Marauder Historical Society

B-26 MARAUDER OVERVIEW, DEVELOPMENT & BASIC OPERATIONAL HISTORY

Project Origins and Early Development:

In January of 1939, the United States Army Air Corps issued a specification (Circular Proposal 39-640) for a twin-engine medium bomber. Requests for proposals were widely circulated throughout the industry and responding companies included Martin, Douglas, Stearman, and North American. The proposal of the Glenn L Martin Company of Middle River, Maryland (near Baltimore) was assigned the company designation of Model 179.

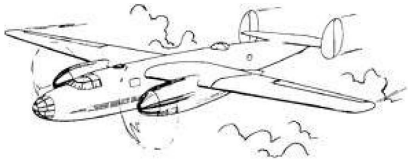
U.S. Army Air Corps crest

Peyton Magruder

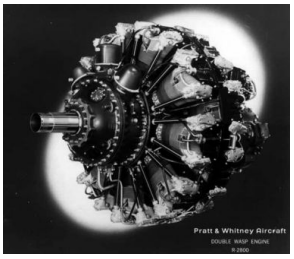
Martin assigned 26-year-old aeronautical engineer named Peyton M. Magruder as Project Engineer for the Model 179. Magruder and his team decided on a low-drag fuselage profile with a circular cross section. Since the Army desired high maximum speed but had not specified maximum landing or stall speeds, the team selected a wing a span of just 65 feet with a dihedral of only 1.3 degrees.

This yielded a wing loading of over 50 pounds per square foot. The wings were unusual in possessing no fillets, and were shoulder-mounted to leave the central fuselage free for bombs and provide ground clearance for the large propellers.

Early wind tunnel test models featured a twin vertical tail configuration (shown at right) that designers thought would provide better aerodynamic control. However, this was replaced by a single fin and rudder to provide the tail gunner with a better field of view.



Notional drawing the Martin Model 179 medium bombardment aircraft (c1939)



The engines were to be a pair of 1850 hp. Pratt & Whitney R-2800-5 Double Wasp air-cooled radials, the most powerful available at the time. Two-speed mechanical superchargers were installed to maintain engine power up to medium altitudes, and ejector exhausts vented on both sides of the closely-cowled nacelles. The engines drove four-bladed Curtiss Electric propellers of 13 feet, 6 inches in diameter, and with large spinners and cuffs at the blade roots to enhance engine cooling.

The bomb bays were in an unusual tandem configuration. The forward pair of doors folded in half "accordion-style" when opened, while the aft doors opened outward in a more conventional "clamshell" fashion. Two 2000 lb. bombs could be carried in the main bomb bay, or up to 4,800 lbs. of smaller bombs if the aft bay was used as well.

Detailed design of the Model 179 was completed by June of 1939. On July 5, 1939, the Model 179 was submitted to a Wright Field Board. The Martin design was rated the highest of those submitted, and on August 10, 1939, the Army issued a contract for 201 Model 179s under the designation "B-26". This contract was finally approved on September 10. At the same time, the competing North American NA-62 was issued a contract for 184 examples under the designation B-25. Since the design had been ordered "off the drawing board", there was no "XB-26" as such.

The semi-monocoque aluminum alloy fuselage was fabricated in three sections and had four main longerons, transverse circular frames, and longitudinal stringers covered by aluminum skin. The mid section containing the bomb bays was built integrally along with the wing section.

The retractable tricycle landing gear was hydraulically actuated. The nose wheel pivoted 90 degrees and retracted into the nose section while the main gear folded aft into the engine nacelles. The vertical and horizontal stabilizers featured smooth, stressed-skin cantilever structures, with metal elevator surfaces and a fabric rudder surface.

The first aircraft (C/N 1226, USAAF Serial No. 40-1361) came off the production line in early November 1940, and even though it had yet to fly, orders for 139 B-26As with self-sealing tanks and armor were issued by the Army on September 16, 1940. Further orders for 719 B-26Bs on September 28, 1940 brought the total order to 1,131 aircraft.

On the 25th of September 1940, Martin Test Pilot and Chief Engineer, William K. "Ken" Ebel, Co-pilot Ed Fenimore, and Flight Engineer Al Malewski successfully completed the aircraft's maiden flight. Thus, the bomber went from paper concept to a flying aircraft in less than two years. Since there was no prototype, the first few production aircraft were used for test purposes. The first 113 hours of flight testing went fairly well with few required modifications. However, a slight rudder overbalance necessitated reversal the rudder trim tab direction travel. Soon after, the aircraft was turned over to the Army Air Corps for operational testing.

On February 22, 1941, the first four B-26s were accepted by the USAAF. The first operational unit was the 22nd Bombardment Group (Medium) based at Langley Field, Virginia, which had previously operated Douglas B-18s. However, several nose gear strut failures briefly delayed transition to full operational status. Although the strut was strengthened, the real problem was improper weight distribution. Due to logistical foul-ups, the first few B-26s were delivered without guns and had to be longitudinally trimmed using tools and spare parts for ballast. When the Army received the planes they removed the ballast, thereby moving the aircrafts' center of gravity forward and increasing loads on the nose gear. Installation of the guns corrected the problem.

