

School Buses: Regulations and Best Practices

Lifesavers 2014

Welcome today's speakers

- Charlie Vits, SafeGuard, a brand of IMMI
- Denise Donaldson, Safe Ride News
- Heidi Kessler, Monroe Carrell Jr. Children's Hospital at Vanderbilt

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The Limits of Compartmentalization Protection

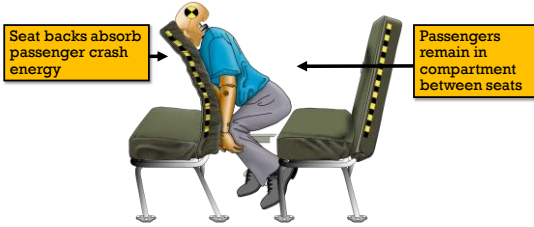
Charlie Vits | Marketing Development Manager **SafeGuard**

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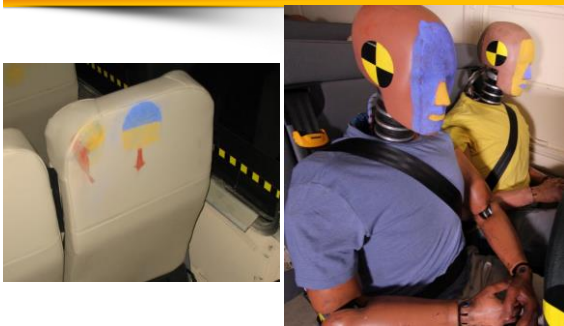
Compartmentalization - 1977

Passive protection for **UNBELTED** passengers



Compartmentalization Forward and in-position







Ohio School Bus Rollover



Compartmentalization is **NOT** enough

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



Bus Crash Demonstration | August 8, 2013



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

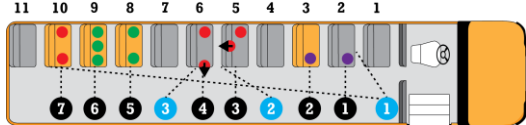
Objectives:

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



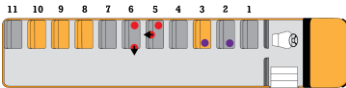
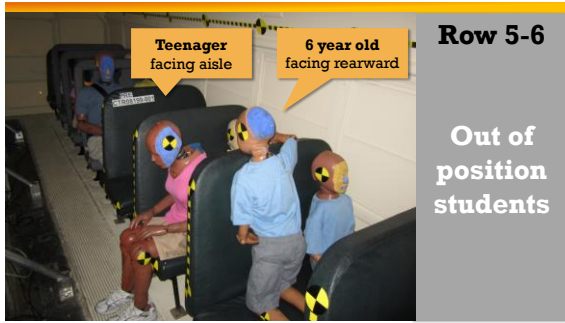


Bus Crash Demonstration | Type C Bus



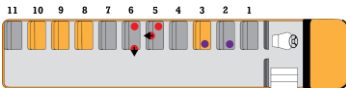
7 On-Board Digital Imagers, 3 On-Board Real Time Video Camera's, 6 Outside Cameras

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



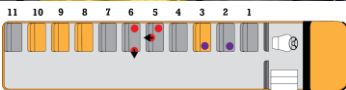
- Preschooler - 5pt
- Unbelted

13



- Preschooler - 5pt
- Unbelted

14



- Preschooler - 5pt
- Unbelted

15

Row 8-9

SafeGuard

11 10 9 8 7 6 5 4 3 2 1

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

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Row 10

SafeGuard

11 10 9 8 7 6 5 4 3 2 1

- 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



On-Board
7 High Speed Video
4 Real Time Video

Off-Board
5 High Speed Video
5 Real Time Video

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

Teenager facing aisle

6 year old facing rearward

Rows 4-5

Out of position

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

Rows 4-5

Out of position

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

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Rows 4-5

Out of position

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

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Rows 6


Out of position

6 year old

Leaning forward
Reaching down

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

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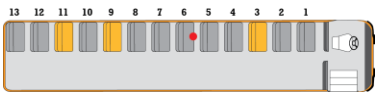


