

Getting up to Speed with a Mooney

For the private pilot, flying away in the world's most efficient four-place production aircraft is a thrill only a Mooney has been able to offer for over 30 years, using the same basic design. John McVicar takes a closer look at the early Mooney.



Speed — it's been Mooney Aircraft Corporation's hallmark since its founding in 1946. While creature comfort has always been a consideration, low drag and high speed have been the prominent features of over 10,000 Mooneys built, 11 of which are currently in New Zealand, 148 in Australia, and around 7,000 in the USA.

With no damage history and still in original order, ZK-CPP, a Mooney M20C, is a good example of an early model. Owned from new by Wellingtonian, Trevor Coleridge, CPP was on the line at the Wellington Aero Club for a time before passing into the hands of Marlborough farmer Jim Dillon for more than 20 years. CPP was purchased by myself in 1998 and now resides in the plush surroundings of Pat Scotter's hangar at Rangiora.

The first M20 was built in 1955 and was Al Mooney's twentieth aircraft design. Dubbed the M20A, this all-wooden wing aircraft was in production until 1961 when the all-metal M20B was introduced. This was superseded by the M20C Mk 21 in 1962. In 1964 an additional model became available — the M20E Super 21 with a 200-hp injected Lycoming giving a maximum cruise of 187 mph. Mooney's competition at this time was Piper's 250-hp Comanche. Back then, *Air Facts* magazine set up a race between the two rivals. Conducted at low-level with throttles wide open, the Mooney outran the Comanche.

By 1965, sales at Mooney were booming, selling almost 700 aircraft that year, with the M20F Executive with stretched fuselage offered a year later in 1966. The last of the M20Cs was built in 1978, a year after the popular 200-hp M20J was introduced — known as the 201 because the cruise speed was 201 mph. The M20K 231/252 first appeared in 1979 and differed from the 201 in that it had a Continental 210-hp. In 1988 Mooney teamed up with Porsche and produced forty-one 217-hp Porsche engined aircraft, the M20L — two of which are flying in Australia. The incredibly quick, big-block Mooneys began rolling off the line in 1988 with the 220-knot, 270-hp M20M Bravo, followed by the 280-hp M20R Ovation in 1994. Mooney's newest model is the 244-hp M20S Eagle.

While the latest M20 Mooneys feature more power, speed, state-of-the-art avionics and luxuriously appointed interiors, the entire M20 series have an almost identical airframe and many other features not found on other light aircraft. Without a doubt, the most distinguishing feature is the unique Mooney tail design with its forward sloping trailing-edge and vertical leading-edge. The theory is that the tail design positions the rudder directly in-line with

Left: John McVicar's M20C Mooney breaks away from the camera ship over the snow-dusted mountains of Lees Valley. Note the flaps, which span nearly two-thirds of the wing, and the short, fat ailerons, which run right to the wingtip. (Callum Macpherson)

Above right: Part of the Mooney's recipe for speed is its flush riveted laminar flow wing, which is a one-piece design with a single spar running from wingtip to wingtip. At "flight idle" the Mooney had no problem keeping up with the 90-knot camera ship (a Robinson R22). (Callum Macpherson)



Callum Macpherson photograph



the airflow when at slow speeds and high nose attitudes. This makes the rudder more effective just when you really need it, such as when landing or approaching a stall. Probably a lesser known fact is that the Mooney pitch trim control moves the entire empennage rather than using drag inducing trim tabs. Some other pretty sophisticated aircraft use this system, including the Boeing 777, 747 and ... er ... the Piper Cub.

The flush riveted laminar flow Mooney wing is also a unique design in that it is very strong, one-piece and has a single spar from wingtip to wingtip. Apparently the fuselage can be removed and the wing rolled around on the wheels. The flaps stretch out over nearly two-thirds of the wing, while the ailerons are short and wide and run right to the tip of the wing — a combination designed to give better control at slow speeds.

Attached to the wing is an equally strong fuselage. Rather than being the typical monocoque construction, Mooneys feature a welded steel tubular frame wrapped with non-structural aluminium as the foundation for the forward fuselage. The steel frame also acts as a roll cage around the occupants. Not surprisingly, there has never been a structural AD on a metal Mooney airframe and only one mid-air break up — that unfortunate person entered a tornado-ridden thunderstorm. All M20 series Mooneys share the same load limitations of +3.8g and -1.5g.

The trailing link tricycle gear has a rudder-pedal-operated steerable nose wheel and toe-operated brakes. Rather than conventional oleo legs, Mooneys utilise low maintenance rubber discs to absorb shock from taxiing and landing. Anyone who has woken up in the morning at a remote strip to find a collapsed oleo leg will appreciate this system.

Al Mooney was so intent on reducing drag that even the step on the M20C is retractable. Getting into the low, left seat of a Mooney does require some mild gymnastics compared with the high chair of a Cessna. Once seated with legs stretched outwards, the Mooney is comfortable and the cabin width, contrary to popular opinion, is almost exactly the same as a Beech, Piper or Cessna. Mooney has reduced the fuselage cross sectional area and therefore reduced drag by lowering the area above the pilot's head and curving in the side windows above the shoulder.

