



**Test Method SAE J1321  
2005 Toyota Corolla**

**Test Date: October 25, 2006**

**Report Date: November 22, 2006**

**MGA Reference Number: C06V3-011.5**

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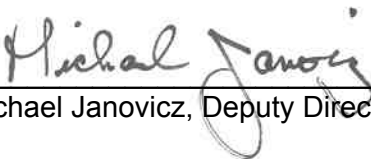
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**SIGNATURE APPROVAL PAGE**

Test Procedure: SAE J1321 Fuel Mileage Test Checklist  
dated December 13, 2005

Total Pages: 21

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The results presented in this report relate only to the specified test items.

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**SECTION 1**  
**TEST SUMMARY AND RESULTS**

This report documents the results of fuel mileage testing per SAE J1321. These tests were conducted in order to determine if the installation of certain aftermarket components would yield a gain in fuel economy. The tests were conducted on the oval track of MGA's Wisconsin Proving Grounds.

Testing consisted of a baseline vehicle configuration (factory OEM) mileage test followed by a modified vehicle configuration (aftermarket parts installed). The test produced a 2.4 mile per gallon increase between the baseline and modified configurations.

	<b>Baseline Configuration</b>	<b>Modified Configuration</b>	<b>Difference</b>	<b>% Difference</b>
<b>Mileage [miles]</b>	42.1	42.1	0	0.00%
<b>Time [h:m:s]</b>	1:03:37	1:03:35	-0:00:02	0.05%
<b>Average Speed [mph]</b>	39.71	39.73	0.02	0.05%
<b>Fuel Mass Used [lbs]</b>	6.396	6.038	-0.358	-5.60%
<b>Fuel Economy [mpg]</b>	40.15	42.53	2.38	5.93%

\*Note: SAE J1321 specifies total test time is to be within 18 seconds between any two runs. The repeatability of the two runs is therefore within the acceptable limit of this standard.

Note: MGA Research does not certify or endorse products. The manufacturer name and/or component name appear only to identify the tested item(s).

**SECTION 2**  
**VEHICLE DESCRIPTION**

**Vehicle Information**

Year, Make, Model: 2005 Toyota Corolla  
VIN: 1NXBR32E55Z353449  
Date of Manufacture: 05/04  
Number of Passengers: 5  
Pre-Test Odometer Reading: 35,519 miles  
Post-Test Odometer Reading: 35,619 miles

**Engine**

Number of Cylinders: 4  
Displacement in Liters: 1.8 L  
Fuel Type: Gasoline  
Engine Placement: ( ) Longitudinal or (X) Transverse  
Location of Engine in Vehicle: (X) Front ( ) Middle ( ) Rear

**Transmission**

Type: ( ) Manual or (X) Automatic  
Number of Gears: ( ) 1 ( ) 2 ( ) 3 (X) 4 ( ) 5 ( ) 6 ( ) Other:  
Overdrive: (X) Yes or ( ) No  
Final Drive: (X) Front ( ) Rear ( ) 4-Wheel

If automatic transmission, can transmission be manually held in gear? (X) Yes ( ) No  
(i.e., there are no gear shifts when vehicle transmission is in lowest gear)

**Weight (From Tire Placard)**

GAWR Front Axle: 1885 lbs  
GAWR Rear Axle: 1720 lbs  
GVWR: 3585 lbs

Fill all vehicle fluids to maximum: (X) Yes ( ) No

Add fuel to the capacity of the fuel tank: ( ) Yes, amount of fuel added: \_\_\_\_\_

**Unloaded Delivered Weight**

Left Front:	<u>805 lbs</u>			
Right Front:	<u>785 lbs</u>	Total Front:	<u>1590 lbs</u>	
Left Rear:	<u>500 lbs</u>			
Right Rear:	<u>474 lbs</u>	Total Rear:	<u>974 lbs</u>	Total: <u>2564 lbs</u>

**Test Weight (includes driver)**

Left Front:	<u>870 lbs</u>			
Right Front:	<u>818 lbs</u>	Total Front:	<u>1688 lbs</u>	
Left Rear:	<u>573 lbs</u>			
Right Rear:	<u>512 lbs</u>	Total Rear:	<u>1085 lbs</u>	Total: <u>2773 lbs</u>

**Tires (From Tire Placard)**

Recommended Tire Size

Front: P205/60R16

Rear: P205/60R16

Tire Pressure at Capacity

Front: 32 psi

Rear: 32 psi

**Tires (Physically on Vehicle)**

Tire Size

Front: P205/55R16

Rear: P205/55R16

Manufacturer

Front: Michelin

Rear: Michelin

Test Pressure

Front: 44 psi

Rear: 44 psi

## **Vehicle Modifications**

Note any interior or exterior vehicle modifications that may affect the test results:

**Baseline Configuration:** Original Equipment, Spare Tire, Rear Seat Cushion, and Accessories removed for testing.

**Modified Configuration:** Added Moletech devices per instructions found in product packaging. Devices were installed in 3 locations: Two were placed inside the fuel tank, one was placed behind the air cleaner, and one was placed next to an engine coolant line. Spare Tire, Rear Seat Cushion, and Accessories removed for testing.

