SAFETY COMPLIANCE TESTING FOR
FMVSS 124H
ACCELERATOR CONTROL SYSTEMS

FORD MOTOR CO.
2004 FORD FREESTAR, MPV
NHTSA NO. C40203

GENERAL TESTING LABORATORIES, INC.
1623 LEEDSTOWN ROAD
COLONIAL BEACH, VIRGINIA 22443

MAY 10, 2004
FINAL REPORT

PREPARED FOR

U. S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
400 SEVENTH STREET, SW
ROOM #115 (HV8-223)
WASHINGTON, D.C. 20590
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Prepared By: [Signature]

Approved By: [Signature]

Approval Date: 5/10/04

FINAL REPORT ACCEPTANCE BY OVSC:

Accepted By: [Signature]

Acceptance Date: 5/13/04
Compliance tests were conducted on the subject 2004 Ford Freestar MPV in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-124-06 for the determination of FMVSS 124 compliance.

Test failures identified were as follows: NONE
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SECTION 1
PURPOSE OF COMPLIANCE TEST

FMVSS 124 specifies requirements for the return of a vehicle's throttle to the idle position when the driver removes the actuating force from the accelerator control, or in the event of a severance or disconnection in the accelerator control system. The purpose of FMVSS 124 is to reduce deaths and injuries resulting from engine overspeed caused by malfunctions in the accelerator control system. This standard applies to passenger cars, multipurpose passenger vehicles (MPV's), trucks and buses.
SECTION 2
TEST PROCEDURES AND DISCUSSION OF RESULTS

Compliance testing was conducted on a 2004 Ford Freestar, MPV, NHTSA No. C40203 in accordance with the National Highway Traffic Safety Administration (NHTSA) Laboratory Procedure TP-124-08.

Output from the vehicle throttle position sensor on the air throttle plate shaft was used to measure throttle position and data was recorded at 1000 HZ with GTL's data acquisition system. Testing was conducted to simulate the normal removal of the driver's foot from the accelerator pedal. Testing was performed with the vehicle in park and the engine running. Return to idle times were determined for four throttle plate positions with the accelerator control system complete and with each of the two throttle return springs on the throttle plate shaft independently disconnected. The severed linkage test was also performed by disconnecting the throttle cable from the throttle body. As the air throttle plate was mechanically linked to the accelerator pedal, no electrical disconnections were required.

This testing was performed at high ambient temperature of 52° C (-5 +0) in accordance with the NHTSA Test Procedure TP-124-08.
SECTION 3
COMPLIANCE TEST DATA

Test data for this test can be found on the following pages. Photographs are found in Section 5 and Test Plots are found in Section 6.
VEHICLE DESCRIPTION

VEHICLE MY/MAKE/MODEL/BODY STYLE: 2004 FORD FREESTAR MPV

VEHICLE NHTSA NO.: C40203

VEHICLE VIN: 2FMZA50624BA08509

DATE OF TEST: APRIL 19, 2004

TEST LAB: GENERAL TESTING LABORATORIES

VEHICLE ENGINE TYPE: V6

GVWR: 2,567 KG

VEHICLE ENGINE SIZE: 3.9 L

MAX. BHP ENGINE SPEED: UNK

MFR. IDLE RPM: COMPUTER CONTROLLED (750)

FUEL METERING DEVICE (Carburetor, fuel injection, etc): FUEL INJECTION

REMARKS:

RECORDED BY: [Signature]

DATE: 04/19/04

APPROVED BY: [Signature]
DATA SHEET 2
NORMAL OPERATION TEST
(fully operational system)

VEHICLE MY/MAKE/MODEL/BODY STYLE: 2004 FORD FREESTAR, MPV
VEHICLE NHTSA NO.: C40203
DATE OF TEST: APRIL 19, 2004

Check one:

SYSTEM CONDITION: COMPLETE (no modifications) Normal Operation

<table>
<thead>
<tr>
<th>ACCELERATOR POSITION % WIDE OPEN THROTTLE (WOT)</th>
<th>THROTTLE POSITION SENSOR READING</th>
<th>RPM</th>
<th>TEMPERATURE (°F)</th>
<th>THROTTLE POSITION SENSOR READING @ IDLE (BASELINE)</th>
<th>RETURN TIME TO IDLE (Msec)</th>
<th>PASS/FAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>25%</td>
<td>25</td>
<td>4000</td>
<td>120</td>
<td>120.7</td>
<td>6.5%</td>
<td>14</td>
</tr>
<tr>
<td>50%</td>
<td>50</td>
<td>4000</td>
<td>140</td>
<td>120.8</td>
<td>6.5%</td>
<td>18</td>
</tr>
<tr>
<td>75%</td>
<td>75</td>
<td>4000</td>
<td>142</td>
<td>120.8</td>
<td>6.5%</td>
<td>38</td>
</tr>
<tr>
<td>100%</td>
<td>100</td>
<td>4150</td>
<td>144</td>
<td>120.8</td>
<td>6.5%</td>
<td>24</td>
</tr>
</tbody>
</table>

