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REPORT NUMBER: 114-CAL-04-05

SAFETY COMPLIANCE TESTING FOR FMVSS No. 114 THEFT PROTECTION

TOYOTA MOTOR MANUFACTURING, INDIANA INC.
2004 TOYOTA SIENNA MPV

NHTSA NUMBER: C45103

GENERAL DYNAMICS TEST NUMBER: 8655-F114-05

GENERAL DYNAMICS
ADVANCED INFORMATION ENGINEERING SERVICES
TRANSPORTATION SCIENCES CENTER
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May 4, 2004

FINAL REPORT

U. S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Enforcement
Office of Vehicle Safety Compliance
400 Seventh Street, SW
Room No. 6115 (NVS-220)
Washington, DC 20590

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12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Enforcement Office of Vehicle Safety Compliance (NVS-220) 400 Seventh Street, SW, Rm. 6115 Washington, D.C. 20590		13. Type of Report and Period Covered Final Report, April 13 – May 4, 2004 14. Sponsoring Agency Code NVS-220
15. Supplementary Notes		
16. Abstract Compliance tests were conducted on the subject 2004 Toyota Sienna MPV in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-114-01 for the determination of FMVSS 114 compliance. Test failures were identified as follows: None		
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SECTION 1

PURPOSE OF COMPLIANCE TEST

This test is part of the Federal Motor Vehicle Safety Standard (FMVSS) 114 Compliance Test Program conducted for the National Highway Traffic Safety Administration (NHTSA) by General Dynamics Advanced Information Engineering Services under Contract No. DTNH22-01-C-01025. The purpose of this test was to determine if the subject vehicle, a 2004 Toyota Sienna MPV, was in compliance with FMVSS No. 114, Theft Protection. The purpose of this standard is to reduce the incidence of crashes resulting from unauthorized operation of vehicles by specifying requirements for theft protection. Additionally, FMVSS No. 114 specifies requirements to reduce the incidents of crashes from rollaway of parked vehicles with automatic transmissions as a result of children moving the shift mechanism out of the "park" position. This standard applies to passenger cars, trucks and multipurpose passenger vehicles having a Gross Vehicle Weight Rating (GVWR) of 4536 kilograms or less. This compliance test was conducted using the requirements found in the OVSC Laboratory Test Procedure No. TP-114-01, dated December 17, 1997.

SECTION 2

TEST PROCEDURE AND DISCUSSION OF RESULTS

A 2004 Toyota Sienna MPV with an automatic transmission was subjected to FMVSS No. 114 testing in accordance with the NHTSA Office of Vehicle Safety Compliance (OVSC) Laboratory Test Procedure TP-114-01, dated December 17, 1997. This test was performed by General Dynamics Advanced Information Engineering Services on April 13, 2004.

The test equipment used for this test included a standard metric tape ruler, a digital inclinometer with digital clinometer function, weight scales and a digital manometer. Testing was performed in the following sequence:

KEY LOCKING SYSTEM REQUIREMENT (S4.2):

The key locking system with the key removed, did prevent normal activation of the vehicle's engine. Both steering and forward self mobility were prevented.

WARNING ALARM REQUIREMENT (S4.5):

With the key left in the locking system and the driver's door opened, an audible alarm was activated. This "warning to the driver" was verified in all ignition switch positions except "on" and "start".

"PARK" POSITION REQUIREMENT (S4.2.1(a)(2)):

The key locking system only permitted removal of the key when the automatic transmission shift lever was locked in "park". Key removal was attempted in all shift lever positions.

TEN PERCENT GRADE "PARK" REQUIREMENT (S4.2.1(a)(3))

The vehicle was driven forward and stopped with the service brakes on a 10.7% grade. The parking brake was fully applied and the transmission lever was placed in "park". When the service and parking brakes were released the vehicle moved 15 mm (150 mm maximum is allowed on a 10% grade). Since the available test grade was more stringent than the specified condition, the subject vehicle appeared to perform within the safety performance requirements.

SPECIAL DEVICES REQUIREMENT (S4.2.2):

The vehicle was equipped with a special device, which when activated, permit movement of the transmission lever from "park" after the key was removed from the locking system (refer to figure 6 on page 5-7 and corresponding owner's manual section on page 6-4 of this report). The device was operable by depressing a button covered by a non-transparent surface, which, when installed, prevented sight and activation of the device. A screwdriver or similar tool was required to remove the device cover. Upon device activation, the steering wheel remained locked.