Rows 6


Out of position

6 year old

Leaning forward
Reaching down



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

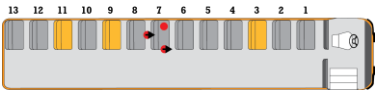


Rows 7-8

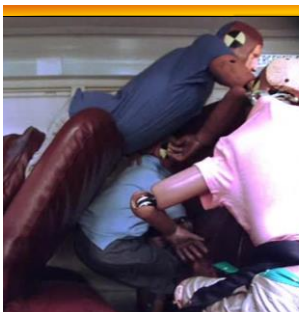
Out of position

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

Row 8:
Adult
Standing and leaning over seat



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

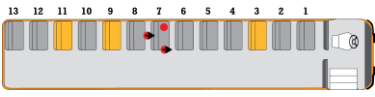


Rows 7-8


Out of position

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

Row 8:
Adult
Standing and leaning over seat

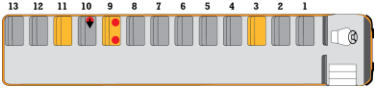


- Preschooler - 5pt
- Unbelted
- Lap-Shoulder Belt




Rows 9-10
Out of position

Row 9: Unbelted adults
Row 10: Unbelted adult
 Back against wall
 Feet sideways

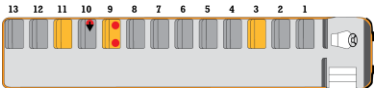


● Preschooler - 5pt
 ● Unbelted
 ● Lap-Shoulder Belt




Rows 9-10
Out of position

Row 9: Unbelted adults
Row 10: Unbelted adult
 Back against wall
 Feet sideways



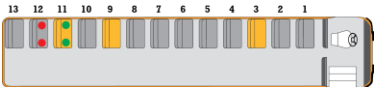
● Preschooler - 5pt
 ● Unbelted
 ● Lap-Shoulder Belt



Rows 11-12

Row 11:
 Belted
 Adult + 6 year old

Row 12:
 Unbelted
 Adult + 6 year old



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

Rows 11-12

Row 11:
Belted
Adult + 6 year old

Row 12:
Unbelted
Adult + 6 year old

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

- Preschooler - 5yrt
- Unbelted
- 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

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

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If this were YOUR child in a crash

Compartmentalization



Lap-Shoulder Belts




Which protection would YOU choose?

The Limits of Compartmentalization

MORE INFO

safeguardseat.com

Charlie Vits
cvits@imminet.com



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Q & A

- Time to get your questions answered!



**Beyond
Compartmentalization:**
Selecting CSRS for Preschoolers
and Children with Special Needs

Denise Donaldson, Safe Ride News Publications
Lifesavers Conference, 2014

Indisputable Limitations

FACT:

Compartmentalization can provide proper protection in certain types of crashes involving a large bus and properly seated occupants who are elementary age and older and who are not medically fragile.

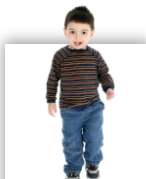
LIMITATIONS:

- The child is too small/young (preschool, under 50 pounds).
- The bus is too small (≤ 10,000 pounds).
- The child has special needs (fragile or cannot stay in position).

YES—these kids ride on school buses!



INFANTS
Babies who meet the RF weight/height limit for CSRS. (Usually ≤ age 2)



TODDLERS
Youngsters at least age 1 and over 20 pounds who have transitioned to FF.



PRE-SCHOOLERS
Little kids, especially who weigh under 50 pounds.



Students with Special Needs Also Ride the Bus



- "Special needs" includes many conditions.
 - Physical Needs
 - Neurological Needs
 - Mental and psychological/behavioral needs
- Some (but not all) require occupant protection solutions, using:
 - Conventional devices
 - Special needs (medical) devices
 - Wheelchairs

Terminology to Know



CHILD SAFETY RESTRAINT SYSTEM (CSRS):

Devices used on school buses to provide child protection beyond basic compartmentalization, other than lap-only or lap-shoulder belts. These must meet the requirements specified in FMVSS 213.

Types of CSRS:
Knowing what's available

Add-On CSRS Just for Buses

Attach Using a "Cam Wrap"

Safety Vests



Safety Harnesses



School-Bus-Only CSRS



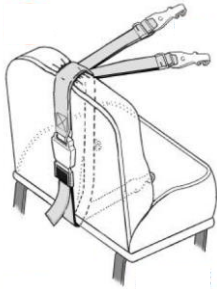
Add-On CSRS Just for Buses

Some are made for special needs



Cam Wrap Attachment

Shown: "Portable Seat Mount" for Vests



Integrated CSRS Just for Buses

Built-in CSRS



- Five-point harnesses
- Forward-facing only
- No installation needed!
- Most fold away for use by others



Integrated CSRS Just for Buses

Built-in CSRS for Special Needs



- For children needing extra support
- Adds positioning straps lap-only or lap-shoulder belt systems



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Sometimes Conventional CRs Are Used on School Buses



Models designed for cars can be used on school buses, if:

