Flying the Light Retractables

A guided tour through the most popular complex single-engine airplanes

LeRoy Cook

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by LeRoy Cook

About the Author: LeRoy Cook chose to become a lifelong student of aviation in his early years, catching the fever during the celebration of the 50th Anniversary of powered flight in 1953. He determined to learn and share as much of aviation as he could, and is still exploring flight 50-plus years later. His career as an aviation writer began in 1970; he had been a flight instructor since 1965 and wanted to reach a wider audience, through aviation publications. With over 1,350 magazine articles published, Cook was a monthly columnist at ***Private Pilot Magazine*** for 34 years, where he was a senior editor. He holds ATP ratings for single and multi-engine airplanes, with commercial glider and seaplane ratings and his Gold Seal flight instructor's certificate carries single and multi-engine airplane, instrument and glider privileges. A lifelong resident of western Missouri, Cook is married with three children and continues teaching others about flying on a daily basis.

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7005 132nd Place SE
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Email: asa@asa2fly.com
Internet: www.asa2fly.com

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The Mother Church of Light Retractables

If there were a quintessential light retractable, it would have to be the Mooney M20 series, from the original Mark 20 to the M20J. As the first four-place retractable-gear airplane designed around the light, powerful Lycoming four-cylinder engine, the Mooney created a whole new class of efficient, personal traveling machines.

Using the prevailing standards of Civil Air Regulation Part 3, the Mooney M20 received its initial type certification on August 24, 1955; it is from this original TC that most variants have been certificated. Although the basic layout has remained the same, one will find that the newer Mooneys have very little in common with the first airplanes, in either construction methods or aircraft systems. Tracing the history of the Mooney Company will help us understand the evolution of the M20 series.

Al Mooney began his career in aircraft design in the mid-1920s, working for various other firms until the euphoric period after the end of World War II, when he and his brother Art started Mooney Aircraft Company in that hotbed of aviation, Wichita, Kansas. His first product was a tiny single seat speedster with retractable landing gear and flaps, dubbed the M18 Mooney Mite. Initially powered by a converted Crosley auto engine, producing all of 25 hp, the Mite was quickly retrofitted with 65-hp Lycoming and Continental engines. The M18 was built from 1946 through 1955, by which time the Mooneys had left the payroll of the company that bore their name. Mooney Aircraft moved from Wichita to Kerrville, Texas in 1953, as development of a new, larger Mooney was well underway.

A four-place Mooney M20 had been on Al Mooney's drawing board by mid-1952, resembling a scaled-up Mite. As with the M18, the first Mooney Mark 20s utilized truly composite construction; the wing was built entirely of wood, including a spruce plywood skin to minimize airflow disruption over the laminar-flow airfoil section. The empennage was also built of wood, while the fuselage used a combination of monocoque aluminum construction in the tailcone area and non-stressed aluminum skin over a tubular steel truss around the cabin area. The engine was Lycoming's brand-new 150-hp O-320,

Pre-1961 Mooney Mark 20As like this one had a wood wing and tail, although the fuselage was aluminum skinned. Most have now been retired.

tightly cowled and turning a Hartzell constant-speed propeller. The landing gear and flaps were manually operated.

The light, compact Mark 20, with an empty weight of only 1,415 pounds, exceeded the one-mph-per-horsepower standard by a considerable amount, reputedly cruising at 165 mph and hitting a 171 mph top speed. By 1957, Lycoming had its 180-hp O-360 engine ready, and it appeared in the 1958 Mark 20A with a McCauley constant-speed propeller; its maximum cruise speed was quoted at 180 mph, with a top speed of 190. Exhaust augmenter tubes under the belly of the original M20 did a good job of enhancing cooling airflow through the engine, but they produced a husky bark, causing adjustable cowl flaps and a conventional exhaust system to be fitted to the 1958 airplanes. Both the Mark 20 and Mark 20A were offered for 1958; the 180-hp airplane outsold its smaller brother by a three-to-one margin, so only the M20A was offered thereafter. In all, some 700 Mark 20 aircraft were built.