"OUT OF PARK" POSITION REQUIREMENT (S4.3):

Starting from the condition of the engine running at idle with the transmission shift lever in the "drive" position, the steering wheel remained unlocked and the vehicle was free to roll with the transmission shift lever in each position except "park" or "reverse" when the key locking system was turned to the "lock" position.

SECTION 3

TEST DATA

FMVSS 114, THEFT PROTECTION

DATA SHEET 1 – ALL VEHICLES

TEST DATE: April 13, 2004 LAB: General Dynamics

CONTRACT: DTNH22-01-C-01025 VEHICLE NHTSA NUMBER: C45103

VIN: 5TDZA23C34S070133 BUILD DATE: 09/03

MY/MAKE/MODEL/BODY STYLE: 2004 Toyota Sienna MPV

LOCATION OF KEY LOCKING SYSTEM: The key locking system consisted of an ignition switch mounted on the right side of steering column and a transmission shift lever that was located on the center console mounted to the lower portion of the vehicle dashboard.

TRANSMISSION TYPE:

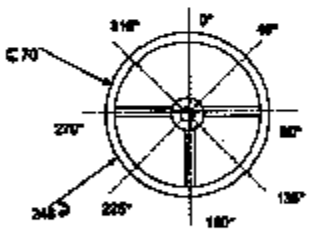
Automatic X ; Manual - ; Other -

DRIVE TRAIN TYPE:

Front Wheel X ; Rear Wheel - ; Four Wheel -

OPTIONAL RELEASE DEVICES:

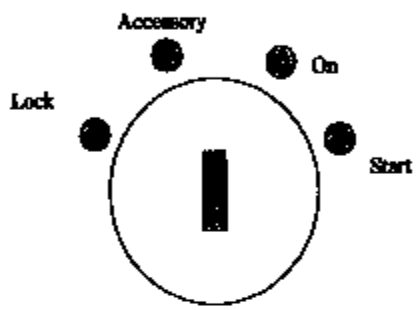
Key - ; Transmission X ; None -

REQUIREMENT S4.2	PASS	FAIL
Engine cannot be started without utilizing the ignition key.	X	
With key removed, steering wheel locks: Yes X ; No - Identify locking position on wheel using an arrow. Clockwise - 248° Counterclockwise - 70° 		
Key removal prevents forward self mobility: Yes X ; No - If yes describe: Automatic transmission remains in the "park" position.		
Locking system, with key removed prevents starting the engine and either steering or self mobility or both.	X	

REQUIREMENT S4.5	PASS	FAIL
Warning system is activated when the ignition key is left in any switch position except "on" and "start" and the driver's door is opened.	X	

REMARKS:

Ignition Switch Positions: (refer to page 6-2 of this report for a description of the switch positions provided in the vehicle owner's manual).



RECORDED BY: James Czarnecki DATE: April 13, 2004

APPROVED BY:

FMVSS 114, THEFT PROTECTION

DATA SHEET 2 – AUTOMATIC TRANSMISSION VEHICLES ONLY

TEST DATE: April 13, 2004 LAB: General Dynamics

CONTRACT: DTNH22-01-C-01025 VEHICLE NHTSA NUMBER: C45103

VIN: 5TDZA23C34S070133 BUILD DATE: 09/03

MY/MAKE/MODEL/BODY STYLE: 2004 Toyota Sienna MPV

VEHICLE TEST WEIGHT* (kg): 1961 WEIGHT OF DRIVER AND BALLAST (kg): 91

FUEL TANK LEVEL: 100 (% OF MAX)

*with driver and ballast

TIRE PRESSURE:

Vehicle Manufacturer Recommended (kPa): Front 240 ; Rear 240

Measured (kPa): LF 240 ; LR 240 ; RF 240 ; RR 240

REQUIREMENT S4.2.1(a)(2)	PASS	FAIL
Key locking system prevents key removal from any shift mechanism detent position except "park".	X	SEE NOTE
Key locking system prevents key removal from any position between the detent positions where the shift mechanism will remain without assistance.	N/A	SEE NOTE
NOTE: In the event that the key can be removed at any of the transmission shift lever positions, the vehicle's transmission or transmission shift lever shall become locked in "park" as the direct result of removing the key. If such a mechanism exists, describe the mechanism and its function:	N/A	N/A
System prevents movement of the shift mechanism out of "park" position after removal of key.	X	-

