



**The Limits of  
Compartmentalization  
Protection**

School Buses: Regulations and Best Practices  
Tuesday, April 29, 2014 - 10:45AM - 12:15PM

Charlie Vits, SafeGuard  
317-867-8153  
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**The Limits of  
Compartmentalization  
Protection**

Charlie Vits | Marketing Development Manager SafeGuard

**LIFESAVERS 2014**

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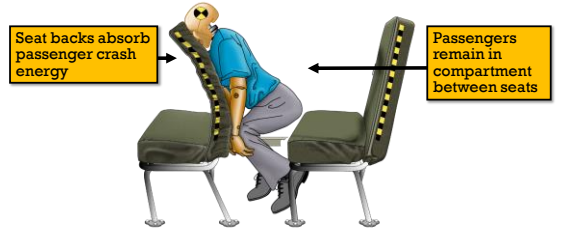
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**Compartmentalization - 1977**

Passive protection for **UNBELTED** passengers




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### Compartmentalization Forward and in-position



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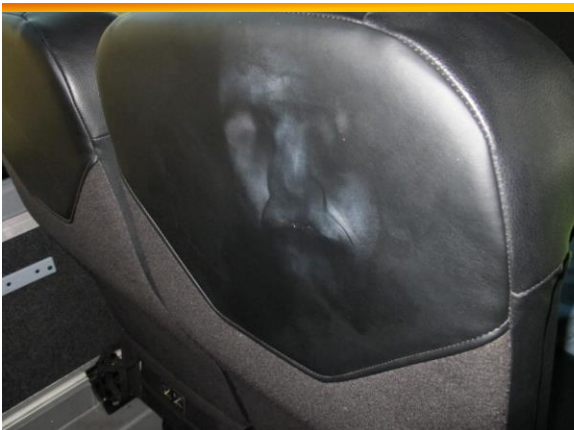
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## Ohio School Bus Rollover



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## Compartmentalization is **NOT** enough

- Designed for low-energy, frontal crashes
- Kids must be in the “compartment”
- Kids must be properly seated, forward facing



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## Bus Crash Demonstration | August 8, 2013



- 100 guests
- 1998 Type C school bus
- 25 mph frontal crash

**Objectives:**

1. Belted and unbelted
2. Out of position
3. Replace misinformation with facts



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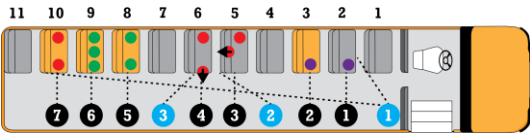
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### Bus Crash Demonstration | Type C Bus



7 On-Board Digital Imagers, 3 On-Board Real Time Video Camera's, 6 Outside Cameras

- Preschooler - 5pt
- Unbelted
- Lap-Shoulder Belt
- High Speed Camera
- Real Time Camera
- Factory Seat
- SafeGuard Seat

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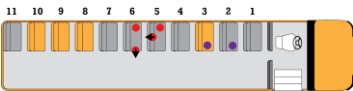
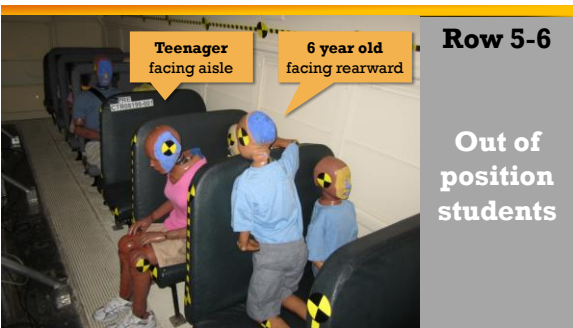
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- Preschooler - 5pt
- Unbelted

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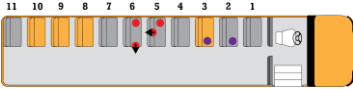
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**Row 5-6**