RETURN TIME REQUIREMENTS:

1 second (1000 ms) for vehicles less than 4536 kg.
2 seconds (2000 ms) for vehicles more than 4536 kg.
3 seconds (3000 ms) for vehicles exposed to -18°C or less

PASS _____ X __________ FAIL __________

REMARKS:

RECORDED BY: [Signature] DATE: 04/19/04
APPROVED BY: [Signature]
DATA SHEET 3 (1 of 2)
FAIL-SAFE OPERATION DISCONNECTION

VEHICLE MY/MAKE/MODEL/BODY STYLE: 2004 FORD FREESTAR, MPV
VEHICLE NHTSA NO.: C40203
DATE OF TEST: APRIL 19, 2004

Check one:

SYSTEM CONDITION: #1 SPRING DISCONNECTED

<table>
<thead>
<tr>
<th>ACCELERATOR POSITION</th>
<th>THROTTLE POSITION SENSOR READING</th>
<th>RPM</th>
<th>TEMPERATURE (°F)</th>
<th>THROTTLE POSITION SENSOR READING @ IDLE (BASELINE)</th>
<th>RETURN TIME TO IDLE (Msec)</th>
<th>PASS/FAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>% WIDE OPEN THROTTLE (WOT)</td>
<td></td>
<td></td>
<td>ENGINE COOLANT</td>
<td>AMBIENT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25%</td>
<td>25</td>
<td>4000</td>
<td>143.6</td>
<td>120.6</td>
<td>6.5%</td>
<td>19</td>
</tr>
<tr>
<td>50%</td>
<td>50</td>
<td>4000</td>
<td>144.3</td>
<td>120.0</td>
<td>6.5%</td>
<td>28</td>
</tr>
<tr>
<td>75%</td>
<td>75</td>
<td>4000</td>
<td>145.2</td>
<td>120.0</td>
<td>6.5%</td>
<td>32</td>
</tr>
<tr>
<td>100%</td>
<td>100</td>
<td>4160</td>
<td>146</td>
<td>120.0</td>
<td>6.5%</td>
<td>41</td>
</tr>
</tbody>
</table>

RETURN TIME REQUIREMENTS:

1 second (1000 ms) for vehicles less than 4536 kg.
2 seconds (2000 ms) for vehicles more than 4536 kg.
3 seconds (3000 ms) for vehicles exposed to -18° C or less

PASS ___ X ___  FAIL __________

REMARKS:

RECORDED BY: [Signature]  DATE: 04/19/04
APPROVED BY: [Signature]
DATA SHEET 3 (2 of 2)
FAIL-SAFE OPERATION DISCONNECTION

VEHICLE MY/MAKE/MODEL/BODY STYLE: 2004 FORD FREESTAR, MPV
VEHICLE NHTSA NO.: C40203
DATE OF TEST: APRIL 19, 2004

Check one:


SYSTEM CONDITION: #2 SPRING DISCONNECTED

<table>
<thead>
<tr>
<th>ACCELERATOR POSITION % WIDE OPEN THROTTLE (WOT)</th>
<th>THROTTLE POSITION SENSOR READING</th>
<th>RPM</th>
<th>TEMPERATURE (°F)</th>
<th>THROTTLE POSITION SENSOR READING @ IDLE (BASELINE)</th>
<th>RETURN TIME TO IDLE (Msec)</th>
<th>PASS/FAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>25%</td>
<td>25</td>
<td>4000</td>
<td>141.0</td>
<td>121.7</td>
<td>6.5%</td>
<td>17</td>
</tr>
<tr>
<td>50%</td>
<td>50</td>
<td>4000</td>
<td>141.4</td>
<td>121.6</td>
<td>6.5%</td>
<td>31</td>
</tr>
<tr>
<td>75%</td>
<td>75</td>
<td>4000</td>
<td>141.5</td>
<td>121.6</td>
<td>6.5%</td>
<td>36</td>
</tr>
<tr>
<td>100%</td>
<td>100</td>
<td>4150</td>
<td>141.5</td>
<td>121.6</td>
<td>6.5%</td>
<td>36</td>
</tr>
</tbody>
</table>