Years of neglect and outside storage have taken their toll on the 1955–1960 wood-construction Mooneys, some of which exhibited deterioration, particularly in the tail area. At this point, most of the wooden Mooneys have been converted to metal tails, at considerable cost, due to rigorous load tests required by a recurring AD to detect failures in the wooden tail structure.

By 1960 a market preference for all-metal aircraft was clearly evident, requiring the M20A to be redesigned with a metal wing and tail. Initial doubts about Mooney's ability to substitute flush riveting for smooth plywood were laid to rest, and the 1961 M20B appeared as the Mark 21, starting with serial #1701. A total of 48-gallons of fuel was now carried in integral wet-wing bays

within the wing; the wood-wing Mooneys offered 35 gallons in the wings and an optional 14 gallons in an aft-fuselage tank. The Mark 21's flaps and landing gear were still manually operated; the wheels folded away with a hefty bar that moved through a 90° arc, from a vertical location under the panel to a flat position on the floor between the seats. The flaps, meanwhile, were extended by a small chrome lever under the panel that one pulled down to engage one of two notches. Empty weight increased by about 85 pounds with the conversion to metal construction, and the advertised cruise speed was boosted by 2 mph, to 182 mph. A total of 222 M20Bs were built.

For 1962, Mooney brought out its M20C, still marketed as the Mark 21. The most obvious changes were an increase in gross weight, from the earlier airplane's 2,450 pounds to 2,575 pounds, and the installation of a hydraulic hand-pump to lower the flaps, using the same handle as the M20B. A few strokes with the selector in the "down" position extended the flaps to as much as 33°, up from 21.5° in the M20B. Flipping the selector to "up" allowed the hydraulic pressure to bleed off, retracting the flaps. The M20C, as the basic 180-hp, carburetor-equipped economy Mooney, settled in for a long, stable production run, even while other permutations evolved; renamed the Ranger in 1965, it was still in production when the 201 was introduced in late 1976. The final 15 M20Cs were built in 1978, for a total of 2,192 airplanes.

The Mooney line was expanded in 1963 to include a fixed-gear, fixed-pitch entry-level version called the M20D Master. Maximum cruise speed was quoted as 139 mph, and gross weight was identical to the M20C, with 50 pounds more useful load. Because the airframe was identical to the Mark 21, the owner of an M20D could have it converted to a retractable-gear airplane at any time, as practically all have been by now. Only 161 Masters were built through 1966.

For 1964, new flush-fitting fuel filler caps replaced the old thermos-type caps under a hinged plate, increasing fuel capacity by four gallons. A Super 21

The 200-hp Mooney M20E Super 21 was one of the fastest small Mooneys, particularly when modified with a sleeker cowling and windshield, as this one has been. Stretched into the M20F Executive 21, it eventually became the M20J 201.

Flying the Light Retractables

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A guided tour through the most popular complex single-engine airplanes

Author LeRoy Cook provides a guided tour through ten of the most popular high-performance single-engine airplanes. Cook leads you through the development history of each plane with plentiful insight into design considerations, evolutionary changes, advantages and disadvantages of the different models, and background on maintenance issues. He demos the technical territory in-flight —here, the pilot or potential owner will get a sense of what they really want to know. This is like going flying with the author and having the advantage of his eye for detail and sense of observation.

Cook gives a unique perspective on ergonomics, control feel and other features that work or don't work for the pilot and/or passengers...it becomes obvious that he has spent many hours in different makes of aircraft. As a potential buyer, you're most interested in perfomance and economic trade-offs, and Cook excels in such details. His balanced discussion stacks the technical detail (speeds, loads, etc.) against economic factors. You're not swamped with numbers, but you come out with a good sense of what you need and want to know about flying these light retractable-gear airplanes.

Beautiful photographs accompany each airplane discussion, covering these aircraft: Mooney M20C, M20J 201/MSE, Beech Bonanza 35, Beech Sierra, Cessna Cardinal RG, Cessna Cutlass RG, Lake Buccaneer, Piper Comanche 180, Piper Arrow, Rockwell Commander 112TC.

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Aviation Supplies & Academics, Inc.
7005 132nd Place SE
Newcastle, Washington 98059
1-800-ASA-2-FLY • www.ASA2FLY.com