

## Testing on the Fly:

### World War II Field Expedients That Kept Aircraft in Combat

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**N**ormally, solving weapon system problems requires a deliberative process of arriving at engineered solutions, and of testing and evaluating them under controlled conditions. But this process became a casualty of war when damaged aircraft needed improvised fixing in flight. During the heat of World War II air battles, with no time to ponder and test a solution, aircrews relied on their own ingenuity to bring aircraft—in this case, B-17s and B-24s—back to base on a wing and a postulation.

The B-24 Liberators of the 5<sup>th</sup> Bomb Group operated in an atmosphere rife with disaster. The runway they used at Samar in the Philippines in 1945 was packed coral, sharp enough to cut tires, yet yielding enough to cause wheels with flat tires to gouge into its surface. Deep ditches paralleled the runway, to carry off rainwater and to keep the runway functional. When the Liberators experienced asymmetrical tire failures on the coral, they often turned abruptly toward the ditches. Pilot Robert D. Houghton of the 5<sup>th</sup> Bomb Group described a crash in a letter home: "...I saw a ship swerve on the runway, burst into flames and slide a thousand feet like a Roman candle."<sup>1</sup>

The 5<sup>th</sup> Bomb Group, self-nicknamed the Bomber Barons, drew patrol missions in the uncertain days of August 1945, after Japan reeled under two atomic bomb attacks, but before the formal surrender. The Group's task was to reconnoiter the China coast for any evidence of recalcitrance by Japanese forces, and it took a lot of gasoline to fly from Samar to China and back. On one such sortie, a loaded Liberator had sufficient speed to give good controllability on take-off, until the left main tire blew out. Just clearing the coral at about 6 AM, the bomber was lucky to be airborne, but its crew still faced the predicament of an inevitable return to the same treacherous airstrip that had claimed lives and airframes before. A different Liberator was sent on this patrol mission in its place.<sup>2</sup>



*Figure 1. Lt Col Albert W. James helped devise ways to land B-24s with flat tires on a crushed coral runway in the Philippines (Albert W. James collection)*

But what to do about the crippled B-24 in the air? Its fate was in the hands of Lt Col Albert W. James, who brought some prior Wright Field test and evaluation savvy with him when he joined up with the 5<sup>th</sup> Bomb Group in the Pacific. The group's last wartime commander, James worked diligently with his men and their B-24 Liberators. He kept a command

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Figure 2. This 5<sup>th</sup> Bomb Group B-24L Liberator shows the single-tire main gear at the end of a long strut beneath the wing. With one main wheel flat, the Liberator naturally tended to slew in the direction of the damaged tire. (Albert W. James collection)

jeep with aircraft radios so he could be in communication with his aircrews, and on this day talked to the men inside the bomber stricken with the flat tire. He knew the peril: “When you had a blowout, you usually lost everybody in the plane...” he recalled in a 1979 interview. The crew had about 10 hours to ponder their predicament as they burned off the gasoline intended for the China patrol. By that time, their bomber would be several tons lighter. If nominally less prone to catching fire in that configuration, this was insufficient comfort to the men on board or Colonel James. The crew—even those members not required for landing the Liberator—shunned the option of bailing out, a measure considered last-chance by many aviators.

In this instance, James questioned the crew at length to ascertain that the left main tire was in fact deflated. Only then did he advise the men to use physics to improve their chance of survival, by deflating the other main tire to bring the bomber’s landing gear friction back into symmetry. “I didn’t want to be in the position of shooting out the good tire, and then discover the other was good too,” he explained. The B-24’s right waist gunner, in an act of faith, removed one round of .50-caliber ammunition from its linked belt and inserted it into the breech of his machine gun. Taking careful aim at the extended good mainwheel, he punctured it with irrevocable finality. “It was the only thing I figured they could do and land and stay on the runway,” Colonel James said.<sup>3</sup>