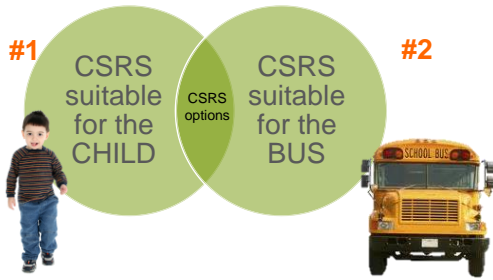
- They fit the needs of the child
- They can be properly anchored onto the bus seating

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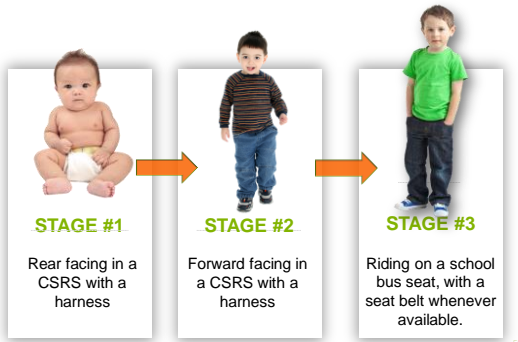
CSRS Selection:
Identifying the right solution for the child

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Basic Approach to CSRS Selection



On school buses, CPS has 3 stages...



Three stages for school bus CPS: STAGE 1



Three stages for school bus CPS: STAGE 2

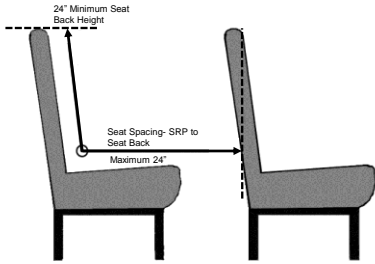


Three stages for school bus CPS: STAGE 3



School Bus Seating:
Selection based on considering the seating environment

Bus Considerations:
Seat Row Spacing



The maximum spacing allowed is 24 inches. This is ideal for CSRS use.

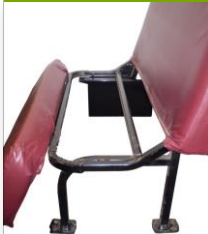
Bus Considerations:
Seat Row Spacing



It is fairly easy to see why Minimum Seat Spacing presents challenges to CSRS use!

Bus Considerations:
Seat Frame Strength

Standard (FMVSS 222) Seat Frame

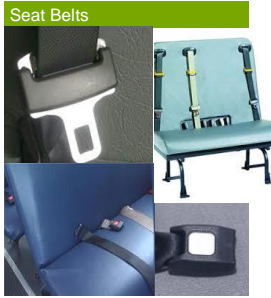


Reinforced (FMVSS 210) Seat Frame



Seat belts and/or lower anchors can be retrofitted ONLY on reinforced seating that meets FMVSS 210.

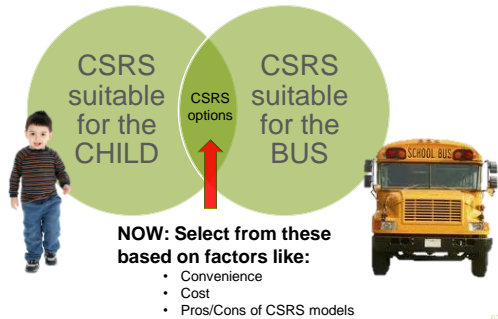
Bus Considerations: Anchorage Options



FMVSS 225 (Lower Anchors) and FMVSS 222 (lap-shoulder belts) apply to small buses ≤ 10,000 pounds only. Some state and municipal laws apply to larger buses.

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Basic Approach to CSRS Selection



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Want to Learn More?



- 8-Hour training course: “CPS Restraint Systems on School Buses National Training” (NHTSA)
- School Bus Safety Handbook – 2nd Edition (Safe Ride News Publications)
- Online Tutorial available on NHTSA website
- CPS for School Buses listserve: CPSforSchoolBuses@yahoo.com (info at www.saferidenews.com)

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Helpful Resources



- **NHTSA: Guideline for the Safe Transportation of Pre-school Age Children in School Buses**
<http://www.nhtsa.dot.gov/people/injury/buses/Guide1999/prekfinal.htm>
- **NHTSA: Choosing the Correct School Bus For Transporting Pre-School Age Children**
http://nhtsa.gov/people/injury/buses/choosing_schoolbus/pre-school-bus_01.html
- **NHTSA: Child Safety Restraint Systems (CSRS) on School Buses Training Videos**
<http://www.nhtsa.gov/Driving+Safety/School+Buses/SCRS/CSRS+on+School+Buses+Training+Videos>
- **Head Start Regulations: CFR 45 Part 1310**
- **National School Transportation Specifications & Procedures** <http://www.ncstonline.org>
- **Safe Ride News:**
<http://safirideneews.com/smdnn/SRNProducts/SchoolBusSafetyHandbook/tabid/203/Default.aspx>

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Q & A

- Time to get your questions answered!