DATA SHEET 2 – AUTOMATIC TRANSMISSION VEHICLES ONLY (continued)

REQUIREMENTS S4.2.1(a)(3)	PASS	FAIL
With the transmission in "park" measure movement of the vehicle down the slope upon releasing the service brake.		
Test grade: 10.7 % (9 to 15 %)	X	SEE NOTE
Measured movement: 15 mm (150 mm maximum)		
NOTE: Repeat procedure if vehicle fails on a grade in excess of 10%.		
Test grade: - % (9 to 10 %)	-	-
Measured movement: - mm (150 mm maximum)		

REQUIREMENT S4.3	PASS	FAIL
Transmission in any position other than "park" or "reverse" and the key locking system in the off or "lock" position. The steering wheel must remain unlocked and the vehicle must remain free to roll.	X	-

REMARKS:

RECORDED BY: James Czarnecki DATE: April 13, 2004

APPROVED BY:

FMVSS 114, THEFT PROTECTION

DATA SHEET 3 – SPECIAL DEVICES

TEST DATE:	April 13, 2004	LAB:	General Dynamics
CONTRACT:	DTNH22-01-C-01025	VEHICLE NHTSA NUMBER:	C45103
VIN:	5TDZA23C34S070133	BUILD DATE:	09/03
MY/MAKE/MODEL/BODY STYLE:	2004 Toyota Sienna MPV		

REQUIREMENTS S4.2.2(a)	PASS	FAIL
Electrical failure capability permits ignition key removal with transmission shift lever in other than "park" position. Yes - No -		
Upon key removal steering wheel locks.	N/A	N/A
Device permits key removal when the transmission is in other than the "park" position. Yes - No -		
The means for activating this device is covered by a non-transparent surface which prevents sight and activation of the device. The non-transparent surface is removable only by use of a screwdriver or other tool.	N/A	N/A
Describe the device, its cover and its location: Not equipped		
Describe how the device is activated: Not Applicable		
Upon key removal, steering wheel locks.	N/A	N/A

REMARKS:

This vehicle was not equipped with this special device.

REQUIREMENTS S4.2.2(b)	PASS	FAIL
Device permits moving the transmission shift lever from "park" after key removal. Yes X No -		
The means for activating this device is covered by a non-transparent surface which prevents sight and activation of the device. The non-transparent surface is removable only by use of a screwdriver or other tool.	X	-
Describe the device, its cover and its location: A small, non-transparent rectangular cap is located forward of the shift lever above the transmission gear indicator on the dashboard (refer to figure 5 on page 5-6 and the respective sections of the owner's manual on page 6-4 of this report) which covers a push button activated device. The device cover can be removed using a small flat blade screwdriver or similar tool. Describe how the device is activated: The device is activated by inserting a finger into the device opening and pushing Down on the override button. This allows the operator to shift the transmission out of "park" with the ignition key removed. The device is described on page 6-4 (page 425 of the vehicle owner's manual) of this report.		
Upon device activation, the steering wheel remains locked.	X	-

REMARKS:

None

RECORDED BY: James Czarnecki DATE: April 13, 2004

APPROVED BY:

SECTION 4

TEST EQUIPMENT LIST AND CALIBRATION DATES

Equipment	Manufacturer	Name	Range	Accuracy	Calibration Date	Calibration Due
Clinometer	MD	Smart Level	0-100%	0.1%	3/29/2004	3/29/2005
Steel Tape	Stanley	Stanley 3137	3 meters	0.5mm	N/A	N/A
Weight Scales	Long Acre	Computer Scales 2000	0-12,000lbs.	0.2%	11/25/2003	11/25/2004
Manometer	Meriam Instrument Co.	350 Smart Manometer	0-200 psi.	0.05%	8/3/2003	8/3/2004
Plumb Bob	Stanley	Plumb bob	N/A	N/A	N/A	N/A

SECTION 5

PHOTOGRAPHS

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Figure 5-5 Proposed Drainage Study
Xenia Municipal Airport
Xenia, Ohio

Figure 3-1. Typical Installation of Pipe Bollard

SECTION 6

VEHICLE OWNER'S MANUAL