MAC-BMC 600-watt Motor

Motor: M1
Hall sensors tuned for CW rotation
Winding: Delta (stock)
Headline 48v controller
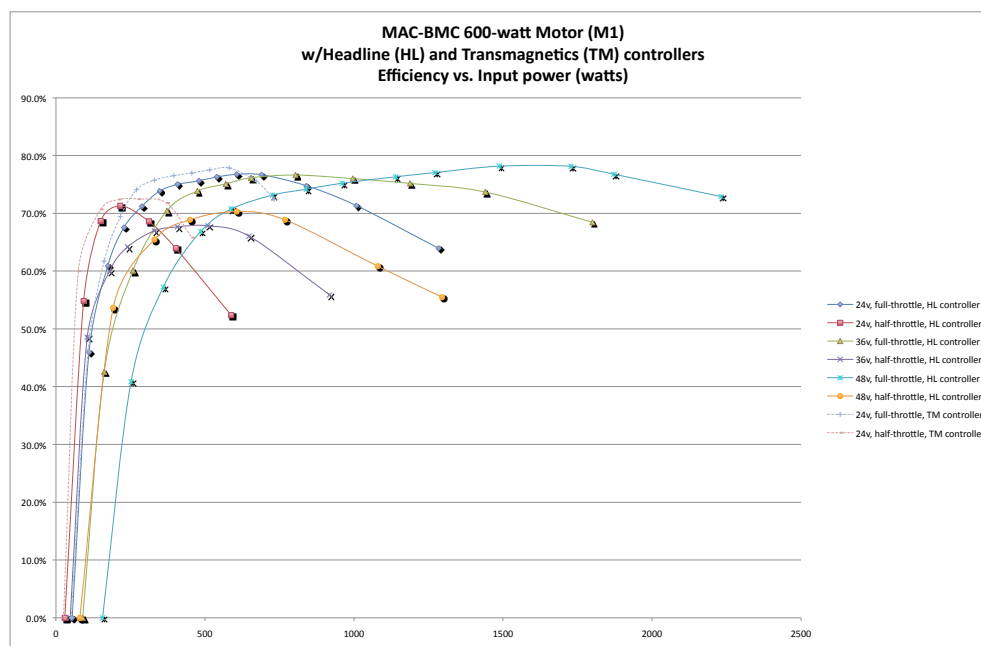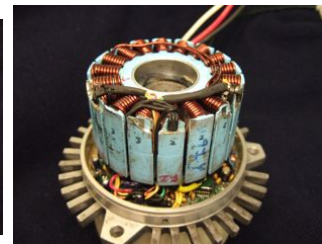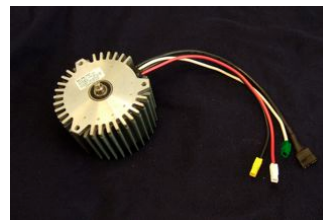
Motor: M1
Hall sensors tuned for CW rotation
Winding: Delta (stock)
Transmagnetics 24v controller

24-volt supply — Full Throttle (HL controller)

Power (CycleAnalyst)	Power (PowerTap)	Efficiency
54	0	0.0%
111	51	45.9%
174	106	60.9%
228	154	67.5%
288	205	71.2%
348	257	73.9%
408	306	75.0%
480	363	75.6%
540	412	76.3%
606	465	76.7%
690	529	76.7%
840	628	74.8%
1008	719	71.3%
1284	821	63.9%

24-volt supply — Full Throttle (TM controller)

Power (CycleAnalyst)	Power (PowerTap)	Efficiency
51	0	0.0%
108	50	46.3%
162	100	61.7%
216	150	69.4%
270	200	74.1%
330	250	75.8%
396	303	76.5%
456	351	77.0%
516	400	77.5%
582	453	77.8%
672	508	75.6%
732	530	72.4%

24-volt supply — Half Throttle (HL controller)

Power (CycleAnalyst)	Power (PowerTap)	Efficiency
30	0	0.0%
93	51	54.8%
150	103	68.7%
216	154	71.3%
312	214	68.6%
402	257	63.9%
588	308	52.4%

24-volt supply — Half Throttle (TM controller)

Power (CycleAnalyst)	Power (PowerTap)	Efficiency
25	0	0.0%
75	45	60.0%
150	106	70.7%
210	152	72.4%
276	200	72.5%
372	267	71.8%
456	300	65.8%

36-volt supply — Full Throttle

Power (CycleAnalyst)	Power (PowerTap)	Efficiency
90	0	0.0%
162	69	42.6%
258	155	60.1%
372	262	70.4%
474	350	73.8%
570	428	75.1%
654	498	76.1%
804	616	76.6%
996	757	76.0%
1188	893	75.2%
1440	1061	73.7%
1800	1232	68.4%

36-volt supply — Half Throttle

Power (CycleAnalyst)	Power (PowerTap)	Efficiency
48	0	0.0%
105	51	48.6%
180	108	60.0%
240	154	64.2%
330	221	67.0%
408	276	67.6%
510	346	67.8%
648	428	66.0%
918	513	55.9%

48-volt supply — Full Throttle

Power (CycleAnalyst)	Power (PowerTap)	Efficiency
156	0	0.0%
252	103	40.9%
360	206	57.2%
486	325	66.9%
588	416	70.7%
726	531	73.1%
840	623	74.2%
960	722	75.2%
1140	870	76.3%
1272	980	77.0%
1488	1163	78.2%
1728	1350	78.1%
1872	1437	76.8%
2232	1627	72.9%

48-volt supply — Half Throttle

Power (CycleAnalyst)	Power (PowerTap)	Efficiency
80	0	0.0%
192	103	53.6%
330	216	65.5%
450	310	68.9%
606	426	70.3%
768	529	68.9%
1080	657	60.8%
1296	719	55.5%

MAC-BMC 600-watt Motor (M1)
w/Headline (HL) and Transmagnetics (TM) controllers
Efficiency vs. Input power (watts)

Legend:
- 24v, full-throttle, HL controller
- 24v, half-throttle, HL controller
- 36v, full-throttle, HL controller
- 36v, half-throttle, HL controller
- 48v, full-throttle, HL controller
- 48v, half-throttle, HL controller
- 24v, full-throttle, TM controller
- 24v, half-throttle, TM controller

Notes: Efficiency was measured by comparing energy drawn from the battery according to a Cycle Analyst and comparing that to energy sent to the rear wheel of the bicycle as read from a PowerTap hub.
Motor power passes through a chain and sprocket (#25 chain; 11t - 90t) to a mid-drive, which is then passed to the rear wheel using normal bicycle chain (15t - 34t).
Efficiency of the two-stage chain and sprocket drive is probably around 93%-95%, so actual motor/controller efficiency is about 6.5% greater.
This motor exhibited remarkably consistent efficiency across a wide range of input power, only falling off at very low and high power levels, the latter due to a 50A current limit on the controller.