**Out of position students**



- Preschooler - 5pt
- Unbelted

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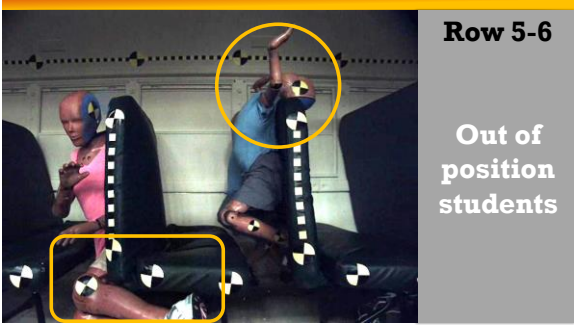
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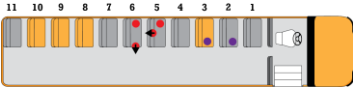
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**Row 5-6**

**Out of position students**



- Preschooler - 5pt
- Unbelted

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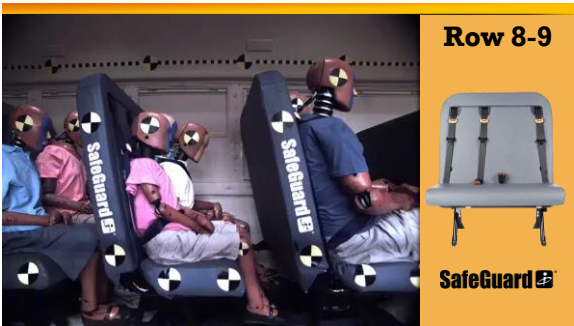
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**Row 8-9**

**SafeGuard**



- Preschooler - 5pt
- Unbelted
- Lap-Shoulder Belt

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**Row 10**




**Safeguard**



● Preschooler - 5pt  
 ● Unbelted  
 ● Lap-Shoulder Belt

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**Bus Crash Demonstration | November 13, 2013**


2001 Type D front engine  
78 Passenger  
30 mph frontal crash

**Objectives:**

1. Belted and unbelted
2. Out of position
3. Dispel seat belt misinformation



CAPE




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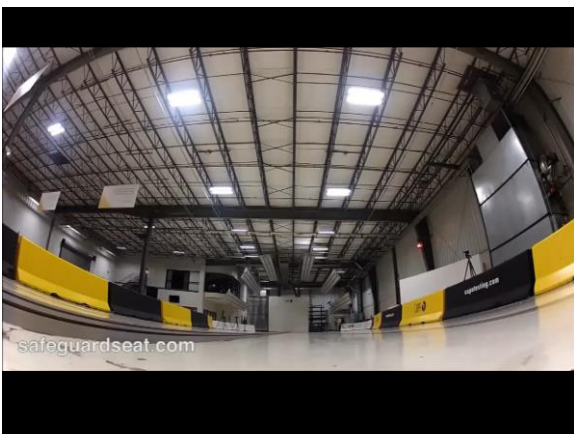
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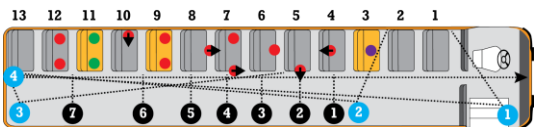
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**On-Board**

7 High Speed Video  
4 Real Time Video

**Off-Board**

5 High Speed Video  
5 Real Time Video



- Preschooler - 5pt
- Unbelted
- Lap-Shoulder Belt
- High Speed Camera
- Real Time Camera
- Factory Seat
- SafeGuard Seat

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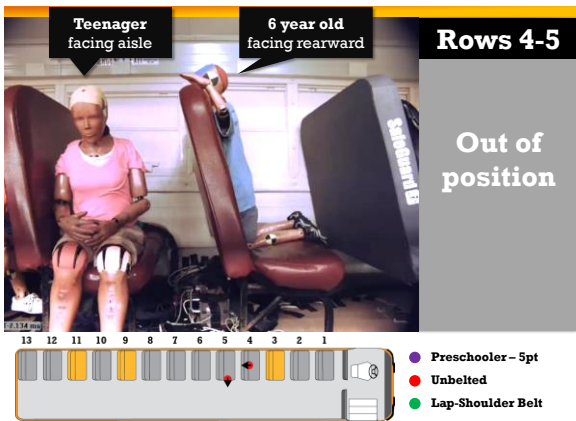
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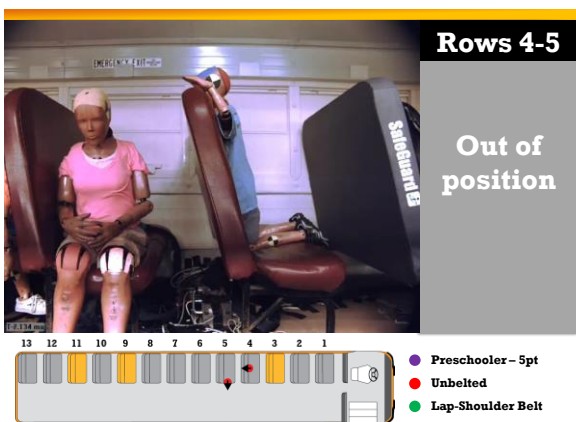
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**Rows 4-5**

