

M20E at FL230

January 7, 2001

About a year ago, I reported on taking my 1966 M20E up to 20,000 feet. Yesterday, I did another test flight and flew my 1966 M20E (N9208M) to 23,000 feet. This is amazingly high for a normally aspirated Mooney. Anyway, here are some of the details. At the bottom is my flight log reported at 1,000 foot intervals.

Why did I do this test flight? I am interested in exploring the envelope of my airplane. In any case, as a former 231 owner, I appreciate the benefits of high altitude flying and wanted to see what the M20E could do in case I should ever need these capabilities.

I took off from my home airport, Salinas CA, and climbed on a course to Avenal VORTAC 100 nm south west. I started my climb at an IAS of 100 kts and a power setting of 25MP/2500 RPM. I gradually leaned the mixture as we climbed and gradually increased the RPM to a maximum of 2650. After the first 4,000 feet I was at full throttle and got whatever MP the altitude afforded. The RAM air door was opened above 4,000 feet. I maintained 100 KIAS to about 11,000 feet and thereafter reduced the airspeed to maintain rate of climb. At 23,000 feet I was indicating 68 KIAS and still getting 200 FPM climb. Cowl flaps were open throughout the climb.

The airplane was light, I departed with 28 gallons in the tanks, and one pilot (200 lbs) and about 75 pounds of the usual junk found in my airplane (O2 system, flight bag, canopy cover, fire extinguisher, to bar, etc). The dip stick showed 6 qts of oil. Thus on takeoff the plane weighed about 2025 pounds, 550 pounds below the 2575 gross weight. The aircraft is a stock clean wing M20-E with the usual collection of antennae. The engine is at 1600 hours TSMOH but with 700 hour top with new cylinders. The engine is strong. The only flaw (and this is minor) is that the governor/prop won't turn faster than 2650 RPM rather than 2700. (Top Gun, take note).

After takeoff, I was receiving radar advisories from Oakland Center. At 15,000 feet I asked for an IFR clearance direct Avenal VORTAC with a block altitude from FL180 to FL210. This was given without question when I indicated the purpose of the flight was "engineering tests". I stated that at Avenal I would reverse course back to my departure point, Salinas VORTAC. Just before FL180, I was given a clearance to hold at FL180 for overtaking traffic which I did for 2 minutes. I have removed this hold from the tables below. I then continued my climb. At FL210 I asked for a further clearance for a climb to FL230 which was granted right away. I reached Avenal at about the same time I reached FL230 and I gradually reversed course to the north west. It had taken me 50 minutes to climb to FL230 during which I used 9 gallons of fuel and covered 100nm. At this point I closed the cowl flaps, leaned the engine a bit and did a level speed run. This yielded an IAS of 98 kts at a temperature of -18 degrees C. Since I left my E6B computer in the airplane, I'm not sure what that translates to as TAS, but I would guess about 130kts on about 7 GPH. (Turned out to be 144 knots)

As I completed my speed run, I was given a clearance to "hold at FL230 for traffic". Thus I had to spend an extra 10 minutes at FL230 when I was actually somewhat eager to get down. I requested

and received a clearance to FL180 and at that altitude canceled IFR and continued my descent which seemed to take forever even at a descent rate of 1,000 fpm.

My O2 system is a Dr. Bob Achtel special with Oxi-saving cannulae and Nelson flow meters. I understand that cannulae are not approved above FL180. Since I did not have any masks handy, I continued to use the cannulas and cranked up the O2 flow to the mask level and felt fine throughout the flight. An O2 saturation tester would have been a real plus for this test flight.

I am interested if anyone else has done similar test flights in non-turbo Mooneys. I think the M20E still had maybe another 2,000 feet left in her at 23,000. Having owned a 201, which is much heavier with the same engine, I doubt if the "J" could have made it up to 20,000 feet much less 23,000 feet. But my 201 (N4452H) had a tired engine and was not happy S&L at 13,000 feet. An irony is that I never took my 231 above 18,000 feet.

Now having said the airplane can reach 23,000 feet, I don't think that is a useful operational level. The ROC was minimal, the cruise speed was slow, and at gross weight, I doubt if the airplane could come close to 23,000. I regularly fly my E-model at between 14,000 and 16,000 and that's fine as long as there aren't a lot of up drafts and down drafts. But above 20,000, I wouldn't recommend it for operational flying.

N9208M, 1966, M20E, Test Flight to 23,000 Feet

Alt	OAT	Time	RoC	MP	RPM	KIAS	Fuel	Flow	EGT
0	17.0	0.00		25.0	2500	100	0.2	14.8	1300
1000	18.0	1.00	1000	25.0	2500	100	0.5	14.6	1300
2000	19.0	2.00	1000	25.0	2500	100	0.9	14.0	1280
3000	19.2	3.00	1000	25.0	2500	100	1.3	13.8	1260
4000	18.1	4.18	845	24.9	2500	100	1.5	13.5	1240
5000	17.7	5.32	882	24.1	2500	100	1.9	14.7	1220
6000	15.7	6.73	706	23.3	2500	100	2.3	16.3	1200
7000	14.8	7.90	857	22.5	2500	100	2.5	14.4	1200
8000	13.2	8.98	923	21.7	2500	100	2.8	12.4	1200
9000	11.6	10.33	741	21.0	2500	100	3.1	12.5	1200
10000	9.9	11.57	811	20.0	2600	100	3.3	12.1	1210
11000	8.3	13.17	625	19.4	2600	100	3.6	10.4	1200
12000	6.4	14.93	566	18.3	2600	95	4.0	11.1	1170
13000	4.2	16.68	571	17.7	2650	95	4.2	10.8	1200
14000	1.1	18.58	526	17.0	2650	95	4.6	9.9	1190
15000	0.1	20.95	423	16.2	2650	90	5.0	10.0	1200
16000	-2.0	23.40	408	15.8	2650	90	5.4	9.5	1220
17000	-4.6	26.25	351	15.0	2650	90	5.8	9.5	1200
18000	-7.2	29.37	321	14.2	2650	85	6.3	8.3	1180
19000	-9.2	32.95	279	13.4	2650	85	6.9	7.9	1230
20000	-11.4	36.45	286	13.0	2650	85	7.2	8.0	1210
21000	-13.9	41.37	203	12.2	2650	80	7.8	7.4	1230
22000	-15.4	45.12	267	11.9	2650	75	8.4	7.3	1220
23000	-18.5	50.07	202	11.3	2650	68	9.0	7.3	1270

Cruise at 23,000 feet: KIAS=98, OAT -18.5, Cowl flaps closed, leaned to 1270 (abt 100 degrees ROP),