

15 MINUTES CAN SAVE YOUR LIFE



Motorsport is more advanced than ever. The cars and safety equipment are far better and more high-tech than ever. Still, drivers and co-drivers are killed almost every week...why?



SIMPSON

DRIVEN by SAFETY

The Answer:

Too often... drivers do not take ownership of their own safety.

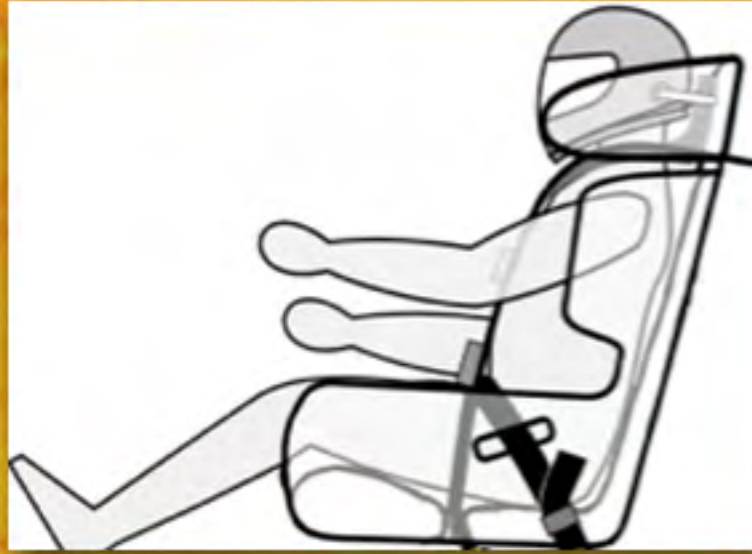
This checklist presentation focuses on Harness Systems and Head Restraints to help improve cockpit safety.

It is born from mistakes that we often see made in cockpits.
We believe a quick review of this checklist by drivers and safety personnel will help prevent serious injuries and save lives.



DRIVEN by SAFETY

Three Types of Cockpit Restraints Are Needed



- Securing the driver in the seat with a Harness System is fundamental to cockpit safety.
- A properly installed Harness System further requires a Head Restraint to secure the driver's head and neck.
- Head surrounds and/or side nets are needed to “keep the spine in line” in side impacts.

Stop the Pelvis. Stop the Chest. Stop the Neck.



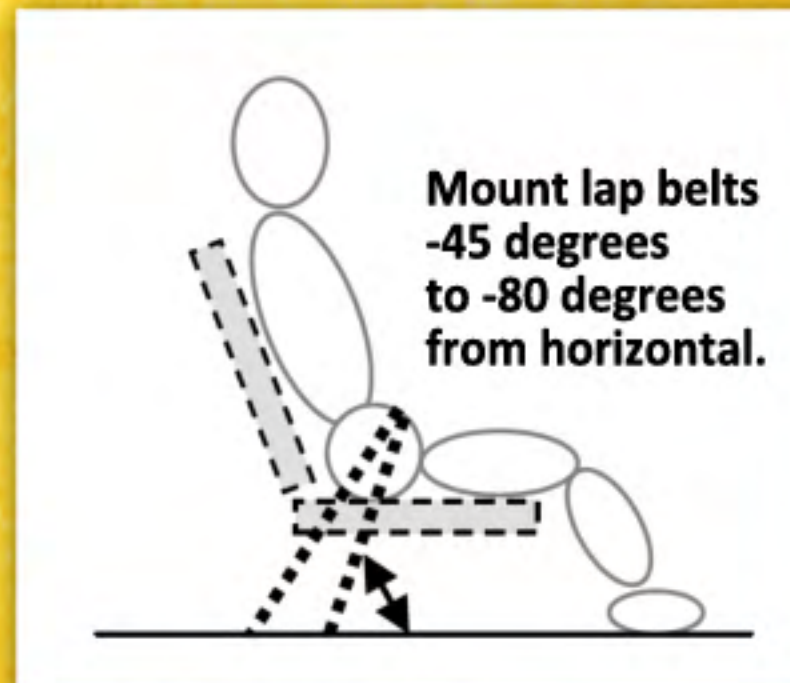
- The pelvis is the strongest bone, or hard part, in the body.
- The pelvis is far stronger than the collar bone or neck.
- Stopping the pelvis reduces loads on the collar bone and neck.

CHECKLIST

Lap Belt Mounting Points

- Lap Belts are critical to the entire Harness System.
- When you stop the pelvis, it helps stop the chest and the neck.
- To stop the pelvis, mounting points should be -45 degrees to -80 degrees from horizontal.

Source: SFI Seatbelt
Installation Guide.



