SUPERFORTRESS

PHOTOGRAPHY BY **JASON TONEY**

WHAT IT'S LIKE TO FLY THE BIGGEST BOMBER OF WORLD WAR II

BY JEFF SKILES

THE PASSENGERS ASSEMBLE in front of the B-29, gaping skyward at the great bulbous nose. Some of them clutch a memento in their hands—dog tags, or maybe a photograph of a loved one—a connection to another time and place when the shadows of hundreds of B-29s darkened the sky. They listen quietly to the safety briefing before splitting up to climb to their assigned locations for the flight. Those lucky enough to join us in the forward crew compartment climb through a hatch in the nose wheel well; those in the back scale a ladder and pass through a small door in the rear gunners' compartment.

The two pilots sit widely separated in the cockpit at rather simple control stations. Each has just basic instruments, a

control yoke, rudders, and four throttles. I assume my assigned position as copilot. Behind me, facing backward, sits the flight engineer at a panel bristling with gauges, levers, and switches. This is the command center of the big bomber. Other than basic flight controls, everything goes through the engineer.

In military usage, a radio operator, navigator, and a bombardier would have joined the forward compartment crew, but today those positions are unnecessary and their seats are available for passengers. Our four forward passengers sit nervous with anticipation. Often WWII servicemen will occupy their assigned stations from so long ago and relive the sights and sounds of their youth now separated by 70 years of memory.

A fistful of throttles.

Rear crew compartment seating.

Engine start is accomplished entirely by the engineer who purposefully manipulates the controls from his console. The ground personnel and the scanners in the back are his eyes and ears as the engines fire one by one, belching smoke before settling to a low loping rumble as we leave the chocks and taxi for takeoff.

The B-29 has a free swiveling nose wheel, and directional control is accomplished with differential braking and power. It sounds easy, but taxiing *FIFI* has a learning curve. The brakes grab at the slightest application, and neophytes like me lurch from side to side in a serpentine path down the taxiway.

At runway's end the engineer once again takes control for the engine run-up. He tests each engine—carefully exercising the props, checking the magnetos, listening for any discordant tone amidst the symphony playing out on the wings.

WRIGHT 3350

The B-29 was the first production aircraft to be equipped with the new Wright 3350 twin-row, 18-cylinder engines producing 2,200 hp. Early on these engines had significant teething problems. Cooling of the rear bank of cylinders became a particular problem that was only exacerbated by the tight cowl design, heavy operational weights, and the hot temperatures in the Pacific theater of operations. Abused thusly, the cylinders showed an alarming propensity for swallowing their own valves, often accompanied by an engine fire. The metal alloy used for the engine crankcase had a high concentration of magnesium that could ignite and burn at temperatures high enough to compromise the structure of the aircraft. This fate befell the second B-29 prototype after an uncontrollable magnesium fire burned through the wing spar. Boeing's chief test pilot and 11 crew members were lost in the accident.

Continual modifications to the engine improved the cooling but didn't entirely eliminate the problem. Near the end of World War II the engine fuel delivery system was altered from carburetion to direct fuel injection that greatly increased the reliability of the Wright 3350. This modified engine became the basis for the higher horsepower workhorses that powered the DC-7 and Constellation airliners through the 1950s.

While the CAF's B-29, *FIFI*, isn't operated at the weights and temperatures experienced by crew members in World War II, it had its own share of engine problems related to the early Wright 3350 engines. In 2006, *FIFI* was set down for a four-year restoration during which its engines were replaced with new engines incorporating many of the design changes adopted in the later versions of the big Wright. In 2010, a safer and much more reliable *FIFI* flew again.

The ailerons are geared to lower control forces.

PHOTOGRAPHY BY **JASON TONEY** AND **BRADY LANE**

TAKEOFF ROLL

We're at the Commemorative Air Force (CAF) Wings Over Houston air show, and the airfield is being run by the air boss. We wait for an aerobatic act to finish and then hear "*FIFI* cleared for takeoff." The air boss is in a hurry to get us out between acts.

