Olson-EcoLogic
Engine Testing Laboratories, LLC

Fuel Economy Comparison
TEST REPORT

With
Kia and Hyundai Automobiles

When Tested Over the CARB Approved
AMA Road Test Cycle

For:
SaviCorp
2530 South Birch Street
Santa Ana, CA 92707

February, 2015

Conducted by
Olson-Ecologic Engine Testing Laboratories
Fullerton, CA

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Introduction

This report provides fuel economy data from relatively new automobiles when being driven over a California Air Resources Board approved driving route. Initial fuel economy data is measured over the CARB route as baseline data with the vehicle in OEM condition. The same route, vehicle and driver repeats the drive cycle with the SaviCorp dynovalve installed and operating to measure the fuel economy and compare the measured improvement in fuel economy.

The EPA evaluation of fuel economy over a specified road route used to be identified as the "511 Program." This referred to EPA's testing program as a consentual test to measure fuel economy of automobiles under section 511 of the Motor Vehicle Information and Cost Savings Act. That authority and test protocol was recodified and testing is now done by road testing as described in this test report, plus the use of indoor laboratory chassis dynamometers.

Automobiles Tested

The two automobiles tested in this project are as follows:

Vehicle Make	Kia	Hyundai
Vehicle Model	Rio	Elantra
Model Year	2014	2014
Engine Size	1.6L	1.8L
EPA Fuel Economy MPG		
City	27	28
Highway	37	38
Combined	31	32

Driving Protocol

All driving and precise fuel addition was done by experienced Olson-EcoLogic Engine Testing (OE) technicians. The driving route and average performance conditions, plus the actual road map followed for all testing, is shown in the Appendix.

This driving route is California Air Resources Board approved and accepted by AMA. The test vehicles were first operated over the driving route with a full fuel tank as a baseline measurement with all original automotive equipment operating in a normal

manner. After the cycle was completed the fuel tank was precisely filled and recorded to determine the miles per gallon used for baseline comparison.

The SaviCorp DynoValve system was then energized and the vehicles were driven over the same route by the same drivers and returned to the same gasoline pump to accurately measure the fuel used to calculate the miles per gallon while the DynoValve system was operating. The difference between the baseline operation and identical operation with the DynoValve system was calculated and is shownn in the following Figures 1 and 2 for the two vehicles:

Test Results

Figure 1. Kia Automobile

DynoValve Fuel Economy Report

Vehicle Make	Kia
Vehicle Model	Rio
Model Year	2014
Engine Size	1.6L
Tank Size	11.4

U.S. Environmental Protection Agency Fuel Economy Averages

City	Hwy.	Combined
27	37	31

OEM Run Average

	Miles	**KM**
FINISH	12385 miles	19940 KM
- START	- 12333 miles	19856 KM
= Distance Driven	= 52 miles	83.67 KM
+ Fuel Used	÷ 1.544 gal	5.844 Liter
= Fuel Economy	= 33.68 MPG	6.98 L/100 K

Operating with DynoValve 108-1-250 1 min / 5 sec

	Miles	**KM**
FINISH	12333 miles	19856 KM
- START	- 12281 miles	19772 KM
= Distance Driven	= 52 miles	83.67 KM
+ Fuel Used	÷ 1.204 gal	4.557 Liter
= Fuel Economy	= 43.19 MPG	5.45 L/100 K

Improvement in Fuel Economy	**28.2%**

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Test Results

Figure 2. Hyundai Automobile

DynoValve Fuel Economy Report

Vehicle Make	Hyundai
Vehicle Model	Elantra
Model Year	2014
Engine Size	1.8L
Tank Size	12.8

U.S. Environmental Protection Agency Fuel Economy Averages

City	Hwy.	Combined
28	38	32

OEM Run Average

	Miles	**KM**
FINISH	22306.5 miles	35913 KM
- START	- 22255.6 miles	35832 KM
= Distance Driven	= 50.9 miles	81.90 KM
+ Fuel Used	÷ 1.459 gal	5.522 Liter
= Fuel Economy	= 34.886 MPG	6.74 L/100 K

Operating with DynoValve 108-1-250 1 min / 5 sec

	Miles	**KM**
FINISH	22255.6 miles	35832 KM
- START	- 22203.8 miles	35748 KM
= Distance Driven	= 51.8 miles	83.35 KM
+ Fuel Used	÷ 1.254 gal	4.746 Liter
= Fuel Economy	= 41.307 MPG	5.65 L/100 K

Improvement in Fuel Economy	**18.4%**

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Appendix

ARB Approved Test Drive Route

ARB Approved
Test Drive Route

Mileage Accumulation Report

Test Procedure-Mileage Accumulation (AMA Route)

1. All mileage was accumulated on the public roads in the Orange County California area. The basic mileage accumulation route shown in Fig.1 attached was used with modifications as necessary to satisfy the test requirements

2. Data for the driving schedule:

Average speed of cycle; 29.2 MPH
Total mileage of cycle; 53.7 miles

Driving Mode	Approximate events per mile
Stops	.74
Normal acceleration from stop	.71
Normal Acceleration from 20 MPH	1.32
Wide Open throttle accelleration and fast decelleration	.11
Idle Time	15.21

Speed MPH	% of total miles
30 MPH	6%
35 MPH	9%
40 MPH	9%
45 MPH	20%
50 MPH	3.3%
55-60 MPH	35.2%

Variable acceleration & deceleration: 17.5%

Total: 100%

ARB Approved
Test Drive Route

Mileage Accumulation Report

3. Route Description

Start Point: SaviCorp
2530 South Birch Street
Santa Ana, CA 92707

1. Exit parking lot on Central, go to stop sign at Main St.
2. Turn right on Main & drive west to MacArthur
3. Turn left on MacArthur and drive east on the ramp on Highway 55 south, meeting stop light
4. Drive south on Highway 55 to the end of Highway 55, where it turns into Newport Blvd. southbound, stop light
5. Proceed southbound on Newport Blvd. to off ramp or Pacific Coast Highway, stop light
6. Turn left onto Pacific Coast Highway and drive south to Camino de Las Ramblas
7. Enter the northbound on ramp for Interstate 5, metering light
8. Proceed north on Interstate 5 to the transition ramp to Interstate 405 north
9. Proceed north on Interstate 405 to the MacArthur Blvd off ramp, stop light
10. Turn right onto MacArthur Blvd. and drive west to Main Street, stop light
11. Turn right on Main Street and drive north to Central Avenue
12. Turn right on Central Street and drive to SaviCorp parking lot end of mileage loop

Finish Point: SaviCorp
2530 South Birch Street
Santa Ana, CA 92707

Speed Limits: Freeways - 65 MPH
City Streets - 25 to 50 MPH

Road Type: Freeway - 25.7
City Street - 28 miles
Total: 53.7 miles

Stops: Stop Lights.....76
Stop Signs.....1
Railroad crossings.....0
Possible stops.....79
Planned stops.....28

4. The method of recording or certifying the mileage accumulation is that each driver writes the odometer reading, fuel used and other applicable data on the accumulation record sheet.

5. Note that since the mileage accumulation was performed on the public streets, the drivers was instructed to follow normal traffic patterns and flow, observing all speed limits and the maximum seed of 55 MPH. Drivers maintained accumulation record sheets and made entries at the begining, at designated “check points”, and the end of the course.

ARB Approved
Test Drive Route

Mileage Accumulation Report