VIEW THE VIDEO

BOEING B-17G FLYING FORTRESS

THEY CAME BACK

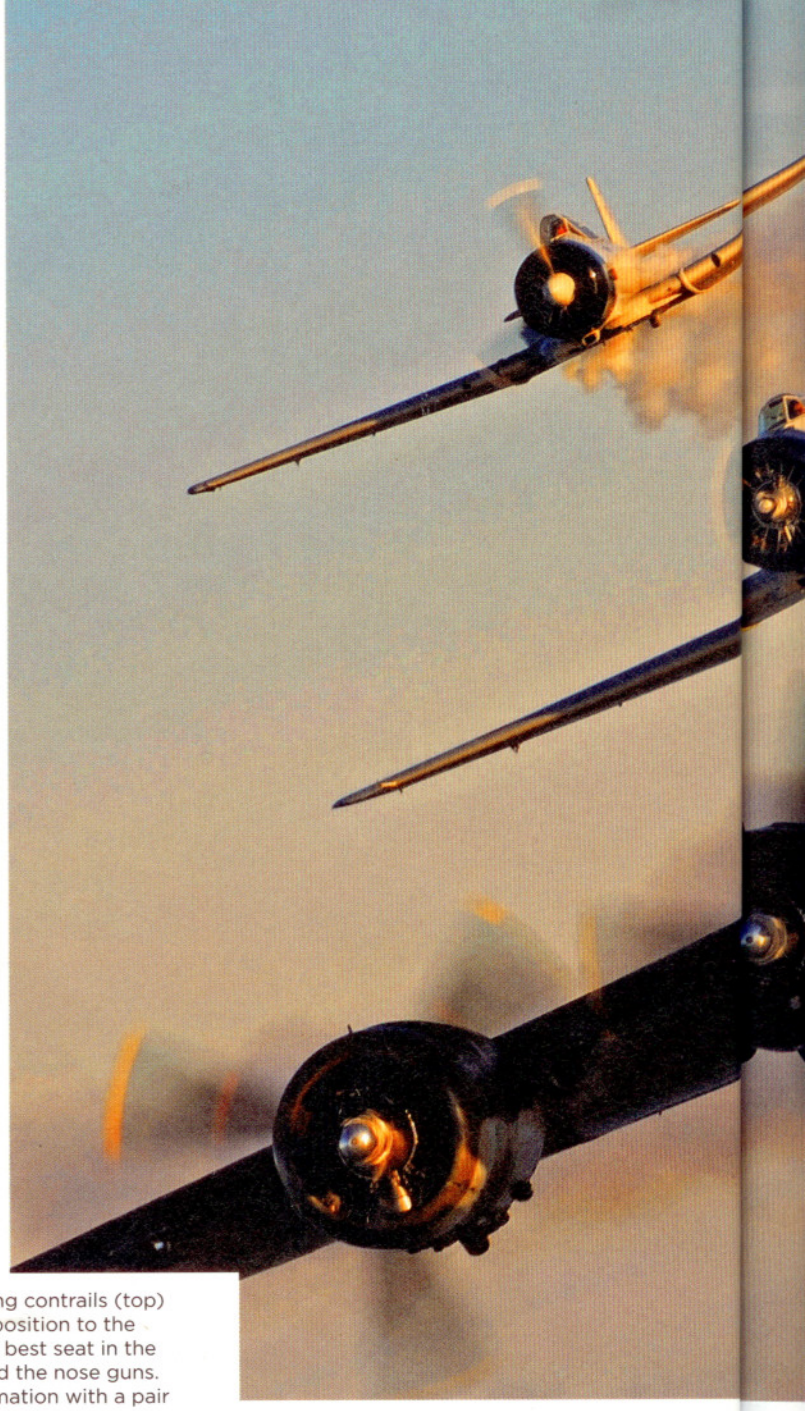
WWII's most reliable aircraft

BY BARRY SCHIFF

THE BOEING FLYING FORTRESS carried a crew of 10 courageous young men, and the aircraft commander had as few as 250 hours of total flying time. They took off from bases in England and elsewhere on daylight bombing raids through flak-blackened skies while struggling to defend themselves against enemy fighters. (It took an average of 3,200 flak grenades to down a bomber.) The bomber crews' goal was to reach and destroy strategic targets and, if possible, to return home and try again.

