
Mooney
Aircraft Corporation/Kerrville, Texas 78028
Subsidiary of Republic Steel
Member of GAMA
N201JS

Speed by ingenious design instead of gas-guzzling brawn.

One mile per hour for each horsepower was just a subject for wistful speculation—then the 201 came along.

Mooney has created a sensation in the aviation world by introducing the first 200hp plane in its class to have a top speed over 200mph. The Mooney 201 has been hailed as a remarkable achievement. Dozens of articles have been written detailing the 201's aerodynamic design breakthroughs. But for you, the aircraft owner, it all comes down to a simple mathematical fact: To match the 201's speed you'd have to spend up to $34,000 more. Settle for another plane close to the 201's price and you'll be flying up to 37mph slower.

You'll save money the day you buy a 201 and you'll save every day you use it. Imagine cruising along at 195mph and burning a scant 10 gallons per hour. Trips that used to take 5 hours will now take four. But the true beauty is that while you're saving time you'll also be saving precious fuel.

You Don't Give Up Comfort to Get Extra Speed

The 201 handles four full size adults in comfort. The cabin measures 43.5 inches elbow to elbow, the same as most Bonanzas in the fleet. There's nothing spartan about the interior either. The contour seats come in your choice of plush velour, handsome genuine leather, as well as tasteful patterned fabrics. But what will catch your eye is the 201's New Dimension panel. It's designed for the serious pilot with all important flight instruments and controls within easy sight and reach. And this

year, the 201 comes with a choice of five autopilot systems and seven different avionics packages that include DME, HSI, RNAV, and radar altimeter options.

You and your passengers will also appreciate the 201's quiet cabin. Wind noise and "prop beating" have been reduced by the same aerodynamic breakthroughs that give the 201 its extra speed without extra gas consuming engine muscle. In addition, this year's 201 has an improved ventilation system and a quieter, vibration-free cabin.

Even a 201 Can Get Better

It would be a pretty tough job to improve the flying performance of the 201, so instead, we've concentrated on making the new 201 the kind of plane that brings out your best performance.