RETURN TIME REQUIREMENTS:

1 second (1000 ms) for vehicles less than 4536 kg.
2 seconds (2000 ms) for vehicles more than 4536 kg.
3 seconds (3000 ms) for vehicles exposed to -18°C or less

PASS X FAIL ______

REMARKS:

RECORDED BY: [Signature]       DATE: 04/19/04
APPROVED BY: [Signature]
DATA SHEET 4
FAIL-SAFE OPERATION SEVERED

VEHICLE MY/MAKE/MODEL/BODY STYLE: 2004 FORD FREESTAR, MPV
VEHICLE NHTSA NO.: C40203
DATE OF TEST: APRIL 19, 2004

Check one:

SYSTEM CONDITION: SEVERANCE

<table>
<thead>
<tr>
<th>ACCELERATOR POSITION</th>
<th>THROTTLE POSITION SENSOR READING</th>
<th>RPM</th>
<th>TEMPERATURE (°F)</th>
<th>THROTTLE POSITION SENSOR READING @ IDLE (BASELINE)</th>
<th>RETURN TIME TO IDLE (Msec)</th>
<th>PASS/FAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>% WIDE OPEN THROTTLE (WOT)</td>
<td>25%</td>
<td>25</td>
<td>4000</td>
<td>146.2</td>
<td>121.4</td>
<td>6.5%</td>
</tr>
<tr>
<td>50%</td>
<td>50</td>
<td>4000</td>
<td>148.5</td>
<td>121.4</td>
<td>6.5%</td>
<td>10</td>
</tr>
<tr>
<td>75%</td>
<td>75</td>
<td>4000</td>
<td>150.0</td>
<td>121.5</td>
<td>6.5%</td>
<td>14</td>
</tr>
<tr>
<td>100%</td>
<td>100</td>
<td>4150</td>
<td>150.6</td>
<td>121.4</td>
<td>6.5%</td>
<td>33</td>
</tr>
</tbody>
</table>

RETURN TIME REQUIREMENTS:

1 second (1000 ms) for vehicles less than 4536 kg.
2 seconds (2000 ms) for vehicles more than 4536 kg.
3 seconds (3000 ms) for vehicles exposed to -18° C or less

PASS: X  FAIL: 

REMARKS:

RECORDED BY:  __________________________  DATE:  04/19/04
APPROVED BY:  __________________________
## SECTION 4
TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>DESCRIPTION</th>
<th>MODEL/ SERIAL NO.</th>
<th>CAL. DATE</th>
<th>NEXT CAL. DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONTINUOUS RECORDER</td>
<td>OMEGA</td>
<td>55662</td>
<td>03/04</td>
<td>03/06</td>
</tr>
<tr>
<td>ENGINE RECORDING</td>
<td>FLUKE</td>
<td>7471026</td>
<td>03/04</td>
<td>03/05</td>
</tr>
<tr>
<td>ENGINE RECORDING</td>
<td>MONARCH</td>
<td>1444664</td>
<td>07/04</td>
<td>07/05</td>
</tr>
<tr>
<td>SOFTWARE</td>
<td>GTL</td>
<td>N/A</td>
<td>BEFORE USE</td>
<td>BEFORE USE</td>
</tr>
<tr>
<td>CHAMBER</td>
<td>GTL</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>EXHAUST DUCT</td>
<td>GTL</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>
SECTION 5
PHOTOGRAPHS
THROTTLE POSITION SENSOR

FIGURE 58
THROTTLE POSITION SENSOR
2004 FORD FREESTAR
NHTSA NO. C40203
FMVSS NO. 124H

FIGURE 5.7
THROTTLE RETURN SPRING #1
FMVSS 124 THROTTLE RETURN TEST
124 HOT/NORMAL/ 25% WOT

NHTSA C40209 FORD FREESTAR

Channel: Throttle Position

Y1: 22.310 %
Y2: 8.429 %
t1: -44416.000 ms
t2: -44401.000 ms
dt: 0.014 s
t: 71.428 Hz
FMVSS 124 THROTTLE RETURN TEST
124 HOT/NORMAL/ 50% WOT
2:31:08 PM 4/19/04

NHTSA C40209 FORD FREESTAR

V % RPM

TRIGGER

THROTTLE POSITION %

13:59:08.50 13:59:08.55 13:59:08.60
h:min:s

Channel: Throttle Position
Y1: 47.259 %  Y2: 5.954 %
T1: 33449.000 ms  T2: 33431.000 ms
dt: 0.018 s  f: 55.856 Hz
FMVSS 124 THROTTLE RETURN TEST
124 HOT/NORMAL/100% WOT
3:00:48 PM 4/19/04