B-26 production line, Middle River, Maryland

The first B26 Marauder

Early Controversy and Operational Challenges:

"Maintain thy airspeed lest the Earth rise up to smite thee."

The B-26 was a fast plane with better overall performance than its contemporary, the B-25 Mitchell. However, the Marauder's small wing area and high wing loading, the highest of any allied bomber of the time, meant higher approach, touchdown and stall speeds (140 mph, 120 to 115 mph, and 130 mph with no flaps, respectively). With the war heating up across the planet, the demand with new air crew man was extremely pressing. Most experienced pilots were already overseas, seasoned instructors were in short supply, and it was not practical to give new pilots much flight time during initial training. They rapidly went from low performance aircraft (such as the Beechcraft AT-9) directly into "hot ships" like the B-26.

The Marauder's high performance and revolutionary features made this a huge leap for most, and the high approach speed and unforgiving single engine operation were more than some "green" pilots could handle. Experienced mechanics were also in short supply, which may have contributed to the high incidence of engine failures early in the bomber's career.

Due to its rotund fuselage, the Marauder's engines were placed fairly far outboard. Loss of power on one side therefore caused substantial asymmetrical thrust that could induce rapid yaw and roll rates if minimum controllable airspeed (VMC) was not achieved (or maintained). Although this was to be expected of an aircraft with this power and configuration, these characteristics initially led to a high number of accidents, particularly on takeoff.

The crash rate inevitably spawned a number of cynical nicknames such as *'Widowmaker", "Martin Murderer", "The Flying Coffin", "B-Dash-Crash", "The Flying Prostitute"* (because its small wings provided "no visible means of support"), and *"The Baltimore Whore"* (because the Martin Company was located there).

By the autumn of 1943, the situation resulted in the appointment of a blue ribbon Commission of Inquiry was led by then-Senator Harry Truman. When he and other commission members arrived at the Avon Park Bombing Range, they were greeted by the still-burning wreckage of two crashed Marauders. Indeed, the regularity of crashes by pilots training at MacDill Field - up to fifteen in one thirty day period - led to the only mildly exaggerated catchphrase, "One a day in Tampa Bay." The Board soon ordered the entire B-26 fleet to be grounded pending further inquiry.

Nevertheless, despite its high stall and landing speeds (which remained essentially unchanged despite numerous modifications made to reduce them), the Marauder had no really "vicious" flying characteristics, and its single-engine performance was actually fairly good for the day.

Undignified ending for a Marauder

Although the B-26 was for a time considered so dangerous that air crews tried to avoid getting assigned to Marauder-equipped units and civilian ferry crews actually refused to fly them,it turned out that the bomber was actually very safe in the hands of a properly trained crew certainly demanded a higher standard of training than the B-25 Mitchell, but once mastered, the B-26 offered a level of operational immunity to its crews unmatched by any other aircraft in its class.

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Design Changes Lead to the Lowest Loss Rate of Any WWII Combat Aircraft:

The lowest combat loss rate of all WWII aircraft

Consequently, a variety of design changes were implemented and the resulting B-26B had an additional 6 feet (1.8 m) of wingspan and other changes. These modifications slightly reduced landing and stall speeds and ultimately yielded the lowest attrition rate of any combat aircraft of WWII. Nevertheless, it remained a challenging plane to fly and somewhat controversial throughout its service life.

B-26 crews first began flying combat missions in the South Pacific in the spring of 1942, but the majority were sent to England and the Mediterranean. The 22nd Army Air Force Bomb Group was originally based in northern Australia but often operated from Port Moresby, New Guinea. On 9 June 1942, Lt. Cmdr. Lyndon B. Johnson flew on a bombing mission to Lae, New Guinea, but his aircraft developed engine trouble and returned to base.

Like the B-25, the B-26 was originally designed for medium-altitude bombing, but the demands of combat eventually brought them down to treetop level. Later versions of the B-26 were equipped with a side-mounted battery of forward-firing machine guns for strafing ground targets. Intensive low-level bombing and strafing at Utah Beach by the Marauders before and during the "D-Day" Normandy invasion contributed to a reduction in casualties among the American assault force.

The B-26 was phased out of Army Air Force service shortly before the end of the war. The last Marauder mission of WWII was flown in May 1945. It continued to see duty in a variety of civilian roles for many years. Today, this superb machine lives on as a highly-prized museum item and in a handful of flyable variants.