The Mooney is the ultimate cross-country machine. The relatively small number of Mooneys in New Zealand is perhaps due to the small geographic area to be covered compared with Australia and the USA. The Royal Western Australia Aero Club in Perth, one of the more remote cities in the world, has sixteen Mooneys on line. The M20C burns

around 35 litres per hour at 75 percent power, giving it a maximum endurance of 5 hours. Don't forget that at Mooney speeds, that equates to a long way on a tank of gas. Normal take-off speed is 60 knots and a climb rate of 800 ft/min can be expected at 105 knots. With a constant speed propeller, the tightly enclosed O-360A1D Lycoming develops 180 hp at 2,700 rpm and requires the use of cowl flaps during the climb.

Electrical failure in earlier models presents no major dramas. Up until 1968, all Mooneys had a bullet-proof manual gear retraction system. Hinged from the floor, the long gear handle, or Johnson Bar, locks forward into the bottom of the instrument panel for the down position. To retract, the thumb button is depressed while sliding the locking mechanism downwards and the handle is pulled to floor between the seats. The entire retraction of all three wheels seems almost instantaneous and is effortless if done before too much speed is gained.

Flaps are extended hydraulically through a manual handle located next to the gear. Full flap is obtained with four complete pumps, and the flaps will retract automatically. Mooney introduced electrically operated landing gear and flaps as standard in 1969, however, the manual gear is so popular there is no price difference between electric and manual gear when purchasing an early Mooney.

The dual flight controls feel heavier than other similar aircraft due to having push-pull tubes rather than cables, and serve as a stable cross-country and instrument platform. The rudder is the lightest control of all three axes and is also the least powerful, although 15-knot crosswind landings are possible. Different from other aircraft, the nose tends to pitch downwards when flap is lowered. Anticipation and generous use of trim and rudder is required when applying full power in a go-around or missed approach situation as the pitch-up is significant.

Until 1977, standard Mooney equipment included an automatic wing leveller known as the Positive Control or PC system. Pneumatically operated, the PC system senses both roll and yaw in the turn coordinator, which meters vacuum to cylinders attached to the control tubes.

Slowing the slippery Mooney down requires forward planning. The M20C has a maximum gear retraction speed of 105 knots and flap speed of 89 knots, so it requires some thought when descending at 160 knots. Late model Mooneys with cruise speeds of over 200 knots are equipped with pop-up speed brakes on the wings, a modification fitted to many earlier models. The manual gear system is easily extended if the maximum extension speed is adhered to. It seems hard to imagine how one could ever forget to lower the

wheels on a Mooney as it is such a vital drag inducing ingredient to getting the speed under control.

The Mooney has a mild stalling behaviour typical of many light aircraft types, however, if out of balance it will readily drop a wing. If severely aggravated, using full elevator and rudder together at slow speeds, the aircraft will stall, roll over and settle into the initial stages of a spin which is easily recoverable.

Landing is no different from landing a Cherokee so long as you get the final approach speed down. The majority of Mooney accidents have been the result of the pilot not slowing enough in the circuit and ending up with a fast final approach speed. The recommended normal final approach speed is 71 knots — any higher and the aircraft will float down the entire strip in ground effect and, if forced on, will bounce. With a short field approach speed of 62 knots and a stall speed in landing configuration of 50 knots at MAUW, the M20C is able to drop in and out of fairly short strips.

The Mooney is an aircraft with so much capability. It goes fast — real fast — it'll take four people away, land on the local farm strip, and doesn't require a trust fund to run. For all its systems, the Mooney is remarkably simple and easy to maintain. In return for these features, all a Mooney asks for is a pilot who respects and knows how to handle its high performance characteristics.

1966 Mooney M20C

Engine Lycoming	O-360 A1D
TBO	2,000 hours
Propeller	74-inch constant speed
Length	23.2 ft
Height	8.4 ft
Wingspan	35 ft
Aspect ratio	7.3
Wing area	167 ft ²
Wing loading	15.4 lbs/ft ²
Seats	4
Empty weight	1,525 lbs (745 kg)
Useful load	1,050 lbs (420 kg)
Payload w/full fuel	650 lbs (280 kg)
Max take-off weight	2,575 lbs (1165 kg)
Power loading	14.3 lbs/hp
Fuel capacity	52 gallons (198 litres)
Baggage capacity	125 lbs (59 kg)
Take-off distance	815 ft (270 m)
Take-off distance over 50 ft	1395 ft (460 m)
Rate of climb	800 ft/min
Service ceiling	17,500 ft
Maximum speed	165 knots (190 mph)
Cruise (75% @ 7,500 ft)	156 knots (180 mph)
Duration @ max cruise	5 hours
Stall speed clean	58 knots
Stall speed (flaps down)	50 knots
Landing distance	595 ft (200 m)
Landing distance over 50 ft	1,550 ft (510 m)