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**MISHIMOTO ENGINEERING REPORT**

Subject: Subaru WRX Front-Mount Intercooler Kit

**TEST VEHICLE: 2015 SUBARU WRX**

Test Vehicle Modifications: Mishimoto Performance Air Intake, Mishimoto Catted Downpipe, Mishimoto Stage 2 tune.



**Figure 1: Test vehicle**

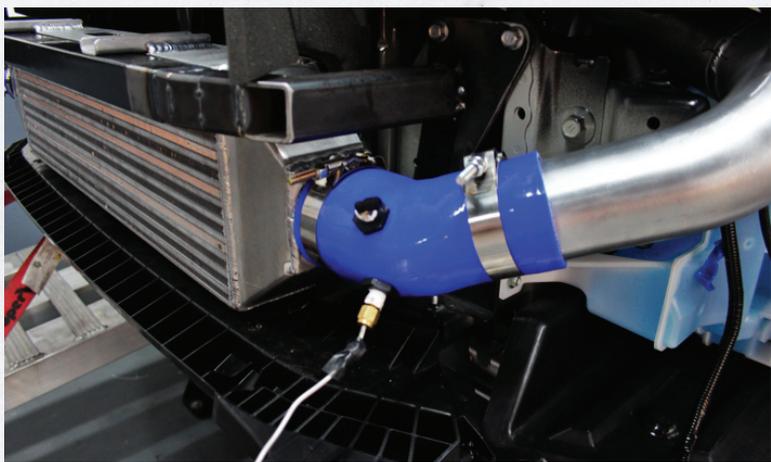
**Testing Conditions:** Temperature range 68° F-70° F (20° C-21° C) and 40% humidity

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**Apparatus:** For temperature and pressure 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. Inlet temperature sensors were installed in the intercooler coupler just before entering the intercooler (Figure 2). Outlet temperature sensors were installed in the intercooler coupler at the outlet of the intercooler (Figure 3).



**Figure 2: Mounting location for outlet temperature sensor, which reads approximately 10 times per second.**

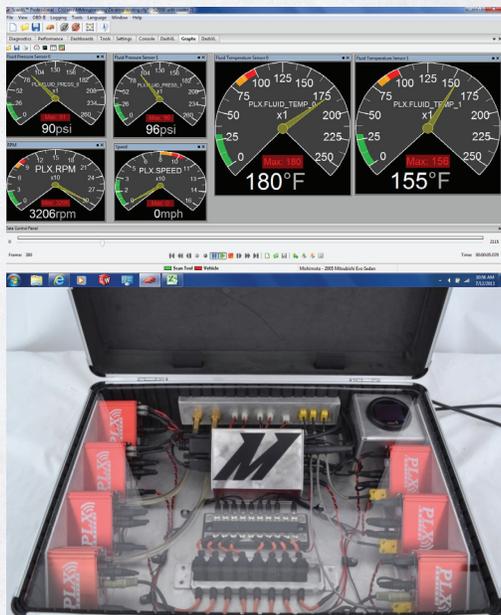


**Figure 3: Mounting location for Inlet temperature sensor, which reads approximately 10 times per second.**

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**Figure 4: PLX sensor modules were used to monitor engine pyrometers.**

**Background**

The Subaru WRX and STI are famous for their top-mount intercooler (TMIC) setups. TMIC setups are adequate for stock engines, but for more extreme engine modifications, the TMIC and even the aftermarket TMIC cannot support the horsepower that some drivers want to achieve. Mishimoto recommends an aftermarket TMIC for vehicles up to about 300-450 whp. Above 450 whp, Mishimoto recommends upgrading to a front-mount intercooler (FMIC). The increased size and the location of an FMIC in the front of the vehicle allow for a greater amount of airflow. Figures 5-7 below show comparisons between the stock TMIC, Mishimoto TMIC, and Mishimoto FMIC.

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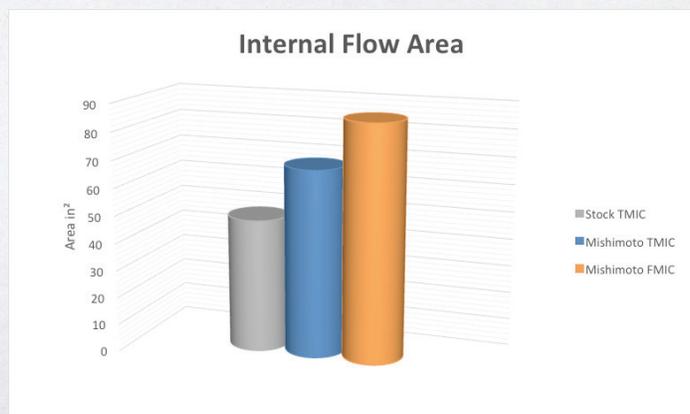
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## Development

This FMIC kit was developed on both a 2015 WRX with 6-speed transmission and a 2015 WRX with CVT (automatic) transmission, so we could be sure that the kit would fit both transmissions properly. A key design constraint when we set out to develop the FMIC for the 2015 WRX was that absolutely no cutting or trimming of any stock parts would be necessary. With careful thought and placement of the components that comprise the FMIC kit, we were able to meet this constraint and create an FMIC kit that requires no permanent modification to any parts of the 2015 WRX. Much of this is possible due to the design of the crash bar. As seen in Figures 2 and 3 above, the crash bar is placed in front of the intercooler instead of the more traditional way of mounting the crash bar behind the intercooler. This design places the crash bar above the lower grille opening behind the bumper, and allows the intercooler to be placed further back toward the radiator support.