Peyton M. Magruder, Chief Designer of the Marauder

Peyton M. Magruder was born on October 19, 1911 at Fort Riley, Kansas. He was the lead aircraft designer for the Marauder program, but was also responsible for design work on the previous Martin B-10 and Model 146. His father was Marshall Magruder, a Brigadier general in the U.S. Army, and the family moved from one post to another during Peyton's early life. They lived in Manila, Yokohama, Hawaii, and several other posts, and although Peyton attended four different high schools, he still won appointments to both Annapolis and West Point.

Magruder chose to attend the Naval Academy in Annapolis and entered in 1930. He reportedly studied less and partied more than most of his contemporaries, but still remained in the upper part of his class. He was a pole-vaulter on the track team, member of the swim team, and won a $350 bet by running 5 miles in 29 minutes and 3 7 seconds. However,during his senior year in 1934, he resigned during a scandal that is now part of the Academy's lore, but also to apply for enlistment in the Army's aviation school. At the time, the Army would not accept Navy officers or cadets since the Navy had its own air school.

To improve his odds of acceptance, Magruder joined a National Guard air units and enrolled in the University of Alabama's aeronautical engineering program. However, before completing his first year of studies, he was engaged to be married and looking for employment. He soon obtained a position at the Naval Aircraft Factory in Philadelphia through a chance encounter with Admiral Ernest J. King, then Chief of the Navy Bureau of Aeronautics. Magruder's family had been neighbors with King in Newport, Rhode Island while Adm. King and his father studied at the Naval War College. Magruder stayed at the NAF for two years before moving in 1937 to a job at Glenn L. Martin Company, now Lockheed-Martin.

Peyton Magruder with Jimmy Doolittle

Glenn L. Martin Company gave the 27-year-old aeronautical engineer the title of "Project Engineer" and the task of designing Model 179 according to Army Air Corps' January 1939 specifications. This model would later become known as the B-26 Marauder. Initial design work was completed in June 1939, and on July 5, the Model 179 was submitted to a review board which gave it the highest rating of all proposals submitted. On August 10, 1939, the Army issued a contract for 201 Model 179s under the designation B-26.

Magruder eventually left the Martin Company and became President of International Chemical Corporation. He died on January 19, 1982, at Marathon, Florida.

Pratt & Whitney R-2800 "Double Wasp" Engine

The legendary R-2800 that powered the Marauder and many other superb aircraft (see the list below) is widely considered to be one of the finest piston aircraft engines ever developed. It was a two-row, 18-cylinder, air-cooled radial design displacing 2,804 cubic inches (46 liters), with a bore of 5.75 inches (146 mm) and a stroke of 6 inches (152 mm).

It had a diameter of only 52.8 inches (1342 mm) and a dry weight of about 2,360 lbs. (1,073 kg). Despite being much smaller than the only other contemporary eighteen cylinder radial, the Gnome-Rhone 18L of 3,442 cu in. (56.4 L), the R-2800 was nevertheless more powerful and thus more difficult to cool. Therefore, the cast or forged cooling fins used in previous motors were no longer practical, and new, very thin and finely shaped, machined fins were developed for the Double Wasp. The engine also incorporated one of the most advanced baffle systems to control cooling air flow.

The valve train was of the poppet type with two valves per cylinder. The engine had a single stage, variable speed, centrifugal supercharger and a a Stromberg injection carbureter. It typically burned 100/130 octane aviation gasoline. The R-2800-43 used in the B-26 Marauder produced 1,900 to 2,000 horsepower and had a power-to-weight ratio of about 0.89 hp/lb. (1.46 kW/kg). At the time of its introduction, no other air-cooled engine, and few inline, water-cooled engines could match the Pratt's power-to-weight ratio. The powerplant series was consistently refined and upgraded during WW II, including additions such as a water injection system to increase combat emergency power. Later models rowards the end of WW II produced over 2,400 hp.

After World War II, the engine served the Korean war and many other conflicts all the way up until the late 1960s. It also powered a variety of post-war airliners made by Douglas, Lockheed and Martin. Today, more than 60 years after the first Double Wasp was built, it is still used in many restored vintage aircraft and even on modem aircraft such as the Canadair CL215 water-bomber.

Other Aircraft Powered by the R-2800:

- North American AJ/A-2 Savage
- Grumman AF Guardian
- Curtis C-46 Commando
- Fairchild C-82 Packet
- Fairchild C-123 Provider
- Sikorsky CH-37 Mojave
- Canadair CL-215
- Convair 240, 340 and 440
- Douglas A-26 Invader
- Douglas DC-6
- F4U Corsair
- F6F Hellcat
- F7F Tigercat
- F8F Bearcat
- P-47 Thunderbolt
- P-61 Black Widow
- Lockheed Ventura/B-34 Lexington/ PV-1 Ventura/PV-2 Harpoon
- SB2A-1 Buccaneer/ A-32/Bermuda
- TBY Sea Wolf
- Vickers Warwick
- Vultee XA-19B
- XB-28 Dragon
- XF-15C-1
- XP-56 Black Bullet
- XP-60