I hold the brakes and call, "Field barometric." The engineer moves the throttles halfway forward, and the engines stabilize at 30 inches of manifold pressure. As I release the brakes and drop my heels to the floor, I move the throttles toward the stops and the Boeing surges ahead. Steering is accomplished entirely by differential power through 50 mph or so. Once the rudder becomes effective I command, "Engineer's throttles, set max power." The engineer takes over the throttles and sets 44 inches of manifold pressure.

At 100 mph I lighten the nose wheel slightly, and at around 125 mph, *FIFI* levitates into the air. It's hard to define exactly when we leave the runway, but once I'm sure I step hard on the brakes until I feel the "thump, thump" of the wheels coming to a stop before commanding, "Gear up."

We climb out flat to gain speed and precious engine cooling. The B-29 has a long fuselage, and its tail is protected by a retractable tail skid. The CAF has a custom; if you scrape the skid, you must sign the skid plate with a Sharpie and your transgression will be there for all to see until the next pilot removes your name by equaling your feat.

Passing through 150 mph I call, "Flaps up, climb one."

At 190 mph, "Climb two, after-takeoff checklist." The engineer dutifully reduces our power even further as we head out for our 30-minute flight over Galveston Bay.

BOEING HEAVY BOMBER

The design work for the B-29 began hardly more than three decades after the Wright brothers' first flight. The blueprints defined an aircraft of extremes, faster, larger, and heavier than any mass-produced aircraft ever built up to that time. New innovative technologies like pressurization, high-aspect-ratio wings, and remotely controlled gun turrets would be incorporated. The Boeing would be as sophisticated as any other aircraft on the planet and would weigh an astounding 144,000 pounds.

The Army Air Corps ordered 250 before the first prototype flew and increased the order to 500 after the Japanese bombed Pearl Harbor. Eventually more than 4,000 would be built at a cost that exceeded any other government contract ever written before.

The high-altitude missions flown by American servicemen could stretch on for as long as 15 hours. Often fighter aircraft didn't have the range to accompany the B-29s over their targets; the bomber's defense was altitude, airspeed, and firepower.

The B-29 can fly as high as 31,000 feet, and its maximum speed is 350 mph. It has three pressurized compartments: the flight deck, a rear compartment housing three gunners, and the tail gunner's area. A tunnel connects the forward and rear compartments through the bomb bay. Before making their final runs over a target, the

Pilot stations have very basic controls.

Larry Jeffus through the rear pressure hatch.

Captain David Oliver, Jeff Skiles, and Rob Wickman brief for a flight.

crews would don their oxygen masks and the aircraft would be depressurized to better accept battle damage.

In a triumph of mechanical design, the four gun turrets are remotely controlled. The gunners had five sighting stations, an elevated "barber's chair," and two side blisters in the rear compartment, as well as the nose and tail gunners' position. The gunners operated small targeting devices that electrically controlled the remote gun turrets above and below the aircraft. The fire control officer in the top blister assigned the gunners to the individual turrets as he saw fit.

The control surfaces are massive, and they have no hydraulic boost. The elevator is fairly light when trimmed properly, but the rudder and ailerons require quite a bit of muscle. The ailerons have a mechanical reduction to give the pilot reasonable control forces. Rather than the normal 90 degrees, the control yoke must be spun 180 degrees in each direction for full aileron deployment.

The large control movements required on final approach make the pilot look as if he's on an exercise machine, with 90-degree aileron application and large rudder inputs often required to stay on profile.

The first prototype flew in 1942, and the design was already needed desperately in the war effort. The B-29 had many teething problems with its engines, pressurization, propellers, and fire control systems, but there was little time to perfect the aircraft. Rather than shut down production to implement design changes, new aircraft were instead flown directly from assembly plants to special

TUPOLEV TU-4

In the waning moments of World War II, Stalin ordered his aviation industry to construct an exact copy of the B-29 to be built as a Soviet heavy bomber. The Soviets had come into the possession of three intact, and flyable, B-29s that had all made emergency landings at the eastern Russian port of Vladivostok. *Ramp Tramp*, *Ding Hao*, and the *General H.H. Arnold Special* had all diverted due to mechanical problems or battle damage suffered during raids over Japan and Manchuria.