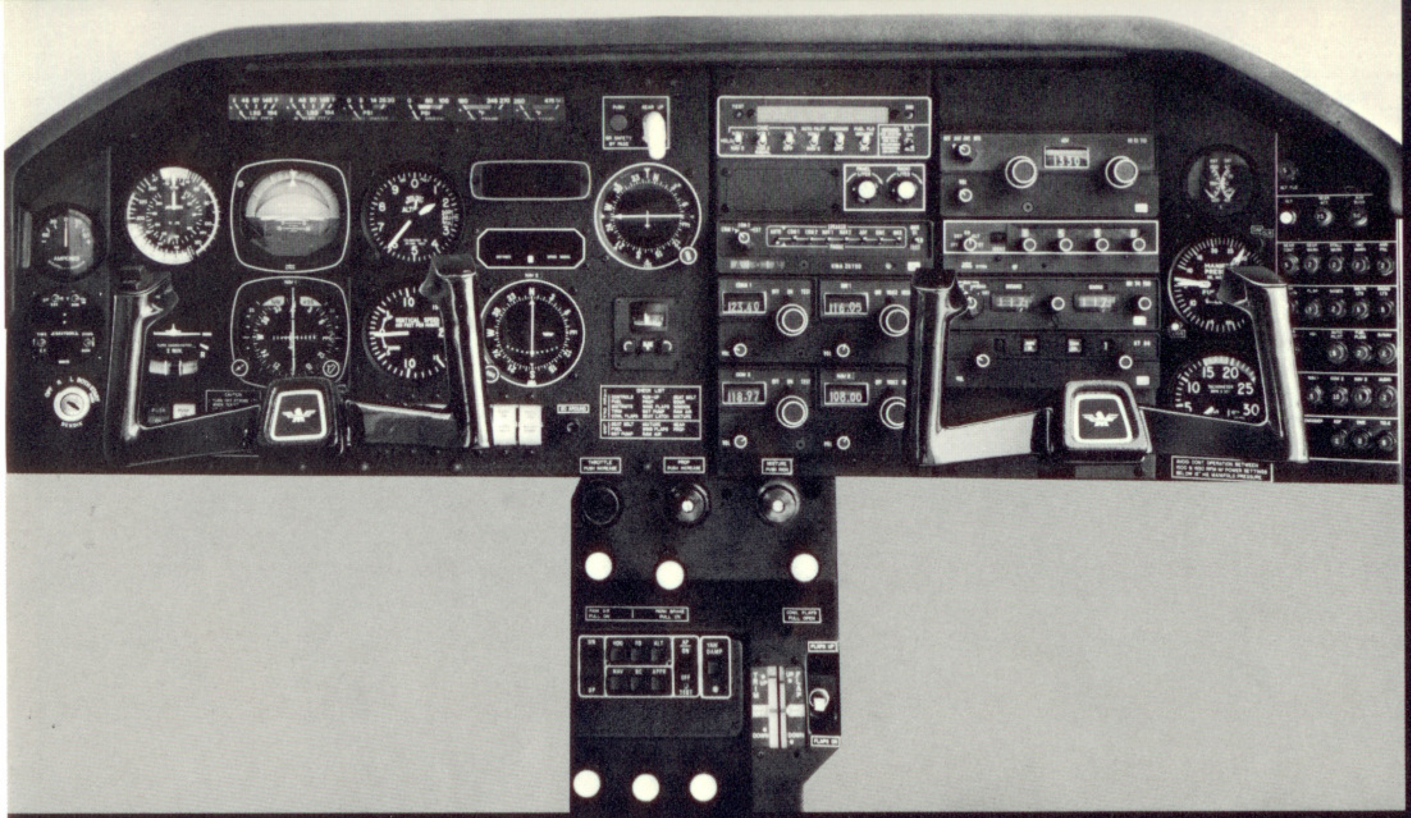
For example, even more precise power management is now possible due to new professional power controls. The fuel selector switch has been placed where pilots like it best, right in the center of the cabin. And even if you should forget it's there, the 201's new state-of-the-art annunciator panel incorporates a "Low Fuel Warning" for each tank. There's even an optional fuel totalizer that shows fuel flow and fuel remaining or fuel burned. Think all of those "just to be safe" extra fuel stops it can eliminate.

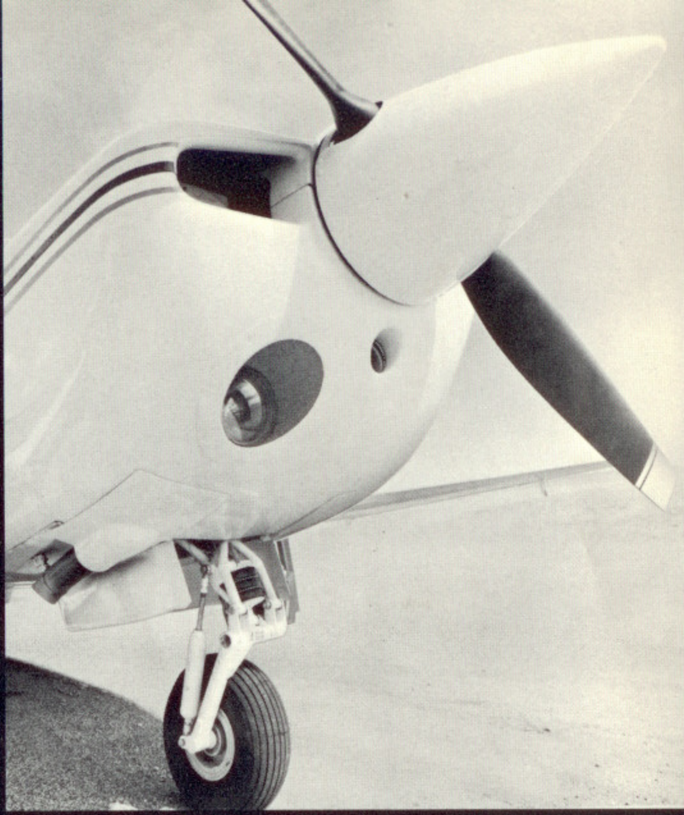
The all electric gear has a new higher gear down speed of 150mph IAS. Backing it up is an improved, spring-loaded gear extension system easily accessible in the center of the cabin. All and all, Mooney has never offered a plane with more standard equipment, or with more available options. You're assured of getting your new 201 equipped just the way you want it.