Around 4 PM on that humid August day, the crippled Liberator was sufficiently lightened of gasoline to permit a landing on two flat main tires. The pilot approached at about 110 miles an hour, then slowed as the B-24’s Fowler flaps were lowered and

extended to increase the wing’s effective area. Colonel James coached the pilot to use the outboard engines to steer the lumbering aircraft if it veered one way or another as it gouged into the coral, since the impulse to tap the brakes would have an unpredictable and dubious effect on two flat tires. Moreover, as speed bled off, the Liberator’s large twin rudders would lose aerodynamic authority to steer the airplane. None of this was easy; Colonel James knew there was “a terrible lag which must be anticipated by the pilot before an engine revs up enough to give the necessary thrust to steer with.”

The theory worked—the B-24 with two flat main tires stayed true as it munched down the runway. It ground to a halt quickly, using less than half the runway, causing only minor damage to its landing gear.<sup>4</sup>

The Bomber Barons were challenged another time by the blowout of a nose tire on takeoff. The Liberator climbed into the muggy sky while its fate was pondered. With two good mainwheels, the decision was made to land it nose high, keeping the flat tire off the coral. Crewmembers not needed for landing chores congregated near the aft bomb bay, close enough to the center of gravity to keep the B-24 manageable on landing, and poised to scramble to the tail once the mainwheels touched ground, adding human ballast to keep the nosewheel aloft. The low-slung B-24s were built with a tailskid in case they rotated too far aft, and the skid’s presence gave the crew some assurance their scheme would work without causing mayhem. “The plan was that as soon as he touched down, the crewmembers would get as far back into the fuselage as they could,” Colonel James explained. When the moment came, the pilot kept his control wheel hauled back in an effort to keep the nose high as long as



Figure 3. Once its structural integrity was lost as it left the coral airstrip, this 5<sup>th</sup> Bomb Group B-24 displayed the catastrophe that attended runway mishaps (A.B. Goldberg collection)

effective elevator forces remained when the bomber rolled down the runway on its mainwheels. With brakes out of the question—they would cause the B-24 to pitch down onto its flat nosewheel—the Liberator relied on the weight of the crewmen in the aft fuselage to exert force on the tailskid, plowing a furrow in the coral runway surface until it stopped, its nosewheel never touching ground.

The fliers crowded into the tail of the bomber were liberated only when a maintenance trailer arrived and was positioned under the aircraft's nose, with a tire placed as cushioning. One by one, the men eased their way forward like mass weights on a scale, until the B-24 rotated gently on the fulcrum of the main gear and came to rest on the trailer, doing no harm to itself or its crew.<sup>5</sup>

Other theaters of war witnessed similar, in-the-moment test and evaluation trials. Photographically documented in England and Italy, the use of crew parachutes as braking devices kept more than one Fortress and Liberator from careening off the runway when hydraulic failures rendered wheel brakes useless. In the days before drogue and braking parachutes were built into high-performance warplanes, bomber crews learned how to take advantage of the symmetry of waist windows on the sides of the fuselages of B-17s and B-24s by tying crew parachutes to the waist gun

mounts and unfurling them once the free-wheeling bomber touched down.

In the end, what these extemporaneous efforts lacked in test-and-evaluation discipline, they made up in ad hoc ingenuity. They also appealed to the airman's old friend, luck. □

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## Endnotes

<sup>1</sup>From correspondence sent by Robert D. Houghton to his father during World War II. Copies obtained by the author from Robert Houghton.

<sup>2</sup>Information about the 5<sup>th</sup> Bomb Group landing improvisations is included in interviews conducted by the author with Lt Col Albert W. James, USAF (Ret) between 1970 and 1979. Portions of this material were published in *Echelon* magazine, Vol. 1 No. 2, March–April 1979.

<sup>3</sup>See note 2.

<sup>4</sup>The Bomber Barons requisitioned B-29 Superfortress main tires when possible, since they were the same size as B-24 main tires, and were reputed to be stronger to support the heavier B-29. Nonetheless, tire problems plagued the loaded B-24s at Samar.

<sup>5</sup>See note 2.