Soviets received for evaluation from the RAF. In May 1944, it was tested at LII (Institute of Flight Testing) Zhukovsky test center near Moscow, and later on a flight to NII VVS it force landed and crashed.

Fairey

The Fairey IIC two-seat floatplane, with a 375-hp Rolls Royce Eagle VIII engine, was shipped in some numbers to North Russia during 1919. RAF crews completed many operational sorties against Red troops and shipping near Archangel. At the end of the Civil War, captured IIC biplanes were transferred to the Baltic Fleet. By the summer of 1922, five of these seaplanes (numbers 2233, 9230, 9231, 9241, and 9249) served with the 1st and 2d Independent reconnaissance detachments.

With the Soviet occupation of the Baltic states in 1940, a small number of Seal floatplanes were acquired. They were declared obsolete and used for on-water target practice.

Gloster

The Gladiator I was the main fighter type in Latvia and Lithuania. In 1940, Soviet troops captured at least fourteen machines, but most of them were not used. One served with the 29th Rifle Corps Squadron. On June 23, 1941, it crashed



while flying a reconnaissance mission over the Lithuanian-Prussian border.

Handley Page

During the autumn of 1942, an RAF composite group was sent to Murmansk to protect Convoy PQ-18 (Operation Orator). British aircraft were flown from Scotland via Sumburgh. The group included one torpedo-bomber wing with two squadrons, both equipped with Hampden TB.1 twin-engine monoplanes. Twenty-three Hampdens landed at various Soviet airfields, while twelve machines were shot down by the Germans or



(Right) The Hampden TB.1 landed at Vaenga airfield.



Hampden torpedo-carrier before flight, with 9th Guard Mine-torpedo air regiment, May 5, 1943.

HAWKER HURRICANE FIGHTERS WERE THE BEST-KNOWN BRITISH AIRCRAFT IN RUSSIA

crashed en route. By September 7, all torpedo-bombers were concentrated at Vaenga-1 airfield near Murmansk. On September 14, RAF crews carried out sorties over the Barents Sea. Because a return flight would be very dangerous, British authorities decided to transfer the Hampdens to Soviet naval aviation. On October 6, 1942, Prime Minister Winston Churchill authorized this decision. On October 12, twenty torpedo-bombers (three had been previously lost during a *Luftwaffe* raid) were accepted by the Air Forces of the Northern Fleet, and handed to crews of the newly formed 24th Mine-Torpedo Regiment (later the 9th Guards Regiment). During conversion training, one Hampden crashed on October 19. The first operational sorties were made on December 16, and by the end of the year more than a dozen sorties had been flown, including night bombing raids on Kirkenes harbor. From January 1943 Hampdens of the 24th Regiment frequently attacked German shipping with torpedoes near the Norwegian coast. Combat attrition diminished regimental strength. By February, the regiment had only eleven Hampdens on hand. Lack of spares reduced the number of airworthy Hampdens. Soviet maintenance units modified the bomb com-

partment by lengthening it to accommodate Soviet 45-36AN torpedoes, and installed the UNK-1 gun turret (with UBT gun), as well as a neutral gas system for fuel tanks. Starting in April 1943, the Hampdens were supplanted by U.S.-built Douglas A-20s. By May 1, the regiment had only seven Hampdens. By June twelve planes had been lost. The final operational sortie was made on June 4, 1943. By mid-July the Soviet North Fleet had only one unairworthy Hampden. (In 1991, one of the Hampdens (P1344) which had crashed en route to Russia was rescued and shipped to Great Britain for restoration.)

Hawker

In 1932, Estonia purchased eight Hawker Hart day bombers, with 525-hp Rolls Royce Kestrel IIS engines. These were seized by Soviet occupation forces and turned over to the VVS RKKK (Soviet Air Force). According to Soviet archive documents, eight Harts were on strength of an air squadron attached to the 22d Rifle Corps. Their fate is unknown.

Ex-Latvian Hawker Hinds were not used by Soviet aviation. Hawker Hurricane fighters were the best-known British aircraft in Russia. They were the first Allied planes shipped to the USSR as military aid. Hurricanes served with the RAF 151st Wing, based at Vaenga in September-November 1941, but the 151st Wing operated as a British unit on Soviet territory. In September 1941 the first Hurricanes supplied directly to the Soviet Air Force arrived on convoy PQ 1. On September 22, Hurricane (Z2899) was accepted by a Soviet commission at Archangel. Soviet sources state that 3,082 Hurricane fighters were received, while British sources list only 2,952. The difference being the Soviet practice of counting spare kits. Soviet aviation acquired IIA, JIB, IIC, IID, X XI, XII and XIII types, including some IIAs converted from Hurricane Is. Initially Great Britain sent only war-weary fighters, but later the USSR received factory-fresh aircraft.

Hurricane II, with two ShVAK cannons and two UBT guns, taxiing before takeoff on Don front, 1942.



(Right) Martinsyde F.4 fighter with Red army air detachment.

HURRICANES WERE USED AS BOMBER INTERCEPTORS ... , FRONT-LINE FIGHTERS, FIGHTER-BOMBERS AND ATTACK PLANES

Ex-151 Wing Hurricanes were transferred to the North Fleet aviation 72d Regiment in November 1941, used operationally, seeing considerable action near Murmansk. The first big operation in which Hurricanes took part was the Battle of Moscow. Three air regiments with Hurricanes served in its defense in January 1942. Large numbers were received in the spring of 1942, and served on the Karelian, Kalinin, Northwest, and Voronezh fronts. Naval aviation used Hurricanes in the North and Baltic Fleets.

Many Hurricanes were converted in various ways. Soviet plants and workshops replaced the British rifle-caliber Browning machine guns with new armament. Factory No. 81 mounted four 20 mm ShVAK cannons or two ShVAK and two 12.7 mm UBT guns. North Fleet aviation had Hurricanes equipped with four 7.69 mm guns and two 12.7 mm UBK guns. Experimental fighters were tested with four UBK guns. Four to six rocket projectiles (RS-82 or FAB-50 and FAB-100 bombs could be carried. Many fighters carried steel armored backplates.

Some Hurricanes were modified as tactical reconnaissance planes with one camera (usually AFA-I type) in the rear fuselage. Some were converted to two-seaters as trainers or used as artillery spotters. Variants existed in sole examples as glider tugs, cargo transports and ambulances. Hurricane glider-tugs were used by the 1st Glider Regiment (Saratov). One had a fixed ski-undercarriage. At Moscow, retracting skis were designed, but only one Hurricane was converted this way. Variations with Soviet engines (M-82, M-88, M-105) were known to have been made.

Hurricanes were used as bomber interceptors (especially MkIICs), front-line fighters, fighter-bombers and attack planes. One Hurricane division (four regiments) took part in the Battle of Stalingrad. By 1943, the Hurricanes had become obsolete as front-line fighters, and were gradually transferred to second-line units. Air defense regiments in the middle of the country used Hurricanes until 1946. Carrying flares, these units used Hurricanes as illuminators; they usually operated in pairs with YAK-9 or LA-5 fighters. Single-seat and twin-seat spotters served in the autumn of 1943, on the Leningrad and Kalinin fronts.

The Hurricane IID tank-buster was tested at NII VVS and rejected, as the indigenous IL-2 with twin 37 mm cannons was far better. MkIIDs and MkIVs were delivered to air defense (PVO) units. The 44th Regiment PVO (Bologoe) had MkIIDs on strength in 1943-1944, but were unable to intercept German bombers and reconnaissance planes. The 246th Regiment, based at Bobruysk with Hurricane MkIIDs, was hardly involved in combat. North Fleet aviation used Hurricanes until the end of 1944.

One Hawker Typhoon IB was sent to Russia in 1945. This ex-RAF aircraft was accepted by a Soviet mission at Teheran on July 20, and was later evaluated at NII VVS and ILL test centers.



Martinsyde

During 1922-1923, Soviet Russia purchased about 100 Martinsyde F.4 Buzzard single-seat fighters, with 300-hp Hispano-Suiza engines. By the spring of 1926, the F.4s remained only with the 2d Independent fighter squadron ("F. Dzerzhinsky") at the Moscow Military District. By June 1926, some twenty-five planes were still in service. By 1927, the F.4 disappeared from front-line units, being superseded by new I-2 and later I-3 fighters. Remaining F.4s were sometimes used in flying schools, with eight F.4s at the School of Air Fighting.

The Soviet Union also bought the Martinsyde F.16 two-seat reconnaissance plane, with the Hispano-Suiza engine. About two dozen F.16s served with first-line and second-line VVS units.

Miles

Soviet Russia purchased one Miles airplane, the Hawk, for evaluation during the second half of the 1930s. In January 1938 it served as personal plane of VVS commander-in-chief A. Loktionov.



Norman-Thompson

The Norman-Thompson flying boat, with a 220-hp Wolseley engine was used by Baltic Fleet aviation since 1922. This two-seat aircraft had no armament, and flew as a communication plane in winter on a ski undercarriage.

Royal Aircraft Factory

The F.E.2b two-seat reconnaissance plane was produced in quantity from 1915, but did not appear in Russia until 1916. It was similar to the

(Right) Norman-Thompson flying boat nr. 3312.



Pilot Vasilchenko, with Red 6th Fighter detachment, near his S.E.5.

French Voisin biplane, which was already well-known to Russian airmen. However, the F.E.2b was underpowered and its combat performance could be criticized. Russian aviation received seven F.E.2bs, with 100 hp Green engines. Without armament these planes were used as trainers until 1923.

The B.E.2e two-seat reconnaissance aircraft, with a 90-hp RAF.1, was purchased at the end of 1916. Russian pilots liked its stability, easy handling and good acrobatic properties. But the B.E.2e had no armament, which restricted its use for front-line operations. In July 1916, five B.E.2e (numbers 6792, 6801, 7111, 7118, and 7123) were earmarked for the 2d Artillery air detachment (with XI Army). Wireless equipment was mounted in the rear fuselage for use as artillery spotters. Within two months three were damaged, and repaired at the 3d aviation park. By October 20, 1917 the 3d aviation park received a second batch of not-serviceable machines, (numbers 6786, 6787, 6791, 6793, and 6799). During the Civil War planes of this type served on both sides of the front lines. One B.E.2e nr. 6795 served with the Red 28th air detachment.

After the Civil War in Russia the B.E.2e was used as civil agricultural planes. In autumn 1924, at Tushino, near Moscow, flight spraying techniques were tested. The dry insecticides were contained inside a tank forward of the cockpit. Insecticides were sprayed from altitudes of 9-18 meters. The B.E.2e was used as a trainer until 1925.

The R.E.8 two-seat reconnaissance plane, with 150-hp RAF.4a engine was delivered to White forces in South Russia in 1919, equipping spotter units of the 3d and 9th air detachments, as well as the 1st and 3d Don air detachments. The Volunteer Army had R.E.8s (numbers 193, 204, 206, 211, 278-281, 285-291, 293-296, 1119-1132, 1178, 1180, 1183, 1188-1189, 1200-1206, and 3683).



(Near right) R.E.8 with Red Army aviation, 1920.

(Far right) R.E.8 at the ODVF Exhibition, Taganrog, 1925.

During the evacuation of the Volunteer Army from Kiev the train carrying the equipment of the 3d air detachment had no locomotive, to prevent capture by the Reds an R.E.8 fuselage with engine was mounted and fixed on a flat car and enabled the train to escape.

In North Russia, the Slavo-British air group also had some R.E.8s. Red forces captured some dozens of R.E.8s during the Civil War. They were seldom flown due to poor handling qualities, plus they were prone to fires in the air. Most machines were used as trainers at flying schools and Air Fleet Friends Society (ODVF) sections

During the Civil War S.E.5 single-seat fighters, with 150 hp Hispano-Suiza 8A engines appeared in Russia, and were flown by pilots of both sides. As late as 1925, the Red Air Fleet had 15 S.E.5s on strength. Some are mentioned in archive documents; in 1920 the 3d Fighter air detachment had two, (numbers 6363 and 6368), while the 6th Fighter air detachment had number 6377.

Short

Some Short 184 two-seat floatplanes were captured by Red forces on both the North and South fronts. Repaired aircraft were delivered to the Baltic and Black Sea Fleet. On July 1, 1922, Baltic Fleet aviation had two Short 184s, (numbers 9024 and 9193, serving with the 1st Independent reconnaissance detachment at Oranianbaum. The Black Sea Fleet received one Short 184, number 9089, which was assigned to the 4th hydroplane detachment. By 1924, all Short 184s were written off as obsolete.

At the end of World War II the RAF delivered one example of the Short Stirling III four-engine heavy bomber to the USSR. It was accepted by a Soviet crew at Teheran on March 1, 1945, and was tested at the LII test center. Soviet pilots saw the Stirling as a slow and ugly plane, much inferior to the U.S.-built B-17 and B-24 bombers, which were also tested at LII.

Sopwith

In December 1915, the Lebedev aircraft factory at Petrograd constructed a copy of the Sopwith Tabloid biplane. A few Lebedev-built planes of this type were successfully tested and later delivered to





(Above) Short 184 seaplane nr. 9085, with No. 266 Squadron RAF, captured by Red troops near Petrovsk on the Caspian Sea, 1919.

(Right) Red Army Sopwith 1 1/2 Strutter, winter 1919.



the 21st Corps air detachment. Service evaluation at the front was extremely poor, so Lebedev failed to receive orders for mass production.

The spring of 1917, saw the first appearance of the Sopwith 1 1/2 Strutter in Russia. Some, numbers A1131, 1519-1523, 1543, saw service with the 9th Army air detachment, attached to the VII Army. In August 1917, the 18th Corps air detachment received numbers 1115 and 1159; the 35th air detachment received number 1556; the 6th Army air detachment had numbers A1133, 969, 1518, 1524, 1553; the 17th Corps air detachment had numbers 1122, 1125, 1538, 1540, 1545, 1551, and 1554, while the 3d aviation park had number 1123, 1136, 1221, 8176, and 8757, all shipped from Great Britain in 1917. Excellent flying qualities of the Strutter led to the decision to mass produce it at the Lebedev factory. One Strutter (nr. 3437) was dismantled and measured. Production began at the end of 1917 and continued until 1923. The Strutter was used by both Whites and Reds. Lebedev's machines were heavier than those made in Britain and had poor production quality, with damp wood, peeling covering and bad assembly. Sopwith 1 1/2 Strutters were still in Red first-line units in the mid-1920s.

(Below) Russian Lebed VII, a copy of the Sopwith Tabloid.

(Below right) Sopwith Triplane nr. 5486 at Moscow's Khodynka air-field, summer 1917.

An interesting story is connected with the Soviet use of Strutters. Vladimir Lenin, considering himself as the leader of world revolution, decided to promote its victory by propaganda

means, and sent an inquiry about the possibility of delivering leaflets to the European capitals at Berlin, Vienna and Budapest. For this purpose the UVVF (Administration of the Air Fleet) chose the Strutter. It could fly at safe altitudes, but its range was inadequate to return to Russia. The Red Air Fleet had a few Il'ya Muromets four-engine bombers, with adequate fuel capacity and long range, but its Achilles heel was low altitude and slow speed, plus it was vulnerable to fighter attack and ground fire.

For this big propaganda effort six Strutters were prepared, with three pilots to fly to Berlin and three more to Vienna. Each plane was loaded with 35-70 pounds of leaflets in German with revolutionary slogans. Bad weather prevented their flights and soon the Reds signed the Treaty of Brest-Litovsk (March 3, 1918), so the flights were cancelled.

The Sopwith Triplane appeared in Russia at the end of 1917. Some were used by Red aviation. One, number 5486, served with the 1st Fighter air detachment and was later transferred to the Moscow flying school. A second, number 2368, served with the 11th Fighter air detachment. The last Triplane crashed in January 1920. At present, one example is exhibited at the Air Force Museum at Monino, near Moscow.

The Red Army captured two Sopwith Pup fighters from Wrangel's White forces in South Russia.

During 1919 Sopwith Camels, delivered to the White Volunteer Army, saw action in the skies of South Russia. They were already quite worn and the head of the British Mission advised White pilots not to abuse their acrobatic possibilities. The Whites received about forty Camels, part of which





(Right) Sopwith Snipe fighter with personal insignia of famous Red pilot G. Sapozhnikov, 1919.

(Above right) Personnel of 26th Guards fighter regiment near Spitfire LF.IX, Leningrad, April 1945.

were captured by the Reds. They served in the Red Air Fleet to the mid-1920s.

Two Sopwith Snipe fighters were captured by the Red Army. One of them was crashed by Red ace Sapozhnikov in an acrobatic display. The second served with the 2d Fighter squadron (Ukraine Military District) until December 1922. One Sopwith Snipe (E6350) was flown by the famous Russian ace, now RAF Major Aleksandr A. Kozakov, serving with the Slavo-British air group in North Russia. Kozakov crashed to his death on August 3, 1919, at Bereznik airfield near Archangel, while stunting the unfamiliar aircraft at low altitude as a salute to fellow Russian airmen who were leaving to join Kolchak's White forces in Siberia.

Supermarine

During World War II, the Soviet Union received 1,350 famous Spitfire fighters. The first three unarmed Spitfire PR.IV reconnaissance planes were accepted from British crews during the aforementioned Operation Orator, together with the Hampden torpedobombers. On October 23, 1942, one was delivered to the 118th Independent reconnaissance regiment of North Fleet aviation, another six soon followed. Soviets used the PR.IVs for photo-reconnaissance flights over northern Norwegian and Finnish territories. On June 1, 1944, the 118th regiment had four Spitfires on strength, which dropped to two on February 1, 1945. By the end of 1945 the last PR.IV was transferred to the North Fleet Museum at Murmansk. Its fate is unknown.

(Right) Spitfire VB fighter tested at NII VVS.

(Below) Spitfire PR.IV reconnaissance plane during tests at NII VVS.

(Below right) Spitfire LF.IX nr. TA810 at NII VVS airfield, 1945.



During spring of 1943 the British began delivery of Spitfire Mk.VB fighters, ferried across Iraqi and Iranian territories. The Mk.VBs served in the front-line with the 57th Guards Fighter Regiment (April-June 1943) and the 821st Regiment (August-September 1943). These units fought in the skies over the Kuban and Mius River. Mk.VB fighters were delivered to the 7th Fighter Regiment Air Defense system of navy bases along the Caucasian coast. Its usage in action was brief, because of its inferiority to the modern Messerschmitt Me 109F and G variants at low and middle altitudes. Twenty-two Mk.VBs were transferred to air defense (PVO) regiments. The 16th, 69th and 177th Regiments based near Moscow were partially equipped with Mk.VBs as high-altitude interceptors. During the summer of 1944, Spitfire pilots of the 16th Regiment intercepted and destroyed high flying Junkers Ju 86P reconnaissance planes over Moscow. At PVO regiments the Mk.VBs were retained to the end of the war.

After the Great Patriotic War, Soviet naval aviation rebuilt a few Mk.VBs for use as catapult-fighters. Modified Spitfires served with the 24th Shipboard squadron at Alma Tomak air base.





(Above) Russian pilot Ensign Anders of 18th Corps air detachment near his Vickers FB.19, July 1917.

(Above right) Red pilot I. Polyakov near Vickers FB.19, summer 1919.

Operational sorties are not known, but catapult takeoff capability was tested on board the light cruiser Molotov. Soviet aviation accepted 143 Spitfire Mk.VBs.

From the spring of 1944, Mk.IX fighters were being supplied. From March 1944 until June 1945, the British delivered 1,188 aircraft of this type. These Spitfires equipped only air defense units, the 26th Guards, 16th, 177th and 76th Fighter regiments, and others. There were twenty-six regiments with these fighters on strength, based far behind the front lines. The author knows of only one operational episode: on March 8, 1945, two Spitfires shot down a Junkers Ju 88 reconnaissance plane near Lake Lagoda. The LF IX fighters served with PVO regiments until 1952, and were considered the best foreign fighter for high-altitude interception duties. Some Spitfires were converted to two-seaters and were used as conversion train-

(Below) Vickers Vernon at Moscow's Khodynka airfield, 1923.

(Bottom) Vickers Viking flying boat.



ers or for high-altitude parachute dropping tests.

The Supermarine Walrus I flying boat was shipped to Archangel with other supplies brought on the British PQ 17 convoy. British sources believe this plane was scrapped, but in reality it was repaired and supplied to the 16th air transport detachment. This sole Walrus flew to the end of 1943.

Vickers

At the end of 1916, one Vickers FB.19 fighter (A1968) was delivered to Russia for evaluation. It was tested by a number of Russian pilots, including the well-known ace, Evgraf Kruten, who gave it high marks. The Russian government ordered about fifty of the type, but only a few arrived at front units and made operational sorties during the summer of 1917. The FB.19 was plagued with poor pilot vision, which was offset by high speed and good armament. In August 1917 the 9th Fighter air detachment, then on the Romanian front, received two Vicker FB.19s. Two others served with the 18th Corps air detachment. Some FB.19s without armament were delivered to the flying schools at Moscow and Gatchina as trainers. During the Civil War they were used by the Reds. About thirty FB.19s served in Russia, the last of them being scrapped in 1924.

In 1922, the Soviet government purchased for evaluation a Vickers Vernon big passenger plane, with two 450-hp Napier Lyon engines. After thorough testing it was transferred to the 1st Independent heavy plane squadron at the Leningrad Military District. On June 1, 1926 it was listed as being in repair. Its fate is unknown.

In the summer of 1922, one example of the Vickers Viking IV flying boat, with 450-hp Napier Lyon engine, was purchased for evaluation. In 1923 pilot L. Giksa and engineer Radeev flew this plane from Petrograd to Sevastopol, where it served in the Black Sea Fleet's 1st Independent naval reconnaissance detachment until the end of 1926. During the summer it had been damaged and sent to a repair unit, where it was probably written off. ■

Acknowledgment: *The editor thanks Mr. August G. Blume of Charlottesville, Virginia, an expert in Russian-Eastern European military aviation, 1909-1922, for his assistance in preparing this article for publication.*

Bombers and Boats: SB-17 and SB-29 Combat Operations in Korea





Forrest L. Marion

(Overleaf) An SB-17G of the 2d Rescue Squadron. (Photo courtesy of the author from the Menard Collection.)

THESE RESCUE BOMBERS CARRIED UNDER THEIR BELLIES A 27-FOOT BOAT ... THAT COULD BE DROPPED BY PARACHUTE AND WHICH CONTAINED ... FOOD, WATER, AND CLOTHING

DUE TO A LACK OF RECONNAISSANCE UNITS IN THE THEATER, FAR EAST AIR FORCES (FEAF) CALLED ON THE ARSVC FLYING FORTRESSES

The Korean War witnessed hundreds of dramatic rescues of airmen plucked from behind enemy lines and thousands of wounded GIs evacuated from the front lines to safety and medical care. Exploits such as these earned worldwide reputations for the H-5 and H-19 helicopters and SA-16 amphibians, and for the men who flew and maintained the aircraft. But several lesser-known Air Rescue Service (ARSvc) aircraft served in the war theater as well, among them the SB-17 and SB-29 (S for search-and-rescue), rescue-modified versions of the famed World War II bombers. Modified to carry air-droppable lifeboats under their bellies, both bomber types performed valuable service in the Korean War. The SB-17, replaced by the SA-16 and SB-29, flew operational missions from the war's outset until late 1951, while the SB-29 operated in the war theater from September 1950 until the armistice of July 1953.

Boeing SB-17G Flying Fortress

During World War II, thousands of Boeing B-17s had bombed targets in the European and Pacific theaters. Late in that war, the United States had converted a few B-17Gs, redesignated the B-17H, to assist in the rescue of airmen downed in the water. These rescue bombers carried under their bellies a 27-foot boat (termed the A-1) that could be dropped by parachute and which contained enough food, water, and clothing for twelve survivors to last for about twenty days. The first B-17H operational boat drop took place in April 1945, shortly before the war's end in Europe. Until late 1951 in the Korean War theater, the 2d ARS and 3d ARS (Air Rescue Squadron) of the ARSvc continued to operate essentially the same aircraft, now redesignated the SB-17G. Constructed of laminated mahogany plywood, the G-model's A-1 lifeboat contained twenty watertight compartments and carried two air-cooled engines, each of which could power the boat at five knots; or with both engines running, eight knots. To assist survivors in reaching the boat, the A-1 possessed salt-water-activated rocket lines that ejected when the lifeboat struck the water. The SB-17 carried a nine-man crew: two pilots, one navigator, one radar operator, one flight engineer/top turret gunner, one radio operator, two waist scanner/gunners, and one tail scanner/gunner.¹

Perhaps surprisingly, B-17Gs (also briefly referred to as the ERB-17) had operated in Korea well before 1950. One B-17G pilot, retired Lt. Col. William A. Barnett (a lieutenant in Korea), who served in Detachment 5, 3d Emergency Rescue Squadron (later, 3d ARS), at Kimpo Army Air

Base, Korea, from October 1946 to March 1947, recalled the primitive operational conditions existing there at the time:

We had 2 B-17s, 2 PBVs [OA-10 Catalinas] and an L-5 which I flew a lot. Chase[d] ducks on the Han River and when it was covered with ice, would chase foxes. We would use it to check people who failed to tell of their arrival at some field and we had to go see if they got there. . . . Later on one of our flak happy Navigators managed to salvo a lifeboat in a rice paddy.