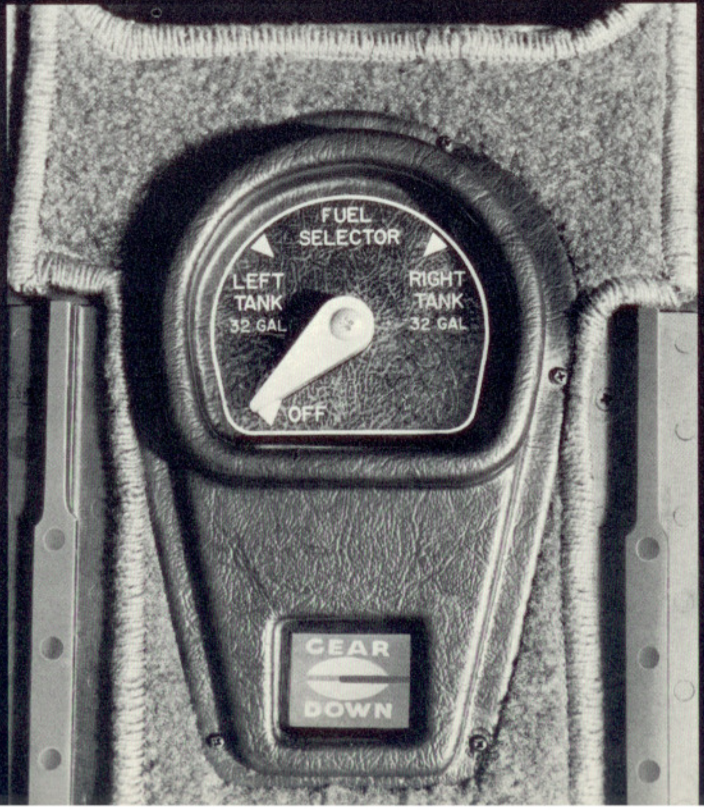
The 201 Is Every Inch A Mooney

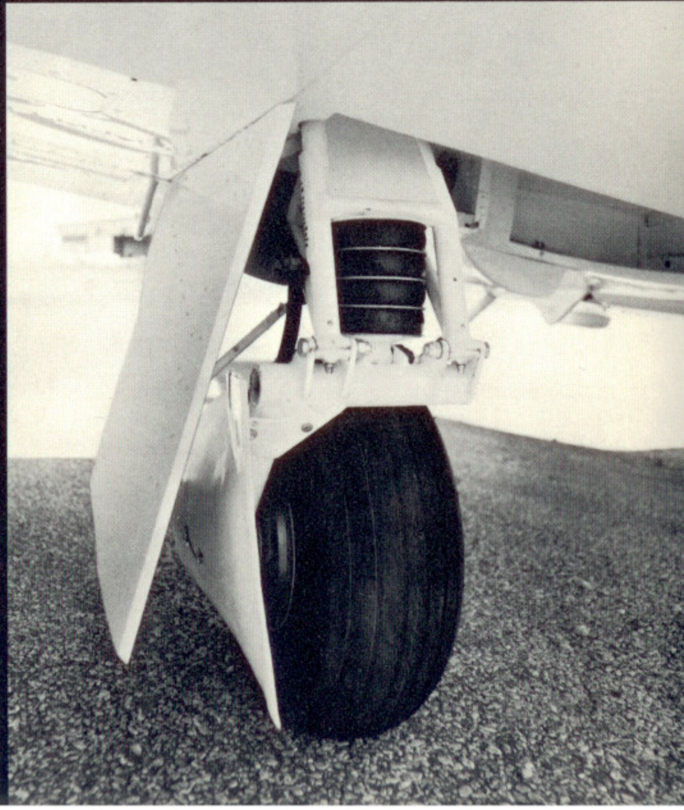
The 201 is new and exciting. But because it's a Mooney, there are some things we'd never change. Like all Mooneys, the cabin is surrounded by an alloy-steel roll bar cage for occupant protection. A continuous main wing spar runs from wingtip to wingtip, and is far stronger than FAA requirements. Zinc chromate corrosion proofing is standard. The rugged electric landing gear has no oleos or hydraulics to run up shop bills. We even chose a superior engine. The ruggedized 200hp Lycoming has no cruise restrictions and it has a recommended TBO of 1600 hours.

