1992-1999 BMW E36 X-Line Radiator

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MISHIMOTO ENGINEERING REPORT

Testing the Mishimoto 1992-1999 BMW E36 X-Line Radiator

Test Vehicle:
1996 BMW M3

Objective:
To make a performance radiator that is a direct fit into the 1992-1999 BMW E36

Testing conditions:
Temperature range: 74°F -78°F (23°C-26°C)

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Apparatus:

For hardware Mishimoto choose to use PLX sensor modules driven by the Kiwi WiFi plus IMFD. This is a wireless system from the sensor modules to the iPad or Laptop computer. The software used was the Palmer Performance Scan XL pro, which has full data logging capabilities.

Figure 1: Fluid temperatures were taken from the inlet and outlet of both radiators using Mishimoto inline water temperature sensor adapters and PLX fluid temperature sensors. (Inlet sensor location is shown above.)

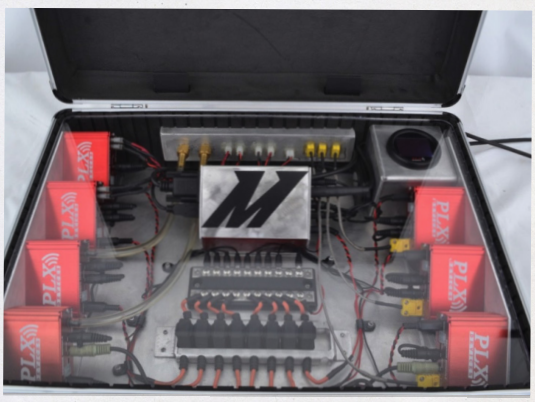

Figure 2: PLX devices in portable case used for testing Mishimoto products

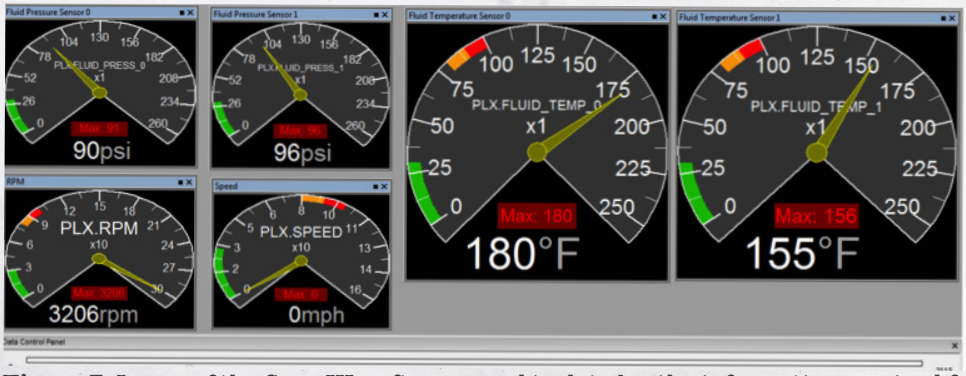

Figure 3: Image of the Scan XL software used to data log the information received from the PLX devices

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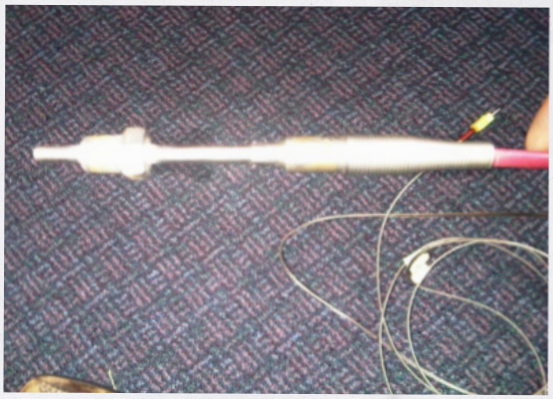

Figure 4: A thermocouple was mounted in the grille of the M3 to measure the temperature of the air as it entered the system. (Above image is of the K-type thermocouple used for measuring air temperatures.)