Barnett described the living conditions at Kimpo as equally primitive, including sporadic electricity which was interrupted at least two nights a week by the North Koreans who controlled the country's power in those days. The unit history further attested to the unsatisfactory conditions at Kimpo, including cold water, cold quonset huts, and lack of recreational facilities.²

Although the SB-17s did not serve in the war theater beyond the autumn of 1951, they were the most heavily involved of all ARSvc aircraft in the war's first weeks. One of the first USAF aircraft to respond to the North Korean attack on June 25, 1950, was a Flight A, 3d ARS, SB-17 in which Capt. James A. Scheib transported a U.S. Army brigadier general from Japan to the vicinity of Seoul. The general was to investigate the then-unknown situation on the ground. Although the condition of the airfields near Seoul prevented Scheib from landing and delivering his passenger, his was the first ARSvc sortie of the Korean War.³

In the opening days of the war, due to a lack of reconnaissance units in the theater, Far East Air Forces (FEAF) called on the ARSvc Flying Fortresses to conduct reconnaissance and target weather reconnaissance missions. For instance, on June 28 and 29, and July 3, 1950, 1st Lt. Carl H. Erickson piloted an unarmed SB-17 on lengthy day and night weather reconnaissance sorties over North Korea, providing valuable information to FEAF fighters and bombers as they prepared for some of the war's first air strikes north of the 38th parallel.* An SB-17 pilot in Flight D, 1st Lt. Donald R. Marshall, flew eighteen combat sorties during the first two months of the war, including weather reconnaissance, general reconnaissance, and orbit sorties. Of his first nine sorties, most were flown at night, usually lasting eight to nine hours.⁴

* The SB-17s were unarmed at the start of the conflict but were armed shortly thereafter. Armament consisted of two .50-caliber machine guns in the top turret, a .50-caliber gun at each of the two waist gunner positions, and two .50-caliber guns in the tail gunner position.

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Capt James A. Scheib, an SB-17 pilot.

SB-17S ALSO CONDUCTED SEARCHES, ESCORTED AIRCRAFT IN DISTRESS, AND EVEN RECEIVED CREDIT FOR THE RESCUE OF TWELVE PERSONNEL

On the night of June 30, Lieutenant Marshall flew an orbit sortie over Tsu-shima Island, located between the southern end of the Korean peninsula and the southernmost Japanese main island, Kyushu. Due to poor weather all operational aircraft were recalled to their bases, but Marshall's SB-17 was directed to conduct a weather reconnaissance in preparation for the next day's planned strikes against North Korea. Flying in the vicinity of Pyongyang that night, Marshall recalled seeing some tracers as well as very inaccurate anti-aircraft fire. On the flight home, the SB-17 found itself the only U.S. aircraft returning from the north and received assistance from "every radar station that could see us in Japan."⁵

Based at Ashiya AB (known as "Ashiya by the Se-a"), Japan, and flying mainly at night, retired Major Marshall recalled he would "come home to sleep in the day to the shouts of the kids in the dependents' housing area playing 'Korean War.' It was a strange thing to combine war for a half day," he noted, "then come home to the family and club parties for the rest of the day." At the same time, in the war's first months U.S. bases in Japan, including Ashiya, were filling quickly with wounded American GIs from the front and had to be prepared in case the enemy attempted an aerial

attack on the base. In fact, on one memorable night shortly after the outbreak of hostilities, a flight of four South Korean F-51s fighters—whose home base was threatened by the enemy—decided to follow one of the SB-17s back to Japan. Lacking the proper transponder code, Japan-based radar station operators identified the F-51s as enemy fighters. Hearing that the base at Ashiya was under attack and seeing the unidentified fighters on its tail, the SB-17 opened fire on the South Koreans, who returned the fire, fortunately, without effect. Finally, the F-51s were able to make radio contact and clarify their identity, but only after Ashiya's military personnel and dependents alike had responded to the "air raid."⁶

Despite these and other stresses experienced by many airmen and their wives, in addition to reconnaissance and orbit sorties, SB-17s also conducted searches for missing aircraft, escorted aircraft in distress, and even received credit for the rescue of twelve personnel from U.S.-U.N.-controlled areas. During the last week of October 1950, FEAF reserved three SB-17s for classified missions, but details about them are unknown. Although no SB-17s were lost due to operational causes, on November 8, 1950, two SB-17s were involved in a major accident while taxiing at Ashiya AB, Japan. The hydraulic line to the brakes failed on one of the aircraft (the hydraulic pressure warning light had also failed), leading to an unavoidable collision with the other SB-17 and turning the nose sections of both aircraft into "complete wrecks." Both aircraft were salvaged.⁷

On January 21, 1951, multiple in-flight emergencies nearly resulted in the loss of an SB-17. On that date, aircraft number 3885 was returning to Johnson AB, Japan, following an orbit near the Korean coast in support of a FEAF bomber strike against the North. First, the number four engine quit and had to be feathered. An SA-16 sent to intercept the SB-17 and escort it to safety was unable to make visual contact due to the poor weather. Shortly thereafter, 3885 experienced a lightning strike that caused a fire in the nose compartment. Before being extinguished, the fire burned out the gunsight and disabled the radio compass and both navigational compasses. Fortunately, excellent coordination among ground radar stations along the west coast of Japan enabled them to guide the crippled SB-17 through icing conditions to a safe landing at home base.⁸

Although 3d ARS performed the lion's share of rescue work in the Korean War theater, 2d ARS was active as well. Former Sgt. Leonard J. Graf, a rescue scanner and engine mechanic assigned to Flight C, 2d ARS, served at Kadena AB between 1949 and 1951. Years later, Graf recalled the escort work performed by Okinawa-based SB-17s in the war's first year:

We were kept real busy escorting B-29 [aircraft] on bombing raids to North Korea & on max effort days we could see 90 B-29's go by us as we orbited Amami-O-Shima island south of Japan [one hun-

A B-29 photographed by Sgt. Leonard J. Graf, a rescue scanner and engine mechanic assigned to Flight C, 2d ARS, who served at Kadena AB.

THE SA-16 SEARCHED AN AREA FARTHER NORTH..., AND ... REPORTED SEEING A SURVIVOR IN A ONE-MAN LIFERAFT



dred miles north of Okinawa]. We would then go back to Oki & do our days work, then back up to Amami-O-Shima to wait until the last B-29 limped back home.

The SB-17s were slower than the B-29s, necessitating the practice (described above) of orbiting Amami-O-Shima, returning to Okinawa, then returning to Amami-O-Shima to escort the B-29s on their final leg home.⁹

The first operational A-1 boats drop by an SB-17 during the Korean War permitted the rescue of a B-26 crewmember. Late in the evening of December 6, 1950, a B-26 crew returning from a night sortie was forced to bail out over the Korea Strait, north of Susa, Japan. A snowstorm prevented the alert aircraft from taking off, so the 3d ARS dispatched a crash rescue boat from Fukuoka, Japan, to begin the search at daybreak. SA-16 and SB-17 aircraft were also briefed to begin a search at daybreak for the crew, weather permitting. Early on the 7th, the aircraft took off as planned and, hampered by snow showers and low visibility, searched until late afternoon without success. A second crash boat came in to relieve the first, which returned to Fukuoka to refuel. On the 8th, bad weather precluded resuming the search until noon. Receiving revised information on the B-26's location at the time of bailout, the SA-16 searched an area farther north than had been searched previously, and at 1500 hours reported seeing a survivor in a one-man liferaft. The amphibian pilot attempted to land but aborted due to the high swells. Instead, its crew dropped a five-man life raft and observed the survivor getting in. The SA-16 pilot requested that an SB-17 be dispatched to drop a lifeboat to the survivor. At 1620

hours, 1st Lt. Carl P. Dimmitt of Flight D, 3d ARS, arrived on the scene in SB-17 No. 3824 and, after performing several boat drop patterns, made the first operational boat drop of the war. The A-1 lifeboat descended under its three-clustered parachute and plunged into the water within fifty feet of the survivor. A second SB-17 stood by in case the first drop failed. It intended to remain in the area until a crash boat arrived, but snow showers and low visibility forced it to return to base. Meanwhile, the crash boat arrived in the area, but weather again prevented it from locating the survivor. By 0730 hours on the 9th, two SB-17s were airborne in search of the A-1 boat, but they were still hampered by low visibility. Weather conditions worsened later in the day and, consequently, the crew planned to resume its search in the morning. By 0718 hours on December 10, two search aircraft were airborne. Shortly thereafter, SB-17 No. 3824 reported the A-1 lifeboat had been sighted at a beach northeast of Susa, where the survivor had landed. Later that day, an SC-47 aircraft picked up the sole survivor of the B-26 crew, a Captain Lewis, and flew him to Iwakuni, Japan.¹⁰

Interestingly, while acknowledging the overall superiority of the SB-29 over the SB-17, the 3d ARS historian commented that, in the case above, "the old SB-17 had to be called in to drop a boat just before dark. An SB-29 from Yokota would never have made it." His assessment reflected the SB-29's longer runway requirement compared to the SB-17. Three of only four SB-29-suitable runways in Japan were located in the Tokyo area, thereby requiring, for rescues in the waters near Korea, a much longer flight for an SB-29 from Yokota AB (Tokyo) than for an SB-17 from Ashiya

SC-47 AIRCRAFT PICKED UP THE SOLE SURVIVOR OF THE B-26 CREW

An SB-17G of the 5th Rescue Squadron. (Photo courtesy of the author from the Menard Collection.)



ON MARCH 29, 1951, FLIGHT D RECEIVED A CALL THAT AN OKINAWA-BASED B-29 WAS IN TROUBLE

DESPITE THE INTENSE AND LENGTHY SEARCH, NEITHER THE MISSING BOMBER NOR CREW WERE FOUND

AB, which was located on the southernmost main island of Kyushu, closer to the Korean peninsula.¹¹

By the end of 1950, SA-16 amphibians had begun arriving in theater to replace the older SB-17s. Retired Maj. Donald R. Marshall, who flew SB-17s at Ashiya AB, credited the maintainers with keeping the rescue bombers combat ready, despite being phased out in 1951. Marshall, who flew eighteen combat sorties in the war's first two months, recalled years later, "most of the credit would have to go to the ground crews. We had 3 SB-17s, and most of the time one was in the air, one was ready to fly on alert status, and a third was necessary for stand-by status. And these SB-17s were weary old aircraft to start with."¹²

By the spring of 1951, 3d ARS possessed its full authorization of twelve SA-16s. Although the SB-17's days were numbered, they continued to perform some combat sorties despite a lack of spare parts. On the morning of March 29, 1951, Flight D received a call that an Okinawa-based B-29 was in trouble. Controllers at Yokota, Japan, intercepted the message from the distressed aircraft: "number two and three engines out . . . returning to Kadena at 2,000 [feet], Air Sea Rescue required." Returning from a combat sortie, Lt. Col. Harry G. Peterson, Flight D's commanding officer, was alerted to proceed to Cheju-do Island, off the southern coast of Korea, to conduct a search that grew over the next nine days to include not only ARSvc assets but also other USAF aircraft as well as U.S. Navy and Royal Navy assets. Unfortunately, despite the intense and lengthy search, neither the missing bomber nor crew were found.¹³

On the day this search ended, April 7, 1951, Lieutenant Dimmitt performed the second (and the final operational A-1) lifeboat drop of the

Korean War to an actual survivor (in at least one other case an SB-17 dropped a boat but it was later discovered that the pilot had perished). Dimmitt was flying a combat orbit over the Yellow Sea covering B-29 strikes against airfields near Pyongyang when, at about 1130 hours, an emergency call reported that a B-29 had just exploded in midair. The lieutenant headed his SB-17 toward the disaster area. Upon reaching the site, he found two empty life rafts. Two miles away, he located a one-man dinghy with a survivor in it. Dimmitt executed three boat drop patterns: the first, for positive identification; the second, to determine wind direction and a drop pattern; and the third, to drop the boat. Within minutes of the drop, an SA-16 arrived, landed, and picked up the survivor. As the now-empty A-1 lifeboat drifted toward shore, fighter aircraft were called in to destroy it, thereby preventing a valuable asset from falling into enemy hands. Lieutenant Dimmitt continued his search until, low on fuel, he headed back to K-2 (Taegu No. 1). The lieutenant had flown both of the operational lifeboat drops from SB-17s resulting in a life saved, and that month the unit historian quipped, "To keep the string of doubles intact, Lt. Dimmitt's wife presented him with twin boys."¹⁴

During another heavy bombing effort by FEAF B-29s against North Korean airfields, between May 7 and 9, 1951, the two remaining SB-17s from Flight D, 3d ARS, alternated flying combat rescue orbits off the coast near Pyongyang. Early in 1951, Flight A had ceased to operate the SB-17, becoming the first all-SA-16 flight in 3d ARS. By August, Flight D's "old reliables" were gone; shortly thereafter, Flight C, 3d ARS, followed suit. In October 1951, Flight C, 2d ARS, flew its



A B-29 photographed by Sgt. Leonard J. Graf.

last SB-17 operational sorties. As a writer in the *Misawa Air Base Piloteer* noted nostalgically, "Many airmen view the passing of the SB-17 from the Air Rescue scene with mixed emotions. The old 'Flying Fortress' is one of the most loved aircraft that has ever been a member of the Air Force team."¹⁵

Boeing SB-29 Superfortress

Like the SB-17, the SB-29 dated from World War II. However, unlike the SB-17, the Air Rescue Service did not receive its operational version of the B-29 Superfortress until after World War II. By 1949, SB-29s were entering the ARSvc inventory to provide long-range rescue coverage. The SB-17. Like the SB-17, the SB-29 carried a 30-foot lifeboat, designated the A-3. The all-metal A-3 lifeboat contained a thirty-day supply of food, water, and clothing sufficient for twelve survivors and featured a single inboard engine, but otherwise it was similar to the A-1. In June 1950, the 3d Air Rescue Squadron (3d ARS) did not possess any SB-29s. But beginning in September 1950, Flight B, 3d ARS (later, 37th ARS, 3d ARG), operated four SB-29s out of Japan, providing rescue coverage for the bomb-carrying B-29s.¹⁶

Operating temporarily out of Misawa AB, Japan, Flight B flew its first SB-29 combat orbit on September 1, 1950, before the flight's engineering section could revise the Boeing aircraft's performance charts to reflect the additional drag caused by the A-3 lifeboat. On September 4th, an SB-29 flew cover for an H-5 helicopter picking up Capt. Robert E. Wayne, a downed F-51 Mustang pilot in North Korea. Wayne was the first airman whose rescue from behind enemy lines in Korea has been documented. On the 20th, an SB-29 intercepted, for the first time, a B-29 in distress as

it returned from a combat sortie. The bomber had lost one engine and was losing power on another. The SB-29 escorted the B-29 to a safe landing in Japan and then returned to its orbit point. On September 26 and 27, an SB-29 searched unsuccessfully for survivors of a U.S. Navy P2V that had ditched near the Korean coast.¹⁷

In late November 1950, now operating from Yokota AB, Japan, 3d ARS assigned Flight B the task of providing rescue coverage to classified "Charlie Randall" RB-45 missions flown by the 91st Strategic Reconnaissance Squadron. The SB-29s could match the speed of the RB-45 better than could the SB-17s or SA-16s. From December 4 to 6, an SB-29 searched, with other rescue aircraft, for an RB-45 reported missing during a Charlie Randall sortie. Unfortunately, the search proved fruitless.¹⁸

Two ground incidents involving fires highlighted the fact that not all aircraft-related hazards took place during flight. On December 1, 1950, TSgt. Howard H. Hines, a newly arrived SB-29 assistant crew chief, was repairing a hose on the oxygen system of one of the Yokota-based bombers. A sudden explosion occurred that left Sergeant Hines with burns on both hands and a badly burned left leg. Quoting from Hines's Soldier's Medal citation, "he remained in the aircraft fighting the fire." But despite such valor, in addition to new oxygen system hoses the aircraft required a new copilot seat. Although Sergeant Hines spent the next three months recuperating from his burns at Tokyo General Hospital, he later returned to duty with 3d ARS, eventually retiring from the Air Force in 1969 with the rank of senior master sergeant. In January 1952, a fire caused by an oil stove destroyed Flight B's maintenance tent and two adjoining tents, but without injuries. Two months later, the flight's commanding officer, Lt. Col. Leon H. Golinsky, commended MSgt. James Broughton for voluntarily working many hours to replace the engineering records destroyed in the fire.¹⁹

Although no SB-29s were lost to enemy action, Flight B lost one on January 31, 1951. On that morning, Capt. Robert J. Stark, pilot of the backup SB-29, received a call to complete a scheduled orbit mission after an engine loss and malfunctioning instruments had forced the primary SB-29 to quit its orbit. At 0916 hours, Stark's SB-29 took off from Yokota AB but immediately lost electrical power and the use of two engines. Unable to remain airborne, it clipped through trees and crashed four miles from nearby Johnson AB, killing Capt. Edward D. Hagerty (copilot) and MSgt. Donald E. Tovsen (flight engineer), and seriously injuring Captain Stark and another crewmember, Cpl. Robert G. Curran, who died February 11. The other seven crewmembers were less seriously hurt. A ground rescue team from Flight A, 3d ARS, responded immediately and arrived at the scene in fifteen minutes. Medics administered first aid to the injured. Within thirty minutes, Capt. John C. Shumate, a para-doctor and Silver Star

THE OLD 'FLYING FORTRESS' IS ONE OF THE MOST LOVED AIRCRAFT THAT HAS EVER BEEN A MEMBER OF THE AIR FORCE TEAM



An SB-17G at Misawa AB, Japan, in 1949. (Photo courtesy of the author from the Menard Collection.)

AN SB-29 FROM THE 37TH ARS ALSO FLEW ORBITS ON DECEMBER 2 AND 5, 1952, IN SUPPORT OF PRESIDENT-ELECT EISENHOWER'S TRIP TO KOREA

recipient from an earlier (H-5 helicopter) rescue mission, parachuted into the crash site from an SA-16. In less than an hour, the most seriously injured were en route to the hospital at Johnson AB. Flight B personnel recovered the engine from the lost aircraft's A-3 boat and restored it to operational use on another lifeboat.²⁰

For several months, wet parachutes attached to the SB-29's A-3 lifeboats hampered operations. Prior to the spring of 1951, the standard procedure was to maintain SB-29s on the ground with their lifeboats loaded, or "bombed up." The problem was that one end of the parachute bag remained open, which allowed rainwater to enter. On one mission, when the SB-29 dropped its lifeboat, the wet parachute failed to open because it had frozen solid at high altitude. Based on the Air Material Command's assessment that water entered the A-3 boat only when the aircraft was on the ground, not during flight, in March 1951 3d ARS revised its procedures to permit securing the lifeboat to the belly of the SB-29 just before takeoff. At the end of a mission, the boat would be detached and stored until the next flight, which eliminated all possibility of the boat's taking on rainwater while on the ground.²¹

In September 1951, Flight B relocated from Yokota AB (Tokyo) to Komaki AB (Nagoya), Japan. In February 1952, the flight conducted practice lifeboat drops at nearby Lake Biwa. For the first time, the crews used a boat drop sight developed by TSgt. Ralph W. Templin of the flight's armament section. Templin's invention was a simple, low-cost device, easily constructed, maintained, and operated, and it represented a considerable improvement over the Norden bombsight used previously. On the first training drop Maj. Harry M. "Three Engine" Abell's crew released the A-3 boat from 800 feet; indicated airspeed was 180

mph, and the drop angle was 45 degrees on the reflex sight (Templin's). After parachuting for half a minute, it landed 150 feet from the target. On the second drop, 1st Lt. William A. Bright's crew dropped the boat from 750 feet, 180 mph indicated airspeed, and a drop angle of 36 ½ degrees on the reflex sight. The landing this time was 150 feet to the left and slightly downwind of the target. Presumably, 150 feet from the target met the standard for an operational drop, but a comparison with previous boat-drop results was not mentioned. Like other flying organizations, Flight B augmented its flying training regimen with ground training. The training films used, *Atomic Warfare*, and *World-wide Communism*, suggested the larger concerns of the United States even while fighting a limited war in Korea.²²

In June 1952, Flight B's SB-29s provided rescue coverage during a classified refueling experiment. In Operation Hightide, KB-29Ms refueled F-84 aircraft on combat sorties en route to Korea. An SB-29 from the 37th ARS (formerly, Flight B) also flew orbits on December 2 and 5, 1952, in support of President-elect Eisenhower's trip to Korea.²³

In May 1952, Flight D (later, 34th ARS, 2d ARG) began operating four and eventually five SB-29s from Kadena AB on Okinawa, Japan, in support of the B-29s of the 19th and 307th Bombardment Wings. The 34th ARS flew 200 combat sorties by April 1953. In late 1952, the 34th ARS described the typical SB-29 combat escort profile:

Ten minutes before the bomb group's first formation departs Okinawa, the Rescue SB-29 is airborne. The Rescue pilot times his flight so his SB-29 escorts each bomber from take-off until the bomb-laden aircraft is safely aloft. The SB-29 leaves the bomber, circles back to the field and repeats the previous escort process. If the B-29 develops trouble, the Rescue aircraft can render immediate assistance by dropping the 30 foot lifeboat.

After all bombers are aloft, the SB-29 (known as Airdale) takes a position ten miles upwind from the bomber stream and follows them to the Korean coast-in-point. Because of Airdale's lighter weight, it is abreast with the bomber stream as it reaches Korea's southern tip. Reaching the coast-in-point, the SB-29 proceeds to an assigned orbit position. It remains there until the lead bomber leaves Korea. The SB-29 continues to a point 30 miles east of the coast-in-point. It orbits until each B-29 announces its flying condition. Following the last bomber report, the 34th Air Rescue Squadron SB-29 follows the bomber stream home. Airdale is generally the first ship to leave Kadena Air Base and usually the last to return.²⁴

A mission on the night of October 31, 1952 highlighted how the different types of rescue vehicles complemented one another. That night, one of twelve B-29s returning to Kadena AB from a

An SB-29 of the 37th Air Rescue Squadron in October 1954. (Photo courtesy of the author from the Menard Collection.)



THE INCIDENT BECAME A PRIME EXAMPLE OF A COLD WAR SHOOT-DOWN IN WHICH SOME AMERICAN AIRCREW MEMBERS WERE PROBABLY CAPTURED BY THE SOVIETS AND TAKEN TO THE USSR

Korean bombing mission reported it was experiencing a loss of altitude and surging on two of its four engines. The escort SB-29 (from Flight D, 2d ARS) began an intercept on the distressed B-29 and established visual contact twenty miles northwest of Kadena. Airdale assumed a position above the right wing of the distressed bomber but the B-29 soon lost a third engine and had to ditch in the open sea. The SB-29's navigator, Capt. Clarence H. Roper, continued:

Following the B-29's crash landing, we maneuvered for the boat drop. Sight of the wreckage and survivors was lost. A flare was noticed to our left and we dropped the boat in the illuminated area. The light went out again and we lost visible contact with the boat. Our aircraft remained in the area for another hour but we failed to sight any wreckage, survivors or the A-3 boat.²⁵

Whereas Roper's SB-29 crew experienced the frustrations outlined above, a rescue H-19 helicopter located at least one of the survivors. Capt. John D. Heller was alerted at 0100 hours on November 1, and seventeen minutes later his H-19 was airborne. Arriving at the crash site, he began a search. Ten minutes later a C-47 reported a small light further to the northwest, presumably that of a survivor. When Heller's H-19 arrived at the new location, he prepared to lower the sling for a possible rescue attempt from a hover. However, his copilot reported a crash boat was approaching, so Captain Heller wisely elected to leave the pickup to the boat rather than attempt a hazardous hoist rescue over open water at night. The H-19 pilot remained in the area, providing illumination with his spotlight, while the crash boat

picked up three survivors. Searching continued for three days but no other survivors were found.²⁶

On July 29, 1953, an SB-29 from the 37th ARS dropped an A-3 lifeboat that saved one life. Possibly in reprisal for the downing of a Soviet Il-12 transport on the 27th, hours before the armistice went into effect, early on July 29 a Soviet MiG-15 shot down an RB-50 that was flying an intelligence-gathering sortie in international airspace over the Sea of Japan.²⁷

Alerted late to the situation, two SB-29s scrambled and searched for the missing aircraft. At about 1730 hours, Maj. Edwin P. Gourley's crew spotted wreckage and at least one survivor; his navigator, 1st Lt. Richard H. Heinz, dropped the lifeboat. A survivor, Capt. John Roche, reached the lifeboat and was picked up the next day by a U.S. Navy destroyer. In the meantime, both SB-29s, the second commanded by Capt. Ralph Z. Schneider, searched until after dark when they were relieved by two RB-29s of the 91st Strategic Reconnaissance Squadron. The search continued for two more days, but to no avail. Unknown to the participants at the time, the incident became a prime example of a Cold War shoot-down in which some American aircrew members were probably captured by the Soviets and taken to the USSR. As the SB-29s had arrived in the area, up to fifteen Soviet patrol boats were seen leaving the area, most likely having already picked up some of the crew. The lone survivor rescued by American forces, Captain Roche, recalled having heard shouting from some of the RB-50's crewmembers in the water. Tragically, the status of the fourteen missing aircrew members (two others were known to have died) has never been resolved.²⁸

The record of the boat-carrying bombers of the



A B-17 of the 2d Rescue Squadron. (Photo donated by Sgt. Graf.)