In the 201 we've not only built the plane of the future; we've built a plane that will give you almost headache-free flying long into the future.






FUEL SELECTOR
LEFT TANK 32 GAL
RIGHT TANK 32 GAL
OFF
GEAR DOWN



Mooney 201 Specifications, Performance Data

Engine ....Lycoming IO-360-A3B6D
Horsepower 200
Gross weight ....2,740 lb. (1243 kg)
Empty weight ....1,640 lb. (744 kg)
Useful load ....1,100 lb. (499 kg)
Wing span ....35′ (10.7 m)
Length ....24ft. 8″ (7.5 m)
Height ....8ft. 4″ (2.5 m)
Power loading ....13.7 lb./HP (6.2kg/HP)
Wing loading ....16.4 lb./sq. ft. (80.2 kg/ca)
Luggage capacity ....120 lb. (54kg)
Fuel capacity, usable ....64 gal./384 lb. (2421/174kg)
Wing area ....167 sq. ft. (15.5 ca)
Aspect ratio 7.338
Top speed 201mph/174k (324km/h)
Cruise speed, 75% power ..195mph/169k (315km/h)
Range, 75% power, no reserve 1156sm/1004nm (1865km)
Fuel flow/mpg. 75% power ..10.8gph/18.1mpg (40.91h/7.7km/1)
Cruise speed, 55% power ..174mph/151k (281km/h)
Range, 55% power, no reserve 1,295sm/1,125nm (2089km)
Fuel flow/mpg. 55% power ..8.6gph/20.2mpg (32.51h/8.7km/1)
Rate of climb, sea level 1,030fpm (5.23m/sec)
Stall speed (gear & flaps down, power off, CAS) ...61mph/53k (98km/h)
Service ceiling ....18,800 ft.

Performance figures ± 3%.

Mooney Aircraft Corporation reserves the right to make changes to specifications, materials, standard equipment, and optional equipment offered on its products at any time without incurring any obligations to equip or modify models manufactured prior to or after the effective date of such change.

Buyer's Guide*	Mooney 201	Bonanza F33A	Cessna 210	Turbo Arrow III	Arrow III
Top speed/hp	201mph/ 200hp	209mph/ 285hp	201mph/ 300hp	204mph/ 200hp	175mph/ 200hp
Cruise speed, 8000′ /mpg (best economy)	195mph/ 18.1mpg	196mph/ 13.6mpg	197mph/ 13.1mpg	169mph/ 14.0mpg	158mph/ 15.5mpg
Cruise speed, 12000′	185mph	190mph	186mph	178mph	147mph
Stall speed	61mph	61mph	70mph	63mph	63mph
Rate-of-climb (fpm)	1,030	1,167	860	940	831
Service ceiling (ft.)	18,800	17,858	15,500	20,000	16,000
Equipped payload, 950 mile trip	692 lb.	758 lb.	1,098 lb.	749 lb.	686 lb.
Cabin width (elbow to elbow)	43.5″	45.5″	44.0″	42.0″	42.0″
Suggested base price, January, 1978	$43,500	$72,575	$63,950	$44,890	$40,650

*Comparisons based on manufacturers' information published in FAA-approved flight manuals. Performance may vary with conditions. Cabin measurements made by Mooney Aircraft Corporation on current production aircraft.

The 201's New Dimension Panel puts instruments and avionics where they should be. Note the new power controls and increased front seat knee room.

The sculptured cowling includes a polycarbonate-covered landing light, and removes in three minutes to reduce maintenance expense.

The 201's large aerodynamically refined windshield provides excellent visibility and smooth airflow.

The centerline fuel selector is located below the center console. Note the gear position indicator, which provides a direct mechancial indication of gear position as a backup to the annunciator lights on the panel.