Another great feature of the Mishimoto 2015 WRX FMIC is that it is compatible with the Mishimoto Baffled Oil Catch Can System. For WRXs that already have that system installed, a simple relocation of the driver-side can (CCV side) is required and is completed using all the existing components from the Mishimoto Baffled Oil Catch Can kit.



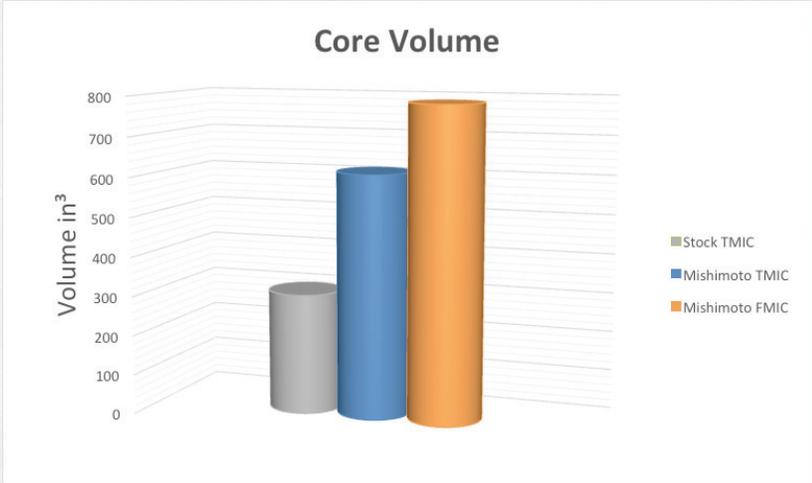
**Figure 5: Mishimoto FMIC shows a 77% increase in internal flow area over stock.**

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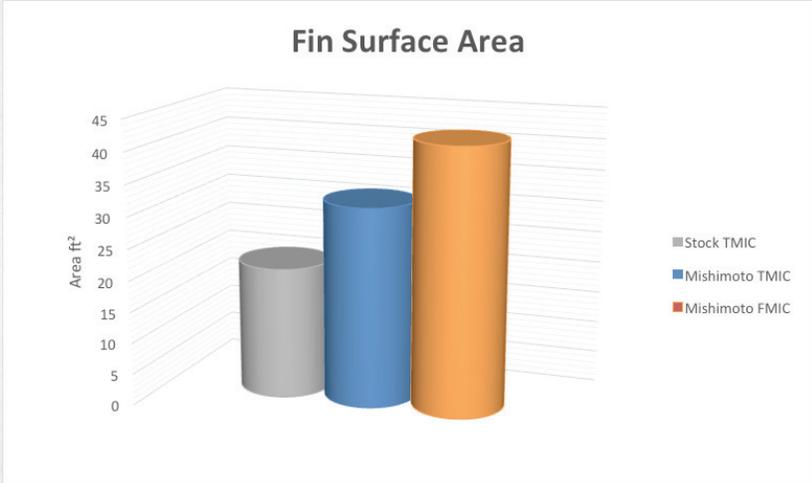
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**Figure 6: Mishimoto FMIC shows a 158% increase in core volume over stock.**