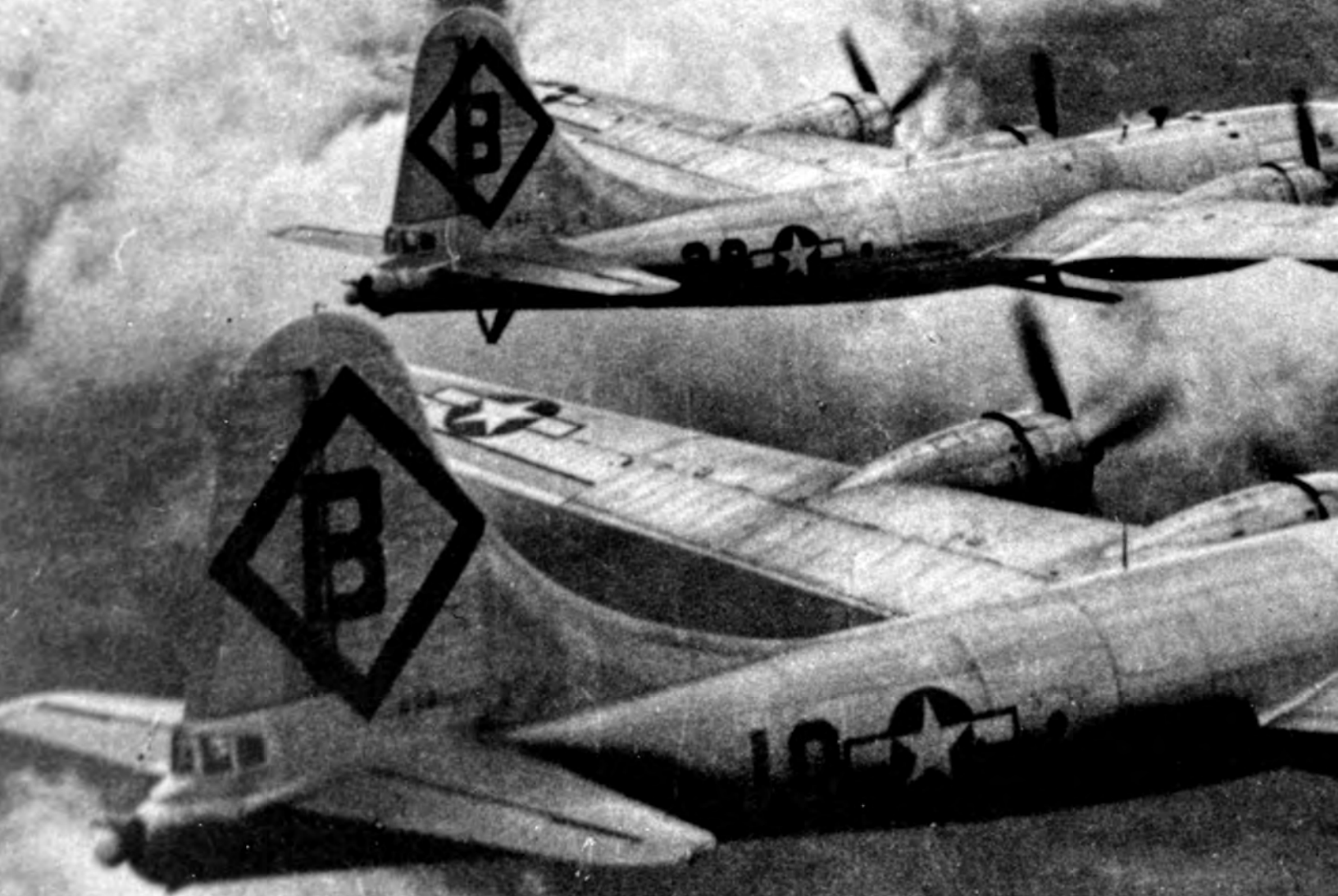
Air Rescue Service represented only a small part of the air rescue story in Korea, one that heretofore has been neglected almost entirely. But these aircraft were assets in terms of aircrew morale as much as in terms of their material benefit to the U.S./UN air effort. Although SB-17s and SB-29s

dropped only a few lifeboats operationally during the war, they buoyed the morale of fellow bomber crewmembers who knew that if they had to ditch or bail out over water, a well-equipped lifeboat would be there for them. Scheduled for replacement prior to the war's start the SB-17 served admirably early in the war and was responsible for several lives saved. But by the early summer of 1951, with adequate numbers of SA-16s and SB-29s available in the war theater for over water rescues, the useful service life of the venerable World War II bomber had come to an end. Although relatively new to the Air Rescue Service inventory, the SB-29 did not continue much beyond the cessation of hostilities in Korea. Shortly afterward, a rescue version of the C-54 transport, the SC-54, replaced the SB-29 and SB-17s that were still in service outside of the Korean War theater. The SC-54 possessed longer range, greater cargo capacity, and a more than ten-fold increase in the number of survivors it could potentially save with lifeboats and kits. In the final analysis, the Korean War experience of the SB-17 and SB-29 boat-droppers served as an example of the creative and determined use of the assets at hand to perform a mission whose importance had not been fully appreciated until the exigencies of that unanticipated and difficult conflict.²⁹ ■

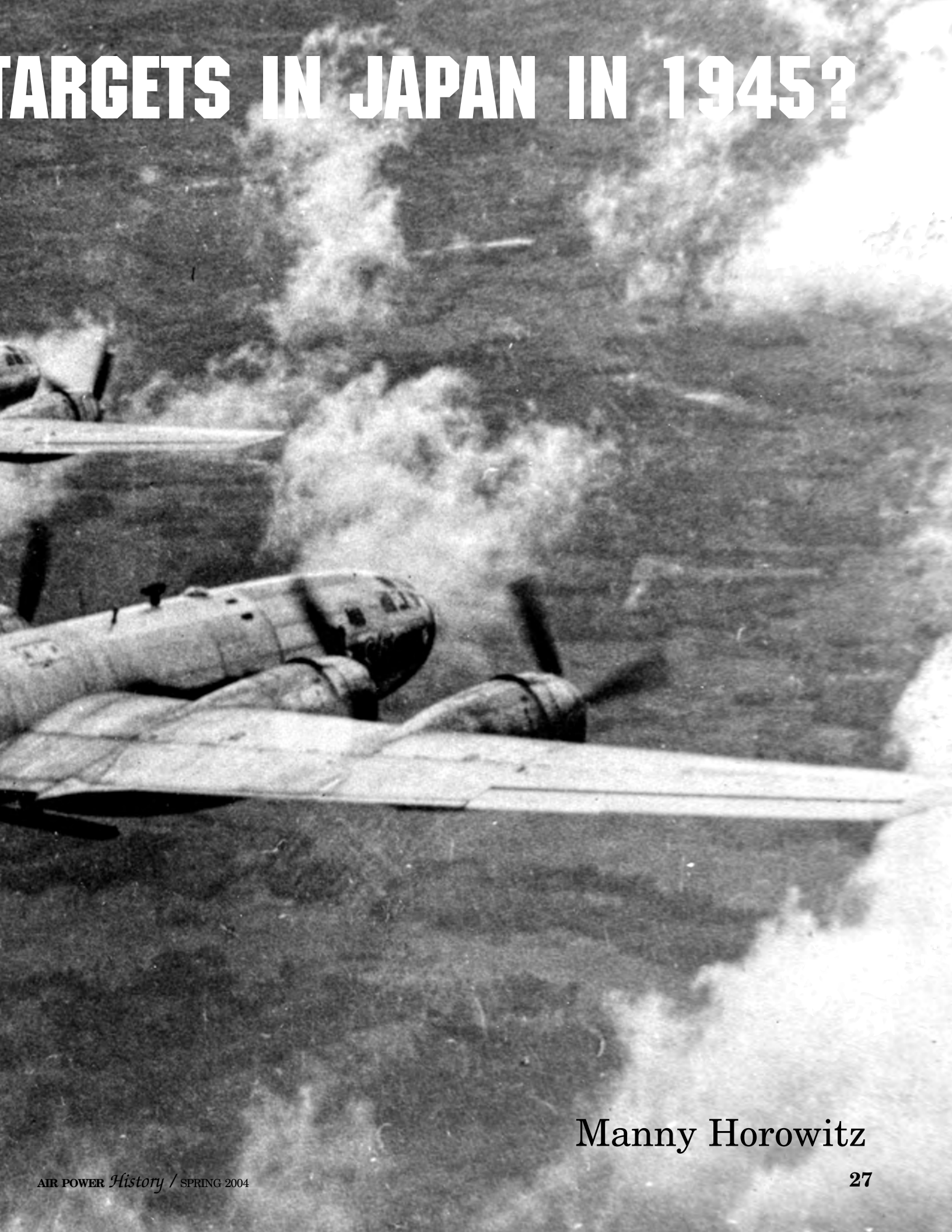
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WERE THERE STRATEGIC OIL T



TARGETS IN JAPAN IN 1945?



Manny Horowitz

(Overleaf) B-29s on a bombing run in the Pacific theater. (All photos courtesy of the author.)

THE USSBS REPORTS THAT, THE BOMBING OFFENSIVE AGAINST THE JAPANESE OIL INDUSTRY DID NOT BEGIN UNTIL MAY 1945 ... THE REFINERIES WERE LARGELY INACTIVE FOR LACK OF CRUDE OIL

A REVIEW OF THE DATA ON CRUDE OIL PRODUCTION AND REFINING REVEALS SOME INCONSISTENCIES, AND LEADS TO AN ENTIRELY DIFFERENT CONCLUSION

During World War II, the 315th Bomb Wing, Twentieth Air Force, was assigned the task of destroying the oil refining capacity and oil storage facilities of Japan.¹ After careful analysis and evaluation, the Strategic Intelligence Section of the Air Staff in Washington, D.C. concluded that destroying the Japanese petroleum industry would produce an immediate effect on the tactical situation in the Pacific Area of Operations. The Joint Chiefs of Staff believed that aerial bombardment of Japanese refineries would deprive them of critically needed crude oil and gasoline and would shorten the war. Gen. Carl A. Spaatz, commander of the U.S. Strategic Forces in Europe had seen Germany's ability to wage war severely damaged by the strategic bombing missions against the German oil industry. Later, when he assumed command of the U.S. Army Strategic Forces in the Pacific, Spaatz supported the plan to destroy Japan's petroleum industry, as did Maj. Gen. Curtis E. LeMay, commander of the Twentieth Air Force, and Brig. Gen. Barney Giles, the deputy commander.

Between June 26 and August 14, 1945, the 315th Bomb Wing carried out fifteen bombing missions against Japanese oil refineries and inflicted heavy damage upon the petroleum industry. After reviewing the post-strike photographs of the air attack on one target, the Maruzen Oil Refinery at Shimotsu, General LeMay wrote to the Wing Commander, Gen. Frank Armstrong, "you achieved ninety-five percent destruction, establishing the ability of your crews with the APQ-7 to hit and destroy precision targets, operating at night. This performance is the most successful radar bombing of the Command to date."

The United States Strategic Bombing Survey (USSBS) reports that, "the bombing offensive against the Japanese oil industry did not begin until May 1945. By that time the blockade had achieved its maximum effect and the refineries were largely inactive for lack of crude oil. Many tank farms were completely empty when bombed"² Elsewhere, the Survey states that, "the total amount of oil stocks destroyed between May 1945 and the end of the war amounted to 471,379 barrels (19,797,918 gallons)."³ These figures are very close to the cumulative data obtained for the oil destroyed in bombing missions from May to August 1945, shown in Table 1. These data indicate that 471,341 barrels (19,796,322 gallons) of crude oil, aviation gasoline, motor gasoline, kerosene, gas oil, diesel fuel, fuel oil, aviation lubri-

Table 1: Oil Supplies Destroyed by Aerial Bombing of Japanese Mainland Refineries

1945	Barrels	Gallons
May	203,814	8,560,188
June	103,445	4,344,690
July	103,673	4,354,266
August	60,409	2,537,178
Total	471,341	19,796,322

cating oil, other lubricating oil and miscellaneous oil products were destroyed. In July and August, the last two months of the war, 164,082 barrels (6,891,444 gallons) of oil supplies were destroyed in the bombing campaign.

In Chapter 4 on The Air Attacks and Their Effectiveness, the USSBS reports,

At the Akita refinery of the same company (Nippon Oil Co.) 12,000 100 and 250 pound bombs were released over the target during the last raid of the war. Over 1,200 of them fell into the refinery and oil storage areas. The refinery was in full operation, with furnace fires lighted and equipment filled with oil; a storage area located on a rise of ground adjacent to the refinery contained steel tanks partially filled with oil.... The burning oil from the ruptured tanks in the storage area flowed over the operating section, utterly ruining it.⁴

A review of the data on crude oil production and refining in the U.S. Strategic Bombing Survey reveals some inconsistencies, as the ones cited above, and leads to an entirely different conclusion than was reached by the authors of the Survey with regard to the availability of oil at Japanese refineries during the Twentieth Air Force's bombing offensive in 1945.

It appears that various authors⁵, perhaps relying on the conclusions of the U.S. Strategic Bombing Survey, have also reported that the bombings of the Japanese oil refineries were futile and unnecessary because there was no oil to destroy at these installations. For example, Bradley⁶ reports, "The efforts, however, was criticized by the USSBS. It states that the Japanese were refining virtually nothing by the time the bombing effort started since the blockade had cut off its supply of crude oil from the Netherlands East Indies and the Asian Continent." "Our target selection of the oil industry for the 315th Bomb Wing could be faulted, since it was hitting an already dead industry as a result of the naval

During World War II the author served as a B-29 navigator with the 315th Bomb Wing, Twentieth Air Force, stationed at Northwest Field on Guam. After the war he returned to the City College of New York and obtained his undergraduate degree in chemistry. Then he completed his graduate work at George Washington University, earning a Ph.D. in polymer chemistry. Dr. Horowitz was employed at the National Bureau of Standards, now the National Institute of Standards and Technology (NIST) for 29 years as a research chemist and later as Deputy Director of the Institute for Materials Research and the National Measurement Laboratory. In 1980 he joined the faculty of Johns Hopkins University and is currently a research professor in the Department of Materials Science and Engineering and teaches courses in biomaterials.

THE COMBAT CREWS WHO FLEW THE OIL MISSIONS AGAINST THE JAPANESE REFINERIES REPORTED RAGING FIRES AFTER THE BOMBING RUNS

blockade and B-29 mining campaign.” Historian Kenneth Werrell wrote,

Despite its great success, Eagle [radar] did not help the war effort. There was no point in destroying Japan's oil plants since their production had peaked between July and September 1943, well before the Boeing B-29 Superforts began their bombing campaign. It was the cutting of the oil imports, not the bombing of the refineries that throttled Japanese fuel.... The bombing destroyed 85 percent of the industry, yet contributed little to ending the war since the facilities were essentially closed down for lack of crude oil.⁷

In his book, *Downfall-The end of the Imperial Japanese Empire*, Richard Frank writes, “LeMay assigned the 315th the mission of destroying the Japanese petroleum industry. But ultimately this was the least effective component of the strategic attack upon Japan because the loss of these processing facilities had almost no impact due to the overall lack of crude oil to refine.”⁸ J.B. Smith, in his account of *The Last Mission* flown by the 315th Bomb Wing, reports that “By 1 April [1945] the Allied blockade had effectively shut off all of Japan's foreign oil supply. By the time we began our missions Japan's oil output had been reduced to 3 or 4 percent of its normal refinery yields. Little fuel was being produced domestically, and no supplies were coming from the Southeast. The storage tanks were mostly empty.”⁹ Professor Jerome Cohen provides a scholarly review of Japan's economy during the war and reconstruction, with a useful discussion about the role of oil but, he, too, reflects the view set forth in the USSBS, “Seven percent of all U.S. bombs dropped on Japan fell on the oil industry. Every important refinery on Honshu was hit; 85 percent of the total capacity was rendered inoperative but for the most part the bombs fell on inactive plants.”¹⁰

While these authors wrote that the Japanese oil refineries and storage facilities did not qualify as strategic targets, because they lacked significant quantities of crude oil and petroleum products the debriefing verbal accounts by the combat crews who flew the oil missions against the Japanese refineries reported raging fires after the bombing runs, fires being fed by the petroleum supplies contained in the refineries. This discrep-

ancy led to a research project whose purpose was to verify or disprove the claim that “there were no strategic oil targets left to destroy in Japan in 1945.” Relying on quantitative data obtained from the United States Strategic Bombing Survey, the Nippon Oil Company, the Japan Statistical Yearbook (1950)¹¹, the Geological Survey of Japan¹² and other publications this paper examines these claims about the lack of oil at Japanese refineries and finds them to be unsubstantiated and incorrect.

Nippon Oil Company Data

After more than a year of correspondence and communication with various Japanese organizations (including the Petroleum Association of Japan, the Japan National Oil Corporation, the Petroleum Department of the Ministry of International Trade and Industry, the Japanese embassy in Washington, and the Japan Technical Information Group), quantitative data on crude oil and processed by-products were obtained from the Nippon Oil Company for the period April to September 1945. Table 2 lists the crude oil throughput at nine of the Nippon Oil Company refineries. The original data (in kiloliters), have been converted to U.S. gallons and both sets of data are presented. Of the nine refineries listed, data were furnished for the six refineries located on the Japanese mainland (Kashiwazaki, Niigata, Akita, Yokohama, Kudamatsu and Hokkaido). The data reveal that there were inventories of crude oil at all of these refineries and, in some, significant quantities. (No data were provided for the refineries at Tsurumi and Kansai.) The facility on Taiwan was the only refinery not located on the Japanese mainland.

Total crude oil throughput for each refinery, for the period April-September 1945, is provided as well as the total for each month for all of the refineries. The quantities of the oil at the six mainland refineries are as follows: Kashiwazaki: 15,010.3 kiloliters (3,965,421 gallons), Niigata: 10,881.5 kiloliters (2,874,675 gallons), Akita: 36,867.3 kiloliters (9,739,603 gallons), Yokohama: 3,144.7 kiloliters (830,767 gallons), Kudamatsu: 12,722.2 kiloliters (3,360,951 gallons) and Hokkaido: 4,526.8 kiloliters (1,195,890 gallons). The total crude oil throughput from April-Sep-

Table 2. Crude Throughput at Nippon Oil Refineries* in 1945

Name of Refinery	April Kiloliters -Gallons	May Kiloliters -Gallons	June Kiloliters -Gallons	July Kiloliters -Gallons	August Kiloliters -Gallons	September Kiloliters -Gallons	Total Kiloliters -Gallons
Kashiwazaki	3,129.5-826,751	2,859.1-755,317	2,236.5-590,839	2,747.7-725,887	1,972.0-520,963	2,065.5-545,664	15,010.3-3,965,421
Niigata	1,367.3-361,213	2,121.2-560,379	1,855.0-490,054	1,428.0-377,249	2,994.0-790,955	1,116.0-294,825	10,881.5-2,874,675
Akita*1 ^a	9,411.0-2,486,198	8,532.3-2,254,063	4,516.8-1,193,248	10,913.5-2,883,128	3,493.7-922,966	0.0-0.0	36,867.3-9,739,603
Yokohama	724.0-191,266	650.6-171,876	79.3-20,949	358.7-94,761	542.7-143,371	789.4-208,544	3,144.7—830,767
Kudamatsu ^a	8,255.2-2,180,859	3,174.9-838,745	1,292.1-341,347	0.0-0.0	0.0-0.0	0.0-0.0	12,722.2-3,360,951
Hokkaido	131.3-34,687	1,084.2-286,424	995.4-262,965	761.9-201,279	852.4-225,187	701.6-185,348	4,526.8-1,195,890
Taiwan	135.0-35,664	153.0-40,420	0.0-0.0	0.0-0.0	0.0-0.0	0.0-0.0	288.0-76,084
Total	23,153.3-6,116,639	18,575.3-4,907,223	10,975.1-2,899,402	16,209.8-4,282,305	9,854.8-2,603,441	4,672.5-1,234,381	83,440.8-22,043,391

* The Nippon Co. did not report data for two of its refineries, Tsurumi and Kansai.

*1 The Akita Refinery was located at the Tsuchizaki Port in Akita Prefecture

a Japanese oil refineries bombed by the 315th Bomb Wing, 20th Air Force.

Refinery	Bombing Mission		Crude Oil Reserves, 1945		Percent Reduction
	No.	Date	Kiloliters (Gallons)		
			August	September	
Akita	15	August 14, 1945	3493.7(922,966)	0.0	100%
Kansai (Amagasaki)	8	July 19, 1945	no data available		
	14	August 9, 1945	no data available		
			June	July	
Kudamatsu	2	June 29, 1945	1,292.1 (341,347)	0.0	100%

Name of Refinery	April	May	June	July	August	September	Total
Kashiwazaki	920.5 (243,178)	1,223.8 (323,303)	935.9 (247,246)	719.8 (190,157)	991.6 (261,961)	854.4 (225,715)	5,646.0 (1,491,560)
Niigata							0.0
Akita	607.1 (160,384)	605.0 (159,829)	670.9 (177,238)	773.5 (204,343)	90.0 (23,776)	0.0	2,746.5 (725,570)
Yokohama	-30.5 (-8,057)				41.4 (10,937)		10.9 (2,880)
Kudamatsu	972.8 (256,994)	1,199.6 (316,910)	353.3 (93,335)	411.4 (108,684)	0.0	0.0	2,937.1 (775,923)
Hokkaido	20.0 (5,284)	375.8 (99,279)	325.0 (85,858)	-95.0 (-25,097)	187.0 (49,402)	300.0 (79,254)	1,112.8 (293,980)
Taiwan	59.5 (15,719)	40.8 (10,779)	163.5 (43,193)	0.0	0.0	0.0	263.8 (69,691)
Total	2,549.4 (673,500)	3,445.0 (910,100)	2,448.6 (646,871)	1,809.7 (478,086)	1,310.0 (346,076)	1,154.4 (304,969)	12,717.1 (3,359,604)

Material	Quantity		% of Total
	Kiloliters	Gallons	
Gasoline	12,717.1	3,359,604	15.7
Kerosene	7,286.2	1,924,868	9.0
Gasoil	6,535.2	1,726,469	8.0
Fuel Oil	39,610.9	10,464,408	48.7
Lubricating Oil	15,087.4	3,985,789	18.6
Total	81,236.8	21,461,138	100.0

tember 1945 for these six refineries amounted to 83,152.8 kiloliters (21,967,307 gallons). The grand total for all the refineries was 83,440.8 kiloliters (22,093,391 gallons).

Three of the Nippon Oil Company refineries were struck by the 315th Bomb Wing and this information is given in Table 3. These data demonstrate that at the Akita Refinery, the oil inventories in August 1945 were 3,493.7 kiloliters (922,966 gallons) and after the bombing mission on August 14, 1945 the oil inventories were zero. From April to July 1945 the monthly oil inventories at the Akita Refinery ranged from 4,516 kiloliters (1,193,248 gallons) to 10,913 kiloliters (2,883,128 gallons). The oil inventories at the Kudamatsu refinery in June 1945 were 1292 kiloliters (341,347 gallons) and after the air strike on June 29, 1945 the oil inventories fell to zero (July 1945).

A clue to the origin of the crude oil at the Akita Refinery is contained in the Target Information Sheet for the Akita bombing mission shown in Appendix 1. Section 3 of this document identifies

the Akita refinery as "one of the most important targets in the Japanese Petroleum Industry." And it also, "Processes crude oil from the oil fields around Akita, which are the largest natural petroleum producers in Japan proper." The annual crude oil capacity of these oil fields, in late 1944, was estimated to be 1,320,000 barrels (55,440,000 gallons). The subject of the Japanese oil fields will be discussed later in this paper.

Thus, while the naval blockade and air strikes against Japanese shipping were effective in curtailing or preventing crude oil imports to Japan, domestic oil fields were still capable of supplying shipments of this much needed resource to the refineries.

Table 4 provides data on the quantities of gasoline processed from the crude oil listed in Table 2. Again, in addition to the monthly (April-September 1945) entries for each refinery for which data were available the total quantities in kiloliters and gallons are given for the refineries listed. The total monthly production of gasoline for all the refineries ranged from 1,154.4 kiloliters (304,969 gallons) to 3,445.0 kiloliters (910,100 gallons). The grand total amount of gasoline produced during this period was 12,717.1 kiloliters (3,359,604 gallons).

The Nippon Oil Company also provided useful data on kerosene, gas oil, fuel oil and lubricating oil supplies processed from the crude oil listed in Table 2. This information is summarized in Table 5.

The total quantity of the by-products listed in Table 5 amounts to 81,236.8 kiloliters (21,461,138 gallons). Fuel oil represents 48.7 percent of the total volume of the products, the largest single component, followed by lubricating oil (18.6 percent) and gasoline (15.7 percent).

The data in Table 6 represent the quantities of crude oil at the Nippon Oil Company refineries in 1945 obtained from two independent sources, the U.S. Strategic Bombing Survey (1946) and the Nippon Oil Company in the year 2000. These data are in close agreement, differing by about 9 percent. Both sets of data show that there were between 495,453 and 544,136 barrels (20,809,026 to 22,853,712 gallons) of crude oil at the Nippon Oil Company refineries during the period April to August 1945.

Japan Statistical Yearbook (1950) Data

For the period 1941 to 1945, data on crude oil production in Japan as well as crude oil imports and heavy oil imports have been obtained from the Japan Statistical Yearbook (1950)¹³ and are tabulated in Table 7.

Prior to Japan's entry into World War II crude oil production, for example, in 1940, was 334,834 kiloliters (88.5 million gallons). During the war years crude oil production ranged from 305,720 kiloliters (80.8 million gallons) in 1941 to 245,452 kiloliters (64.8 million gallons) in 1945. It is interesting to note that crude oil production in 1945

Month	Data Source	
	U.S.S.B.S. (1946) *	Nippon Oil Co. (2000) **
April	155,564	145,634
May	129,832	116,839
June	88,035	69,033
July	104,408	101,960
August	66,297	61,987
Total	544,136	495,453

* The U.S. Strategic Bombing Survey Data (1946), on p. 47, Table 13, on crude oil was derived from Nippon Oil Refineries at Kashiwazaki, Yokohama, Kansai, Hokkaido, Nagaoka, Kawasaki, Tsurumi, Niigata, Tokyo, Kudamatsu, Akita and Taiwan.