The 201's wide, rugged gear is all-electric, and retracts or extends in just seconds. The energy-absorbing rubber disc shock absorbers require no maintenance, and gear down speed has been increased to 150mph. The inboard gear doors help provide high cruise speeds.

Efficiency

by Roy Lopresti

Defining Efficiency

Efficiency is a technical term which is at the heart of any airplane's design. Pilots, aviation editors, and aircraft owners each have their own individual definitions of "efficiency." Often these definitions become so complex, they obscure simpler technical definitions of "efficiency."

Technically, efficiency is a measure of how much you get out of a system relative to how much you put into the system.

It may be expressed as a percentage:

$$\text{Efficiency} = \frac{\text{Output}}{\text{Input}} \times 100$$

For example, an automobile with a 100 hp engine may only deliver an effective 90 hp to the road, losing 10 hp in the transmission and drive shaft. The "efficiency" of this system would be 90%:

$$\frac{\text{Output}}{\text{Input}} = \frac{90 \text{ hp}}{100 \text{ hp}} \times 100 = 90\% \text{ Efficient}$$

This simple definition takes into account all of the interwoven factors of the "system." In airplanes these factors become more complex. Wing span, wing loading, power, range, handling characteristics, and the aerodynamics of the external parts all influence the airplane's efficiency.

If the input and output are not both horsepower, as in the above equation, the relationship is not true efficiency. An "efficiency index" can be used when comparing inputs and outputs that are not the same.

An efficiency index can be used to relate a number of performance items. **"Speed efficiency index"** is one such measure. Increased speed without increased power results in increased range, payload, and fuel efficiency. The speed efficiency index of the Mooney 201 is 97.5, or:

$$\frac{\text{Output}}{\text{Input}} = \frac{195 \text{ miles per hour}}{200 \text{ hp}} \times 100 = 97.5$$

"Fuel efficiency index" can be derived from the familiar miles-per-gallon measurement (miles traveled divided by gallons consumed). This index is simply a measurement of *output* (distance covered per hour) divided by *input* (gallons or pounds per hour put into the system), or:

$$\frac{\text{Output}}{\text{Input}} = \frac{195 \text{ miles/hr.}}{10.8 \text{ gals./hr.}} = 18.1 \text{ miles/gal.}$$

"Payload efficiency index" is another useful measurement. It shows how much a given system will carry (output) in relation to the horsepower, or input. In the case of a Mooney 201 for a 950 mile trip, a payload of 692 pounds may be carried (allowing for fuel and IFR equipment). Divided by the 201's system input of 200 hp, the payload efficiency would be:

$$\frac{\text{Output}}{\text{Input}} = \frac{692 \text{ lb. payload}}{200 \text{ hp}} \times 100 = 346$$

The three basic efficiency index measurements (speed, range and payload) for the 201 and other popular retractables are listed below. There's also extra space for you to compute these for other aircraft.

Efficiency Guide *	Mooney 201	Bonanza F33A	Cessna 210	Turbo Arrow III	Arrow III		
Output (cruise at 8000'; mph)	195	196	197	169	158	____	____
Input (HP)	200	285	300	200	200	____	____
Speed Efficiency Index	**97.5**	**68.8**	**65.7**	**84.5**	**79.0**	____	____
Output (cruise speed; mph)	195	196	197	169	158	____	____
Input (fuel burn, gph)	10.8	14.4	15.0	12.1	10.2	____	____
Fuel Efficiency Index (mpg/8000')	**18.1**	**13.6**	**13.1**	**14.0**	**15.5**	____	____
Output (payload, 950 mile trip; lb.)	692	758	1098	749	686	____	____
Input (HP)	200	285	300	200	200	____	____
Payload efficiency	**346**	**266**	**366**	**375**	**343**	____	____

* Comparisons based on manufacturers' information published in FAA-approved flight manuals. Performance may vary with conditions.

What makes the 201 so efficient?

The callouts on the cutaway drawing below highlight the most important ways in which Mooney was able to derive a little over 1 mph top speed for each horsepower. Your Mooney Marketing Center will be glad to show you these design features on the real thing... a new 201.

Mooney's long wingspan provides good rate-of-climb. A shorter span, like the Bonanza's, would add 4-5 mph to the cruise speed, but would require more power for an acceptable rate of climb.