PHOTOGRAPHY BY PHIL MAKANNA


Texas Raiders



B-17 CREWS tried to avoid creating contrails (top) because they betrayed aircraft position to the enemy. The bombardier had the best seat in the house (above) and also operated the nose guns. *Texas Raiders* (right) flies in formation with a pair of T-6 Texans made to look like Japanese Zeroes during a Pearl Harbor attack reenactment.

When the Boeing Model 299, prototype of America's first heavy bomber, made its maiden flight on July 28, 1935, it was the world's largest landplane. Richard Williams, a reporter for the *Seattle Times,* was so impressed by the appearance of the airplane that he referred to it as a "flying fortress." Boeing liked the name and registered it as a company trademark. (During an Army Air Corps test flight a few months later, the Model 299 departed Wright Field with its flight controls locked, resulting in destruction of the aircraft. Because of this, the B-17 became the first airplane ever equipped with a checklist.)

B-17 crewmembers dreaded their missions, but they loved their airplanes. The "Fort" could endure incredible punishment, absorb massive damage, and return from battle in a condition that could not have been imagined.

Robert Morgan, pilot of the famed *Memphis Belle*—the first Eighth Air Force B-17 to complete 25 missions—proudly said, "Forts came home with half their tail sections gone, wings shot almost completely off, noses shot away, massive holes in their sides—but they came back. No other airplane had a greater reputation for strength and reliability than the Flying Fortress."

When production ended in 1945, Boeing, Douglas, and Vega (a Lockheed subsidiary) had built 12,731 Flying Fortresses, of which 8,680 were the final iteration, the B-17G. Peak production occurred during April 1944, when 16 aircraft per day rolled off the assembly lines.

ELEVEN FROM THE END

The Flying Fortress on these pages, *Texas Raiders*, is a B-17G manufactured at the Douglas Aircraft factory in Long Beach, California. It was accepted by the Army Air Force on July 12, 1945, and was number 11 from the end of the production line. This "Fort" never saw combat and was one of 31 transferred to the Navy and fitted with long-range radar, thus becoming America's first AWACS (airborne warning and control system) airplane, a PB-1W.

1.5 MILLION TONS OF BOMBS WERE DROPPED ON GERMANY DURING WORLD WAR II; THE B–17 DELIVERED MORE THAN 500,000.

There was little need for B–17s after the war, and in 1946 almost 1,900 of these retired warriors stood majestically, wing tip to wing tip, across a vast stretch of desert at Kingman, Arizona. Some were purchased for civilian use at an average price of $13,750 per airplane, but most were destroyed.

What is now known as *Texas Raiders* became surplus in 1955 and was obtained by the Litton Corporation for seismic exploration and photographic mapping. In 1967 the Commemorative Air Force (*nee* Confederate Air Force) purchased the airplane from Litton for $50,000. It was the first Flying Fortress intended for restoration, preservation, and flying exhibition.

Thus began years of painstaking and expensive restoration that consumed thousands of man-hours provided by dedicated CAF volunteers. *Texas Raiders* is now emblazoned with markings of the 533rd Bomb Squadron of the 381st Bombardment Group of the "Mighty Eighth" Air Force. It is operated by the CAF's Gulf Coast Wing and based at the David Wayne Hooks Memorial Airport near Houston. The CAF has a second B–17G, *Sentimental Journey,* which is operated by its Arizona Wing near Phoenix. There are only 11 airworthy B–17s in the world, two in Europe and nine in America.

