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MISHIMOTO ENGINEERING REPORT

Testing the Mishimoto BMW E46 M3 Fan Shroud Kit

Figure 1: Test vehicle

Test Vehicle:
2004 M3 with manual transmission

Apparatus:
For temperature monitoring Mishimoto chose the PLX sensor modules driven by the Kiwi WiFi plus iMFD. This is a wireless system from the sensor modules to an iPad or laptop computer. The software used was the Palmer Performance Scan XL pro, which has full data logging capabilities. Sensor locations were installed in line with coolant hoses directly before and after the radiator.

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Figure 2: Mounting locations for temperature sensors, which read approximately 10 times per second.

Figure 3: PLX sensor modules were used to monitor engine pyrometers.

Idle Testing:

The purpose of the fan idle tests is to make sure that removing the stock fan and fan shroud would not cause overheating in an idle/traffic scenario. We tested the stock and Mishimoto radiators, each with the stock fan and the Mishimoto 16" electric fan. Testing notes: All tests were conducted in our heated garage with an ambient temperature of 65˚F. All tests were performed on the same stock E46 M3. The stock clutch fan is always running, and the stock pusher fan turns on when the radiator outlet temperature reads 120˚F. The BMW was

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completely warmed up before recording any information on all tests. The Mishimoto fan controller can be adjusted from about 100˚F to 200˚F, depending on the user's wants or needs. Mishimoto chose an activation temperature of about 140˚F for these tests.

Figure 4: A 16" electric fan was installed with the Mishimoto radiator.

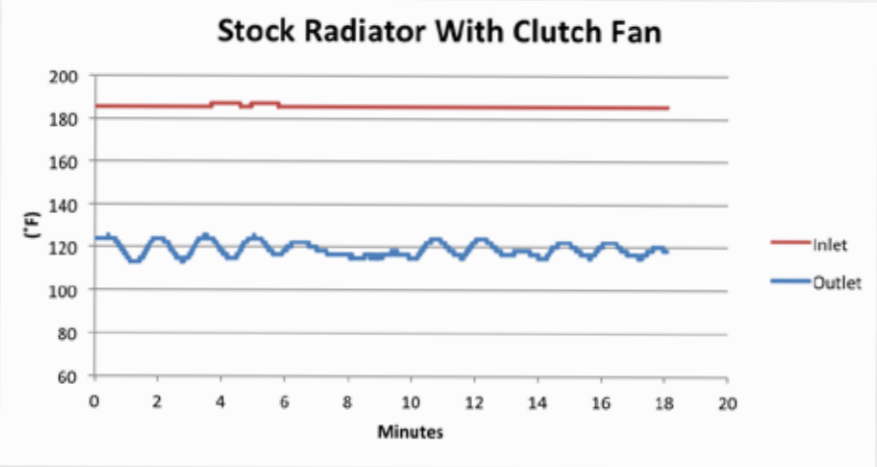

Figure 5: Baseline testing shows that the stock system cools the outlet temperature down to about 115˚F on average.

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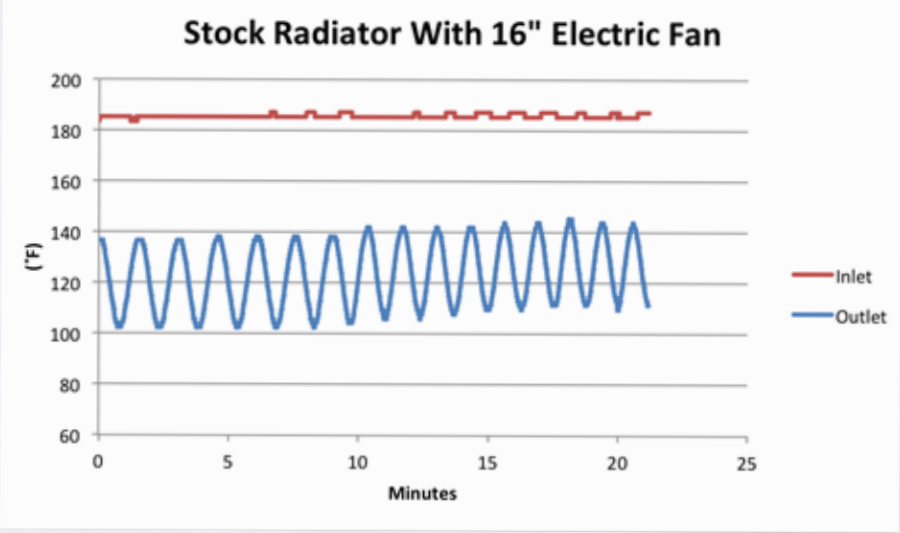

Figure 6: A stock radiator with a Mishimoto 16" fan shows outlet temperatures down to about 105˚F on average. The fan controller is set at about 140˚F activation temperature.