Experiment:

The test compares the temperatures of the stock radiator and the Mishimoto radiator. To conduct the test we drove the car on a highway at 65 mph (engine rpm ranged from 2500 to 3000), and we cruised for approximately six miles. Special attention was given to the space between the E36 and the vehicle in front of it to ensure that an unobstructed wall of air entered the E36 radiator. This experiment is 100% repeatable when the test is conducted under similar weather conditions.

Special Notes: Water with no antifreeze was used in both tests because the water would be drained after testing. The stock thermostat, which opens at 190°F (88°C), was used during this test.

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Product notes

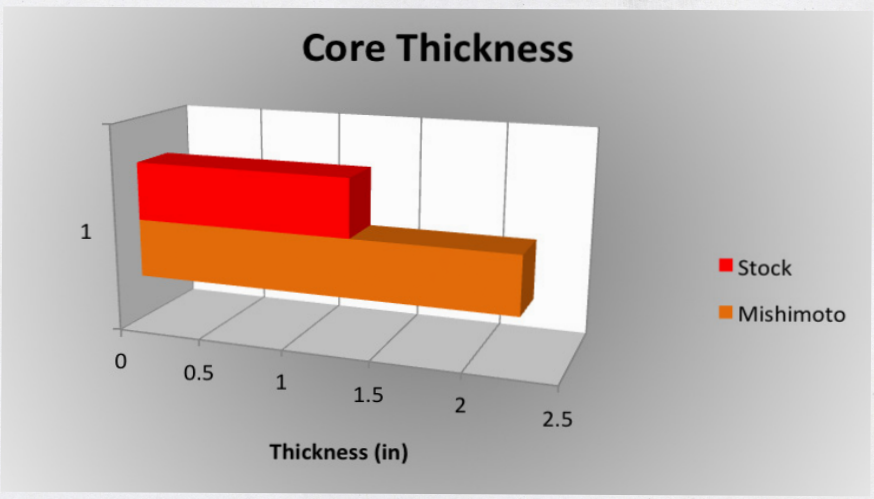

Figure 5: The stock radiator is 1.29 inches thick, whereas the Mishimoto radiator is 2.24 inches thick, an increase over stock of 73%.

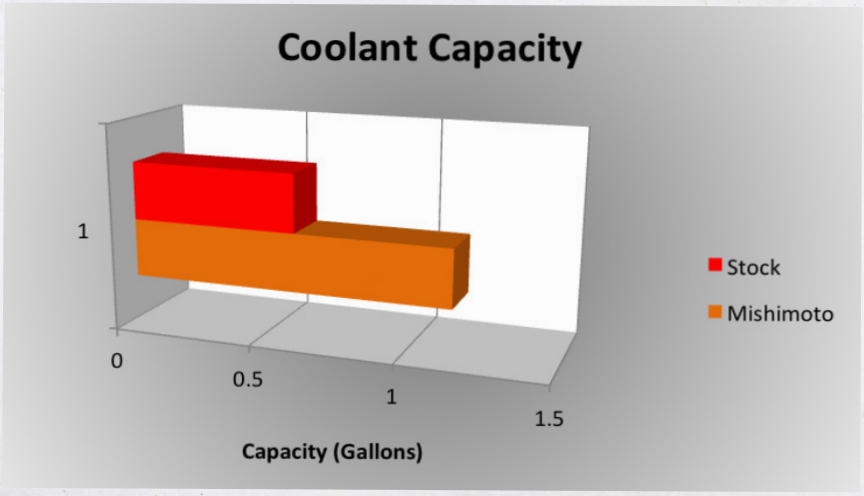

Figure 6: The stock M3 radiator holds 0.60 gal (2.27 L) of coolant, whereas the Mishimoto radiator holds 1.15 gal (4.35 L) of coolant, an increase over stock of 91%.