INSIDE LOOK

Thankful not to have to enter the airplane by pulling myself up and swinging feet first through a small, lofty, and forward hatch the way young and fit military pilots did, I instead entered like a gentleman through a larger rear door. Climbing through the inclined fuselage from tail to nose is a challenge requiring agility, sure-footedness, and the avoidance of sharp objects and

"BIG WEEK," FEBRUARY 1944: 3,500 B-17S IN COORDINATED BOMBINGS ON GERMAN FACTORIES—244 BOMBERS AND 33 FIGHTERS LOST.

THE BALL (BELLY) turret (above left) is shown with guns pointed aft. An unusual aspect of the instrument panel (below) is that the pilot and co-pilot share a single set of centrally mounted flight instruments.

ON THE WEB

ADDITIONAL INFORMATION about *Texas Raiders* (including video) is online (www.gulfcoastwing.org/GCW/B-17.htm). Information about the Commemorative Air Force is also online (www.commemorativeairforce.org).

corners that seemingly probe at you from everywhere. When walking along the narrow catwalk over the bomb bay, you can see "Special Delivery for Adolf" hand-painted on one of the mock bombs.

The B-17 is anything but roomy, despite its size. The tail gunner shoots from a kneeling position but can rock back on his haunches to rest on a small seat.

The shortest crewmember frequently found himself appointed ball-turrent gunner because of limited room in the ball turret. There was not enough space for him to wear a parachute. He entered the ball through a small door opposite to where the guns are located. The guns are pointed aft and the door forward during takeoff and landing so that the relative wind can push against the door to keep it closed. You might notice in war movies that the belly guns are sometimes pointed straight down during flight. This means that the turret's door is up and accessible from within the fuselage. The gunner enters the ball turret as the aircraft approaches hostile territory and then rotates the ball and guns as necessary.

The ball turret can be damaged and jam during battle, trapping the gunner inside. If a gear-up landing must be made at such at time, well, you can imagine the tragic result. (Remind me never to complain about having to sit in coach.)

The cockpit seats are comfortable once you wriggle into them. There is nothing organized or logical about the cockpit layout. Switches and controls are scattered everywhere. The rudder-trim knob looks like an aileron-trim control because of the way it rotates, and vice versa.

One must be careful about moving the mixture controls in a B-17 because they operate bass-ackwards. Shoving them forward places the mixtures in idle cutoff, and Al Maxwell, my instructor during this checkout, told me that this is when "the airplane gets really quiet really fast."

The Fort is an electric airplane. It has electrically operated landing gear, flaps, and bomb-bay doors (all backed up with hand cranks). Electrical systems were regarded as less vulnerable to battle damage than hydraulic systems. The brakes and cowl flaps are hydraulic, and each gun turret has an independent electro-hydraulic system.

An interesting aspect of electrical landing gear—each leg has its own motor—is that the system can be modified easily to allow the crew to extend only one main landing-gear leg, which is what the CAF does during airshows to simulate a B-17 coming in for an emergency landing. (It does not touch down this way.)

FLYING THE FORT

Starting the Studebaker-built engines is a two-man job requiring a coordinated chorus of hand movements. The big radials start one or two cylinders at a time and produce prodigious volumes of smoke while barking and banging, eventually mellowing into a smooth rumble.

The retractable, full-swiveling tailwheel is not steerable. Ground steering requires differential power and brakes. The tailwheel is locked on straightaways, which is helpful when taxiing this mammoth weathervane in a crosswind.

After turning onto the runway, the tailwheel is locked again. The throttles are advanced slowly, and thunderous power shudders through the airframe. Initial steering is accomplished by "walking" the throttles, twisting your wrist to apply differential power as necessary to keep the airplane on the centerline. The rudder begins to bite the air at 50 mph, and power is set to 46 inches of manifold pressure and 2,500 rpm. (Wartime emergency power is 54 inches.) With the tail down, forward visibility would be better without an astrodome—the glass bubble through which the navigator "shoots the stars"—in the way. Although initially disconcerting, you soon become accustomed to looking beyond it.

I was confused the first time I tried to glance at the airspeed indicator in front of me. That's because there was none, nor were there any other flight instruments there. The aircraft commander and copilot share a single set of flight instruments in the center of the panel. Even though I had learned about this in ground school, it is difficult to break the habit of looking straight ahead to see instruments. I am not aware of any other airplane configured like this.