**Figure 7: Mishimoto FMIC shows a 101% increase in fin surface area over stock.**

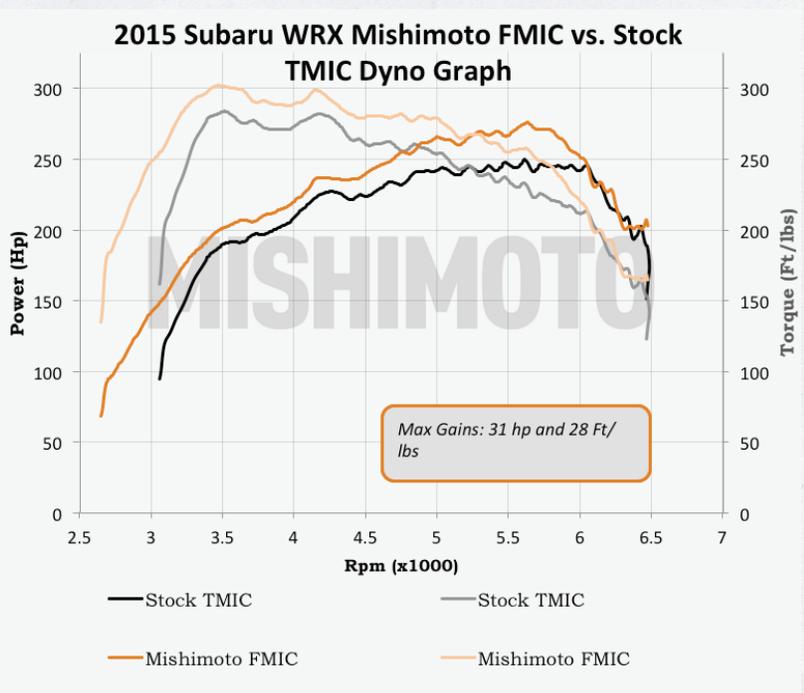
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**Dyno Testing:**

To test the efficiency of the Mishimoto FMIC, the car was strapped to the dynamometer, and temperature reductions were recorded. The car was run at least three times or until we had an average of three consistent dyno plots. The WRX was equipped with a Stage 2 package: Mishimoto Performance Air Intake, Mishimoto Catted Downpipe, Mishimoto Stage 2 tune, and stock TMIC. The WRX was then run with the Mishimoto FMIC kit. The averages of the two plots are represented below in Figures 8-10.

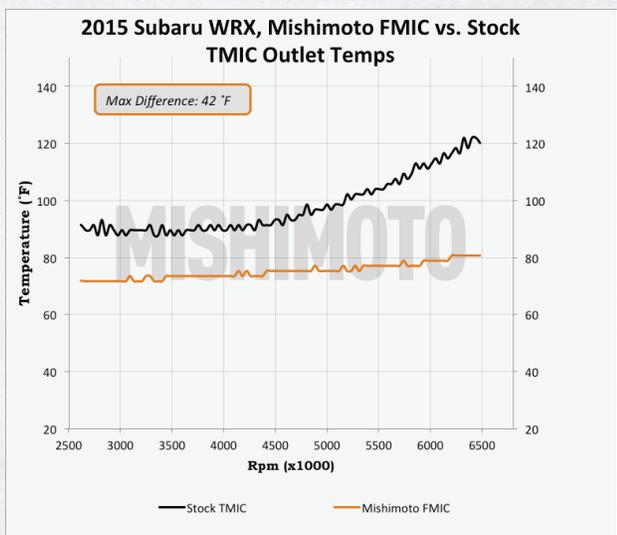


**Figure 8: Stage 2 WRX with Mishimoto FMIC shown in orange. Stage 2 WRX with stock TMIC shown in black. Mishimoto FMIC gained more than 18-22 wtq and 15-25 whp on average throughout the run.**

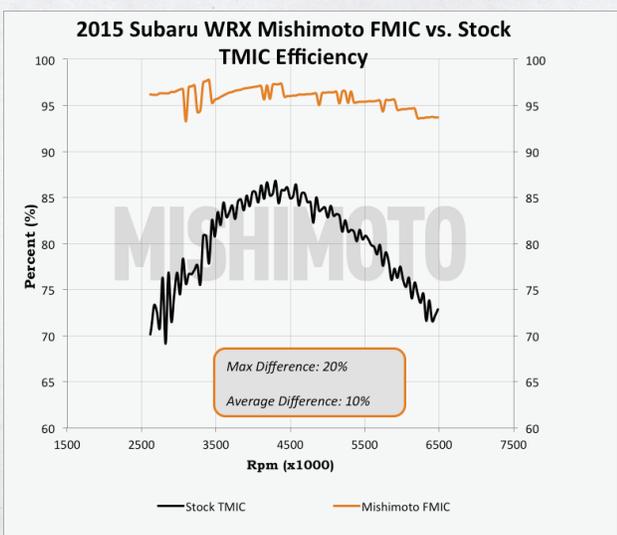
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**Figure 9: Mishimoto FMIC showed a 42° F (23.5°C) temperature drop towards the end of the run compared to the stock TMIC.**



**Figure 10: Mishimoto FMIC shows an average of 80% efficiency on 19 psi tune.**

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**Conclusion**

The Mishimoto Front-Mount Intercooler is designed for modified Subaru WRXs and can support up to 600 whp. Operating at the higher boost levels of the Mishimoto Stage 2 tune, the Mishimoto FMIC achieved 97% efficiency, which is 20% more than the stock TMIC achieved. The Mishimoto FMIC can keep AITs low, so tuners can provide the most aggressive timing while keeping the car safe and free of knock. The Mishimoto Front-Mount Intercooler Kit comes with new intercooler piping and all necessary hardware to make installation as easy as possible.

**Daniel Tafe**  
**Product Engineer**

Subaru WRX Front-Mount Intercooler Kit

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