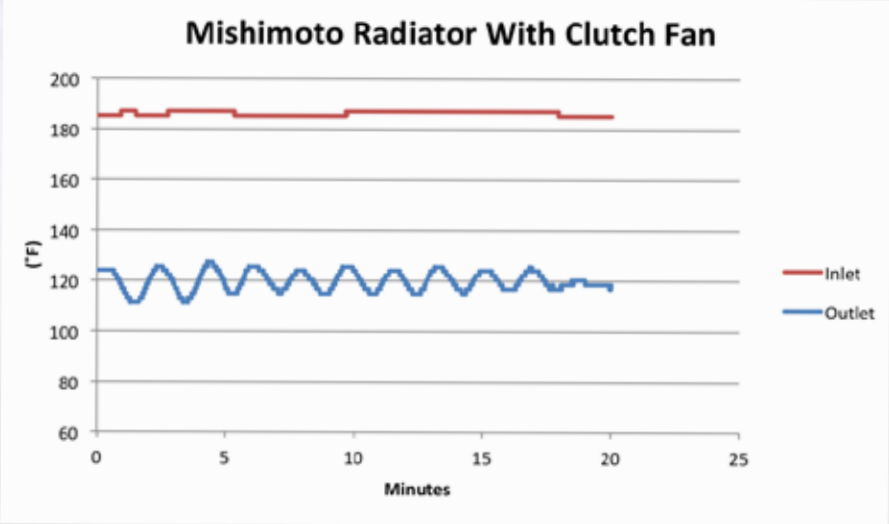

Figure 7: The radiator outlet temperature of the clutch fan cools down to approximately 115˚F on average.

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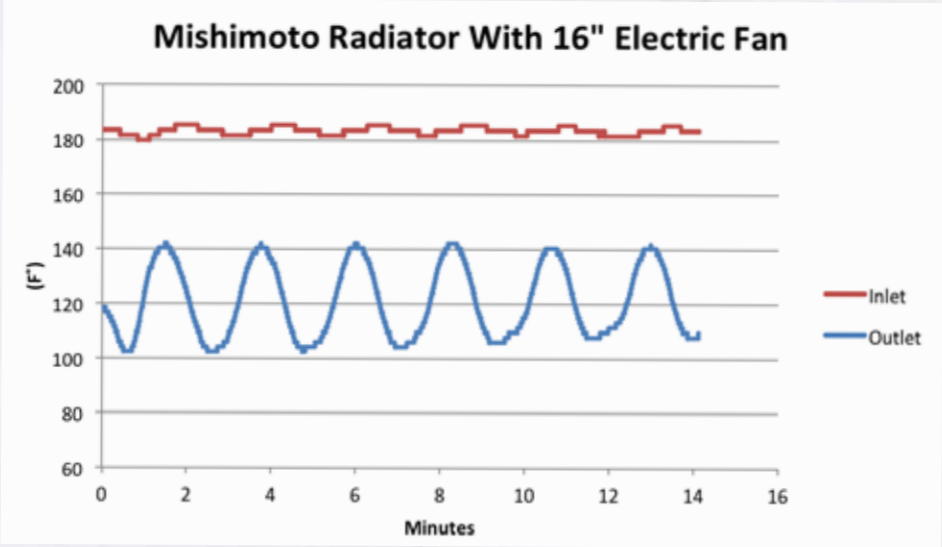

Figure 8: the Mishimoto 16" fan cools the fluid all the way down to approximately 105˚F.

Fan Idle Test Results:

The E46 did not overheat in any of the tests we conducted. Despite not having a shroud, the 16" electric fan lowered the E46 radiator temperature more than the stock fan in both scenarios. Figure 9 below shows the rate of cooling of the Mishimoto radiator with a 16" electric fan compared to the stock radiator with a clutch fan. You can see that the Mishimoto setup (in blue) cools to a lower temperature. Also, the slope shows that the rate of cooling is much faster with the Mishimoto unit. This is what we wanted to see.