The airplane sits 6.5 degrees nose-high, and the entire takeoff roll can be made in this attitude. It is unnecessary to

SPEC SHEET
Boeing B-17G Flying Fortress

PRICE NEW IN 1945: $204,370

SPECIFICATIONS

Powerplants | **Four 9-cylinder, Wright R-1820-97, 1,200 hp**
Recommended TBO | **1,200 hr**
Propellers | **Hamilton Standard, constant-speed, full-feathering, hydromatic**
Diameter | **11 ft 7 in**
Length | **74 ft 9 in**
Height | **19 ft 1 in**
Wingspan | **103 ft 9 in**
Wing area | **1,420 sq ft**
Wing loading | **45.8 lb/sq ft**
Power loading | **13.5 lb/hp**
Crew | **10 — Pilot, co-pilot, navigator, bombardier, flight engineer (top-turret gunner), radio operator, two waist gunners, tail gunner, ball-turret gunner**
Empty weight | **32,720 lb**
Max gross weight (wartime) | **65,000 lb**
Max takeoff weight (wartime) | **64,500 lb**
Useful load | **31,780 lb**
Payload w/std fuel | **21,580 lb**
Payload w/"Tokyo" tanks | **15,100 lb**
Payload w/bomb bay tanks | **10,180 lb**
Fuel capacity, std | **1,700 gal 10,200 lb**
Fuel capacity, w/"Tokyo" tanks | **2,780 gal 16,680 lb**
Fuel capacity, w/bomb bay tanks | **3,600 gal 21,600 lb**
Oil capacity, ea engine | **37 gal**
Bomb capacity (normal, 12 x 500 lb) | **6,000 lb**

PERFORMANCE

Takeoff distance, ground roll | **3,350 ft**
Takeoff distance over 50-ft obstacle | **4,400 ft**
Rate of climb, sea level | **575 fpm**
Max level speed, 30,000 ft | **300 mph**
Max continuous speed, 25,000 ft | **263 mph**
Normal cruise speed, 25,000 feet | **172 mph**
Normal cruise speed, 12,000 feet | **197 mph**
Max range (std tanks) | **1,850 sm**
Max range (w/"Tokyo" tanks) | **3,070 sm**

CRUISE EXAMPLES:
(fuel consumption, all engines)
@ 83% power, autorich | **156 mph**
30,000 ft | **413 gph**
@ 83% power, autorich | **183 mph**
20,000 ft | **413 gph**
@ 63% power, autolean | **160 mph**
15,000 ft | **253 gph**
@ 58% power, autolean | **170 mph**
6,000 ft | **211 gph**
Service ceiling | **35,600 ft**
Absolute ceiling | **40,000 ft**
Landing distance over 50-ft obstacle | **3,500 ft**
Landing distance, ground roll | **1,950 ft**