** The data obtained directly from the Nippon Oil Company in the year 2000 reflected crude oil at the following refineries: Kashiwazaki, Yokohama, Hokkaido, Niigata, Kudamatsu, Akita and Taiwan. Three refineries: Nagaoka, Kawasaki and Tokyo were not included. Furthermore Nippon Oil Company did not furnish any data on the Kansai and Tsurumi refineries.

Year	Crude Oil Production		Crude Oil Imports		Heavy Oil Imports		Total		% Imports
	Kiloliters	Gallons x 10 ⁶	Kiloliters	Gallons x 10 ⁶	Kiloliters	Gallons x 10 ⁶	Kiloliters	Gallons x 10 ⁶	
1941	305,720	80.8	693,812	183.3	465,483	123.0	1,465,015	387.0	79.1
1942	262,605	69.4	559,732	147.9	52,548	13.9	874,885	231.1	70.0
1943	274,524	72.5	980,841	259.1	139,626	36.9	1,394,991	368.5	80.3
1944	254,542	67.2	208,728	55.3			463,270	122.4	45.1
1945	245,452	64.8			6,786	1.8	252,238	66.6	2.7

Year	Production		Imports		Total		% Imports
	Kiloliters	Gallons (Mill.)	Kiloliters	Gallons (Mill.)	Kiloliters	Gallons (Mill.)	
1941	384,107	101.7	649,202	171.9	1,033,309	273.0	62.8
1942	240,908	63.6	64	.0169	240,972	63.7	0.03
1943	308,244	81.4	5,751	1.519	313,995	82.9	1.8
1944	165,257	43.7			165,257	43.7	0.0
1945	39,450	10.4	77,988	20.60	117,438	31.0	66.4

was only 26.6 percent lower than peacetime production in 1940. Total crude oil throughput at Nippon Oil Company refineries, from April to September 1945, for which data are available, amounted to 83,440.9 kiloliters (22.0 million gallons), 34 percent of the total crude oil production in Japan as reported in the Japan Statistical Yearbook for 1945. In 1944 the crude oil imports were 208,728 kiloliters (55.3 million gallons) and represented 45.1 percent of the available crude oil. Crude oil imports in 1945 dropped to zero because of American interdiction tactics while heavy oil imports managed to reach 6,786 kiloliters (1.8 million gallons), 2.7 percent of available oil. Based on the data published by the Japanese Statistics Bureau in 1950, it is evident that significant amounts of crude oil were being produced domestically in Japan in 1945 (245,452 kiloliters, 64.8 million gallons). According to Hansell, the Japanese petroleum industry was extremely critical to their war effort and the destruction of their refining and storage facilities would make it much more difficult for them to successfully continue to conduct their war effort.¹⁴

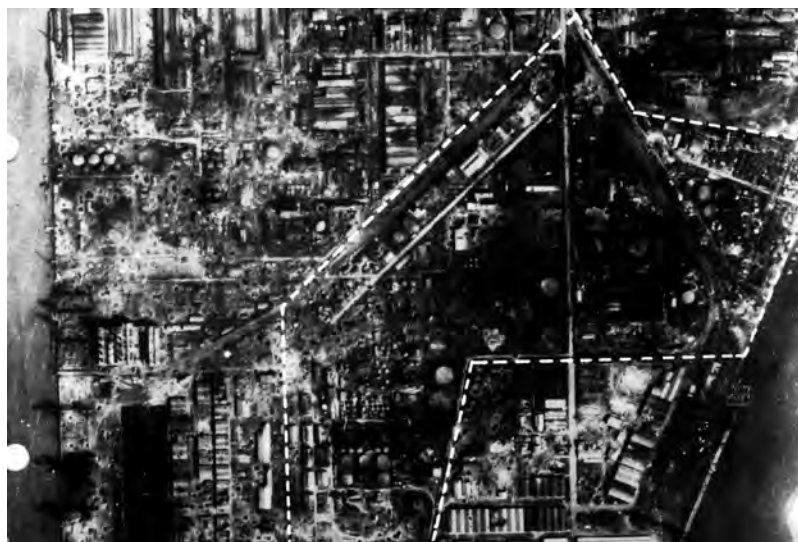
Based on published Japanese data, Table 8 provides useful information on gasoline (kiloliters and gallons) production, imports, total, and percent imports for the years 1941–1945.¹⁵ One notices that for the year 1944 gasoline imports were zero, but in 1945 imports amounted to 77,988 kiloliters (20.60 million gallons). This is difficult to explain, except that from September through December, during the Allied occupation of Japan, gasoline may have been imported by the occupying forces.

Japanese publications reveal that domestic gasoline production increased steadily from 1926 to 1937, reaching a maximum of 826,562 kiloliters (218.4 million gallons) in 1937. In that year imports amounted to 42.7 percent. From that point there was an annual decline in gasoline production and in 1941, 384,107 kiloliters (101.7 million gallons) of gasoline were produced. By 1944 annual production was reduced even further to 165,257 kiloliters (43.7 million gallons) and in 1945 it reached a war-time low of 39,450 kiloliters (10.4 million gallons). This latter figure may be compared to the gasoline produced at the Nippon Oil Company refineries for which data are available. Table 4 indicates that between April–September 1945 12,717.1 kiloliters (3,359,604 gallons) of gasoline were processed from Nippon crude oil stocks. Therefore, it is estimated that 26,732.9 kiloliters (7,040,396 gallons) of gasoline was produced at other Japanese refineries for which data were unobtainable.

Synthetic Oil

The production of synthetic oil from coal and its subsequent refining into gasoline should also be factored into the question of whether there were strategic oil targets remaining in Japan in 1945. Of the eleven oil refineries bombed by the 315th Bomb Wing the Ube Coal Liquefaction Company in Ube, Japan was the one that was capable of processing coal into hydrocarbon stock destined for conversion into gasoline and other needed products. Chester Marshall reports that, “the Ube plant was one of the few plants that remained in high production in Japan until we [315th BW] came along. It was not only destroyed on August 5, but also ‘sunk’ when the surrounding dikes were breached and the area inundated.”¹⁶ Figure 1 provides an aerial view of the Ube Coal Liquefaction Company prior to the air strike and Figure 2 shows the destroyed installation after the bombing mission. According to reports on 315th Bomb Wing Operations synthetic oil production dropped 44 percent, representing a loss of 265,000 barrels (11,130,000 gallons). Perhaps, this is why Bradley, in describing the 315th Bomb Wing air attack against the Ube Coal Liquefaction Company states that, “it was probably the most significant of the oil campaign.”¹⁷

In 1941, Japan's Inner Zone total annual synthetic oil production was 1,222,000 barrels (51,324,000 gallons). The information in the



(Top) Ube Coal Liquefaction Co. (dashed boundary) before the air strike.

(Above) Ube Coal Liquefaction Co. (dashed boundary) after the air strike.

Survey¹⁸ has been converted into Table 9 which lists some of the Japanese oil companies engaged in synthetic oil production, their refineries (works), location and the production actually attained during the war. For the eight oil compa-

nies listed the annual synthetic oil production amounted to 520,125 barrels (21,845,250 gallons). This represents 42.5 percent of the synthetic oil produced in 1941. The Survey¹⁹ also provided information on the synthetic oil production for the early months of 1945 and this has been used to prepare Table 10. For the period April to August 1945, synthetic oil production amounted to 179,929 barrels (7,557,018 gallons), 14.7 percent of the 1941 production.

It is important to include synthetic oil production in the Japanese Home Islands because synthetic oil (which was refined into useful petroleum products) could be produced from domestic coal, coal tar, and oil shale via an industrial chemical process. Thus, while the United States naval blockade and mining operation were very effective in preventing oil shipments from the territories for reaching Japan, it was possible for synthetic oil to be produced on the Home Islands. Each gallon of synthetic oil produced reduced Japan's dependence on oil from other sources by an equivalent amount.

Coal Liquefaction

As coal was one of the essential starting materials for the coal liquefaction plants, the availability of coal in Japan during World War II must be considered. Data on coal production and imports for the period 1941 to 1945 were obtained from the information contained in the Japan Statistical Yearbook (1950)²⁰ and the International Historical Statistics.²¹ These data are listed in Table 11.

In 1945, Japanese coal production amounted to 29,880 kilotons and imports were 312 kilotons or 1.0 percent of the total. This may be compared to the figures for 1941 which indicate 14.4 percent imports, a value close to the prewar (1940) quantity for coal imports that amounted to 14.9 percent. The affect of the American naval blockade, mining operations and air attacks on Japanese shipping is reflected in this marked decrease in imports. In Morgan's review²² of the Japanese war

A 315th Bomb Wing B-29 returns to base at Northwest Field, Guam.



Table 9. Production of Synthetic Oil at Plants in Japan, Home Islands²³

Name	Location	Production Attained	
		Barrels/Day	Barrels/Year
Nippon Iron Manufacturing Co. (Nippon Seitetsu K.K.) Wanishi Works	Muroran, Hokkaido	50	18,250
Nippon Oil Conversion Industry Co. (Nippon Yuka Kogyo K.K.) Kawasaki Works	Kawasaki, Kanagawa	80	29,200
Nippon Synthetic Oil Co. (Nippon Jinzo Sekiyu K.K.) Omuta Plant Takikawa Works	Omuta, Fukuoka Takikawa, Hokkaido	275	100,375
		110	40,150
Nissan Liquid Fuel Co. (Nissan Ekitai Nenryo K.K.) Wakamatsu Works	Wakamatsu, Fukuoka	350	127,750
Imperial Fuel Industry Co. (Teikoku Nenryo Kogyo K.K.) Ube Works	Ube, Yamaguchi	320	116,800
Toho Chemical Industry Co. (Toho Kagaku Kogyo K.K.) Nagoya Works	Nagoya, Aichi	25	9,125
Tokyo Gas Chemical Industry Co. (Tokyo Gas Kagaku Kogyo K.K.) Yokohama Works	Yokohama, Kanagawa	15	5,475
Ube Industrial Productions Co. (Ube Kosan K.K.)	Ube, Yamaguchi	200	73,000
		1,425	520,125 (21,845,250 gallons/yr)

Table 10. Production of Synthetic Oil (1945)²⁴

Company	Production	
	Barrels	Gallons
1. Imperial Fuel Industry Co. ^a Ube, Naibachi and Naihoro Works	101,456	4,261,152
2. Nippon Synthetic Oil Co. ^b	24,166	1,014,972
3. Nissan Liquid Fuel Oil Co. ^b	36,942	1,551,564
4. Ube Industrial Production Co. ^b	15,787	663,054
5. Nippon Iron Manufacturing Co. ^c	1,578	66,276
6. Toho Chemical Industry Nagoya Works	No Data for 1945	
7. Nippon Oil Conversion Industry Co. Kawasaki Works	No Data for 1945	
8. Tokyo Gas Chemical Industry Co. Yokohama Works	No Data for 1945	
	179,929	7,557,018

a. April-July 1945
b. April-August 1945
c. April-June 1945

Table 11. Coal, Kilotons

Year	Production	Imports	Imports From Territory	Total	% Imports
1941	56,472	5,155	4,427	66,654	14.4
1942	53,540	5,455	3,282	62,277	14.0
1943	55,500	4,068	2,151	61,719	10.1
1944	52,945	2,195	1,129	56,269	5.9
1945	29,880	269	43	30,192	1.0

economy he states that, "of the 6,000,000 tons of merchant ships with which Japan started the war only 2,000,000 tons were left by April 1945." It is also evident that even in peacetime (1940) coal imports represented only a minor percentage of the total available, the bulk coming from domestic

production (mining). In 1941, coal production amounted to 56,472 kilotons, the largest amount of coal produced during the period from 1926 to 1949. This represented 85.6 percent of the available coal. In 1945 the coal production was 29,880 kilotons (99% of available coal), reflecting a 47.1 percent decrease when compared to coal production in 1941. One could conclude that American attacks of the Japanese homeland during 1944 and 1945 contributed to the decline in domestic coal production which incidentally began to increase significantly after the war.

The data in Table 11 demonstrate that even as late in the war as 1945, 29,880 kilotons (29,880,000 tons) of coal were available to the Japanese for war-time use, including utilization at coal liquefaction refineries such as the Ube Coal Liquefaction Refinery. However, it should be mentioned that some of the available coal was of low quality and the high sulfur content often resulted in severe corrosion of the water gas generators in the plants. Also, the shortage of high quality cobalt and thorium catalysts for the conversion of the starting materials to synthetic crude oil led to the use of low activity nickel as a catalyst.

Despite production problems significant quantities of synthetic oil were produced. Returning to Table 9 we see that the synthetic oil production attained in Japan prior to the B-29 air strikes from May to August 1945 was 21,845,250 gallons. The synthetic oil production from April to August 1945, reflected in Table 10, amounted to 7,557,018 gallons.

Japanese Oil Fields

The Japanese oil fields located on Hokkaido and Honshu, contained more than 4,000 oil wells. Table 12, dealing with the quantities of oil produced at these oil fields, has utilized data from the Survey.²⁵

During the first half of 1945, the oil produced at the 4,277 operating oil wells on the mainland of Japan amounted to 739,600 barrels (31,063,200 gallons). This was about 50 percent of the crude oil produced by these wells in 1944, 1,482,500 barrels (66,265,000 gallons). According to other survey data²⁶ during the first seven months of 1945 the total crude oil still amounted to 950,000 barrels (39,900,000 gallons). When equivalent time periods are used for the production in 1945 the difference between the two sets of figures is about 10 percent.

In 1941 the oil storage capacity in Japan was about 60,000,000 barrels, (2,520,000,000 gallons). As a result of the aerial bombing in 1945 85 percent of the storage capacity was destroyed. The remaining 15 percent oil storage capacity amounted to 9,000,000 barrels (378,000,000 gallons).

Table 13 contains 1945 data on crude oil and refined oil from seven Japanese oil companies and two military refineries extracted from the United States Strategic Bombing Survey.²⁷ For each of the

SYNTHETIC OIL COULD BE PRODUCED FROM DOMESTIC COAL, COAL TAR, AND OIL SHALE

Table 12. Crude Oil Production, Japan (Homeland Islands)

Location	Number of Fields	Producing Wells	Crude Oil Production, Barrels		Reduced Production, % 1945 vs. 1944
			1944	1945**	
Hokkaido	9	444	36,400	17,600	51.6
Honshu					
1. Akita	15	1,301	812,000	390,600	51.9
2. Yamagata	7	253	278,000	154,700	44.4
3. Niigata	24	2,279	356,100	176,700	50.4
	55	4,277	1,482,500 (66,265,000 gallons)	739,600 (31,063,200 gallons)	

* Crude oil fields in Japan are located along a north-south line from Hokkaido to the West Coast of Honshu.

** First half of 1945.

Table 13. Production of Crude Oil and Refined Oils (1945)²⁸

Oil Company	Crude Oil Charged		Refined Oils	
	Barrels	Gallons	Barrels	Gallons
1. Mitsubishi Oil Co. Kawasaki Refinery	10,002 ^a	420,084	13,876	582,792
2. Maruzen Oil Co. ¹	88,739	3,727,638	81,663	3,429,846
3. Showa Oil Co. ²	145,381 ^b	6,106,002	127,832 ^a	5,368,944
4. Daiko Oil Co. ³	No Data Available for 1945			
5. Koa Oil Co. ⁴	17,184 ^c	721,728	16,184	679,728
6. Nippon Mining Co. ⁵	189,173 ^d	7,945,266	187,459 ^e	7,873,278
7. Toa Fuel Ind., Co. ⁵	75,335 ^e	3,164,070	74,222 ^d	3,117,324
8. Japanese Naval Refineries ⁶	69,190 ^f	2,905,980	132,293 ^g	5,556,306
9. Japanese Army Refineries ⁷	0 ^h	0	27,969	1,174,698
Total	595,004	24,990,168	661,498	27,782,916

1. Includes Yokohama, Osaka, Funamachi, Imafuku, Osaka (Toyo Sekiyu), Matsuyama, and Wakayama refineries

2. Includes Kawasaki, Kainan, Hikoshima, Sekiya, Tokyo, Hirasawa, and Niigata Refineries

3. Includes Niitsu, Niigata, Tokyo and Yokkaichi refineries

4. Includes Yokohama and Marifu refineries

5. Includes Wakayama and Shimizu refineries

6. Includes second, third and sixth naval depots

7. Includes Iwakumi, Shihei and Kinsei refineries

a. April-July 1945

b. April-September 1945

c. April 1945

d. April-September 1945

e. April-June 1945

f. April-May 1945

g. April-August 1945

h. April-June 1945

Note: The total refined products are more than the crude oil charged because semi-finished products were also processed.

oil companies and the military installations their operating refineries and depots are identified. Also, the specific production period (months) during the year 1945 are indicated when such information was provided. In 1945, the Nippon Mining Company produced the largest amounts of crude oil, 189,173 barrels, (7,945,266 gallons) and refined oil, 187,459 barrels (7,873,278 gallons). The total production of crude oil for all these companies and refineries in 1945 was 595,000 barrels (24,990,168 gallons) and the quantity of refined oil amounted to 661,498 barrels (27,782,916 gallons). Because semifinished products were used in addition to the crude oil the quantity of refined oils is greater than the crude oil. Grant²⁹ reports that in 1945 proved oil field reserves at the beginning of the year amounted to 17,977,000 barrels (755,034,000 gallons). Thus, there was a very large

quantity of crude oil potentially available for use by the Japanese oil refineries in 1945 if the facilities had not been destroyed or damaged by the 315th Bomb Wing air raids.

Conclusion

The United States Strategic Bombing Survey and other publications dealing with crude oil and synthetic oil production and refining concluded that by 1945, Japan had so little oil at its refineries and storage facilities, as to make them unworthy targets for bombardment. This conclusion is both unsubstantiated and incorrect. In fact, the data presented in this article refutes the conclusions reached by the Survey and the other publications cited. The data presented here arrives at an altogether different set of conclusions, summarized as follows:

1. Oil production from the 4,277 operating oil wells in Japan during the first six months of 1945 amounted to 739,000 barrels (31,038,000 gallons). Data in the Survey report for the first seven months of 1945 list the oil production as 950,000 barrels (39,900,000 gallons).

2. The Survey reported that during May-August 1945, B-29 air strikes against the Japanese Home Islands petroleum industry destroyed 471,379 barrels (19,797,918 gallons) of oil supplies. Other data in this literature report the oil supplies destroyed in bombing missions as 471,341 barrels (19,796,322 gallons). There is less than 1 percent of difference between these two sets of figures.

3. Data on crude oil supplies for the Nippon Oil company for the period April-August 1945 from two independent sources reveal the following:

	<u>USSBS (1946)</u>	<u>Nippon Oil Co.(2000)</u>
Barrels	544,136	495,453
Gallons	22,853,712	20,809,026

4. Data on crude oil supplies for 1945 from other Japanese oil companies and refineries:

	<u>Crude Oil Charged</u>	<u>Refined Oils</u>
Barrels	595,004	661,498
Gallons	24,990,168	27,782,916

5. Combining the Survey report crude oil figures for the Nippon Oil Company and the other Japanese oil companies and refineries for which data are available:

	<u>Crude Oil</u>	
	<u>Barrels</u>	<u>Gallons</u>
	544,136	22,853,712
	<u>595,004</u>	<u>24,990,168</u>
	1,139,140	47,843,880

6. As it has not been possible, thus far, to obtain crude oil and refined oil data on all the Japanese oil companies in operation during 1945, the quantities cited must be considered an underestimate. To support this assumption the data from the



Japan Statistical Yearbook (1950) shows that total crude oil production in Japan in 1944 was 254,542 kiloliters (67, 244,906 gallons) and in 1945 it was 245,452 kiloliters (64,843,509 gallons). The 1945 figures represent 80.3 percent of the total crude oil production for 1941 (305,720 kiloliters, 80,765,110 gallons), the peak year for crude oil production in Japan during World War II. The quantity for crude oil production in 1941 (80,765,110 gallons) derived from the *Japan Statistical Yearbook* is in good agreement with the

amount noted in the Akita Target Information Sheet for crude oil produced from homeland wells in 1941 (81,522,000 gallons).

7. The goal of this article is to stimulate discussion of this important military historical question. Hopefully, this discussion will lead to additional research on this subject and make it possible to further improve our understanding of the B-29 aerial bombing campaign against the Japanese petroleum industry in 1945. ■

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General Bernard A. Schriev



ver: Technological Visionary



Jacob Neufeld

(Overleaf) General Schriever sits among models of the "family of missiles" he helped build.

(Right) An outstanding golfer, Schriever launches a ball at the Meadow Club, San Rafael, California, in 1938.

(Below) Class of July 1932, Randolph Field, Texas. Cadet B. A. Schriever is in the front row, third from the left.

IN 1931, BENNIE SCHRIEVER EARNED AN ENGINEERING DEGREE AND AN ARMY COMMISSION THROUGH THE ROTC

BY SEPTEMBER 1944, ... SCHRIEVER COMMANDED THE ADVANCED HEADQUARTERS, FAR EAST AIR SERVICE COMMAND

"A technological visionary... a pioneer in the research and development of new ballistic missile and space programs... a dynamic, innovative leader, and valued advisor." These are some of the attributes that have characterized the life of General Bernard A. Schriever and marked his career of outstanding achievement.

Born on September 14, 1910, in Bremen, Germany, Schriever was only six years old when he came to the United States on the eve of our nation's entry into World War I. Shortly after the family settled nearby to San Antonio, Texas, his father was killed in an industrial accident. His mother, Elizabeth, worked at a variety of jobs to raise "Bennie" and his younger brother, Gerhard. She instilled in the boys the importance of education and somehow provided them the opportunity to attend college. Both sons were graduated from Texas A&M. In 1931, Bennie Schriever earned an engineering degree and an Army commission through the ROTC. He soon caught the flying bug and transferred from the Artillery to Air Corps. Schriever also became a superb golfer, and in 1932 won the state's amateur golf title by defeating Captain Ken Rogers, later one of his flight instructors at Kelly Field.

Shortly after pinning on his wings in 1933, Schriever was assigned to March Field, Riverside, California, which was then commanded by Lt. Col. Henry H. "Hap" Arnold. Also serving at March Field then were some of the Air Corps's future leaders, including Carl A. "Tooney" Spaatz, Ira C. Eaker, and Clarence Tinker. In the winter of 1934, Schriever flew the Air Corps's disastrous air mail missions. Piloting antiquated, ill-equipped planes, Schriever saw many of his companions plunge to their deaths. This experience underscored for him the consequences of technical inferiority and demonstrated the importance of modernizing and strengthening American air power.

The scientifically minded Schriever was soon drawn to flight testing and an engineering career.



After completing the Air Corps Engineering School [forerunner of AFIT] course at Wright Field, Ohio, he went on to earn a Master's degree in aeronautical engineering from Stanford University, just as the United States entered World War II.

From July 1942 until the end of 1945, Schriever served in the southwest Pacific. Beginning as a B-17 pilot with the 19th Bombardment Group, he flew thirty-six combat missions. Also assigned as a maintenance officer, Schriever succeeded at solving problems and introducing innovations. His superiors soon recognized Schriever's technical and leadership abilities and steadily promoted him in rank from captain to colonel, and in position from Chief of Maintenance and Engineering to Chief of Staff, Fifth Air Force Service Command. By September 1944, the thirty-four year old Schriever commanded the Advanced Headquarters, Far East Air Service Command that sup-



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(Above) Lt. Col. Henry H. "Hap" Arnold, in 1934, Commander of the Army Air Mail, Western Zone.

(Above right) Schriever and Maj. Jack Dougherty flew a night mission against Rabaul on September 23, 1942, in support of landings at Guadalcanal.

TECHNOLOGY PUSH PREVAILED OVER REQUIREMENTS PULL

In 1944–1945, Colonel Schriever was Chief of Maintenance for the Fifth Air Force in the Southwest Pacific.

ported theater operations from bases in New Guinea, the Philippines, and Okinawa.

After the war, Schriever's leadership and accomplishments attracted the attention of senior officers, notably "Hap" Arnold, now the Commanding General of the Army Air Forces. Recognizing his protégé's rare combination of engineering training and operational experience, Arnold assigned Schriever the delicate job of maintaining the close ties forged during the war between the air force and nation's leading scientists. Working with the world famous Dr. Theodore von Kármán, chairman of the Scientific Advisory Board (SAB), and with RAND Corporation staffers, Schriever focused on long-range scientific planning. He helped to refine a methodology that matched long-range military requirements with ongoing research and development. Plans were drawn for all major elements of air power—strategic and tac-



tical warfare, air defense, intelligence, and reconnaissance; RAND, the SAB, and university researchers performed the systems analysis studies. As a result, the Air Force did not have to wait for technological change to mature, but could lead and direct it. Put another way, Schriever's staff combined operational requirements with technologies, strategies, and objectives to establish objectives for future systems. "Technology push" thus prevailed over "requirements pull."

Schriever also headed an Air Staff study group seeking to improve development and maintenance practices. Issued in April 1951, their report, "Combat Ready Aircraft Study: How Better Management Can Improve the Readiness of the Air Force," concluded that short-term needs typically required continuous modifications. To avoid this, the study group proposed that all of the components of a weapon's life cycle be coordinated early in development.