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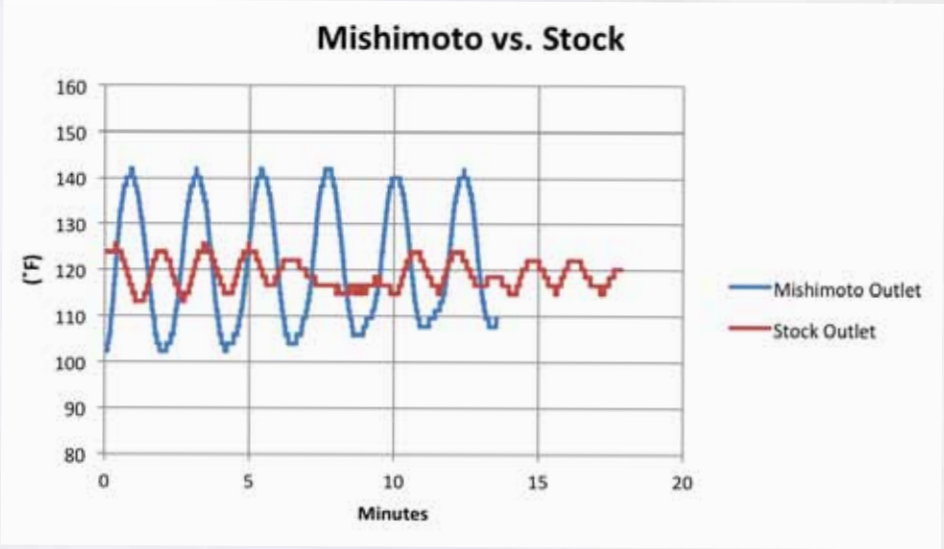

Figure 9: The Mishimoto 16" electric fan shows more efficient cooling than the stock setup.

Dyno Testing:

The purpose of this test was to determine if replacing the stock clutch fan with the Mishimoto 16" electric fan would free up any power due to a loss in rotating mass of the stock fan. To test this we strapped the car to the dyno and made about 3-4 pulls or until we had three consistent runs. Then we removed the stock clutch fan and installed the Mishimoto fan. The graph in Figure 10 represents the average power gains for the three consecutive runs of each fan set-up.

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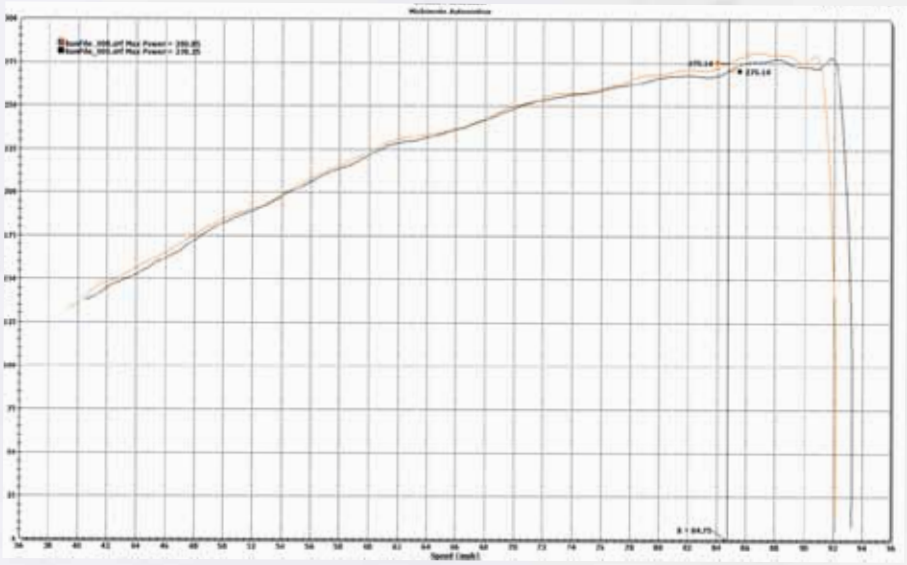

Figure 10: The dyno report shows that the Mishimoto setup (in orange) had gains of up to 5 whp.

Dyno Test Results:

The results were fairly consistent. By replacing the stock clutch fan with the Mishimoto fan, the M3 gained a slight amount of power. Across the board you can expect a gain of about 1% or 2–3 whp by replacing the stock fan. The top end of the range had the largest peak gains, which were about 5 whp in the 6500–7500 rpm range.

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Conclusion:

At idle temperatures, the 16" electric fan will keep your E46 M3 running cooler than the stock clutch fan. Removing the clutch fan will free up a small amount of power, because less rotating mass is connected to the motor. The electric fan conversion also frees up some space in the engine bay, providing more room for other modifications. The Mishimoto 16" electric fan is also offered as a direct-fit kit, which includes all the parts you will need to install the fan yourself.

Kevin McCardle
Product Engineer

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