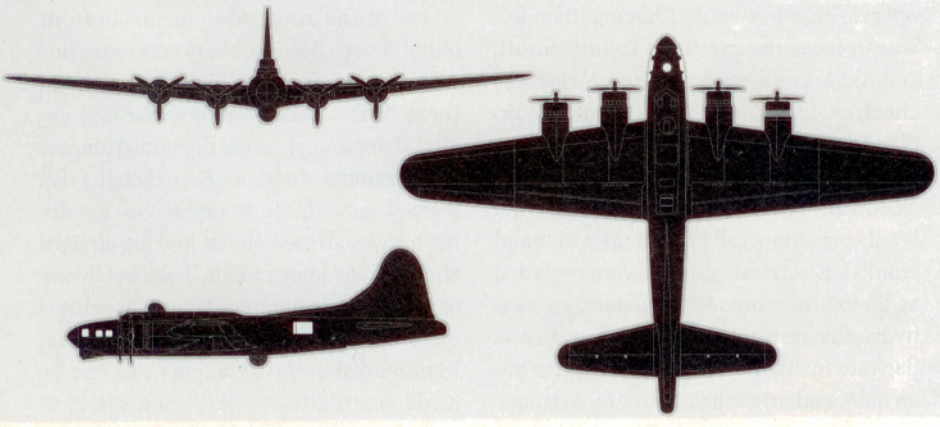
LIMITING AND RECOMMENDED AIRSPEEDS

V_{MC} (min control w/outboard engine inoperative) | **106 mph**
V_Y (best rate of climb) | **135 mph**
V_{FE} (max flap extended) | **147 mph**
V_{LO} (max gear operating) | **180 mph**
V_{NE} (never exceed) | **270 mph**
V_{S1} (stall, clean) | **100 mph**
V_{SO} (stall, landing configuration) | **88 mph**

All specifications are based on manufacturer's calculations. All performance figures are based on standard day, standard atmosphere, sea level, gross weight conditions unless otherwise noted.