## **Portable Fuel System**

**Tank:** Jaz 250-0008-01 8 Gallon Tank

**Pump:** Aeromotive 11106 External Pump, AN-8 inlet and AN-6 outlet

**Regulator\*:** AEM 25-302R Adjustable Fuel Pressure Regulator

**Fuel Pressure Gage:** SPAN LFC210-160-PSI-G Gage

**Lines:** AN-6 Lines, 20 ft total length between the feed and return line fed into the steel OE lines.

\*For all testing the fuel pressure was adjusted to 48 psi with the engine idling. The manufacturer's recommendation is for the fuel pressure to be between 44 and 50 psi.

### **SECTION 3**

#### **TEST PROCEDURE / TEST PLAN**

This procedure is to be used for determining in-service fuel consumption data to be used on a comparative basis. This procedure references SAE J1321.

#### **Test Route:**

A test route of at least 40 miles should be chosen such that it is repeatable and uninterrupted. Tests are to be conducted on the oval track to ensure repeatability.

#### **Fuel Measurement:**

An in-vehicle portable fuel tank shall be used to fuel the vehicle during the test. A calibrated scale shall be used to measure the mass of the fuel in the tank before and after the test. The scale shall be located either in the vehicle or at the start and stop point of the test route.

#### **Speed Measurement:**

The vehicle's odometer reading should be recorded before and after each run. Additionally, the same lane shall be maintained, and laps counted, for the entire test route such that the mileage can be correlated to the geometry of the course, if necessary. The test mileage divided by the total test time will be used to determine average speed. The test times are not to deviate by more than 18s, per SAE J1321.

#### **Test Execution:**

The driver shall accelerate and brake smoothly, using the same visual reference points when possible. Unless otherwise noted, an automatic transmission shall be placed in the highest gear selection at all times. If vehicle has the capability to drive more than two wheels, the vehicle should be locked into two-wheel drive if possible. If a manual transmission is used, each gear position used during steady state speeds will be noted. The cruise control shall be used to maintain steady-state speeds when possible. Tests will be conducted in the clockwise direction on the oval track, maintaining the same lane throughout testing.



## Test Procedure:

1. Verify the operation of the portable fuel system by taking a short test run
2. Fill the portable tank to a safe capacity.
3. Idle engine with transmission in neutral at 4000 rpm for 5 minutes.
4. Drive the vehicle for 1/2 hour prior to each test to ensure that all fluids and components are adequately warmed up. Refill the fuel tank as necessary, being sure to exclude the time taken for fueling from the warm-up time.
5. Refill the portable tank to a safe capacity.
6. Drive the vehicle to the test start point on the oval track.
7. Weigh the mass of the tank, keeping sure to remove any tension from the fuel lines.
8. Record the vehicle odometer and startup any data systems.
9. Record the time of day, wind velocity, humidity, and barometric pressure
10. Let the engine idle for 1 minute before proceeding on the test route.
11. Proceed to follow the test route and test plan
12. After the vehicle has come to a complete stop, let the engine idle for 1 minute.
13. When testing is completed, record the mass of the tank in the same manner as above
14. Record all ambient conditions.
15. Comparative tests for multiple vehicle configurations should always be repeated with ambient conditions as close to the original test as possible.

## Test Plan

Circuit	Speed [mph]	Laps	Miles	Time [h:m:s]	Gear
Oval	0 (engine idle)	0	0	0:01:00	P
Oval	30	15	18	0:36:00	D
Oval	60	20	24	0:24:00	D
Oval	0 (engine idle)	0	0	0:01:00	P

**SECTION 4  
DATA SHEETS**

**Data Sheet (Baseline)**

Date:	10/25/06
Time:	4:40 p.m.
Test Driver:	Brian Roach
Test Recorder:	Donavan Haidinger
Temperature:	58.0° F
Relative Humidity:	34%
Barometric Pressure:	30.14 in. Hg
Wind Velocity:	2 mph
Wind Direction:	W
Notes:	30 min. warm-up
Vehicle Configuration:	Baseline Rear seat, spare tire removed

	Time	Odometer (miles)	Trip (miles)	Time (min)	# Laps	Fuel Mass ( lb)
Start	4:50 PM	35519	0	4:42:00	0	45.126
End	5:54 PM	35561	42.1	1:03:37	35	38.730
Difference	64 min.	42	42.1	1:03:37	35	6.396

Fuel Mass:	6.396 lb
Fuel Specific Gravity*:	6.1 gal/lb
Fuel Used:	1.04 gal
Distance Traveled:	42.1 miles
Miles per Gallon:	40.15 mpg

\*This is a reference value used for calculation only. This value was not measured.