Generally, there were two alternatives. Under the prime contractor method, a single company managed and integrated an entire weapon system. This approach granted to industry substantial



THE SYSTEMS APPROACH ... BECAME THE CENTER-PIECE OF SCHRIEVER'S MANAGEMENT METHODOLOGY

authority for development and production, and enabled the Air Force to purchase management services. A second way was through the associate contractor method, where the government hired one company to create specifications and oversee development, while other companies were hired to develop hardware components. Under the latter method, Air Force officers served as the integrators. Known as the systems approach it subsequently became the centerpiece of Schriever's management methodology.

The opportunity to test these theories arose during an SAB meeting, in March 1953, when Schriever learned about the encouraging results of recent thermonuclear tests. Subsequently, the newly inaugurated Eisenhower Administration directed a thorough review of major weapons systems, especially guided missiles. The task fell to the Secretary of the Air Force's special assistant for research and development (R&D), a hard-charging, blunt-speaking engineer named Trevor Gardner. In October 1953, Gardner appointed Dr. John von Neumann to chair a committee to consider building an intercontinental ballistic missile (ICBM). In its February 1954 report, the Teapot committee recommended that the Air Force initiate a crash program to produce an ICBM. In May, the Air Force made the Atlas ICBM its top priority and Gardner selected Brigadier General Schriever to head the program.

Activated on July 1, in Inglewood, a suburb of Los Angeles, Schriever's Western Development Division (WDD), was housed in a former parochial school. It began with twelve officers and three enlisted men, and eventually grew to some 1,500 personnel. Schriever had to create an organization to manage extremely varied and novel science and technology, build facilities for testing and production, integrate the missile systems, fit together the nuclear weapons they would carry, and provide the launching sites, equipment, and ground support necessary to bring the missiles to operational status. Moreover, he had to accomplish all of this

within six years and *before* the Soviets could themselves build, deploy, and target their missiles against the United States! It was a deadly serious, real-life contest of "beat the clock."

Convinced that the Air Force lacked the requisite technical expertise, Schriever hired the Ramo-Wooldrige Corporation for systems engineering and technical development. He also acted quickly to gain control over the procurement apparatus. Consequently, he arranged for the Air Materiel Command to co-locate with WDD a special contracting office assigned to him. Schriever also instituted the Gillette Procedures, a simplified decision chain that helped him to avoid administrative micromanagement and reduced the approval authority to two high-level ballistic missiles committees—one representing the Air Force, the other the Department of Defense (DoD). Thus, Schriever gained complete authority over all aspects of the Atlas program and transformed WDD into a virtually autonomous organization.

Meanwhile, the USSR had dealt a stunning blow to America's pride by launching the world's first artificial satellite, Sputnik, on October 4, 1957. Although the administration tried to minimize the military significance of the Soviet feat, political opponents noted that the satellite was launched by a ballistic missile and they raised an alarm of a "missile gap." Recently imposed funding restrictions, were quickly lifted and funding increased.

The Atlas ICBM experienced several early test failures, before achieving its first successful flight from Cape Canaveral, 575 miles over the South Atlantic, on December 17, 1957. But reliability improved with more testing. The next three tests were successes, including the December 1958

THE AIR FORCE MADE THE ATLAS ICBM ITS TOP PRIORITY AND GARDNER SELECTED BRIGADIER GENERAL SCHRIEVER TO HEAD THE PROGRAM

(Below) Western Development Division's first headquarters in Inglewood, California, 1954.

(Below right) Sputnik on display at Moscow's Academy of Sciences Pavilion.



(Near right) Atlas launch in 1960.

(Far right) Titan launch in 1962.

SCHRIEVER APPEARED FREQUENTLY BEFORE CONGRESSIONAL COMMITTEES ... THEIR RELATIONSHIP WITH SCHRIEVER WAS ALWAYS GOOD.

SCHRIEVER FORESAW THE POTENTIAL OF OUTER SPACE SYSTEMS



launch of Project SCORE (Signal Communications Orbiting Relay Equipment) satellite that went into orbit, playing President Eisenhower's Christmas message. The operational Atlas Series D tests had a somewhat checkered record at first, but recovered in time for the Air Force to declare operational a three-missile launch complex at Vandenberg AFB in September 1959. By year's end the Atlas D became combat ready. An alternate ICBM, the Titan, and an intermediate-range ballistic missile (IRBM), the Thor, were added to the missiles "family."

Between 1957 and 1960, Schriever appeared frequently before congressional committees, spending more time in Washington than in California. But, he had worked well with Congress since his experience on the Air Staff and the early days at WDD. An ardent, persuasive, and respected advocate for the missile program, his engaging personality, quick wit, and excellent golf game helped him to form friendships. Thus, even as Congress attacked President Eisenhower and the missile gap, their relationship with Schriever was always good.

In April 1959, Schriever was promoted to lieutenant general and named head of the Air Research and Development Command (ARDC), which was charged with developing and maintaining the Air Force's air and space weapons. ARDC managed more than 6,400 research and development contracts, engaging some 1,500 major companies. ARDC employed the Cooke-Craigie Plan, instituted in the late 1940s, which had revised the Air Force's sequential development planning practice to a limited production run while a system was still in initial development. The operative philosophy was that a steady supply of test vehicles would be available to enter into production.

The ICBM program advanced to a "second generation" Titan II, which was powered by a storable liquid propellant, could be launched from an underground silo, and had all-inertial guidance;



and the solid-fueled Minuteman, which completed its first flight in February 1961, three years after being approved, and went on alert beginning in October 1962, during the Cuban Missile Crisis— incredible achievements by today's standards.

* * *

Even as he was preoccupied with acquiring ICBMs and IRBMs, Schriever foresaw the potential of outer space systems and the need to extend the Air Force's interests into the "high frontier." While many of his achievements in the space field remain classified, we can acknowledge his pivotal role in developing the requirements for intelligence and reconnaissance satellites and manned space flight. Schriever's enthusiasm for space exploration tapped his fortitude in sometimes standing up alone to his superiors. Indeed, although some people tried to muzzle him, Schriever never shrank back from what he believed in.

Schriever assigned responsibility for the reconnaissance satellite program WS-117L to Navy Capt. Robert C. Truax. In October 1955 ARDC moved the program from the Wright Air Development Center, in Ohio, to WDD. On April 2, 1956, Schriever approved the plan for full-scale development of the advanced reconnaissance satellite. In January 1958, he reminded the Senate Armed services Committee that: "...we [the Air Force] have been interested in satellites since 1946 when we started the RAND Corporation."

The Eisenhower administration was more circumspect about the potential of space. In February 1955, the Killian Committee report to President Eisenhower did not place much confidence in a space satellite. Therefore, the U-2 and balloon reconnaissance programs received priority over the USAF's Advanced Reconnaissance [Satellite] System (ARS), later the WS-117L. WDD recommended a five-year full-scale development of the ARS, costing approximately \$117 million.

President Eisenhower and Gen. Thomas D. White view capsule from Discoverer XIII satellite at White House ceremony, August 15, 1960. Generals LeMay and Schriever are at far left.



**IN ... 1960,
THE AIR
FORCE
DISCOVERER
XIII ...
RECOVERED
IN MID-AIR
ITS FIRST
SATELLITE
FILM
CAPSULE.**

However, only \$4 million was allotted for follow-up studies. WDD pressed on, nonetheless. By 1956 it had acquired Camp Cooke (renamed Vandenberg AFB). Secretary of Defense Charles Wilson approved the transfer, provided that the Navy kept the Point Mugu site and disallowed live firings from Cooke. In February 1957, Schriever delivered a speech on space in San Diego, saying that space would be important for national security. The next day, Secretary Wilson directed: "Do not use the word 'space' in any of your speeches in the future." Everything changed after Sputnik was orbited. People became space minded. Suddenly, Schriever flew "like a shuttlecock in a badminton game" between the West coast and Washington, D.C., as the Pentagon and Congress demanded what USAF needed to go faster in space, to do something. In the autumn of 1960, the Air Force Discoverer XIII program (its classified project name was Corona) recovered in mid-air its first satellite film capsule.

**THE AIR
FORCE
REGAINED
CONTROL OF
SPACE R&D
IN 1961**

The growing importance of space technologies and missions was the catalyst for a major reorganization. Continuing squabbles had inspired the Eisenhower administration and Congress to create NASA for civilian space and the Advance Research Projects Agency (ARPA) for military space. Initially, USAF, which had managed space technology through its WS-117L program for military reconnaissance satellites, lost out to ARPA. The ARPA effort foundered.

Thanks in part to Schriever's relationship with Roswell Gilpatric, the new Deputy Secretary of Defense, the Air Force regained control of space R&D in 1961 when Gilpatric gave USAF space technology responsibility on condition that it resolved its flawed acquisition process between AMC and ARDC. General Thomas White, the Air Force Chief of Staff, backed Schriever. In April 1961, Air Force Systems Command (AFSC) was

established, incorporating ARDC and some elements of Air Materiel Command; Air Force Logistics Command was established to handle logistics matters. Promoted to four-star rank and head of AFSC General Schriever conceived and effected the consolidation of Air Force technical and logistical efforts into a single organization. More significantly, he transformed the concept of materiel development and acquisition from a functional to a *systems* approach—the focal point for virtually all-new weapons.

Schriever's role in this transformation was pivotal with respect to his insistence on technologically superior performance standards, adherence to preestablished production schedules, and reliance on cost-control measures. While AFSC commander, he fostered research and oversaw the acquisition of systems that provided strategic deterrence; early detection, warning, and air defense; advanced aircraft and spacecraft designs; command, control, and communication systems; and aerospace medicine. By 1963, AFSC organization employed some 27,000 military and 37,000 civilians, operated an annual budget of over \$7 billion (about 40 percent of the USAF's total), and managed eighty major weapons systems. General Schriever defined and institutionalized the acquisition process by demonstrating the interrelationship between technology, strategy, organization, and politics.

Meanwhile, Office of the Secretary of Defense had also gained greater authority, especially under the 1958 DoD Reorganization Act. The Defense Secretary could reassign combat functions and the development and operation of new weapons without congressional approval. The Act also laid the groundwork for a strong manager, such as, Robert S. McNamara. An advocate of centralized control through quantitative measurement. McNamara implemented the Planning, Programming and

In April 1961, General Schriever was named Commander of Air Force Systems Command and received his fourth star.



SCHRIEVER WILL BE BEST REMEMBERED AS THE ARCHITECT OF THE AIR FORCE'S MISSILES AND SPACE PROGRAMS

Budgeting System, i.e., centralized civilian control. DoD evaluated proposed systems primarily on the basis of cost effectiveness and then subjected programs to continual reviews. With respect to Titan III and Dyna-Soar, Schriever estimated that additional studies would delay the projects from six months to one year. Dyna-Soar was replaced by the Air Force's Manned Orbiting Laboratory.

In 1963, in response to Air Force Secretary Eugene Zuckert's request for a futuristic study, Schriever launched Project Forecast—one of the most comprehensive long-range assessments ever undertaken of the nation's position in military science and technology. Participants included 40 government agencies, 26 colleges and universities, 70 corporations and 10 non-profit organizations. Published in 1964, this landmark report concluded that rather than leveling off, technology was only beginning its exponential growth. Project Forecast identified several promising areas of exploration that would lead to quantum improve-

ments in air and space weapons: notably in the fields of advanced composite materials, computers, flight design, and propulsion.

For twenty years, from the end of World War II until his retirement in 1966, General Schriever was at the locus of events as the Air Force developed its organization and processes for complex technology. Schriever helped create the SAB, ARDC and AFSC. In the Development Planning Office he helped establish systems analysis as the procedure to set requirements for new technologies. From 1953 to 1959 he headed the ballistic missiles effort. Thanks in large part to Schriever's brilliant management, the United States deployed on time its first ICBMs—Atlas and Titan—and the intermediate range Thor. These were succeeded quickly by the more advanced Titan II and revolutionary, solid-fueled Minuteman ICBMs. Even today, some forty years after they were first deployed, advanced models of the Minuteman still provide the backbone of our nation's defense.

In September 1966, after devoting thirty-three years of service to his country, Schriever retired from the United States Air Force. Since then the general has served in many advisory roles for the U.S. government and worked tirelessly to further research in some of the nation's leading corporations. Among his most notable endeavors, he was chairman of the President's Advisory Council on Management Improvement, served on the President's Foreign Intelligence Advisory Board, the Defense Science Board, and with the Ballistic Missile Defense Organization Advisory Committee.

Although Schriever will be best remembered as the architect of the Air Force's missiles and space programs, his influence extended far beyond that. He also introduced the Air Force to the systems approach, including operations research, project management, and systems engineering. In addition, he merged scientific and engineering visions with military procedures to create methods that have become standard throughout the Department of Defense. ■

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FOR THE RECORD

Touch and Go in Uniforms of the Past

by
Jack Waid

The United States Air Force is rich in tradition and pride. But, unless we act quickly to preserve it, even such everyday items as the Air Force uniform, we may lose part of our heritage.

A Tuskegee Airman mural, World War II field desk, World War I, post-World War I and World War II uniforms were all shown at the August 2003 Offutt AFB Air Show. (All photos courtesy of the author.)



SSgt. Jack G. Waid is NCOIC, Personnel, with AFROTC Det. 470 at the University of Nebraska at Omaha. He is responsible for all personnel issues concerning cadets and staff. In July 1990, shortly after graduating from Perry (Georgia) High School, he enlisted in the Air Force. During the next fourteen years, he worked in many orderly rooms and on commanders' support staffs. SSgt. Waid's previous assignments include NCOIC, 90 SFS/CSS, F. E. Warren AFB, Wyoming. Before that, he was stationed at the USAF Academy, where he worked with the Dean of the Faculty, Cadet Disenrollments, and the Logistics Group. He also supported the mission of the 35th TFS, Kunsan AB, Republic of Korea. He has nearly completed the requirements for the Community College of the Air Force degree and is pursuing a Bachelor of General Studies degree in history. SSgt Waid is constantly involved in displaying USAF history. Recently he set up displays at the Sarpy County Museum in Bellevue, Nebraska, the "Tales of the 55th" Birthday Celebration at Offutt AFB, and at the University of Nebraska for AFROTC recruiting purposes. He has also loaned uniforms to the Air Force Weather Agency and donated uniforms to the Airmen's Leadership School at Offutt AFB.

I first became aware of this issue during 1997, as the USAF celebrated its fiftieth year of independence. The "summer issue, winter issue" arrangement—with several combinations in between—was replaced by a streamlined selection of very distinctive uniforms that offered only a few combinations. I observed that in a struggle to find its identity, the Air Force had constantly changed its image. A quick survey showed that over the past fifty years the Air Force had changed its uniforms more often than did the Army and Navy combined over the last 200 years.

September 18, 1947, the establishment of the USAF, also marked the day that the Army's brown shoes were dyed black. Next, the Air Force introduced the blue service dress uniform and blue Eisenhower jacket. The first distinctly Air Force fatigue uniform also was issued in the mid-1950s. And so was launched the quest for a new identity. That search has gone on for more than fifty years and is still ongoing.

By 1948, all of the Air Force's brown shoes had turned black. There may have been a few old brown shoes around, but not many. The enlisted members' uniform began to evolve, first with silver and blue Air Force chevrons added to the Army green uniform. The collar brass used by the Army was hollowed out. Our most recent USAF insignia, with a hollow circle around it, is in gold not silver. Airmen also wore a hollow gold circle with the old U.S. Army Air Forces symbol, the prop and wings. There was even new brass for the



Uniforms donated to the collection by former Chief Master Sergeants of the Air Force Gaylor, McCoy, and Benken.

Army wheel hat, a hollow circle with an eagle on it, all in gold.

The officers' uniform did not begin to change until 1950, when the Air Force adopted and issued blue wool uniforms. The service dress jacket was much like the last four-pocket service dress that officers still wore in the late 1990s. The only difference was that it had two bottom pockets on the outside of the jacket. There was also a blue waist jacket known as an "Ike" jacket. While the Ike jacket was eventually phased out, the blue service dress saw little change until the early 1970s, when the outside pocket was removed.

When Chief Master Sergeant of the Air Force James M. McCoy went to basic training, he was issued the new blue uniform. At another basic school all the trainees there were issued the last of the Army uniforms with the blue and silver chevrons. Curiously, all of the trainees who received the Army uniform were promoted to Airmen Second Class upon completion of basic. Could it have been due to the fact that they were issued the older uniforms?

In the 1950s, along with the new Air Force blues was added a serviceable khaki uniform. Officers and enlisted members were issued "bush" uniforms for wear in hot climates. The jacket was similar to our present day Battle Dress Uniform (BDU) shirt. The jacket featured one distinctive difference in that it included a waist belt. Also

worn was a pith helmet, and shorts with khaki knee-high socks. A pair of black low quarter shoes topped off this uniform. Not surprisingly, this uniform enjoyed little popularity in the ranks and was quickly eliminated from use. Some khaki uniforms, however, did stick. Also issued to both officers and enlisted members was a khaki service uniform. It was identical to the blue service dress jacket and was nicknamed "Silver Tans." The blue wheel hat worn with the "Silver Tans" lasted until the 1960s.

Along with this uniform was the 505 khaki duty uniform. However, the 505 had one serious drawback. Unless this uniform was heavily starched, it lost the press—its sharpness—after being worn for a short time. The chin strap worn with the successor of 505s, the 1505 uniform, also was discarded. The 1505 was the last khaki uniform the Air Force issued. It was phased out by 1975, after which time airmen no longer wore khaki uniforms.

In the 1950s the Air Force issued its first distinctive fatigue uniform. It consisted of a two-pocket shirt, pants, and ball cap—all gray in color. Interestingly, the uniform was not issued in winter or summer weight, although the hat was. The winter cap had earflaps. This uniform soon gave way to green fatigue uniforms, identical to the Army's. During the Vietnam War, airmen were issued the green rip stop battle dress uniform (BDU), while still being issued the green

Collection of various uniform items, featuring a 1960s missileer helmet, World War II and Vietnam helmet, with the brown shoes of the Army Air Force and black shoes of the U.S. Air Force.



fatigue uniform. When the Vietnam War ended, the USAF issued the battle dress uniform with a camouflage pattern. In the 1980s, the green “pickle suit” or fatigue uniform was no longer used and the camouflage BDU became the Air Force’s new fatigue uniform.

In the 1950s, the Air Force issued enlisted flight crew members a flight suit that looked a lot like our BDU shirt made of blue wool and the pants looked like horse riding pants. A wool ball cap with earflaps and chin strap was issued with this uniform. The enlisted flight suit was soon phased out and pilots and flight crew members began to wear gray “bags.” For a brief time in the late 1960s early 1970s, pilots began to wear bright orange flight suits. The flight suit has remained relatively the same, with color representing the only major change.

There were black and white mess dress uniforms for wear in the summer or winter months. The black mess dress was worn in the winter, black jacket, pants and wheel hat. The white mess dress was worn in summer with a white jacket, black pants and white hat. These color variations in the mess dress uniform had some staying power. They were issued and approved for wear in the 1950s; they were not phased out until the 1980s.

Female members of the Air Force also had several distinctive uniforms. In the early years, the WAF (Women in the Air Force) had several uniforms similar to those of the men. In the 1950s, WAF personnel wore a white service dress uniform

in the summer months. They also had specific workout clothes and a blue and white pin-striped blouse, with matching skirt as a duty uniform.

In the 1980s, officers could purchase for wear an all white service dress uniform. It was nicknamed the “good humor man’s” uniform and was quickly phased out. There is no doubt that countless hours could be spent discussing the evolution of the uniform and however interesting the topic, something had to be done to preserve these changes.

In early 1997, the “Airman’s Awards Banquet Committee” at the USAF Academy in Colorado Springs, Colorado, convened to discuss preparations for the upcoming banquet. During the meeting the question regarding an Air Force Fiftieth Anniversary historical display of sorts was raised. At the time, I was a senior airman and volunteered to take on the project. My vision was to create a display tracing the evolution of the uniform from the very beginning—from the balloon corps in the 1860s—to the double knits of the 1990s. At the start, I anticipated that this would be a very easy task. By the end of February, I realized that this was going to be more difficult than I had imagined. My efforts led me from the Academy to Lowry AFB and Peterson AFB, Colorado, and Wright-Patterson AFB, Ohio. Everywhere I went, I heard the same explanation, that is “Air Force instructions indicated that ‘artifacts’ belonging to an Air Force museum or organization of similar use can only be used or displayed in Air Force museums, or

A selection of Air Force uniforms at the Offutt AFB Air Show. Note the "good humor man's" uniform (left) followed by the blue missileer uniform and 1505s.



like functions.” This issue posed a major roadblock. Hope came when I contacted the Airmen’s Heritage Museum at Gunter AFB, Alabama. Receiving much the same answer, however, I was given the name of an individual who maintained a collection of Air Force memorabilia. This individual was willing to help if the display remained within the state of Alabama, but declined to support me when asked to mail some of it to the Academy. He did refer me to a company in Virginia that supplied, sold, and rented military uniforms.

That company in Virginia supplied what I needed and was very helpful. We finalized a deal that provided six distinct uniforms, consisting of the upper half only, shirt or jacket and hat. The total cost was over \$300. Prior to the banquet, held on March 29, 1997, I was given the name of a local collector of military uniforms and memorabilia from whom I obtained Army Air Corps and early Air Force uniform. I also made inquiries of other airmen, asking for the use of old and obsolete uniforms. In all, I acquired twenty-four uniforms from active and retired service members, a local collector, and a militaria company. After much time of searching and several hundred dollars in expenses, I managed to complete this project. In fact, on the evening of the banquet Chief Master Sergeant of the Air Force Eric W. Benken gave me his coin and after retirement donated a uniform and picture to the collection.

Since 1997, in an effort to preserve our rich heritage I have amassed a collection of uniforms dating from World War I to today. I have named the display “Touch and Go with the Runways of the Past.” I believe that I have contributed to Air Force heritage by setting up my own uniform display. Now members, organizations, and bases can have access to these “artifacts” without having to travel great distances or pay large fees for admission. By September 2002, the collection had been seen throughout the states, including Maxwell AFB, Washington, D. C., Cannon AFB, Lackland AFB, the Broadmoor in Colorado Springs, F. E. Warren AFB, local VA hospitals, and Air National Guard bases, the Vietnam moving wall display, parades, retirement ceremonies and other related events. Donations of uniforms to the display have also come from throughout the United States. Some notable donations have come from general officers and from four CMSgts of the Air Force—Gaylor, McCoy, Pfingston, and Benken. I also purchased uniforms from the Salvation Army, Goodwill Industries, E-bay, surplus stores, and yard sales. The collection now consists of more than seventy distinct uniforms. Visitors to the collection can touch, feel and even wear our history, without having a glass wall separating them.

We must all remember how important it is to preserve our heritage and traditions. One effective way to show our progress and history is to display our uniforms, the symbol of who we are. ■

Fleet Operations in a Mobile War: September 1950 – June 1951. Joseph H. Alexander. Washington, D.C.: Naval Historical Center, 2001. Maps. Photographs. Bibliography. Pp. 53. Paperback ISBN: 0-16-050905-X

Col. Joseph H. Alexander served almost twenty-nine years in the U.S. Marine Corps as an amphibious assault officer, including two combat tours in Vietnam and five years at sea. He also holds a Master of Arts degree from Georgetown University and is a distinguished graduate of the Naval War College. The author of five books and six monographs on U.S. Marine Corps amphibious operations, Col. Alexander has received the U.S. Naval Institute's 1977 Author of the Year award for his book, *Storm Landings: Epic Amphibious Battles in the Central Pacific*. He has also helped produce eighteen documentaries for The History Channel and the Arts & Entertainment Network.

In *Fleet Operations in a Mobile War*, the colonel describes how the U.S. Navy took control of the sea during the Korean War by establishing surface blockades around North Korea; supporting United Nations ground forces through carrier air strikes; using shipboard artillery to destroy enemy coastal targets; and conducting coastal raids and amphibious assaults, feints, and withdrawals. At the operational level, Alexander describes the pressure the Navy was under to protect Japan and Taiwan from the ambitions of North Korea and the Soviet Union. He chose to study the September 1950 to June 1951 time period because if there were to be a World War III, it most likely would have occurred at this time.

Although this monograph has very little information about the naval air campaign during this period, his treatment of the amphibious assault on Inchon is noteworthy. He starts with how General MacArthur made his decision to attack, despite a number of negative recommendations from his staff. Alexander then describes, with the aid of photographs and maps, the placement of ships, the order of battle, problems encountered approaching the target beaches, and the measures taken by the North Korean Peoples Army to oppose the landing. Within the text, Alexander takes a page to address related topics of the naval campaign such as "The Return of the Battleships" and "Lieutenant Clark's Secret Mission." Lt. Clark and his loyal band of South Korean fighters gathered intelligence regarding the approaches and landing areas at Inchon. He also mentions the role of minesweepers as well as the daring rescue of a downed pilot in "Ordeal in the Mountains."

The photographs and prints of original oil paintings are excellent, and the maps included contribute greatly to understanding the navy's situation during this time.

This well-written monograph is worthy of your reading time.

