



## Fuel Economy Comparison

Thomas Built bus with Cummins ISB  
IC bus with MaxxForce 7

August 3 – 7, 2009

A fuel economy test was conducted between a Thomas Built bus and a Navistar IC bus. It was determined at the onset that this test would be a vehicle MPG comparison versus an engine comparison only. In this manner, testing would be conducted of competitive products available in the school bus market.

The Thomas Built Saf-T-Liner C2 with Cummins ISB power and the Navistar IC bus CE series with Maxxforce 7 power were obtained from two school bus properties. The buses made available for testing are in-service buses and were tested without alteration of vehicle or engine specifications.

The intent of the testing was to understand if a fuel economy difference was measureable and from this standpoint SAE J1526, Type III test methodology was followed. Weigh tanks were used for each test segment and engine run times were closely monitored per SAE J1526 guidelines.

Two test routes were used:

- Test segments #1 and #2 used the same 77.5 mile Interstate and controlled access route to simulate transferring students to an activity in an adjacent school system.
- Test segments #3 and #4 used the same closed test track to simulate student pick-up and/or drop off. The closed test track was used in order to closely monitor traffic conditions and vehicle spacing, as well as test segment engine run time.

Below are the bus specifications, test segments, and short descriptive test segment route notes.

### Bus Specifications:

Thomas Built bus  
Engine: Cummins ISB  
Overall Length = 37 ft. 6 in.  
Wheelbase = 21 ft 6 in.  
Ground Clearance = 13.5 in.  
Mileage = 10536 miles  
Size = 72 Passenger  
Rating = 260 hp / 620 tq  
Tread Front = 16/32  
Tread Rear = 18/32  
Transmission = 2500  
Axle = 5.71

Navistar IC bus  
Engine: MaxxForce7  
Overall Length = 36 ft. 6 in.  
Wheelbase = 21 ft 6 in.  
Ground Clearance = 12.5 in.  
Mileage = 14913 miles  
Size = 66 Passenger  
Rating = 215 hp / 550 tq  
Tread Front = 15/32  
Tread Rear = 14/32  
Transmission = 2500  
Axle = 5.29

### **Summary of Test Segments #1 and #2:**

Test segments #1 and #2 used the same 77.5 mile Interstate and controlled access route to simulate transferring students to an activity in an adjacent school system.

**Test #1** Interstate route 77.5 miles

Thomas Built bus tank weight

start = 140.10  
end = 87.90  
fuel used = 52.20

IC bus tank weight

start = 138.05  
end = 72.95  
fuel used = 65.10

Thomas Built bus MPG = 10.54

IC bus MPG = 8.46

**Thomas Built bus fuel economy advantage = 19.8%**

**Test #1 segment notes:** Heavy rain and cross winds with severe weather warnings. Excessive idling with stop and go traffic for 27 minutes due to an accident at mile marker 82. Additional accident at mile marker north of scheduled turn around point led to another session of idling with stop and go traffic for 19 minutes. Lighter traffic patterns on south leg of route.

**Test #1 route map:** I-65 exit 64 north to exit 95. West to US 31, south to I-65 exit 76 then south to exit 64. See map below.

**Test #2** Interstate route 77.5 miles

Thomas Built bus tank weight

start = 135.35  
end = 88.90  
fuel used = 46.45

IC bus tank weight

start = 135.00  
end = 80.70  
fuel used = 54.30

Thomas Built bus MPG = 11.85

IC bus MPG = 10.13

**Thomas Built bus fuel economy advantage = 14.5%**

**Test #2 segment notes:** Overcast with light variable winds, light traffic. No additional stops due to accidents, etc. Same route as test segment #1. The Thomas Built bus did perform an active regeneration and the IC bus did not. This information was kept in anticipation of the IC bus eventually performing an active regeneration. This event (regeneration) did not take place.