Skin friction drag is a function of square feet of airplane surface exposed to airflow. There's virtually no "fat" in a 201's surface area, hence, minimum skin friction drag.

Leakage drag is caused by air flowing to areas where you don't want it to go. For example, high air pressure from the bottom of the wing "leaking" through flap or aileron gaps to the lower pressure top of the wing results in some drag from the leakage flow itself. In addition, the leakage flow exits the leakage path and disturbs the primary flow causing more drag. Gap seals on flaps and control surfaces reduce the 201's leakage drag, and provide for better control as well.

The combined drag of two bodies which are in close proximity is often higher than the sum drag of the individual parts: this "extra drag" is called interference drag. Mooney paid close attention to designing fairings for the flap hinges, horizontal stabilizers, and other areas to reduce this drag.

Air flowing inside the engine cowling creates a large portion of total airplane drag. Mooney's system of internal aerodynamics uses *less* air *more efficiently* and provides even cooling to each cylinder.

There are no unnecessary protuberances in the 201. For instance, a low drag electric OAT is used instead of the traditional "meat thermometer" guage sticking through the windshield. The landing gear leg and brake lines are covered with an inboard gear door. The forward half of the wing on both upper and lower surfaces are flush riveted. Inspection panels on the lower surface are flush mounted.

A Basic Aerodynamic Efficiency Glossary

Aspect ratio: A non-dimensional number determined by squaring the span of the wing, and dividing by the wing area, or:

$$\text{Aspect ratio} = \frac{(\text{span})^2}{\text{area}}$$

For the 201, the ratio is 7.33:

$$\text{Aspect ratio} = \frac{(35)^2}{167} = 7.33$$

For a rectangular wing, aspect ratio is the ratio of span to chord. The higher the aspect ratio, the lower the induced drag. Gliders have the highest aspect ratios, and military fighters and delta wing aircraft like the SST have the lowest.

Cooling drag: The amount of drag caused by the cooling airflow through the engine cowling. Slowing the air down, ducting it around the cylinders, and then speeding it up again as it leaves the cowling results in a net loss of energy and creates drag. This drag is probably the most significant single drag item on piston airplanes.

Efficiency: The measurement of a system's output divided by its input.

Induced drag: Drag induced by lift. In creating lift, a wing creates vortices beginning at the wingtip. These vortices induce downward flow of air ahead of the airplane. To fly in "down" air a higher aircraft attitude is needed; this higher attitude results in induced drag.

Interference drag: The drag caused by the mutual interference of two or more bodies in close proximity. Body "A" may produce 10 pounds of drag, and Body "B" may produce 15 pounds. But together "A" + "B" may produce a total of 45 pounds of drag. The "extra" drag, in this case, 20 pounds, is interference drag. Interference drag is reduced by careful attention to basic design as well as use of fillets to smooth (and reduce) interference patterns.

Leakage drag: Drag caused by airflow through parts of an aircraft, such as a poorly sealed cabin door, control surfaces, etc. Leakage drag disturbs the airflow around it, and may reduce a control surface's effectiveness.

Aerodynamic Efficiency: A measure of aerodynamic output to input generally expressed as lift-to-drag ratio (see below).

Lift-to-Drag (L/D): Measure of overall aerodynamic efficiency. The higher the L/D the greater the range and glide ratio. The higher the L/D the less power needed for level flight. L/D is equivalent in a power-off situation to glide angle. Gliders have very high L/D ratios. Airplanes with high aspect ratios usually have high L/D.

An interesting fact about an airplane's maximum L/D (or glide angle) is that it is only dependent on the airplane's external shape and it is totally independent of weight. The 201's max L/D (or max glide angle) is about 11 to 1, and at any weight.

Skin Friction Drag: Drag caused by airflow contact with surface or skin area. The more skin or surface area, the more drag.

Miscellaneous Drag: Drag caused by protuberances such as an OAT gauge, exposed landing gear parts, tail skid, etc.

Trim Drag: In cruise, the horizontal stabilizer is providing a lift force, (usually a down force for conventional aircraft) to keep the aircraft in a cruise attitude. The drag that is caused by this balancing or trim force is called Trim Drag.