William A. Nardo, NASM Docent



B-24 Liberator [Combat Legend Series]. By Martin Bowman. Shrewsbury, UK: AirLife Publishing, 2003. Illustrations. Photographs. Appendices. Index. Pp. 96. \$14.95 Paperback ISBN: 1-84037-403-9

Prolific aviation writer Martin Bowman adds yet another title on the B-24 Liberator in this volume for the Combat Legends Series from AirLife. With over sixty books to his credit, including a longer text on the B-24 he first published in 1980, Bowman is no stranger to the field of aviation history. This volume, with its many photographs, color profiles, and equally colorful text, is typical of the author's popular work and will find favor with the enthusiast. From the Royal Air Force Liberator appearing on the cover, to the considerable space between the covers devoted specifically to the aircraft's British service history, this Combat Legends edition will especially appeal to the UK market.

The first XB-24 flew at the end of 1939, less than a year from its initial conception. Between the plane's introduction in 1941 and the end of the war in 1945, 18,482 Liberators would roll off production lines around the country—"more than any other major American combat aircraft in history." The most numerous versions were the B-24D, G/H, J, L, and M models, with the most distinguishing variations between these being among their Pratt & Whitney R-1830 power plants and their armament, whether in turrets or glazed enclosures. Bowman covers them all—and more—including descriptions of transport/cargo models, maritime duty, and drones.

The B-24's numbers and attributes of range, speed, and payload guaranteed that the aircraft would make significant contributions in virtually every theater of World War II. Bowman features personal accounts of crewmembers who saw action in most of these, from the expanse of the Pacific, India, Asia, and the Aleutians, to Europe and the Mediterranean, as well as with the U.S. Navy and RAF.

The author includes extra features within appendices on weapons; production data; specifications; museum aircraft; military units; and even a long list of available kits, detail accessories and decals for the modeler! Combat Legend B-24 Liberator is an attractive and substantial history of this classic aircraft all within a compact format.

Col. John S. Chilstrom, USAF, AFROTC, Tulane University



Bombers over Berlin: The RAF Offensive, November 1943-March 1944. By Alan W. Cooper. Shrewsbury, UK: AirLife Publishing, 2003 [first published in 1985]. Maps. Illustrations. Photographs. Notes. Appendices. Index. Pp. 319 \$19.95 Paperback ISBN: 1-84037-429-2

Bombers over Berlin is the story of the Royal Air Force's attacks on the capital of the Third Reich during the winter 1943-1944. Attacks on the enemy capital by the RAF earlier in the war and by USAAF crews shortly afterward are outside the book's scope. What Cooper does is take the reader on each of sixteen night missions flown from November 18, 1942, until March 25, 1943, in the campaign known as "the Battle of Berlin." He tells the story of the aircrews and their efforts in striking one of the most difficult targets of the war. This history gives equal treatment to the technology, tactics, and eyewitness experience of the bomber crews to paint a vivid picture of what it was like to fly these missions.

Cooper is well qualified to document Bomber Command. Following a career in the British Army, he took up military history seriously. His books include titles on the "Dambusters" (617 Squadron), the air battles of the Ruhr and Dresden, plus additional works on the RAF and contributions as a researcher for other historians. To cover the Battle of Berlin, he relied largely on post raid reports and numerous interviews with survivors to assemble the greatest number of personal accounts.

Bombers over Berlin gives testimony to the challenges faced by Bomber Command's airmen to reach their targets such as the long-distance (650 miles from the bomber bases) and the dangers from flak and fighters. With the exception of a brief mention of the importance of these strikes to the overall war effort, the book does not attempt to weigh the merits of the RAF area-bombing strategy, nor does it truly analyze the efficacy of striking at Berlin proper.

Authors such as Martin Middlebrook, in *The Berlin Raids* (1988), do far more to describe why Sir Arthur Harris, Bomber Command's Commander-in-Chief, was so bent on striking Berlin in his firm belief that it would hasten the war's end. Middlebrook, suggests "the controversy over whether the Battle of Berlin was success or failure has continued ever since." Indeed, the price of these raids was high: nearly three-thousand airmen died, another thousand became prisoners of war, and over 500 bombers were lost. Never questioning the courage or determination of the airmen, this toll was enough that many (including the official British history) would be led to conclude the battle hurt the RAF more than their bombs hurt Berlin.

Sadly, the toil and sacrifice by the men in RAF Bomber Command was inadequately covered for many years after World War

II. More recent publishing, such as Denis Richards' *The Hardest Victory* (1994) go a long way to provide both a balanced account and long due credit to the British dead that numbered over 55,000. Alan Cooper's *Bombers over Berlin* is a worthwhile companion to such work with the personal tales valued by readers seeking to understand the courage of the bomber crews on those long and difficult nights when the target was Berlin.

Col. John S. Chilstrom, USAF, AFROTC, Tulane University



The Politics of Coercion: Toward A Theory of Coercive Airpower for Post-Cold War Conflict. By Lt. Col. Ellwood P. "Skip" Hinman IV. Maxwell AFB, Ala.: Air University Press, 2002. Table. Illustrations. Notes. Bibliography. Pp. 73. ISBN: 1-58566-109-0

Lt. Col. Hinman is chief of Seventh Air Force Strategy, Osan Air Base, Republic of Korea. He is a senior pilot in the U.S. Air Force with 2,600 flying hours to his credit. He flew F-117s and A-10s in combat in the Middle East and in the Balkans and has published articles in the *Strategic Review*, *Air Power History*, and the *Aerospace Power Journal*.

This book was written originally as a master's thesis for Air University's School of

Advanced Airpower Studies. The College of Aerospace Doctrine, Research and Education published this thesis as a CADRE Paper so that it may be more widely disseminated.

Colonel Hinman questions whether any existing theory of coercion, as it relates to air power, can be used alone as the standard in post-Cold War conflicts. He asserts that post-Cold War conflicts have three key elements: they are time limited in nature; there are political restraints controlling the conduct of the conflict; and the purpose of the conflict is to create a better state of peace. With these key elements in mind, he surveys the four major existing theories of coercive air power (decapitation, denial, punishment, and risk), explaining the strengths and weaknesses of each with respect to the post-Cold War situation. He then proposes a "hybrid" theory of coercion which utilizes the best of each of the existing theories in a three-phased approach.

Phase One employs the use of a combination of risk and denial theories. The risk theory, as originally proposed by Schelling, "proposes coercing an adversary by holding what it values at risk, not by bombing him in wholesale fashion." That is, "Threatening the massive use of force would presumably obviate the need to actually use it." Pape's denial theory differs from that of Schelling in that it "directly targets the enemy's military strategy and specifically his fielded forces with the intention of making his defeat inevitable." Pape feels that "the

adversary will at some point recognize the futility of a continued struggle and surrender to avoid further destruction."

If Phase One is not enough to defeat the enemy, Phase Two is put into effect. This phase adds Warden's theory of decapitation to the other two, thereby using all three simultaneously. Decapitation theory "aims to paralyze and incapacitate the enemy by destroying the maximum number of political leadership, communication, and selected economic targets in the minimum amount of time." This "relentless shock, surprise, and simultaneity of the decapitation approach will coerce the enemy leader, who fears for his life and the legitimacy of his regime, to succumb to the coercing nation's demands." However, in the post-Cold War venue, this approach would be used sparingly.

Phase Three sees cessation of the risk theory and its replacement by the punishment theory. This theory, proposed by Douhet, "aims to coerce an adversary to change his behavior by shattering civilian morale with direct attacks on the enemy's urban areas and population centers." Hinman would use this theory as a last resort.

Colonel Hinman believes that "one size does not fit all." No one theory will work under all conditions with all enemies. The success of his hybrid theory revolves around its flexibility. It is progressive in nature, "easy" at first but getting harder on the enemy if it needs to go through the phases.

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Within each phase, the commander may rely on one theory more than another depending upon the military-political situation at hand. Hinman states that "The greatest strength of the coercion-hybrid theory is that, instead of expecting politicians to acquiesce to overly aggressive military strategies, it realigns air power with politically restrained nature of post-Cold War conflict. Approaching coercion in this manner capitalizes on the coercive effects of each individual theory to the maximum extent allowable in politically restrained war." I agree with him totally.

William A. Nardo, NASM Docent



Ending the Vietnam War: A History of America's Involvement and Extradition from the Vietnam War. By Henry Kissinger. New York: Simon & Schuster, 2003. Maps. Photographs. Notes. Appendix. Index. Pp. 635. \$18.00 (paperback). ISBN 0-7432-1532-X

For those who want the inside story of how the Nixon and Ford administrations tried to achieve "peace with honor" in Southeast Asia—but don't want to wade through several of Henry Kissinger's previous books—the former National Security Advisor and Secretary of State has consolidated his account of that effort into this new volume. In retelling the painful story of our nation's worst foreign policy failure, Dr. Kissinger uses his impressive intellect and restricted personal records to prove he did almost everything possible, under the adverse circumstances Richard Nixon inherited in 1969 from Lyndon Johnson, to avert what happened in 1975.

In its first few years, the Nixon Administration was able to buy some time by implementing Secretary of Defense Melvin Laird's policy of "Vietnamization," steadily withdrawing American troops and phasing out the draft. Soon, however, an increasingly left-leaning and war-weary Congress threw in the towel, leaving the Watergate-weakened White House powerless to act. Whether the mediocre governments of South Vietnam, Cambodia, and Laos could have avoided communist conquests if the United States had given them adequate support is open to question. Kissinger argues that Congress's dishonorable cutoff of American military and economic assistance never even gave them a chance.

While much of the book covers ground that has also been plowed by more objective scholars, its principal contribution to the historical record may be Kissinger's personal account of his tedious and frustrating negotiations with the North Vietnamese, especially the indomitable Le Duc Tho (with whom he shared the Nobel Peace Prize). One is left to conclude that, in this case,

diplomacy was war by other means.

Also of interest are Kissinger's insightful appraisals of colleagues, bureaucratic rivals, and political enemies. He is especially effective in counter-attacking his more extreme critics, some of whose claims now appear ludicrous—if not libelous. There may be some significance, however, in what and whom Kissinger has chosen to omit from the story. For example, in several instances he castigates President Gerald Ford's immediate staff for shamelessly advising him to publicly wash his hands of South Vietnam and Cambodia for domestic political purposes. Yet, except for White House spokesman Ron Nessen, he avoids providing their names. The reader is left to wonder why Kissinger does not, for example, reveal the views of Ford's other close advisors at the time, such as Donald Rumsfeld and Dick Cheney.

For Air Force readers, one of the names most glaringly missing from Kissinger's narrative is Gen. John W. Vogt, whom he first met when Vogt attended the Harvard School for International Affairs. It was Kissinger who recommended that Nixon appoint Vogt as commander of Seventh Air Force in April 1972. Vogt almost immediately became the most important American military leader in Southeast Asia. Yet his key role in the final phase of combat operations is never mentioned. Kissinger does give requisite credit to the importance of B-52 bombing in forcing the North Vietnamese back to the bargaining table. He does not, however, seem to recognize that improved U.S. air tactics and technology—rather than the South Vietnamese Army—were primarily responsible for stopping North Vietnam's massive offensive in the Spring of 1972. Indeed, "Linebacker II" (the well-known code name for the final U.S. air operations against North Vietnam) does not once appear in the text.

In conclusion, this book presents a "top-down" version of history, more valuable for diplomatic historians and political scientists than for military, naval, or air power historians.

Lawrence R. Benson, retired USAF historian and US Army Vietnam veteran



The Dynamics of Military Revolution, 1300-2050. By MacGregor Knox and Williamson Murray, eds. Cambridge, UK: Cambridge University Press, 2001. Tables. Notes. Index. Pp. xiv, 203. \$29.00 ISBN: 0-521-80079-X.

This slim volume of essays seeks to fill a major gap in the current literature on revolutions in military affairs (RMAs). Knox and Murray believe that the periodic phenomenon of revolutionary change in warfare is well grounded in history, but that the terms "revolution" and "RMA" have come to be

used so loosely as to have lost their real meanings. The editors' stated intention in this collection of historical case studies is to establish a framework for understanding revolutionary change and to offer what they see as much-needed guidance for U.S. force planners in discerning the scope and direction of changes in warfare in this century. The predominant theme of the book is that revolutions in warfare have resulted not from technology alone, but rather from infrequent social and political upheavals (what they term "military revolutions") or from the battlefield exploitation of new technologies through innovative operational concepts and organizational change (what they call "RMAs").

The introductory essay by Knox and Murray provides a concise but thorough overview of the evolving theory of revolution in warfare, followed by their own framework for thinking about revolutionary change. Each of the succeeding essays focuses on a specific case study of military revolution in the past seven centuries. Clifford Rogers and John Lynn explore the non-technological roots of military revolution achieved by English and French forces in the fourteenth and seventeenth centuries respectively. Knox describes the fundamental changes in global warfare that were driven by the emergence of mass politics and mass warfare during the French Revolution. Mark Grimsley continues this theme by delving into the coupling between mass warfare and elements of the Industrial Revolution in the U.S. Civil War. Dennis Showalter and Holger Herwig explore revolutionary changes in land and sea warfare, respectively, generated by rapid technological developments in the latter part of the nineteenth century. Jonathan Bailey and Murray conclude the case studies with their analyses of profound changes in the character of combat operations that arose during World War I and the subsequent interwar period.

The final essay seeks to summarize the common characteristics of past RMAs and the attributes that have distinguished the most successful militaries from their competition during periods of rapid technological and social change. It serves as the basis for a scathing assessment of innovation efforts within the U.S. military, which the authors deem woefully deficient in preparing for twenty-first century challenges. Among their criticisms are lack of serious experimentation and failure to conduct self-critical analysis of past operations. They see no evidence of open debate about real warfighting issues. They believe 1) the U.S. has failed to clearly identify an opponent to serve as the focus of operational concept development, 2) too much emphasis is being placed on technology as an end in itself rather than the more critical operational concepts and organizations by which technology is effectively employed, and 3) the greatest deficiency is a general failure to

study relevant history and tie future requirements to past experience. The result is what the authors term innovation in a strategic and operational “vacuum” leading to continued acquisition of military capabilities that are increasingly irrelevant to problems the U.S. is likely to face. At first cut this conclusion seems somewhat surprising given the resounding success of U.S. forces in the 1991 Gulf War (and later in Afghanistan and Iraq). In the authors’ view, today’s U.S. military represents an RMA that is now over; its Desert Storm victory was merely a demonstration of innovative Cold War achievements intended for a fight with the Soviet Union but applied to a hapless Middle East opponent.

This is a sweeping indictment well open to challenge for some of its broad generalities. Those readers looking for specific guidance or recommendations with respect to future U.S. forces will not find them here, despite the teasing title. Yet, there is truth to their assertion that serious efforts by the U.S. military to explore the impact of revolutionary change remain subordinate to the dominant interests of the *status quo*. The book’s historical essays make a clear case that the penalty for failing to innovate successfully has been sufficiently severe that

the issue of military revolutions needs to be taken seriously, especially by dominant military powers. This provocative book is a welcome addition to the literature on military innovation that is well recommended to those with any interest in the ongoing debate about U.S. force transformation.

*Captain James R. FitzSimonds, USN (Ret),
EMC Corporation Chair of Information
Technology, Naval War College*



To Reach the High Frontier: A History of U.S. Launch Vehicles. Edited by Roger D. Launius and Dennis R. Jenkins. Lexington: The University of Kentucky Press, 2002. Tables. Illustrations. Photographs. Notes. Index. Pp. 519. \$49.95 ISBN: 0-8131-2245-7

This book’s co-editors have compiled a series of historical essays written by specialists in the major rockets used to launch nuclear warheads, satellites, and space vehicles. The co-editors are experts in their own right. Roger Launius is chairman of the National Air and Space Museum’s Space History Department and has written sever-

al books on aerospace history. Dennis Jenkins earns his living as a consulting engineer at Cape Canaveral and has worked on the Space Shuttle program for twenty years. He is also an author.

The military played a critical role in the development of U.S. launch vehicles. In fact, the missiles we have come to view as launch vehicles for satellites—Atlas, Titan, and Thor—began their life as military missiles designed to carry nuclear warheads. When these missiles became surplus, the government simply had them converted into civil launch vehicles. While military involvement in space has led to reliable launch vehicles, it has not led to affordable launch vehicles. The military designed and built these missiles to meet national security needs; price was a secondary factor. Even launch vehicles such as the Saturn family, the first U.S. missiles designed and built as pure space boosters, were built during the race-to-the-moon days and had historic levels of funding to sustain their development and production. When funding later dropped, the National Aeronautics and Space Administration (NASA) recognized that it needed reusable launch vehicles if it wanted to continue to exploit space at a creditable rate.

NASA intended for the Space Shuttle to

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provide low-cost access to space by employing reusable systems. Achieving these savings, however, required that the Space Shuttle cut operational costs by flying often—in 1984 NASA still believed the Shuttle could fly twenty-four missions a year. Accidents put an end to this dream and the shuttle has provided neither low cost nor routine access to space. The co-editors point out that the battle between reusable and expendable launch vehicles continues as the military, NASA, and commercial companies seek to create the next-generation of launch vehicles that meet the end goal for all three: low cost economical access to space, a goal not yet achieved.

The book spans some four decades of space flight. The co-editors have constructed the book chronologically with historical essays on the launch vehicles described placed within the era of space flight in which they belong. Unable to cover every subject of importance related to the development of space launch vehicles, Launius and Jenkins used three criteria to choose subjects for inclusion in the book: (1) the essay had to cover a subject of interest to readers and yet hold potential for furthering the history of space access; (2) because the history of space launch vehicles has not

received the attention of other historical subjects, the essays should not duplicate work already completed by other scholars; and (3) the author had to be an expert on the subject. In the end, the book succeeds in giving a comprehensive history of U.S. launch vehicles. As with any collection of historical essays written by fourteen writers, some authors write better than others and one chapter may interest you while another seems to drag. That aside, *To Reach the High Frontier* is an excellent book for those wanting to understand the development and importance of U.S. launch vehicles.

David F. Crosby, writer, Ninth Air Force History Office, Shaw AFB, South Carolina.



History of Rocketry and Astronautics: Proceedings of the Thirtieth History Symposium of the International Academy of Astronautics, Beijing, China, 1996. Hervé Moulin and Donald C. Elder, eds. AAS History Series, Vol. 25, Donald C. Elder, Series Editor; IAA History Symposia, Vol. 16. San Diego, California: American Astronautical Society, 2003. Tables. Dia-

grams. Illustrations. Photographs. Notes. Numerical and Author Index. Pp. xii, 358. \$85.00 ISBN 0-87703-498-2 (\$60.00 Soft Cover, ISBN: 0-87703-499-0)

Like previous *History of Rocketry and Astronautics* volumes, the latest one includes many different topics spanning geographically diverse places and chronologically disparate periods. It contains twenty papers based on presentations by authors from eleven countries at the 1996 IAA History Symposium in Beijing, China. Organized by editors Hervé Moulin and Donald Elder into three parts—Pioneering Work, Unmanned Applications, and Manned Projects—the published proceedings offer the results of cutting-edge historical research, often conducted in previously untapped sources. The result is a substantial body of new information and tantalizing suggestions to spur further scholarly inquiries.

Part I, which focuses on pioneering work, takes readers from the realm of theoretical imagination through early theoretical and experimental activities to the historical study of rocketry and astronautics within the IAA. Frank Winter's well documented chapter, "The 'Trip to the Moon'

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The *Lancaster Index* database is primarily designed for information professionals in the defense and security sector, and can appear somewhat daunting to the casual visitor. A look at the User Guide, downloadable from the site, is recommended. Free access, using the global index, scans the whole database, but returns literature citations that exclude the volume, issue, and page references. Researchers who need these references for serious research purposes will need to take out a paid subscription. Individual rates range from \$9.95 for a 24-hour pass to \$99.95 for a 365-day pass.

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and Other Early Spaceflight Simulation Shows c. 1910-1915: Part 2," continues an analysis, which he began in volume 23 of the series, of how carnival companies with Moon or Mars attractions generated public enthusiasm for space travel. Karlheinz Rohrwild examines the likelihood that Hermann Oberth launched a small, liquid propellant rocket in 1935, and O.G. Gzenko highlights Konstantin Tsiolkovsky's early contributions to space life sciences. Three authors—V.N. Sokolsky, F.C. Durant III, and F.I. Ordway III—summarize collectively the origins of the IAA history committee in 1961 and its subsequent efforts to promote the history of rocketry and astronautics.


The eleven chapters in Part II cover unmanned applications. Phillippe Jung, Hervé Moulin, and Jacques Villain examine, respectively, the testing of hundreds of French-designed rockets on the beaches of Cannes during the 1950s, the D1 French satellite program of the 1960s, and the successful European development of Ariane launch services from the 1970s into the 1980s. John Becklake discusses development of a rocket-powered transonic aircraft

model by RAE-Vickers during the late 1940s. Julius Braun ponders the relative success of the first Redstone launch on August 20, 1953, while D.V. Shatalov explores the creation of Russia's Pletsetsk cosmodrome during 1957-1966. Theo Pirard reviews the technical development and political impact of German rocketry in three African countries—Egypt, Zaire, and Libya—during the 1960s and 1970s. Three chapters deal with Asian rocketry and space activities: Yasunori Matogawa on Japanese solid-propellant rockets during World War II; Huang Jianding and Ye Dingyou on development of Chinese solid rocket motors beginning in the 1960s; and Chen Shilu, Yan Hui, Cai Yuanli, and Zhu Xiaoping on space technology and education in China since 1960. Finally, Boris Rauschenbach rounds out the section by arguing that rocket enthusiasts during the 1930s misunderstood completely the fundamental principles of stable flight and expected to achieve it through simple design measures rather than employment of control devices (i.e., gyroscopes).

Part III contains five chapters on manned projects. Valentina Ponomareva

and Debra Facktor reveal the story of the first women's cosmonaut team, while Oleg Sokolov assesses the Soviet manned lunar program. Christian Lardier tackles the intriguing phenomenon of secrecy surrounding the identity of Soviet rocket and spacecraft designers. "Facts not considered" during the investigation of the Apollo 1 fire spark Shirley Thomas's curiosity, while Australian professor Frank Cotton's contribution to the origins of the partial pressure suit draws Kerrie Dougherty's interest.

Despite the praiseworthiness of this book, one can identify some less-than-sterling features. Readers undoubtedly will find a few chapters intellectually shallow. Because many of the papers required translation, there is unevenness in grammatical quality. The eclectic nature of the twenty chapters might discourage those expecting a clearly focused edition. Like the fifteen previous IAA History Symposia volumes, this one lacks a detailed topical index. This could be particularly disturbing to historians wanting to use the entire set in their research. When all is said and done, however, the contents of this publica-



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tion represent an extremely valuable, substantive contribution to rocket and space history.

Dr. Rick W. Sturdevant, Deputy Command Historian, HQ Air Force Space Command



Secret Empire: Eisenhower, the CIA, and the Hidden Story of America's Space Espionage. By Philip Taubman. New York: Simon & Schuster, 2003. Photographs. Notes. Bibliography. Index. Pp. xx, 441. \$27.00 ISBN: 0-684-85699-9

In May 1960, one of the Eisenhower Administration's most daring and secretive projects suddenly received unwanted notoriety when a gloating Nikita Khrushchev announced the USSR's capture of Francis Gary Powers after shooting down his high-flying U-2 airplane. The humiliated American President had approved this final flight only with great reluctance while another even more revolutionary and secret project, the Corona reconnaissance satellite, suffered one failure after another. Three months later, Ike's faith in the vision of his top scientific advisors was rewarded when the first successful Corona mission (disguised as a scientific experiment) returned 3,600 feet of film from orbit showing 1.5 million square miles of Soviet territory—some-what more than all previous U-2 flights.

Although the U-2 and its supersonic successors, the A-12 and SR-71, received a fair amount of publicity in articles and books during the next three decades, the Corona satellites and their cousins remained shrouded in secrecy. Based on leaks, espionage trials, and informed speculation, William Burrow's *Deep Black* in 1986 was the first book about "spy satellites," followed in more detail by Jeffrey Richelson's *America's Secret Eyes in Space* in 1990. Two years later the U.S. government finally acknowledged the existence of the National Reconnaissance Office (NRO), which had managed space-based intelligence assets since the early 1960s. Not until the official declassification of Corona and a few related programs in 1995 did scholarly histories become possible. In addition to the release of imagery and documents, surviving Corona veterans were at last able to tell their stories in unclassified articles and interviews. Soon, the CIA released additional material on the U-2 and A-12/SR-71. All these sources allowed researchers such as Curtis Peebles in *The Corona Project* (1997) and Jeffrey Richelson in *The Wizards of Langley* (2001) to present more authoritative accounts of declassified overhead reconnaissance programs.

Taubman's book draws on most of the existing sources, supplemented by numerous interviews of his own, to explain how the U-2 and the Corona were developed so

quickly in the face of enormous technical and institutional challenges. Probably the most interesting aspects of *Secret Empire* are its personal sketches of key contributors to the development of overhead reconnaissance, including their relationships with each other and the institutions they served. Clarence "Kelly" Johnson has long been famous for Lockheed's Advanced Development Projects Division (a.k.a. the "Skunk Works") that built the U-2 and SR-71. Taubman gives equal time to James Plummer of Lockheed Missile Systems Division, who put together a similar covert organization to work on Corona. Other featured players include James Killian of MIT and Edwin Land of Polaroid, whom Eisenhower used as trusted advisors on scientific and intelligence matters, and Richard Bissell of the CIA, whose triumphant oversight of technical intelligence programs was soon overshadowed by his disastrous planning of the Bay of Pigs landing in 1961.