Wheelchair / School Bus Safety




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Manual Wheelchairs



Medical Strollers



Power Wheelchairs and Scooters



Wheelchairs

- All references to a wheelchair throughout the rest of this presentation will pertain to any of the previous mobility devices, with the exception of the 3-wheeled scooter.

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Preferred Transportation Option

- It is generally safest to transport children on school buses in an age appropriate seat belt or CSRS – child safety restraint system – that complies with the federal safety standards.
- Wheelchair users that should be out of their wheelchair for transportation:
 - sport style wheelchairs that have low back heights
 - three wheeled scooters – these can not be anchored safely.

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If transferring to bus seat is not possible, it is best to use wheelchairs with Transit Options

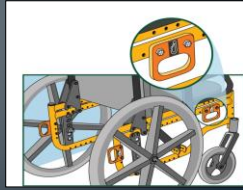
- A wheelchair with transit option has 4 points of securement, and has been crash tested.
- They have clearly marked hooks on the frame for attachment of tie downs.



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WC19 - Wheelchairs

- Wheelchairs that are designed and crash tested to be used in motor vehicles
- Look for hooks on front and back of frame to secure wheelchair down with tiedowns, which may or may not be clearly marked.



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ANSI/RESNA wheelchair standards

- (ANSI/RESNA) American National Standards Institute/Rehabilitation Engineering and Assistive Technology Society of North America
- These are voluntary standards that are made up by safety experts.
- Just because a wheelchair is not WC19 compliant does not mean it can be denied transportation in vehicles.

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Start with the right equipment
Some equipment will have labels that state that it is not approved for transportation purposes.



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Wheelchairs – WC 19

Crash tested securement points.



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Manual Wheelchair



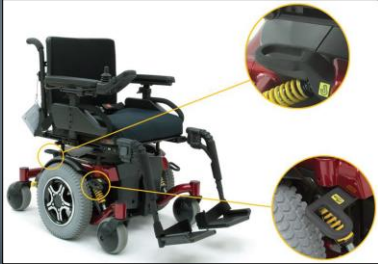
77

Medical Stroller



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Power Wheelchairs



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Website resources

- For a list of wheelchairs that meet W-19 standards go to the following website:

- <http://www.rercwts.org/WC19.html>



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The Wheelchair Tiedown and Occupant Restraint System (WTORS)

Important -

- Always use a complete WTORS that has been crash tested and labeled as complying with ANSI/RESNA WC18 or SAE J2249, a voluntary standard developed by safety and rehabilitation experts.



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WTORS

- The most common type of wheelchair tie down uses four straps to secure the wheelchair to the vehicle. This tie down system can secure a wide range of WC19 and non-WC19 wheelchairs.



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Proper Installation – Securing the wheelchair

Proper installation includes the following:

- Face forward
- 4-point tie down
- Lap/shoulder belt or 5 point harness – separate of straps on the wheelchair.
- Remove lap trays
- Combined occupant and wheelchair weight should not exceed tie-down recommendations.

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Securing the wheelchair that is WC19 compliant

- Always position the wheelchair and rider facing forward in the vehicle
- Attach the four tie down straps to the transit hooks provided on the wheelchair. Tighten the straps to remove all slack.

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Securing a wheelchair that is not WC19 compliant

- Attach the tie down straps to welded junctions of the wheelchair frame or to other structural areas where the frame is fastened together.
- Secure either the top frame or the bottom frame with all four straps.



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Wheelchairs – Non-WC19

- Recommended that the point be marked clearly when you find a good attachment location on the wheelchair
- Plastic ties
- Colored tape
- Or similar markings so that the operator will be able to identify the selected location.



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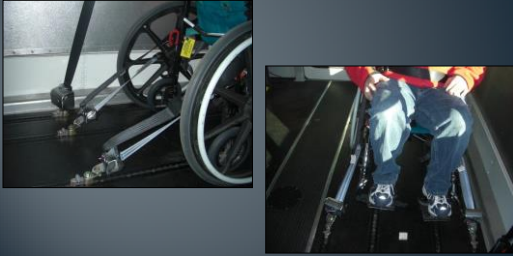
Do Not attach tie downs to:

- Adjustable, moving or removable parts of the wheelchair, such as armrests, footrests & wheels



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WC19 Wheelchairs



Securing / Protecting the Rider

- Should use a crash-tested lap and shoulder belt, or a child restraint harness.
- Lap and Shoulder Belt's should attach to the vehicle and be crash tested.
- Child Restraint Harness' are usually apart of a wheelchair and have been crash tested with the wheelchair.
- Remember that the positioning belt and chest strap on wheelchairs for positioning the client, are not safety restraints.