**Out of position**



13 12 11 10 9 8 7 6 5 4 3 2 1

- Preschooler - 5pt
- Unbelted
- Lap-Shoulder Belt

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**Rows 6**

**Out of position**

**6 year old**

Leaning forward  
Reaching down



13 12 11 10 9 8 7 6 5 4 3 2 1

- Preschooler - 5pt
- Unbelted
- Lap-Shoulder Belt

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**Rows 6**

**Out of position**

**6 year old**

Leaning forward  
Reaching down



13 12 11 10 9 8 7 6 5 4 3 2 1

- Preschooler - 5pt
- Unbelted
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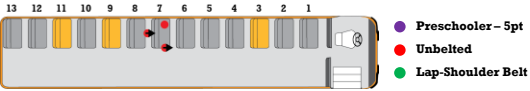


### Rows 7-8

Out of position

**Row 7:**  
**Teenager**  
 Half on/half off seat  
 10 year old unbelted

**Row 8:**  
**Adult**  
 Standing and leaning  
 over seat




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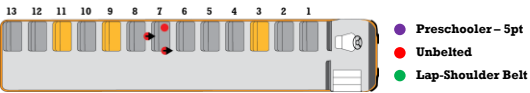


### Rows 7-8

Out of position

**Row 7:**  
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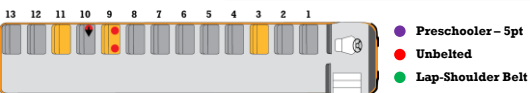


### Rows 9-10

Out of position

**Row 9:** Unbelted adults

**Row 10:** Unbelted adult  
 Back against wall  
 Feet sideways




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### Rows 9-10

**Out of position**

**Row 9:** Unbelted adults

**Row 10:** Unbelted adult  
Back against wall  
Feet sideways

- Preschooler - 5pt
- Unbelted
- Lap-Shoulder Belt

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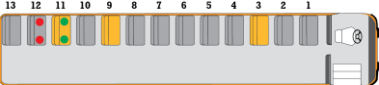
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### Rows 11-12

**Row 11:**  
Belted  
Adult + 6 year old

**Row 12:**  
Unbelted  
Adult + 6 year old

- Preschooler - 5pt
- Unbelted
- Lap-Shoulder Belt

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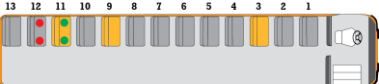
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### Rows 11-12

**Row 11:**  
Belted  
Adult + 6 year old

**Row 12:**  
Unbelted  
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- Preschooler - 5pt
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- Lap-Shoulder Belt

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# What have we learned?

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**Compartmentalization is incomplete**

**Injury protection is limited by**

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### Compartmentalization Limitations



- 1**  
**Type of crash**
- 2**  
**Interior Surroundings**
- 3**  
**Proper Seating Position**

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MISINFORMATION	THE FACTS
Compartmentalization is enough	Compartmentalization is <b>NOT</b> enough
Seat belts reduce capacity	Seat belts <b>DO NOT</b> reduce capacity
Seat belts will be used as weapons	Seat belts are <b>NOT</b> used as weapons
Seat belts are too expensive	Purchase depends on <b>PRIORITIES</b>
NHTSA hasn't approved seat belts	NHTSA set standard for belts on buses
Seat belts slow evacuation	Seat belts <b>AID</b> evacuation
Students won't wear them	Students will wear them <b>WITH STRONG USAGE POLICY</b>

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**If this were YOUR child in a crash**

**Which protection would YOU choose?**

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**The Limits of Compartmentalization**

**MORE INFO**

safeguardseat.com

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