Russia was far behind with its own design for a Soviet heavy bomber. It would take five years to design and build a prototype. By cloning the B-29, the Soviets could have intercontinental bombing capability in as little as two. Noted aircraft designer Andrei Tupolev was assigned the project. He ordered that *Ramp Tramp* be used for flight testing, *Ding Hao* be grounded and remain intact as a reference aircraft, and the *General H.H. Arnold Special* be painstakingly disassembled.

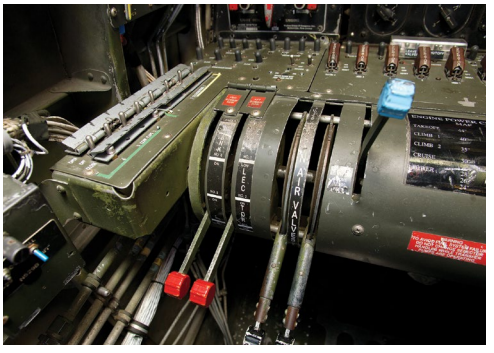
Every one of the B-29's 105,000 parts was measured, labeled, and photographed. Design teams were assigned to re-create every subassembly. The production of some, however, proved beyond the reach of Soviet industry. Rather than try and produce the B-29's large tires, for instance, the Russians simply clandestinely bought them on the war surplus market.

Dubbed the Tu-4, the first Russian B-29 flew in 1947, and surprised western military observers when they appeared over Moscow during the Soviet aviation day parade.

Ironically, as copies of the B-29 they suffered from many of the same maladies. Engine overheating, engine fires, runaway props, and pressurization problems dogged the design, but eventually 845 aircraft were produced for Soviet front line squadrons.

Flight Engineer Ben Powers monitors the engines.

The fire control officer sat in the "barber's chair" to direct the turrets.



The flight engineer's station bristles with controls.

PHOTOGRAPHY BY **JASON TONEY**

modification facilities where they were rebuilt before heading west to the Pacific.

The mechanical problems suffered by the B-29 only continued when on station in the hot, humid Pacific, but Army pilots learned to do mag checks on the takeoff roll, use less power and all available runway for takeoff, and climb at a slow rate and fast airspeed for engine cooling. Eventually the B-29 became a potent weapon that played a critical role in bringing World War II to a close.

INBOUND FOR LANDING

"*FIFI*, bring it in. Cleared to land 17R," squawks the air boss over the radio in his staccato patter. We've been loitering about 5 miles north waiting for an act to finish.

"Manifold 26 inches, flaps 15," I command. Power is always voiced in even-numbered increments, and flaps in odd to avoid miscommunication. The engineer behind me grabs a fistful of throttles and reduces power to the four Wrights on the wing. The aircraft commander toggles the small electric switch that deploys the massive flaps on the wing.

"Flaps 15," confirms the engineer verifying their position.

"Gear down." Tom, the captain, moves the guard out of the way and flips the gear switch. Once again it's a toggle smaller than a light switch. The B-29 is an electric airplane. Except for the hydraulic main wheel brakes, everything on the B-29 is electric.

"Flaps 25, landing checklist," I call.

We're on base leg, and I try and anticipate the turn to final knowing that the ailerons and rudder will feel like they're set in cement. I give it a bootful of rudder and crank in the ailerons; it takes both hands on the wheel. *FIFI* considers the direction from the cockpit for a moment and then slowly begins to roll. Now,

FIFI *emerges from its home.*

The rear gunner has the best view in the airplane.

BIRTH OF A GENERATION

The B-29 Superfortress provided the DNA for many other significant designs of the 1940s and 1950s from bombers, to tankers and cargo aircraft, and even airliners.

At the end of war, the basic design of the B-29 was strengthened and re-engined with significantly more powerful Pratt & Whitney 4360 powerplants. The extra power of the largest piston engines ever mass-produced required a bigger vertical fin design, and the new aircraft was reclassified the B-50. Ultimately, 370 B-50s were built, and they served in the U.S. Air Force well into the Vietnam era, finally retiring from active service in 1965.

The power and strength of the B-50 was combined with a new double-bubble fuselage to create the C-97 Stratofreighter transport and KC-97 Stratotanker aerial refueling aircraft. Eventually, 888 airframes of all variants were built and were the backbone of the Strategic Air Command's aerial refueling wings for many years. The aircraft continued to serve in National Guard units until finally retiring in 1978.