Continue – Securing the Rider

- The lap belt should be angled between 45 and 75 degrees to the horizontal when viewed from the side.
- A diagonal shoulder belt should cross the middle of the shoulder and the center of the chest, and should connect to the lap belt near the hip of the wheelchair rider.



Incorrect Belt Placement



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Incorrect Belt Placement



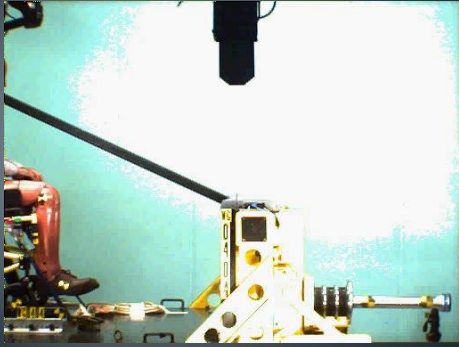
92

Incorrect Belt Placement

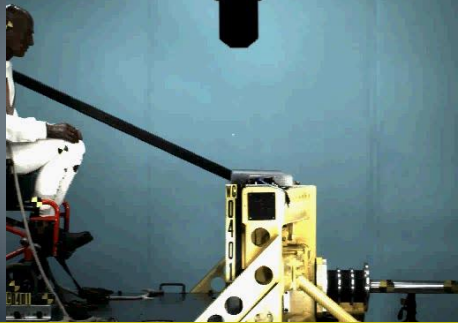


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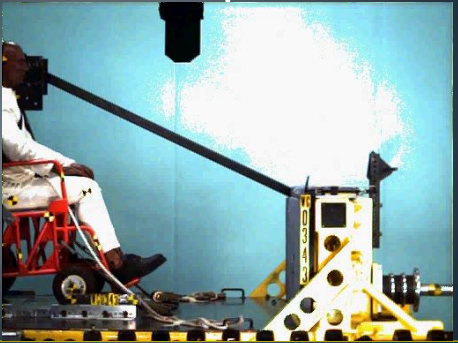
Tie downs to frame:



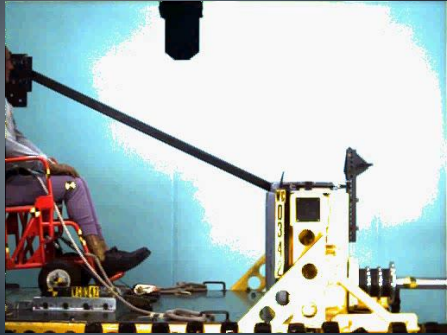
No Lap / Shoulder Belt on child



No Lap Belt



No Shoulder Belt



Important Points to Remember

- It is best to ride with the wheelchair backrest in the upright position however, a back can be reclined back up to 30 degrees, only.
- A properly positioned headrest can help protect the neck in a crash.
- If it is necessary to use a head and neck support during travel, choose a soft, flexible neck collar.

Important Points to Remember

- Remove hard trays to reduce the chance of rider injury from contact with the tray.
- Secure medical and other equipment elsewhere in the vehicle/bus to prevent it from breaking loose and causing injuries in a crash.
- Check WTORS equipment regularly and replace worn or broken components. Keep anchorage track free of dirt and debris

Important Points to Remember

- Read and follow all manufacturers' instructions
- If the WTORS and wheelchair have been involved in a vehicle crash, check with the manufacturers to determine if the equipment needs to be repaired or replaced.

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Complete system with both the WORTS and the Shoulder / Lap belt system



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Thanks

Sharon Conrad

- Child Passenger Safety Advocate/Consultant
- Child Passenger Safety Technician Instructor

For providing video footage and information for the presentation.

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Resources

- University of Michigan Transportation Research Institute – www.umtri.umich.edu
- Rehabilitation Engineering and Research Center on Wheelchair Transportation Safety – www.rercwts.org
- Ride Safe brochure – www.travelsafer.org; umtridocs@umich.edu, 734-764-2171
- List of Crash Tested Wheelchairs - http://www.rercwts.pitt.edu/RERC_WTS2_KT/RERC_WTS2_19_Chart.html

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Q & A

- Time to get your questions answered!

Thank you!

- Please be sure to fill out the session evaluation.
- Be sure to get your CPS CEU passport stamped!