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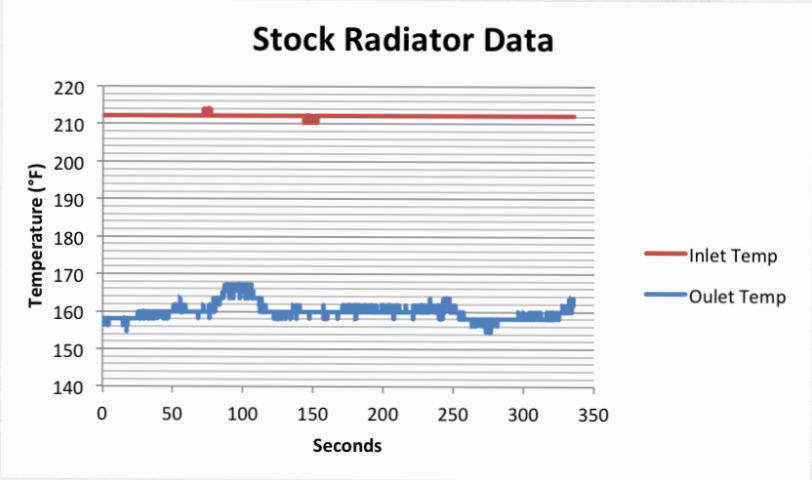

Figure 7: Highway test of stock radiator

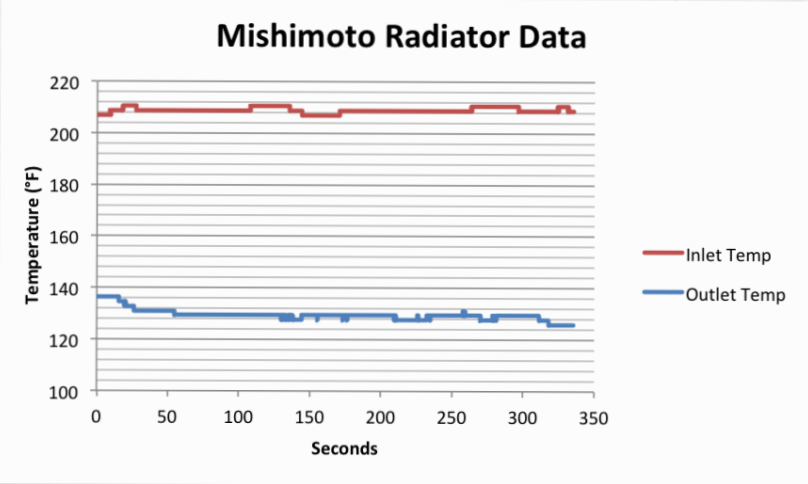

Figure 8: Highway test of stock radiator

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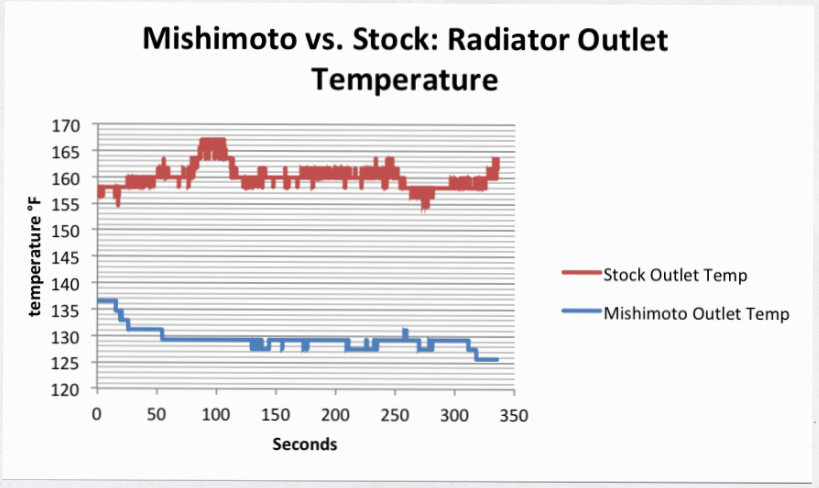

Figure 9: Comparison of radiator outlet temperatures measured from the stock and Mishimoto radiators. On average, the Mishimoto radiator outlet temperature was 30°F (16.7˚C) less than the stock radiator outlet temperature.