A civilian version of the C-97 was designed for intercontinental airlines of the day. The Boeing 337 Stratocruiser was launched to much fanfare as the largest airliner of its day, but it never had the commercial success of the military designs. During its short production run only 56 Stratocruisers were built.

In total 5,284 B-29s and descendant aircraft were built from 1943 until the last KC-97 left the factory in 1958, a 15-year production run with lasting import for our military and our nation.

planning for the roll-out must begin immediately; you have to think where the airplane will be in five seconds or you'll overshoot. It responds that slowly!

"Flaps 35." I try and bull's-eye the runway numbers in the multi-paned nose and select which pane of glass is best to look out of for landing; there are about half a dozen choices—none of them are good.

"Manifold 22 inches." I've let *FIFI* get a bit high on approach; reducing the power will help get back on glide path. The gigantic bird doesn't maneuver like a fighter. I've already learned that it is important to stay on profile.

We'll land as we took off, flat and level. It doesn't take much rotation to hit the tail skid on landing, and the outside propellers are only 24 inches off the ground. Add in a little side slip for a crosswind correction and you could be lopping off runway lights.

At 300 feet in the air I call, "High lights," and the engineer moves the props to flat pitch.

The air boss isn't advertising much of a crosswind, but the very festive-looking flags along the flightline are blowing flat out 90 degrees to the runway. His anemometer must be *inside* the tower cab.

The cockpit windows are about 10 feet in front of me, and there are no familiar reference points looking out the nose. It's hard to get a visual cue for both pitch attitude and alignment with the runway.

"Ease 'em off," I command as we cross the numbers. I hear the engines throttle down as the engineer pulls them back. I don't flare as much as just hold the attitude.

We'll call it a firm arrival. Not the worst landing I've made this year, but it's a good thing everyone was in their seats all the same. I get on the brakes carefully to bring the big bomber to a halt, and we taxi back to deplane our passengers.

AIRPOWER HISTORY TOUR

FIFI is the only B-29 still flying today. Produced in 1945, it served briefly in both World War II and the Korean conflict before being put into desert storage at the Naval Air Weapons Station China Lake. It is from there that the CAF acquired *FIFI* in 1971. Returned to the air after restoration in 1974, *FIFI* is celebrating its 40th year of flying with the CAF throughout 2014.

The mission of the CAF, as well as EAA's B-17 flight experience, is to honor the sacrifices of our servicemen and in their remembrance highlight the lessons of history for future generations.

Every year throughout the country, WWII bombers, fighters, and other aircraft of the era fly in tribute to the brave men and women that fought our battles and protected our freedom. With the CAF AirPower History Tour the CAF brings together in one experience the basic trainers and bombers that a serviceman might have flown on his way to a B-29 cockpit.

WWII was a conflict fought across the globe and is remembered as a time of immense significance for our country. Through living history flights offered by the CAF, EAA, and others, the sacrifices and the triumphs by our brave servicemen will never be forgotten. EAA

Jeff Skiles, EAA 336120, is EAA vice president of communities and member programs. Attend an EAA chapter meeting to see the February and March editions of Chapter Video Magazine, featuring Jeff Skiles' CAF training. To find a chapter, visit *www.EAA.org/chapters/locator*.

FULL CIRCLE

EAA air tour membership services representative Chris Henry received a call from a gentleman asking to purchase a B-17 air tour jacket. He needed it rush shipped, a costly proposition, but cost was no factor; he needed it now. His father, a B-17 waist gunner in World War II, had taken a ride in EAA's *Aluminum Overcast* the day before. It was a powerful experience for him bringing back the sights and sounds of a youth forged in adversity. But, it was also an opportunity for remembrance of friends with whom he served. Friends who didn't make it back, their faces forever captured in faded photographs frozen with the bravado of youth. That very evening, after the flight, his life in many ways had come full circle, and he passed on to whatever place is reserved for old warriors in the sky. The jacket was to bury him as he had lived.

Henry Bordelon sits at the right scanner position.

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