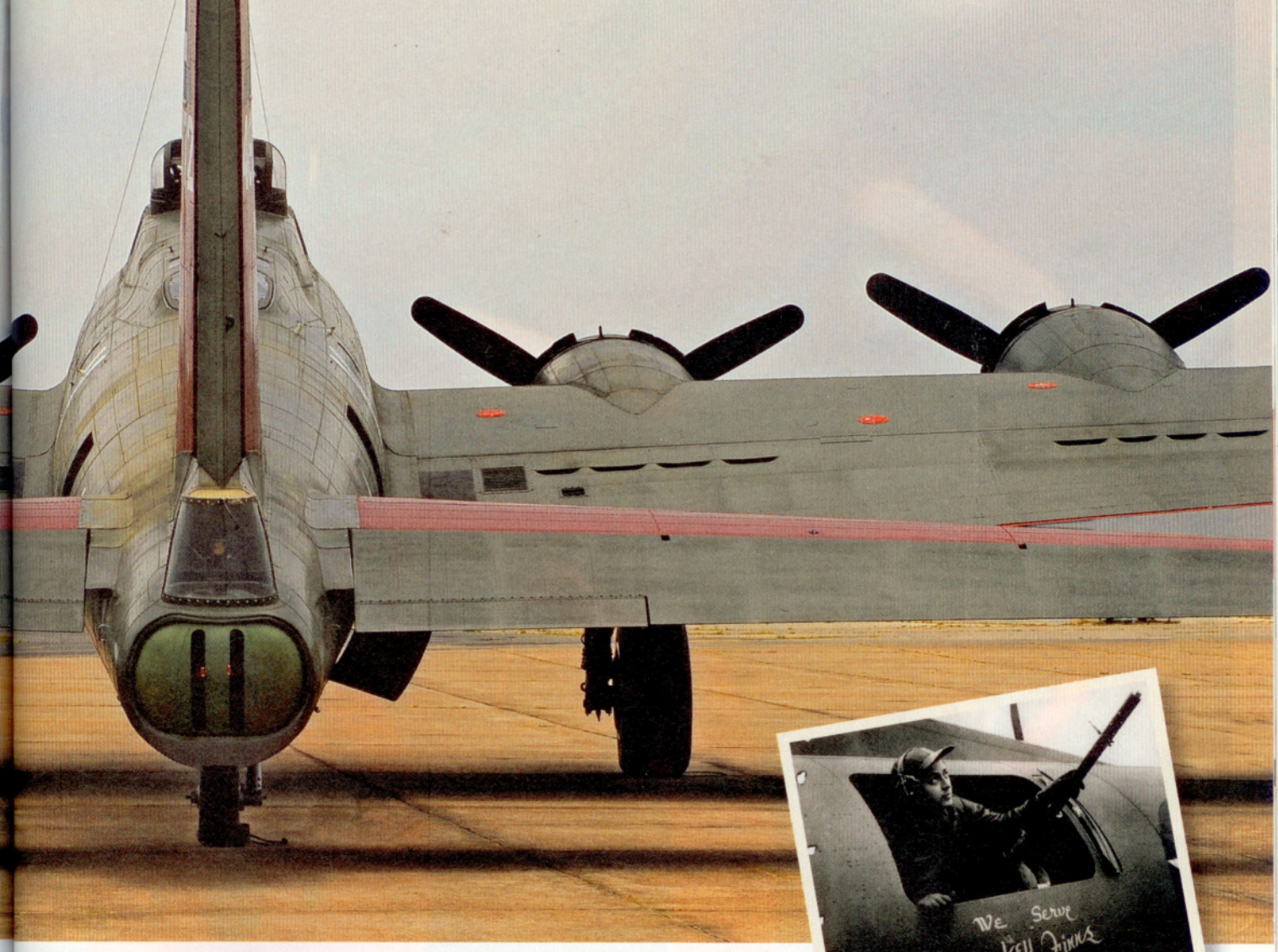
EXTRA

B-17Gs are powered by four 1,200-horsepower Wright R-1820-97 radial engines. The first 1820 was introduced in 1931, only four years after a smaller Wright radial, a 223-horsepower Whirlwind, powered the *Spirit of St. Louis* to Paris.



raise the tail and lower the nose for takeoff because the airplane is in no danger of stalling at this relatively small angle. Although raising the tail would decrease aerodynamic drag somewhat, this also would decrease lift and increase weight on the wheels (rolling drag). When the airplane is ready to fly, it simply levitates.

The flight controls are heavy but not nearly as much as those on the B-24 Liberator or B-29 Superfortress. After rolling in and out of turns, approaching stalls, and simulating engine failures, you discover that the Flying Fortress is an honest, straightforward airplane without noticeable vices. It shows surprisingly little adverse yaw and handles like the proverbial "overgrown Cub." This likely explains why the Fort had the lowest accident rate of any U.S. military airplane during World War II.



"WOE BE TO THE NATION THAT IS WEAK IN THE AIR."

—Brig. Gen. William M. "Billy" Mitchell

An engine failure on a four-engine airplane is not as traumatic as on a twin. You lose only half the power on one side, not all of it. Maintaining directional control seems easier, too. (The failure of two engines on the same side is another story.) B–17 engines originally had both superchargers and turbochargers, but the turbochargers on Texas Raiders (and probably all other currently airworthy Forts) are bypassed to reduce operating cost. The additional power they otherwise would provide is unnecessary at the low altitudes and weights at which civilian B–17s are operated.

For planning purposes, Texas Raiders consumes 225 gallons of fuel per hour. There is no crossfeed system on a Flying Fortress, but fuel can be transferred between tanks, which serves the same purpose.

Like most taildraggers, you can make wheel landings or three-point landings. My preference was the latter. "Come over the fence at 100 to 105 mph, ease off the power, and hold the airplane off as long as you can, until the control wheel is in your gut," Maxwell suggested. "Otherwise, you are likely to skip." He was right. My first two attempts resulted in mild skips, but on my third I finally got it right. I skipped during this one, too, but held it off so much during the bounce recovery that the Fort chirped to a landing.

The B–17 presumably straightens itself if landed in a crab, but I had neither the opportunity nor the desire to experience that. Nor did I have a chance to confirm the answer to a fascinating B–17 brainteaser: The Flying Fortress does not have reversible-pitch propellers, so how is it possible for a pilot in the cockpit to back the airplane into a parking space?

The left and right outboard engines are outboard of the left and right main-landing-gear wheels, respectively. The pilot locks the left brake and applies power to the left outboard engine. This causes the airplane to pivot on the left wheel—this is not good for the tire—forcing the right wheel to roll aft. The pilot then stops the airplane, applies right brake, and adds power to the right outboard engine, which causes the left wheel to roll aft. Alternating in this manner, the pilot can "walk" the airplane backward.

I have advised the Commemorative Air Force that I am willing to log additional time in *Texas Raiders* to test the validity of this answer. **AOPA**

THE AUTHOR expresses his gratitude to B–17 instructor Allen Maxwell and the men and women of the Gulf Coast Wing of the Commemorative Air Force for so graciously sharing their time and expertise.

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