NHTSA C40203 FORD FREESTAR

Channel: Throttle Position
Y1: 100.704 %
Y2: 0.359 %
T1: -14550.000 ms
T2: -14530.000 ms
dt: 0.028 s
t: 35.714 Hz
FMVSS 124 THROTTLE RETURN TEST
124 HOT / SPRING 2 / 25% WOT

NHTSA C40203 FORD FREESTAR

Channel: THROTTLE POSITION
Y1: 23.623 %
Y2: 8.811 %

t1: -50077.000 ns
t2: -68090.000 ns
dt: 0.017 s
t: 58.624 Hz
NHTSA C40203 FORD FREESTAR

FMVSS 124 THROTTLE RETURN TEST
124 HOT / SPRING 2 / 50% WOT

Channel: THROTTLE POSITION

Y1: 57.121 %
Y2: 5.787 %
T1: -44581.000 ms
T2: -44530.000 ms
dt: 0.031 s
t: 32256 Hz
FMVSS 124 THROTTLE RETURN TEST
124 HOT / SPRING 2 / 75% WOT

NHTSA C40203 FORD FREESTAR

Channel: THROTTLE POSITION
Y1: 92.459 %  Y2: 6.485 %
T1: -34875.000 ms  T2: -34836.000 ms
dt: 0.057 s  f: 27.027 Hz
FMVSS 124 THROTTLE RETURN TEST
124 HOT / SPRING 2 / 100% WOT
5:50:13 PM 4/20/04

NHTSA C40203 FORD PRESTAR

Channel: THROTTLE POSITION

Y1: 100.592 %
Y2: 5.590 %

t1: 128977.000 ms
t2: 289892.000 ms
dt: 0.008 s
t: 26.318 Hz
Vehicle Information/Test Specifications

FMVSS 124 - Accelerator Control Systems
2004 Ford Freestar

Requested Information:

1.) A sketch of the driver operated accelerator control system (ACS) starting from the accelerator pedal up to and including the fuel metering device (carburetor, fuel injectors, fuel distributor, or fuel injection pump).

The sketch is attached. The ACS is a mechanical system.

2.) For Normal ACS operation, the method utilized to determine the engine idle state (air throttle plate position, fuel delivery rate, other).

Throttle plate position.

3.) For Fall-Safe operation of the ACS (disconnection or severance), the method utilized to determine return of engine power to the idle state (air throttle plate position, fuel delivery rate, air intake, engine rpm, other).

Throttle plate position is monitored during testing to determine if the throttle plate has returned to idle.

4.) Is the vehicle ACS equipped with any of the following:
   A. Accelerator Pedal Position Sensor (APS)
   B. Throttle Plate Position Sensor (TPS)
   C. Electronic Control Module (ECM)
   D. Air throttle plate actuator motor

   It is equipped with a TPS.

5.) If air throttle plate equipped, is there a procedure which can be utilized by the test laboratory to measure the position of the throttle plate by tapping into the TPS or ECM? If so, please describe.

Yes, the certification laboratory taps into the TPS signal. The output of the TPS is sent to a Gould chart recorder data acquisition system through appropriate signal conditioning, which records all throttle movement.

6.) Point(s) chosen to demonstrate compliance with FMVSS 124 for single point disconnect and severance.

The accelerator cable is removed during a portion of certification testing to simulate the end slug pulling off the core wire.
7.) Where applicable, were connections in the ACS beyond the ECM such as the fuel injectors tested for disconnection and severance? If yes, provide details. 

No.

8.) Where applicable, were idle return times tested for electrical severance accompanied by shorting to ground? If yes, please provide details.

No.

9.) All sources of return energy (springs) for the accelerator pedal and if applicable, the air throttle plate.

The ACS has a torsion spring mounted on the throttle body and a secondary extension spring positioned between the throttle cam and accelerator bracket. During testing, only the torsion spring is initially disconnected and the system tested. Following that, only the extension spring is disconnected and the test repeated.

10.) If fuel delivery rate is used to demonstrate return to idle state, provide:

A. The method used to measure this signal i.e. connection to standard SAE J1587 data bus.
B. Equipment required to measure signal.
C. Fuel rate signal output range at the idle state.

Not applicable.

11.) Is the ACS equipped with a limp home mode? If yes, provide operation description.

No.