Fuel Scale Used:	Setra Quick-Count – 2716
Calibration Date:	6/6/06

**SECTION 4...continued**  
**DATA SHEETS**

**Data Sheet (Modified)**

Date:	10/25/06
Time:	6:35 p.m.
Test Driver:	Brian Roach
Test Recorder:	Brian Roach/Donavan Haidinger
Temperature:	55° F
Relative Humidity:	61%
Barometric Pressure:	30.14 in. Hg
Wind Velocity:	0 mph
Wind Direction:	N/A
Notes:	30 min. warm-up
Vehicle Configuration:	Modified Rear seat, spare tire removed

	Time	Odometer (miles)	Trip (miles)	Time (min)	# Laps	Fuel Mass ( lb)
Start	6:44 p.m.	35577	0	0	0	47.834
End	7:47 p.m.	35619	42.1	1:03:35	35	41.796
Difference	63 min.	42	42.1	1:03:35	35	6.038

Fuel Mass:	6.038 lbs
Fuel Specific Gravity*:	6.1 gal/lb
Fuel Used:	.99 gal
Distance Traveled:	42.1 miles
Miles per Gallon:	42.53 mpg

\*This is a reference value used for calculation only. This value was not measured.

Fuel Scale Used:	Setra Quick-Count – 2716
Calibration Date:	6/6/06

**SECTION 5  
PHOTOGRAPHS**



**Left Front  $\frac{3}{4}$  View of Vehicle**



**Right Front  $\frac{3}{4}$  View of Vehicle**





**Left Rear  $\frac{3}{4}$  View of Vehicle**



**Right Rear  $\frac{3}{4}$  View of Vehicle**





**Vehicle at Start/Stop Point**



**Fuel Tank Being Weighed**

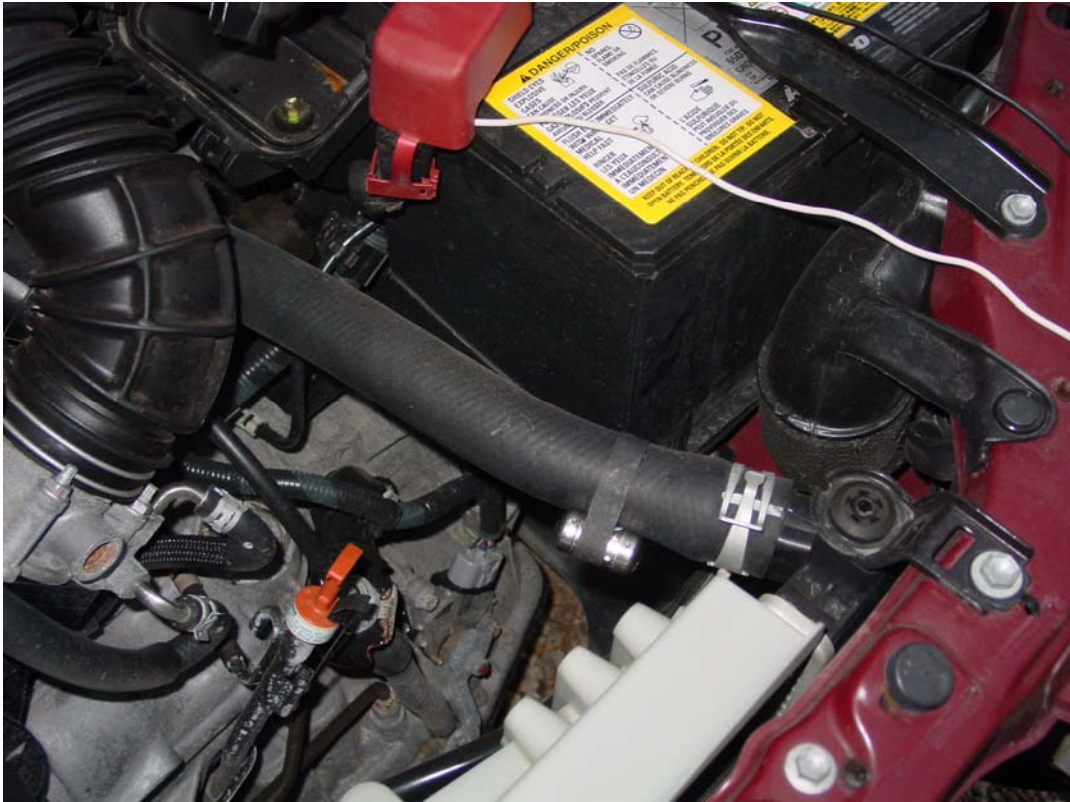




**Portable Fuel System Setup**



**Modification Component Installed in Fuel Tank**



**Modification Component Installed on Radiator Hose**



**Modification Component Installed on Air Filter**