As for the role of the Air Force leaders in fostering the revolution in overhead reconnaissance in the 1950s, Taubman gives credit to the far-sighted contributions of Generals "Bennie" Schriever and "Ozzie" Ritland as well as the aggressive lobbying of Assistant Secretary Trevor Gardner. When treating subsequent developments, the author also acknowledges the critical support provided by the Air Force in launching, controlling, and recovering the payloads. Much like previous authors, however, he focuses mainly on the achievements of the CIA's Directorate of Science and Technology in isolation from the NRO. As for the NRO, it is not adequately recognized as a civilian-run interagency organization that was not just another part of the Air Force. Perhaps because Taubman relied heavily on the somewhat one-sided perspectives of former CIA officials, such as "Bud" Wheelon, his book gives scant credit to the NRO's Air Force component for its own technological successes stories. It would be nice if a few more of the old satellite programs could be declassified while some of their original participants are still alive to share memories.

The text is fairly well documented, but the endnotes employ the rather clumsy device of extracting short quotes instead using numbers to identify sources. However, in general this is a readable and informative account of the early years of overhead reconnaissance that lightly sketches in some developments since Corona.

Lawrence R. Benson, a retired Air Force historian, is helping complete a book by the late John L. McLucas, former Secretary of the Air Force and former Director of the NRO.



Corsair: The F4U in World War II and Korea. By Barrett Tillman. Annapolis Md.: Naval Institute Press, 1979. Maps. Diagrams. Photographs. Notes. Appendices. Bibliography. Index. Pp. xii, 219. \$18.95 Paperback ISBN: 1-55750-994-8

This is Mr. Tillman's fourth book about World War II aircraft. Previously, he has covered Grumman's F6F Hellcat and TBF Avenger and the Douglas SBD Dauntless. Tillman acknowledges that many books have been written about the F4U but that he feels the full story has never been told. He wrote this book to fill in the remaining gaps in the "bent wing bird's" history.

Although he covers all aspects of the plane's history, the major area he felt was inadequately explored was the delay and near cancellation of the Corsair aboard U.S. aircraft carriers. Tillman notes that the "U-bird" was designed as a carrier-based aircraft but spent the first three years of its active life operating from land-based airfields. He feels there is a lesson to be learned here and, therefore, should treat the subject in great detail. "The purpose of studying history is to learn from the past in order to avoid repetition of similar errors in the future."

In this aspect, the book fails to achieve its goal. I expected to find interviews with Vought aeronautical engineers and good, detailed, non-technical explanations as to why they did the things they did, what went wrong, and how they were able to fix the problems. None of this was to be had, however, as Tillman glossed over this entire subject in eighteen pages.

But Tillman does provide a well-researched descriptive history of the F4U's part in the winning of World War II and continues to the Korean conflict and beyond. He starts out with the development of the aircraft by Vought and then describes the aircraft's early action in the Solomon Islands. This is followed by the Royal Navy's use of the F4U. He then returns to the U.S. Navy and chronicles the plane's use on its fast carriers to the end of World War II. The F4U was also widely used in Korea, and Tillman covers this and then ends his story with South American experiences.

The text is filled with facts and figures, such as names of pilots, anecdotes, descriptions of aerial combat, units, times and dates, results of sorties, who became aces in what battles, and much more. Information sources include personal interviews and correspondence, records in the Washington Navy Yard, officials from the French Navy, and the usual assortment of books and articles found in aviation libraries. If one has no intention of trying to memorize facts or figures, the book is an easy read. The information appears accurate and clearly written, but sometimes Tillman used acronyms and World War II military jargon which were never explained in the book. A short

glossary of these terms would have been helpful. The photographs and diagrams are excellent.

This well-written book gives the reader exceptional insight into the role the Vought F4U played during World War II and how the Corsair supported and augmented other aircraft of the time. It is worthy of the U-Birds and the men who flew them.

William A. Nardo, *Docent, NASM*



Airlines and Air Mail: The Post Office and the Birth of the Commercial Aviation Industry. By F. Robert van der Linden. Lexington: The University Press of Kentucky, 2002. Photographs. Notes. Bibliography. Index. Pp. xv, 349. \$35.00 ISBN 0-8131-2219-8

Early air transport lore likes to recount the heroic running of the mail routes in the interwar years and how mismanagement of air mail subsidies forced the government to step in and cancel existing contracts while airlines consolidated. Here, F. Robert van der Linden, curator of Air Transportation at the National Air and Space Museum, demolishes this myth. Indeed, while the heroic dimension of that era is well known, far less understood are the economic and political factors that shaped the airline system.

As van der Linden notes in his historiographical review, most accounts agree that airlines built their own route system and, thus, overlook the level of governmental involvement in the process. In fact, federal participation existed at several levels from aircraft technical requirements, to the establishment of navigational standards, to the indirect subsidizing of the nascent airline industry through mail contracts.

Van der Linden then lays out the relationship between airlines and airmail contracts by framing his account in the context of Republican Progressivism, an ideology associated with New Nationalism that, in the words of President Hoover's postmaster, Walter Fogle Brown, involved flying "in the public interest." This included helping a fledgling industry establish solid foundations. The growing pains of commercial aviation had led to the Air Commerce Act of 1926. However, the air mail subsidy system was such that it resulted in complete confusion and heavy financial losses. When Brown came into office two years later, he took advantage of circumstances—such as failing airlines and expiring contracts—to help redesign the system. By 1929, with airlines failing and the economy beginning its dive, Brown encouraged passage of the Watres Act as a means to limit subsidies and increase returns. His subsequent actions involved favoring a stable oligopoly of existing companies capable of fulfilling their contracts and growing by carrying

passengers in addition to mail. This arbitrary practice, embodied in the Watres Act, became the focal point of his adversaries, who used an angry Congress and a combative incoming Democratic administration to undermine the Brown system of subsidies. In so doing, Congress ignored not only Brown's vision but also the inherent weakness of small independent airlines that would have trouble flying the routes assigned. As van der Linden makes clear, the central difference between the Roosevelt and Hoover administrations was less about the subsidies than about the correlation between mail and passenger transportation. To progressive Republicans, the link was obvious and necessary, but not so to New Deal Democrats.

Van der Linden's study stands out not only for its judicious framing of the foundations of American commercial aviation in dual political and business contexts, but also for the author's profound understanding of the characters and tropes of the interwar airline industry. The technical aspects of the business are brought in only when necessary and relevant to the author's explanations and Van der Linden beautifully summarizes the power relations between major airline pioneers. In so doing he has produced an important study for experts and amateurs interested in the relationship between the commercial aviation community and the federal government, a matter which has moved front and center in our times.

Guillaume de Syon, *Associate Professor of History, Albright College, Reading Pennsylvania.*



Airborne Laser: Bullets of Light. By Robert W. Duffner. New York: Plenum Press, 1997. Diagrams. Illustrations. Photographs. Notes. Glossary. Bibliography. Index. Pp. xvii, 398. \$34.95 ISBN: 0-306-45622-2

On July 18, 2002, the YAL-1A, commonly known as the Airborne Laser (ABL), made its maiden flight in Wichita, Kansas. If this aircraft and its laser weapon revolutionize warfare (as some experts argue), then the groundwork for that revolution began in the 1970s with the Airborne Laser Laboratory (ALL).

Airborne Laser chronicles the long, problematic development of the ALL including its technological challenges and triumphs. The title may be slightly misleading. The book actually deals with the ALL program (a modified NKC-135 carrying a carbon dioxide laser), while the ABL is a follow-on program involving a highly modified B747-400F with a chemical oxygen iodine laser which is largely beyond the scope of the book. Since the purpose of the ALL program was to demonstrate the feasibility of an ABL type weapon, the author's license is understandable.

Dr. Duffner is currently chief of the Historical Information Office of the Air

Force Research Lab's Phillips Research Site at Kirtland AFB. During the ALL program he worked in the Air Force Weapons Lab, also at Kirtland. Both positions placed him close to the ALL program (based at Kirtland) and its details. As one might expect, his well researched, painstakingly documented book has a bibliography full of primary resources including numerous interviews with individuals intimately involved with ALL. A glossary near the back of the book is a valuable resource for the reader who is not familiar with the technical terms and abbreviations.

If Dr. Duffner's goals were to show the origins of the airborne laser program and to document the technical competence of its people, he does both well. He succeeds even though he is really writing to two different audiences. For the average reader, the first five chapters and the epilogue are excellent primers on lasers and laser weapons and will be interesting to any defense issue-minded reader. The more technically minded reader will find the middle chapters intriguing as they cover the technical challenges faced and eventually overcome by the program's scientists and engineers, including a temporary, complete halt in the program caused by microscopic organisms in the Albuquerque water.

The book also examines the unusual working relationships of those individuals working feverishly to "make light." In an environment normally composed of civilian scientists, Air Force scientists tried and succeeded when others around them doubted their potential for success. Also, rank did not matter to those "blue suit" innovators. There were specific instances within the ALL organization where more senior officers worked for junior officers. It is an amazing testimony to the people involved that egos and formality did not hinder the program. A great deal of the credit for that smooth working relationship can be given to the program's leading advocate, Dr. Donald Lamberson (Maj Gen, USAF, Ret). The ALL program was truly a team effort, but it was Dr. Lamberson's steady guidance and remarkable leadership skills that carried the program through its most trying times. If Dr. Edward Teller is the "Father of the H-Bomb," then Dr. Lamberson is the "Father of the ABL."

This is the only book that covers the ALL program in its entirety, and if "past is prologue," then it would be instructive reading for those people currently working on the ABL program. When the ABL eventually shoots down and therefore demonstrates a capability to defeat a ballistic missile, Dr. Duffner would like people to remember that the ABL's origins can be traced to when the ALL shot down five air-to-air missiles decades earlier in the skies over New Mexico.

Lt. Col. Carroll L. Lamb, Jr., USAFR, HQ ACC, Langley AFB. VA.



Combat Legend: de Havilland Mosquito. By Robert Jackson. Shrewsbury, UK: Airlife Publishing, Ltd., 2003. Timeline. Photographs. Appendices. Index. Pp. 96. \$14.95 paperback. ISBN: 1-84037-358-X

Robert Jackson is a former RAF Volunteer Reserve squadron leader and navigation instructor who has written over sixty books. Concentrating on military and aviation subjects, he has covered individual campaigns and wars and the operational history of British aircraft, such as the Spitfire, Hunter, and Canberra.

His latest subject, the de Havilland DH 98 Mosquito, is widely recognized as a beautiful example of the aircraft designer's art. Constructed largely from wood at a time when metal was scarce and expensive, the Mosquito gave the RAF a fast and versatile twin-engine aircraft that filled a number of roles—all of them well. The photo-reconnaissance variant was unarmed and relied solely on speed for survival on missions against the Third Reich. Other "Mossies" went into battle armed with bombs as large as 4,000 pounds or mounted gun armament as powerful as a 57-mm anti-tank cannon. Radar-equipped nightfighter Mosquitoes hunted Nazi intruders over England and ambushed their enemy counterparts intent on downing Halifax and Lancaster bombers over Germany. Fighter-bomber versions conducted some of the most daring and successful raids mounted against the Gestapo in occupied Europe. The Mosquito was extremely successful as a multi-role warplane from its debut in 1941 throughout the war and afterward. Jackson examines the versions and variants, which at times seem to multiply in bewildering numbers. He seems to assume the reader is familiar with the British World War II aircraft designation system. In fair-

ness, this system does seem straightforward, although significantly different from the American system of the time.

This book is aimed at the warplane enthusiast more than the serious historian. Short and fully illustrated with black-and-white and color photographs as well as color art plates of various Mosquito types, the book does not attempt to be a comprehensive history of the airplane. Instead, it provides a brief history of the de Havilland Aircraft Company and its development of the Mosquito, followed by three chapters that give the reader a look at the roles and missions of the fighter, bomber, fighter-bomber, nightfighter, high-altitude fighter, and photo-reconnaissance versions and the crews that flew them. Jackson also briefly discusses U.S. Army Air Force's use of the Mosquito in its photo-reconnaissance role.

Accounts of actual missions contained in these chapters are the most compelling part of the book. Some, such as the famous raids on the prison at Amiens and Gestapo headquarters in The Hague in Holland and Aarhus, Denmark, are well known; others are not. One is struck by the losses incurred. One photograph shows six Mosquito bombers of 105 Squadron and details how each was lost over an eighteen-month period.

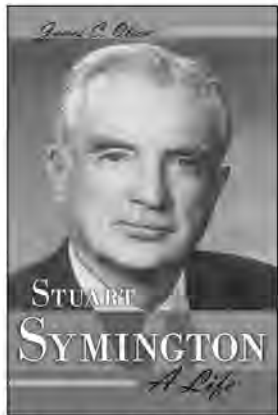
As one would expect in a book of this type, the photographs and color art plates are numerous and mainly very good. Especially interesting are some of the low-level combat photos of the Gestapo raids and anti-shipping missions. However, additional pictures would have been useful. For example, when discussing the German Heinkel He 219 nightfighter, no illustration is provided, although the author considers it the Mosquito's primary night adversary. Similarly, the German "Moskito," Focke-Wulf

Ta 154, is discussed but not illustrated. Also, in discussing the development of the Mosquito, Jackson writes eloquently of the DH 91 Albatross civil transport, calling it one of the most beautiful aircraft ever built and noting that its plywood-balsa-plywood fuselage led to the construction of the DH 98 Mosquito. But again, no Albatross photograph is provided.

The book closes with a discussion of export and post-World War II Mosquito users, notably the Israelis, who acquired the aircraft through a variety of methods including subterfuge and used them to great effect in the 1956 Suez Canal war. Appendices cover technical specifications, armaments, production numbers of the variants, museum aircraft, miniature models available, and a bibliography.

I recommend this book to anyone interested in World War II warbirds in general or Mosquitoes in particular, but no one is likely to mistake this for a "serious" academic history book. It is much more a book to be read for enjoyment.

MSgt William T. Brockman, Georgia ANG, Enlisted Historian, 116 Air Control Wing, Robins AFB GA



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website: <http://www.astronautical.org>

March 18

The annual meeting of the **Society for History in the Federal Government** will be held in the Thomas Jefferson Building, Library of Congress, Washington, DC. This year's theme will be "The History of History in the Federal Government: Past, Present and Future." Contact:

Dr. Suzanne White Junod
Food and Drug Administration History Office
HFC-24, Room 12-69
Rockville, MD 20857
(301) 827-3759, Fax x0551
e-mail: sjunod@ora.fda.gov
website: <http://shfg.gov>

March 18-20

The **International Society of Aviation Photographers** will hold its fourth annual symposium at the Hampton Inn Tropicana in Las Vegas, Nevada. Contact:

Jay Miller
P. O. Box 120847
Arlington TX 76012
Tel.: (817) 261-1420
e-mail: aerofax@sbcglobal.net
website: <http://www.aviationphotographers.org>

March 24-27

The **Army Aviation Association** will hold its annual convention at the Gaylord Opryland Convention Center in Nashville, Tennessee. Contact:

AAAA National Office
755 Main Street, Suite 4D
Monroe, CT 06468-2830
(203) 268-2450, Fax x5870
e-mail: aaaa@quad-a.org
website: <http://www.quad-a.org>

March 25-28

The **Organization of American Historians** will hold its annual meeting at the Boston Marriott Copley Place Hotel in Boston, Massachusetts. This year's theme is "American Revolutions—Transformations in American History." Contact:

OAH Annual Meeting
112 North Bryan Ave.
Bloomington IN 47408-4199
(812) 855-9853
e-mail: meetings@oah.org
<http://www.oah.org/meetings>

March 29- April 1

The **Space Foundation** will host its 20th National Space Symposium at the Broadmoor Hotel in Colorado Springs, Colorado. Contact:

The Space Foundation
310 S. 14th St
Colorado Springs, CO 80904
(719) 576-8000, Fax x8801
website: <http://www.spacefoundation.org>

March 30-April 1

The **Society of Experimental Pilots** and the **Society of Flight Test Engineers** will co-host the Aerospace Testing Exposition 2004 in Hamburg, Germany. Contact:

SETP
P. O. Box 986
Lancaster CA 93584-0986
(661) 942-9574, Fax 940-0398
e-mail: setp@setp.org
website: <http://www.setp.org>

March 31-April 1

The **U. S. Naval Institute's** 130th Annual Meeting and Naval History Seminar will be held at the U.S. Naval Academy in Annapolis, Maryland. Contact:

U.S. Naval Institute
Beach Hall
291 Woods Road
Annapolis MD 21402
(410) 295-1067, Fax x1048
e-mail: frainbow@usni.org
website: <http://www.usni.org/>

March 31-April 4

The **National Archives and National Library of Canada** will co-host a historical symposium entitled Canada's Air Forces at 80 in recognition of the founding of the Royal Canadian Air Force in 1924. The meeting will be held in the Auditorium of Library and Archives Canada in Ottawa, Canada. Contact:

Timothy Dube
728 Thicket Way,
Orleans, Ontario K4A 3B6 Canada
(613) 841-6349, Fax 943-8112
e-mail: tdube@archives.ca
website: <http://www.archives.ca>

April 3

The East Coast chapter of the **Western Front Association** will hold its Spring 2004 Historical Seminar at the Maryland War Memorial in Baltimore, Maryland. Contact:

Len Shurtleff
Western Front Association
(352) 379-3200
e-mail: lshurtleff@aol.com
website: <http://www.wfa-usa.org>

April 7-10

The **Southwest/Texas Popular Association/American Culture Association** will host its annual Atomic Culture in the Nuclear Age conference at the San Antonio Marriott Rivercenter complex in San Antonio, Texas. Contact:

Scott C. Zeman
Area Chair for Atomic Culture in the Nuclear Age
Associate Professor of History
Humanities Department
New Mexico Tech
801 Leroy Place
Socorro NM
(505) 835-5628, Fax x5544
e-mail: szeman@nmt.edu
website: <http://www.h-net.org/~swpca>

April 15-17

Manchester University's Centre for the Cultural History of War will host a multidisciplinary conference entitled "War, Culture & Humanity from Ancient to Modern Times." Contact:

Rebecca Gill
Dept. of History
University of Manchester
Oxford Rd,
Manchester M13 9PL Great Britain
e-mail: gillrebecca@hotmail.com
website: <http://www.historyandclassics.man.ac.uk>

April 15-18

The **British Film Institute** and the **Imperial War Museum** will co-host the 7th British Silent Cinema Festival in Broadway, Nottingham. This year's theme is "Goodbye to All That: British Silent Cinema and World War One." Contact:

Laraine Porter
Broadway
14-18 Broad St
Nottingham NG1 3AL United Kingdom
e-mail: laraine@broadway.org.uk
website: <http://www.broadway.org.uk>

April 17

Austin Peay State University and the **Society for Military History** will co-host a Conference Dedicated to Soldiers' Homecoming on the Austin Peay State University campus in Clarksville, Tennessee. Contact:

Dr Richard Gildrie
Conference Coordinator
Dept. of History and Philosophy
Austin Peay State University
P. O. Box 4486
Austin Peay State University
Clarksville TN 37044
(931) 221-7919, Fax x7917
e-mail: GildrieR@apsu.edu

April 19-21

The **American Institute of Aeronautics and Astronautics** will host International Air and Space Symposium 2004, "Sharing A Common Vision" at the Washington Court Hotel in Washington, DC. Contact:

AIAA
1801 Alexander Bell Dr., Ste. 500
Reston VA 20191-4344
(703) 264-7551
website: <http://www.aiaa.org>

April 20

The **Military Classics Seminar** meets for dinner-discussion at the Ft. Myer, Virginia, Officers' Club. This month's selection is John G. Bourke, *On the Border with Crook*, University of Nebraska Press, 1971. Speaker: Dr. Perry D. Jamieson, U.S. Air Force Historical Office. Contact:

Dr. Edward Marolda
Naval Historical Center
805 Kidder Breese Street, SE
Washington Navy Yard, D.C. 20374-5060
(202) 433-2331
e-mail: Edward.Marolda@navy.mil

April 30-May 2

The **George Washington University** Cold War Group and the **UC Santa Barbara** Center for Cold War Studies will co-host the 2d Annual Graduate Student Conference on the Cold War at George Washington University, Washington, DC. Contact:

Yvette M. Chin
The George Washington University
335 Phillips Hall, Academic Center
Washington DC 20052
(202) 994-6230, Fax x6231
e-mail: Yvette@gwu.edu
website: <http://www.history.ucsb.edu/projects/ccws>

May 5-7

The **National Museum of Naval Aviation** will host its annual symposium at the Museum's facilities in Pensacola, Florida. This year's focus is on Operation Iraqi Freedom and the future of naval aviation. Contact:

National Museum of Naval Aviation
1750 Radford Blvd. Suite C
NAS Pensacola, Florida 32508
(850) 452-3604, Fax x3296
e-mail: Naval.Museum@cnet.navy.mil
website: <http://www.naval-air.org>

May 5-9

The **Council on America's Military Past** will hold its 38th Annual Conference at the Eastland Park Hotel in Portland, Maine. Contact:

Col. Herbert M. Hart, USMC (Ret.)
Executive Director
Council on America's Military Past
Post Office Box 1151
Fort Myer, VA 22211
(703) 912-6124, Fax (703) 912-5666
e-mail: camphart@aol.com

May 6-7

The **Marine Corps Association** and the **U. S. Naval Institute** will co-host a Gulf Coast Military Exhibition and Symposium in New Orleans, Louisiana. Contact:

U.S. Naval Institute
Beach Hall
291 Woods Road
Annapolis MD 21402
(410) 295-1067, Fax x1048
e-mail: frainbow@usni.org
website: <http://www.usni.org/>

May 6-9

The **German Historical Institute** will host a conference entitled "War and the Environment: Contexts and Consequences of Military Destruction in the Modern Age." The conference will be held in Washington, DC. Contact:

Baerbel Thomas
German Historical Institute
1607 New Hampshire Ave., NW
Washington DC
(202) 387-3355, Fax 483-3430
e-mail: b.Thomas@ghi-dc.org
website: <http://www.ghi-dc.org>

May 7-8

The **Society of Air Racing Historians** will hold its 20th annual meeting in Cleveland, Ohio. Contact:

Herb Schaub, Secretary/Treasurer
Society of Air Racing Historians
168 Marion Lane
Berea, Ohio 44017
(440) 234-2301
e-mail: herman@airrace.com
website: <http://www.airrace.com>

May 18

This month's topic in the **Naval Historical Center Seminar Program for 2004** is "A Mixed Bag: Combat Search and Rescue in Operation Desert Storm." Presentations are given in the U.S. Navy Museum, Bldg. 76, Washington Navy Yard, Washington, D.C. For other monthly presentation titles, contact:

Dr Edward J. Marolda, Senior Historian
Naval Historical Center
(202) 433-3940
e-mail: Edward.Marolda@navy.mil

May 18

The **Military Classics Seminar** meets for dinner-discussion at the Ft. Myer, Virginia, Officers' Club. This month's selection is Douglas Leach, *Arms for Empire: A Military History of the British Colonies in North America, 1607-1763*, MacMillan, 1973. Speaker: Dr. Reginald C. Stuart, Mount Saint Vincent University. Contact:

Dr. Edward Marolda
Naval Historical Center
805 Kidder Breese Street, SE
Washington Navy Yard, D.C. 20374-5060
(202) 433-2331
e-mail: Edward.Marolda@navy.mil

May 20-23

The **Journal of Policy History** will host a Conference on Policy History to be held in at the Sheraton Clayton Plaza in St. Louis, Missouri. Contact:

Journal of Policy History
Saint Louis University
3800 Lindell Blvd. P. O. Box 56907
St. Louis, MO 63156-0907
<http://www.slu.edu/departments/jphand>

May 20-23

The annual meeting of **The Society for Military History** will be held at the Hyatt Regency Bethesda in Bethesda, Maryland. This year's theme is "What's On Our Minds: Critical Problems in Military History." Contact:

Jon Sumida
Dept. of History, Univ. of Maryland
website: <http://www.history.umd.edu/Faculty/Jsumida/smhannualmeeting04/>

June 3-4

Siena College will host its annual symposium, World War II – A 60-Year Perspective, with presentations featuring the year 1944. Contact:

Dr Karl Barbir
Dept. of History
Siena College
515 Loudon Road
Loudonville, NY 12211-1462
(518) 783-2512 - FAX 518-786-5052
e-mail: barbir@siena.edu

June 3-6

The **Historical Society** will hold its National Conference in the Spruce Point Inn, near Boothbay Harbor, Maine. The theme of the conference is "Reflections on the Current State of Historical Inquiry." Contact:

2004 Conference
The Historical Society
656 Beacon Street, Mezzanine
Boston MA 02215-2010
e-mail: historic.bu.edu
<http://www.bu.edu/historic>

June 7-10

The **American Helicopter Society** will host its 60th annual forum and technology display at the Inner Harbor Convention Center in Baltimore, Maryland. Contact:

AHS Int'l – the Vertical Flight Society
217 N. Washington St., Alexandria, VA 22314-2538
(703) 684-6777, Fax 739-9279
e-mail: kim@vtol.org
website: <http://www.vtol.org>

June 15

The **Military Classics Seminar** meets for dinner-discussion at the Ft. Myer, Virginia, Officers' Club. This month's selection is Tami Davis Biddle, *Rhetoric and Reality in Air Warfare: The Evolution of British and American Ideas About Strategic Bombing, 1914-1945*, Princeton University Press, 2002. Speaker: Dr. Thomas Julian (Colonel, USAF (Ret.)). Contact:

Dr. Edward Marolda
Naval Historical Center
805 Kidder Breese Street, SE
Washington Navy Yard, D.C. 20374-5060
(202) 433-2331
e-mail: Edward.Marolda@navy.mil

June 21-23

The **Netherlands American Studies Association** will host a conference entitled "The Story of World War II: American Studies" at the Vrije Universiteit in Amsterdam, The Netherlands. Contact:

Dr Diederik Oostdijk
English Department
Vrije Universiteit
DeBoelelaan 1105
NL-1081 HV Amsterdam
The Netherlands
e-mail: dm.oostdijk.let.vu.nl

June 22-27

The **American Society of Aviation Artists** will host its Annual Aviation Art Forum at the Air Force Museum, located adjacent to Wright-Patterson AFB, in Dayton Ohio. Contact:

John Sarsfield, ASAA Vice-President
6541 St. Vrain Road
Longmont CO 80503
(303) 702-0707
e-mail: ASAAcontact@asaa-avart.org
website: <http://www.asaa-avart.org>

June 28-30

The 2004 **IEEE** Conference on the History of Electronics is the fifth in a series of workshops co-sponsored by the IEEE History Committee and the IEEE History Center at Rutgers University. The conference will be held at Bletchley Park, Oxfordshire, England. Contact:

Frederick Nebeker
Senior Research Historian
IEEE History Center
Rutgers University
39 Union Street
New Brunswick NJ 08901
e-mail: f.nebeker@ieee.org
website:
http://www.ieee.org/organizations/history_center

July 12-13

The **Centre for Metropolitan History** at the Institute of Historical Research will host a conference entitled "Metropolitan Catastrophes: Scenarios, Experiences and Commemorations in the Era of Total War." The Conference will be held at the Institute of Historical Research in London, England. Contact:

Dr Stefan Goebel
Centre for Metropolitan History
Institute of Historical Research
University of London
Senate House
Malet Street
London WC1E 7HU United Kingdom
e-mail: stefan.goebel@sas.ac.uk
website: <http://www.history.ac.uk/cmh/war.html>

July 12-14

The **U.S. Army's Center of Military History** will host the 2004 Biennial Conference of Army Historians in Washington, DC. The Theme of the conference is "Military Professionalization: The Quest For Excellence." Contact:

US Army Center of Military History
ATTN: DAMH-FPF (Dr Rush)
103 Third Avenue
Ft. Lesley J. McNair DC 20319-5058
(202) 685-2727
e-mail: rushrs@hqda.army.mil

July 15-17

To mark the 60th anniversary of the atomic bomb, the **Center for the Study of War and Society** and the University of Tennessee Press will co-host a conference to assess the impact of nuclear weapons development on American society and culture. The conference will be held in Oak Ridge, Tennessee. Contact:

Prof. G. Kurt Piehler, Director
Center for the Study of War and Society
220 Hoskins Library
University of Tennessee
Knoxville TN 37996-0128
(865) 974-7094
e-mail: gpiehler@utk.edu
website: [http:// web.utk.edu/~csws](http://web.utk.edu/~csws)

July 22-25

The **1st Annual Aircraft Engine Historical Society Convention** will be held at the Fanmarker Hotel in Rantoul, Illinois. Program will include speakers and vintage aircraft engine ground demonstrations. Contact:

AEHS Convention
P. O. Box 278
Brownsboro AL 35741-9998
e-mail: officers@enginehistory.org

August 3-5

The **Association of Unmanned Vehicle Systems Int'l** will host its annual symposium and exhibition at the Anaheim Convention Center in Anaheim, California. Contact:

AUVSI
3401 Columbia Pike
Arlington VA 22204
(703) 920-2720, Fax x2889
e-mail: info@auvsi.org
website: <http://www.auvsi.org>

August 5-7

The quadrennial joint meeting of the **History of Science Society, the Canadian Society for the History and Philosophy of Science, and The British Society for the History of Science** will be held in Halifax, Nova Scotia. Contact:

History of Science Society Executive Office
P.O. Box 117360
3310 Turlington Hall
University of Florida
Gainesville, FL 32611-7360
(352) 392-1677, Fax x2795
e-mail: info@hssonline.org
website: <http://www.hssonline.org>

August 6-8

The **Western Front Association** will hold its annual national seminar on the SUNY campus in Plattsburgh, New York. Contact:

Len Shurtleff
Western Front Association
(352) 379-3200
e-mail: lshurtleff@aol.com
website: <http://www.wfa-usa.org>

August 17-21

The **International Committee for the History of Technology (ICOHTEC)** will hold its 31st Symposium at Bochum, Germany. This year's theme is "(Re-)Designing Technological Landscapes." Contact:

Barton Hacker
Chairperson, ICOHTEC Program Committee
150 12th Street, N.E.
Washington, DC 20002 USA
e-mail: hackerb@si.edu
website: <http://www.icohtec.org>

August 19-22

The **American Institute of Aeronautics and Astronautics** will host its 5th International Airship Convention and Exhibition in Oxford, England. Contact:

AIAA
1801 Alexander Bell Dr., Ste. 500
Reston VA 20191-4344
(703) 264-7551
website: <http://www.aiaa.org>

August 19-22

The **Mars Society** will hold its annual convention in the Palmer House Hilton in Chicago, Illinois. Contact:

The Mars Society
P. O. Box 273
Indian Hills CO 80454
website: <http://www.MarsSociety.org>

September 9-12

The **Tailhook Association** will hold its 47th Annual Symposium at the Nugget Hotel and Casino in Reno, Nevada. Contact:

The Tailhook Association
9696 Businesspark Ave.
San Diego, CA 92131
(858) 689-9223 / (800) 322-4665
e-mail: thookassn@aol.com
website: <http://www.tailhook.org>

September 11-15

The **Air Force Association** will hold its annual National Convention and Aerospace Technology Exposition in Washington, DC. Contact:

AFA
1501 Lee Highway
Arlington VA 22209-1198
(703) 247-5800
website: <http://www.afa.org>

September 15-18

The **Society of Experimental Test Pilots** will host its 48th Annual Symposium and Banquet at the Westin Bonaventure Hotel in Los Angeles, California. Contact:

SETP
P. O. Box 986
Lancaster CA 93584-0986
(661) 942-9574, Fax 940-0398
e-mail: setp@setp.org
website: <http://www.setp.org>

September 24-25

The **Belgian Luxembourg American Studies Association** and the **Centre for Historical Research and Documentation on War and Contemporary Society** will co-host a Conference on the 60th Anniversary of the Battle of the Bulge in Luxembourg City, Luxembourg. Contact:

William L. Chew III, Ph.D.
Professor of History
Vesalius College, Vrije Universiteit Brussel
Pleinlaan 2
B – 1050 Brussels, Belgium
e-mail: wchew@vub.ac.be

September 28-30

The **American Institute of Aeronautics and Astronautics** will host its Space 2004 Conference & Exhibition in San Diego, California. Contact:

AIAA
1801 Alexander Bell Dr., Ste. 500
Reston VA 20191-4344
(703) 264-7551
website: <http://www.aiaa.org>

October 4-8

The **American Institute of Aeronautics and Astronautics** will host the 55th Congress of the International Astronautical Federation, the International Academy of Astronautics, and the International Institute of Space Law in Vancouver, British Columbia. Contact:

AIAA
1801 Alexander Bell Dr., Ste. 500
Reston VA 20191-4344
(703) 264-7551
website: <http://www.aiaa.org>

October 8-9

The **McCormack Tribune Foundation** and **VMi's Marshall Library** will co-sponsor their third Conference on the Cold War, focusing upon the years 1963-1975. Contact:

Malcolm Muir, Jr.
Dept. of History
Virginia Military Institute
Lexington VA 24450
(540) 464-7447/7338
e-mail: murim@vmi.edu

October 17-20

The **Association of Old Crows** will host its 41st annual international symposium and convention in San Diego, California. Contact:

AOC Headquarters
1000 North Payne Street, Suite 300
Alexandria, Virginia 22314-1652
(703) 549-1600, Fax x2589
e-mail: wood@crows.org
website: <http://www.aoc.org>

October 25-27

The **Association of the U.S. Army** will hold its annual convention and symposium at the New Washington Convention Center in Washington, D.C. Contact:

Association of the United States Army
2425 Wilson Blvd.
Arlington, VA 22201
(800) 336-4570
e-mail: ausa-info@ausa.org
website: <http://www.usa.org/>

October 26-27

The **U.S. Naval Institute** will host its 9th Annual Naval Warfare Symposium and Exhibition in Virginia Beach, Virginia. Contact:

U.S. Naval Institute
Beach Hall
291 Woods Road
Annapolis MD 21402
(410) 295-1067, Fax x1048
e-mail: frainbow@usni.org
website: <http://www.usni.org/>

October 27-30

The 2004 meeting of the **Northern Great Plains History Conference** will be held in Bismarck, North Dakota. Contact:

Joe Fitzharris
Dept. of History – Mail #4018
University of St. Thomas
2115 Summit Ave.
St. Paul MN 55105
e-mail: jcfitzharris@stthomas.edu

November 16-17

The **American Astronautical Society** will hold its National Conference and 51st annual meeting at the Pasadena Hilton in Pasadena, California. Contact:

American Astronautical Society
6352 Rolling Mill Place, Suite #102
Springfield, VA 22152-2354
(703) 866-0020, Fax -3526
e-mail: info@astronautical.org
website: <http://www.astronautical.org>

If you wish to have your event listed, contact:

George W. Cully
230 Sycamore Creek Drive
Spingboro, OH 45066-1342
(513) 748-4737
e-mail: warty@woh.rr.com



Are *Air Power History* readers too timid to reveal their aircraft-spotting skills? A mere thirteen readers tried their hand at identifying last issue's "What Is It?" flying machine. One reader got it wrong.

Last issue's mystery aircraft was the Bell H-12B helicopter.

In 1946, Bell Helicopter was working on a general utility helicopter that would be larger than its Model 47, the familiar, bubble-nosed craft known to American film and television audiences for its role on M*A*S*H. Although the Model 47 is known in military jargon as the H-13 (originally, R-13), the new aircraft, the company's Model 48, actually secured an earlier designation and became the H-12 (R-12). Features included a car-style windshield and doors, not-retractable landings wheels instead of skids, and a 600-horsepower Pratt & Whitney R-1340 Wasp engine driving a two-bladed, 47 ft. 6 in. main rotor with a stabilizing bar.

While two XR-12 test ships (46-214/215) underwent flight tests, the Army Air Forces ordered, then cancelled, thirty-four R-12A models (47-491/524).

The service also ordered a slightly larger version, the XR-12B (46-216) and bought ten service-test YR-12B models (46-217/226). The B model had a rounded fuselage shape, an improved version of the Wasp engine, and minor internal upgrades.

The Army Air Forces became the Air Force in September 1947 and the R-12 series became the H-12 in July 1948. By then, the H-12 had demonstrated difficulties with rotor blade stability and the service decided to invest in the Sikorsky H-5 instead. The H-5 went on to achieve hundreds of combat rescues in the Korean War.

Very little is known today about what was done with the H-12 helicopters, none of which has survived. *Air Power History* would like to hear from any reader who can provide details. "Bell Aircraft Since 1935," by Alain J. Pelletier, was the source for much of our narrative about the H-12. Bob Leder of Bell Helicopter Textron provided our H-12B photographs.

Our "History Mystery" winner is Robert Sewell of Hartford, Connecticut. Thanks to all readers who joined in our "name the plane" exercise.

This Issue's Mystery Plane

Usually, our mystery plane is an American military type, but this time we've chosen an aircraft of an Allied nation. Moreover, our photo by A.J. Jackson shows an example of the "History Mystery" plane after it was put to pasture. See if you can identify the aircraft. But remember, please: postcards only. The rules, once again:

1. Submit your entry on a postcard. Mail the postcard to Robert F. Dorr, 3411 Valewood Drive, Oakton VA 22124.

2. Correctly name the aircraft shown here. Also include your address and telephone number, including area code. If you have access to e-mail, include your electronic screen name.

3. A winner will be chosen at random from the postcards with the correct answer. The winner will receive an aviation book written by this journal's

technical editor.

This feature needs your help. In that attic or basement, you have a photo of a rare or little-known aircraft. Does anyone have color slides? Send your pictures or slides for possible use as "History Mystery" puzzlers. We will return them.



Letters

Why not F-47 Thunderbolts?

I was very pleased to see Michael D. Rowlands' well-crafted and thought provoking article entitled "Why the U.S. Air Force Did Not Use the F-47 Thunderbolt in the Korean War" [Fall 2003 issue].

While I could not agree more with the bulk of Mr. Rowlands' conclusions and research, I was disappointed to note that, among his very comprehensive sources, he did not include reference to a small monograph entitled, *Republic P-47 Thunderbolt: The Final Chapter, Latin American Air Forces Service* (Phalanx, 1993, ISBN 0-9625860-1-3 by the under-

signed). Had he availed himself of that reference, he would have observed that none other than General "Hap" Arnold had made a command decision at the end of the war, with a view towards his vision of a "Hemispheric Air Force," to select the P-47/F-47D series as the "aircraft of choice" with which to equip our hemispheric neighbors under the interim American Republic Projects (ARP) and, later, MDAP. These deliveries and outright sales under FMS continued almost unabated from 1946 until well into 1953 and included major quantities of Thunderbolts that saw service with Mexico, Nicaragua, Cuba, the Dominican Republic, Colombia, Venezuela, Brazil, Ecuador, Peru, and Chile. Guatemala and Bolivia also acquired single examples of the Thunderbolt but never operated them

successfully operationally. Indeed, although they were not taken up, Argentina, Paraguay and even small Haiti had been selected as recipients as well, although as it happened, Argentina went her own way with regard to aircraft acquisition during that period and the U.S. State Department frowned on the projected deliveries to Haiti and Paraguay, at the time for political reasons. The aircraft that actually reached Latin America included late-model P-47D-30, -35, and -40 Thunderbolts, as well as a few F-47Ns that ended up in Nicaragua by way of the Puerto Rican National Guard. Only one nation in Latin America received P-51s under formal U.S. aid programs during the same period, Uruguay, which specifically requested the type.

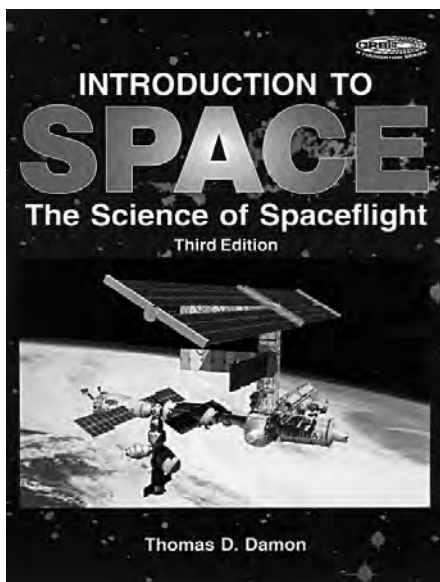
Additionally, during the same period, the United States made significant quantities of F-47s available via MDAP to France, Portugal, Italy, Yugoslavia, Turkey, Iran and Nationalist China. While these very significant offsets were ongoing, the U.S. found sufficient quantities of P-47/F-47s to equip not fewer than 28 Air Guard squadrons, between 1946 and 1954, although this was a much smaller number than the 75 squadrons that were equipped with P-51/F-51 variants. Unquestionably, in my mind, the Arnold decision to select the P-47 as the ARP/MDAP standard fighter-bomber had quite a lot to do with the fact that they were "not available" for Korea. Ironically, many of the former ANG F-47s were refurbished, as late as 1953-1955, by TEMCO in Texas for delivery to Latin America under the provisions of MDAP/MAP, the final propeller driven fighter to see service in that region before the advent of the next "standard" fighter-bomber replacement, the Lockheed F-80C. The French were using their F-47s in Algeria, to very good effect, well into the 1950s.

Dan Hagedorn, Adjunct Curator, Latin American Aviation, National Air and Space Museum, Smithsonian Institution, Washington, D.C.

I was in the Air Corps!

Something in the winter issue of Air Power History has left me a little confused. Perhaps you can clarify it for me.

In the first footnote to the interview of Robert S. McNamara (by Watson and Volk), it says, "The Air Corps was disestablished on March 9, 1942." However,



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Edward G. Gibson, Astronaut, Skylab 4

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hanging on the wall in front of me is my commission that states, "I have recommended and by and with the consent of the Senate do appoint him Second Lieutenant in the Air Corps of the Regular Army of the United States and to rank as such from the fifth day of June nineteen hundred and forty-five." It is signed for the President by the Secretary of War and dated June 5, 1945.

So how did I get commissioned in something that had been disestablished over three years earlier? Or perhaps in the future I should concentrate on the articles and skip the footnotes.

John M. Fitzpatrick, Springfield, Virginia.

Editor's reply: *Good question! Here's Mr. Wolk's explanation:*

In March 1942, the Office of the Chief of the Air Corps was abolished, as was the Air Force Combat Command. Officers continued to be commissioned in the Air Corps until passage of the National Security Act of 1947, which created the United States Air Force.

News

Smithsonian Opens New Museum at Washington Dulles

Part of the Smithsonian Institution's National Air and Space Museum, the Steven F. Udvar Hazy Center, adjoining Washington Dulles International Airport, at Chantilly, Virginia, officially opened to the public on December 15, 2003. Shaped like a giant hangar, it houses many aviation and space treasures that do not fit readily into the Washington, D.C. facility. For example, the Udvar-Hazy Center shelters, among others, the Space Shuttle Enterprise, the Lockheed SR-71 Blackbird, (see photo page 57) the BAC/Aerospatiale supersonic transport Concorde, the famed Boeing B-29 Enola Gay, an IMAX theater, a 164-foot observation tower, and much, much more. If you're in the Washington, D.C. area, this is a "must see" museum.

Look it up on the web:
www.nasm.si.edu/museum/udvarhazy/

New Director of Air Force History

C. R. "Dick" Anderegg, Senior Executive Service, is the Director, Air Force History, Headquarters U.S. Air Force. He provides policy and guidance to the key components of the Air Force History and Museums Program: the Air Force Historical Research Agency, the Air Force Museum, and the worldwide field history program. The Historical Research Agency, located at Maxwell Air Force Base, Ala., maintains 100 million pages of official Air Force archives. The history office at Bolling AFB, Washington, D.C., supports Headquarters Air Force with books, monographs, and special studies; it also organizes exhibits on historical themes. The Air Force Museum, at Wright-Patterson AFB, Ohio, hosts more than 1.5 million visitors a year, collects, restores and displays air and space craft, a legacy that spans more than a century of military flight. The worldwide history program consists of more than 200 Air Force historians, who write periodic operational histories that document their commands' most significant activities.

Mr. Anderegg also serves as the historical adviser to the Secretary of the Air Force and the Air Force Chief of Staff. Prior to assuming his current position, Mr. Anderegg was an air and space power strategist in Project Checkmate during the planning and execution of Operations Enduring Freedom and Iraqi Freedom. He served as an active-duty Air Force officer for 30 years, during which he commanded an F-15 squadron, was twice a fighter group commander and twice a fighter wing vice commander.

Mr. Anderegg is a former F-4 Fighter Weapons School instructor pilot and flew more than 3,700 hours in the F-4C/D/E/G and the F-15A/C/E, including 170 combat missions during the Vietnam War.

Following his retirement from the Air Force at the rank of colonel, Mr. Anderegg wrote and published two Air Force history books and edited a third. He earned a BA degree in English, from Hobart College, Geneva, N.Y. and an MS degree in international affairs from Troy State University, Troy, Alabama. Also, he completed the Fighter Weapons Instructor Course (F-4), Squadron Officer School; Air Command and Staff College, and the Air War College.

His career highlights include recognition as a distinguished graduate, Undergraduate Pilot Training, Laredo AFB,



Texas; F-4 student pilot, MacDill AFB, Florida; pilot, 555th Tactical Fighter Squadron, Udorn Air Base, Thailand; pilot, 78th TFS, Royal Air Force Woodbridge, England, and wing flight examiner, 81st Tactical Fighter Wing, Royal Air Force Bentwaters, England; F-4 student and instructor pilot, 414th Fighter Weapons Squadron, Nellis AFB; flight commander, 12th TFS, Kadena AB, Japan; instructor and aerial attack flight commander, 414th FWS, Nellis AFB; action officer and executive officer for Director of Operations, Deputy Chief of Staff for Operations, Headquarters USAF; Chief of Wing Weapons, 36th TFW, Bitburg AB, West Germany; Commander, 525th TFS, Bitburg, West Germany; Assistant Deputy Commander for Operations, 325th Tactical Training Wing, Tyndall AFB, Florida; Deputy Commander for Operations, 4th TFW, Seymour Johnson AFS, N.C.; Vice Commander, 3rd TFW, Clark AB, Philippines; Commander, 475th Weapons Evaluation Group, Tyndall AFB, Florida; Vice Commander, 325th Fighter Wing Tyndall AFB; Detachment Commander, Air Force ROTC, Pittsburgh, Pa.; self-employed author and editor of various Air Force history projects; air and space strategist, Project Checkmate, Headquarters USAF and consultant to the Rand Corporation.

Reunions

The **Association of Air Force Missileers (AAFM)** will meet May 19-23, 2004, in Omaha, Nebraska. Contact: AAFM

P.O. Box 5693
Breckenridge, CO 80424
(970) 453-0500
e-mail: aafm@afmissileers.org

Pilot Training Class 55S will meet April 30 – May 2, 2004, at Lackland Red Roof Inn in San Antonio, Texas. Contact:

Marv Craig
737 Kimball Road
Ft Collins, CO 80521
(970) 493-0842
e-mail: mcraig@Vilottrainin255s.org

Pilot Class 56N All those interested in having a reunion contact:

Jack Fleck
(858) 487-7255
e-mail: jifleck@aol.com

The **Sampson AFB Veterans Association** seeks to contact all 3650th Basic Military Training Wing members, especially permanent party, Women's Air Force, Basic Trainees, and Special Training school personnel, from 1950 to 1956. Contact:

Chip Phillips
P.O. Box 31
Williamsville, NY 14231-0331
e-mail: chip34@aol.com

50th Fighter-Bomber Wing will hold a reunion June 10-12, 2004, at the Marriott Hotel, Ogden Utah. All members of the 50th FBW, from Clovis through the F-100 era at Hahn AB, Germany. Contact:

Jack Lowrey
(801) 544-0315
e-mail: JumpnJac@aol.com

The **303d Bomb Group (Eighth Air Force)** will hold its annual reunion in Savannah, Georgia, August 26-30, 2004. The unit was based in Molesworth, England during World War II, flying B-17s. Contact:

Lt. Col. Eddie Deerfield
352 Landmark Trail
Palm Harbor, FL 34684
e-mail: ED303fsra@aol.com

The **353d Tactical Fighter Squadron** (Myrtle Beach AFB) will meet at on June 18-20, 2004 at the Hyatt Regency Town Lake in Austin, Texas. Contact:

Tim Black
3301 Barker Hollow Pass
Austin, TX 78739
(512) 280-8436
e-mail: tangblack@austin.rr.com

Misawa Recall: 416th Tactical Fighter Squadron, 531st Tactical Fighter Squadron, (1959-1964) will meet October 4-6, 2004 in Austin, Texas. Polkadotters and 4th fighter pilots also invited. Contact:

Les Frazier
702 River Down Road
Georgetown, TX 78628
e-mail: FLOftus@mac.com
or les@lesfrazier.com.

The **610th Air Control and Warning Squadron** (618th, 527th, and all Southern Japan Radar GCI sites). Proposed reunion at Branson, Missouri, in September 2004. Contact:

Marvin Jordahl
(904) 739-9337
e-mail: jordahlmarvin@attbi.com

The **815th Troop Carrier Squadron (Flying Jennies)** will meet April 15-17, 2004, in Biloxi, Mississippi. Contact:

Jim Elmer
2512 Fairway Avenue
North Little Rock, AR 72116
(501) 771-4106
e-mail: jimelmer@swbell.net

Note: U.S. Navy readers are advised to log on to www.navalinstitute.org and then click on reunions.

Guidelines for Contributors

We seek quality articles—based on sound scholarship, perceptive analysis, and/or firsthand experience—which are well-written and attractively illustrated. The primary criterion is that the manuscript contributes to knowledge. Articles submitted to *Air Power History* must be original contributions and not be under consideration by any other publication at the same time. If a manuscript is under consideration by another publication, the author should clearly indicate this at the time of submission. Each submission must include an abstract—a statement of the article's theme, its historical context, major subsidiary issues, and research sources. Abstracts should not be longer than one page.

Manuscripts should be submitted in triplicate, double-spaced throughout, and prepared according to the *Chicago Manual of Style* (University of Chicago Press). Use civilian dates and endnotes. Because submissions are evaluated anonymously, the author's name should appear only on the title page. Authors should provide on a separate page brief biographical details, to include institutional or professional affiliation and recent publications, for inclusion in the printed article. Pages, including those containing illustrations, diagrams or tables, should be numbered consecutively. Any figures and tables must be clearly produced ready for photographic reproduction. The source should be given below the table. Endnotes should be numbered consecutively through the article with a raised numeral corresponding to the list of notes placed at the end.

If an article is typed on a computer, the disk should be in IBM-PC compatible format and should accompany the manuscript. Preferred disk size is a 3 1/2-inch floppy, but any disk size can be utilized. Disks should be labelled with the name of the author, title of the article, and the software used. WordPerfect, in any version number, is preferred. Other word processors that can be accommodated are WordStar, Microsoft Word, Word for Windows, and AmiPro. As a last resort, an ASCII text file can be used.

There is no standard length for articles, but 4,500-5,500 words is a general guide.

Manuscripts and editorial correspondence should be sent to Jacob Neufeld, Editor, c/o *Air Power History*, P.O. Box 10328, Rockville, MD 20849-0328, e-mail: jneufeld@comcast.net.