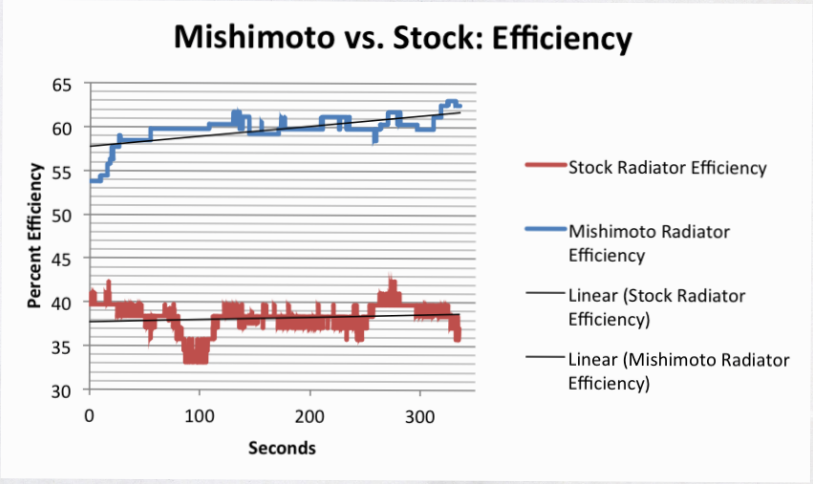

Figure 10:Comparison of efficiency between the stock and Mishimoto radiators. Notice that the Mishimoto radiator on average is aproximately 20% more efficient than the stock radiator. This proves that the Mishimoto radiator has a higher capacity to keep the M3 running cooler.

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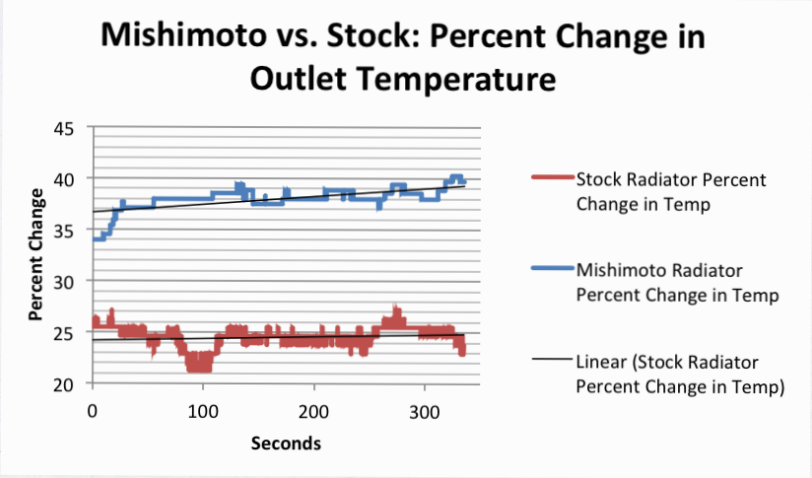

Figure 11: The chart above is a comparison of percent change in the outlet temperatures of the stock and Mishimoto radiators. The Mishimoto radiator has a 13% greater change in temperature than the stock radiator.

Overall Conclusions:

From the data above we have concluded that the Mishimoto radiator is significantly more efficient than the stock radiator. The Mishimoto radiator has a 91% increase in coolant capacity over the stock radiator and decreases the coolant temperature exiting the radiator by 30°F (16.7°C). This increase in cooling efficiency makes the Mishimoto radiator an ideal upgrade for modified or track use vehicles that require additional cooling under harsh driving conditions.

Daniel Tafe
Product Engineer

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