**Assumption:**

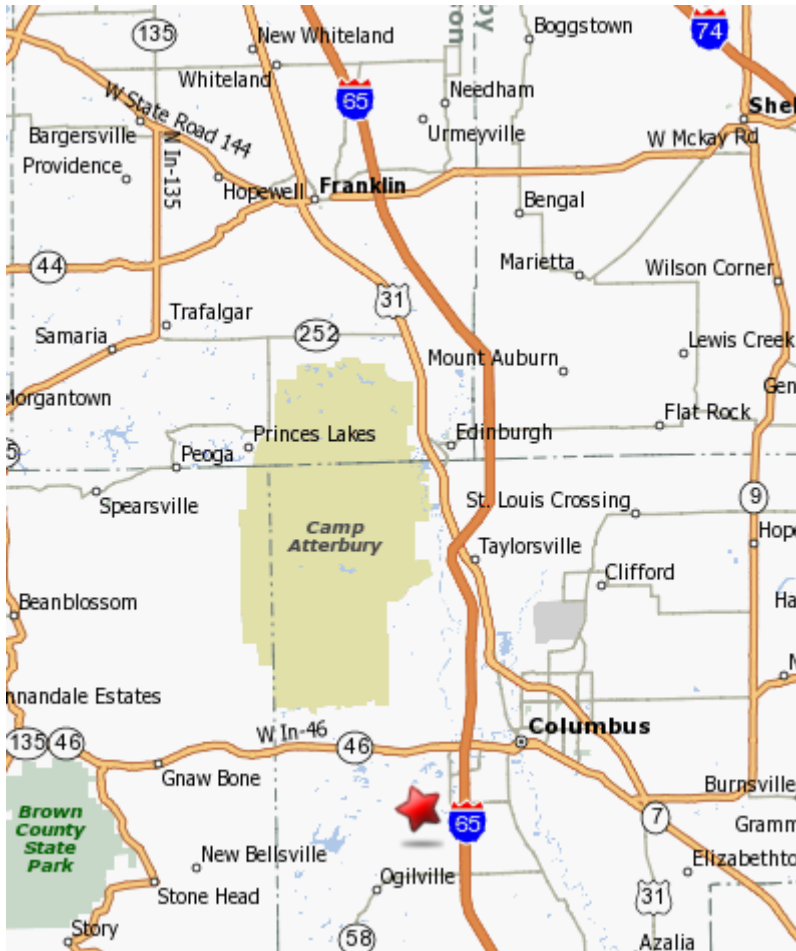
The ISB will use approximately 1 quart (1.77 lb) of fuel for an active regeneration. If this amount of fuel is added back to the amount used, the Thomas advantage becomes:

start = 135.35  
end = 88.90  
fuel used = 46.45  
Regen fuel = 1.77  
  
Fuel used = 44.6

**Thomas Built bus fuel economy advantage = 17.8%**

\* This assumption will account for a major portion of the lost fuel economy advantage compared to test segment #1.

**Interstate test route shown below:**



### **Summary of Test Segments #3 and #4:**

Test segments #3 and #4 used the same closed test track to simulate student pick-up and/or drop off. The closed test track was used in order to closely monitor traffic conditions and vehicle spacing, as well as test segment engine run time.

**Test #3** Pick up route 50.5 miles

Thomas Built bus tank weight

start = 135.75

end = 85.70

fuel used = 50.05

IC bus tank weight

start = 135.70

end = 75.35

fuel used = 60.35

Thomas Built bus MPG = 7.17

IC bus MPG = 5.94

**Thomas Built bus fuel economy advantage = 17.3%**

**Test #3 segment notes:** Stop and go route simulating student pick up ran at Cummins Inc. test track. See attached test track schematic. Sunny with light to variable winds.

**Test #4** Pick up route 50.5 miles

Thomas Built bus tank weight

start = 136.20

end = 87.30

fuel used = 48.90

IC bus tank weight

start = 136.00

end = 77.20

fuel used = 58.80

Thomas Built bus MPG = 7.34

IC bus MPG = 6.09

**Thomas Built bus fuel economy advantage = 17.1%**

**Test #4 segment notes:** Stop and go route simulating student pick up ran at Cummins Inc. test track.

## Closed Track routes:

- Closed test track
- 1 lap = 1.2 miles
  - Three stops per lap
  - Cones set up for each coast, brake and stop event
  - Timed laps for consistency

- Stop
- Brake
- Coast
- Maintain speed