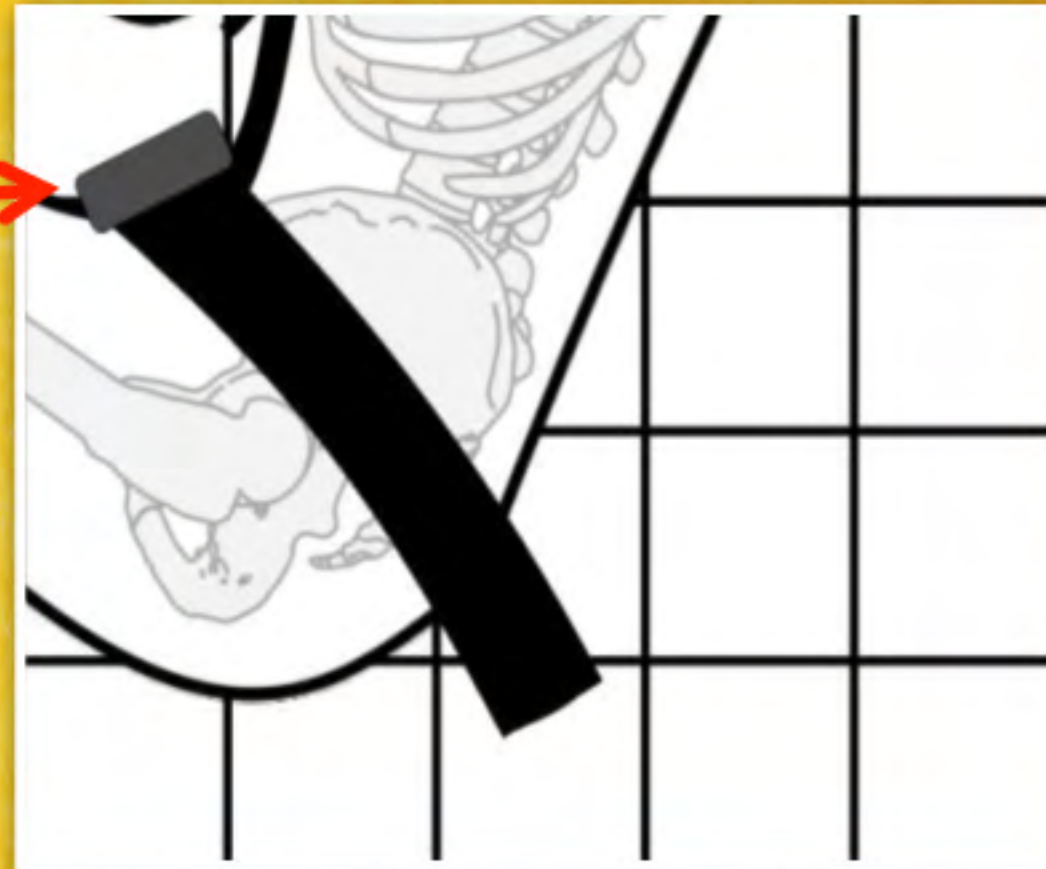
CHECKLIST

Lap Belt Mounting Points

- Lap Belts should lie flat across the pelvic bone.
- When tight, “buckle” should be 1 to 2 inches below navel.

Buckle 1 to 2 inches
below navel.

Lap Belt flat across
the pelvic bone.



CONSEQUENCES

When Lap Belt Mounting Points Are Wrong

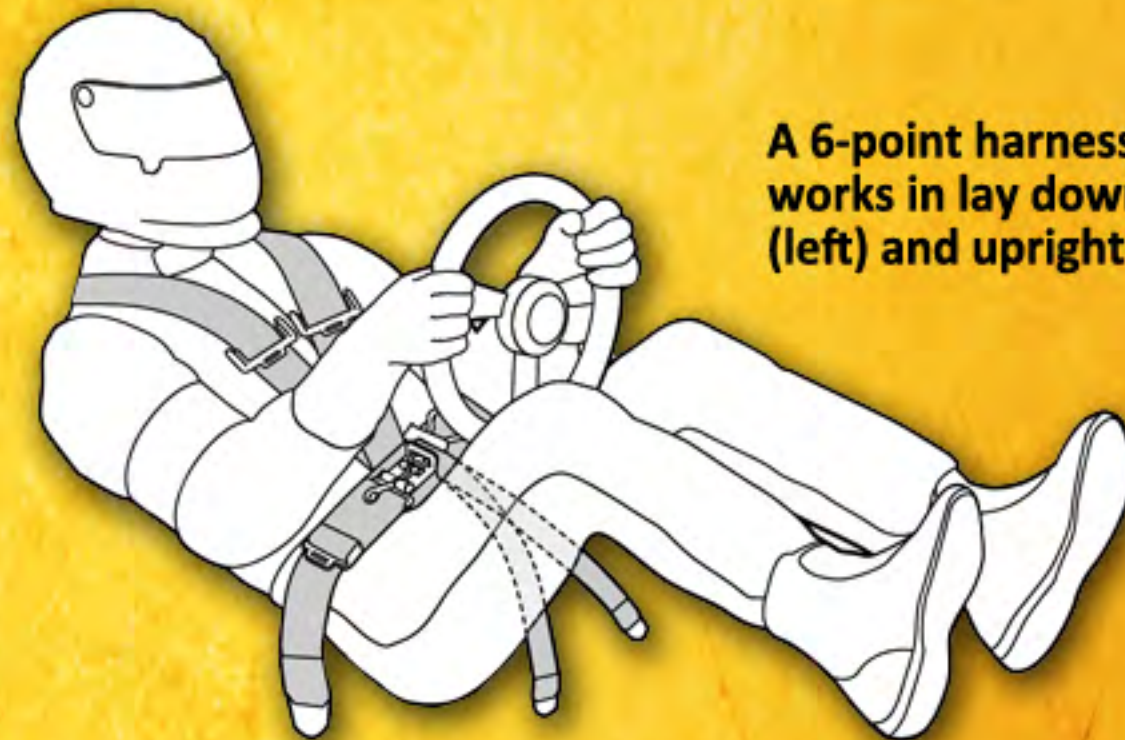


- The more the pelvis moves -- the greater the load on chest/neck.
- If the pelvis does not sustain the load -- ribs, abdomen, organs at risk.
- The more the pelvis moves -- greater risk of Shoulder Belts slipping off.

CHECKLIST

Use A Six-Point Harness

- All belts must work in concert to “keep the spine in line” and the driver firmly planted in the seat.
- A six-point harness helps stop the motion of the pelvis and lower body earlier in a crash. This helps stop the chest and neck.
- Stop the pelvis. Stop the chest. Stop the neck.



A 6-point harness works in lay down seats (left) and upright seats.

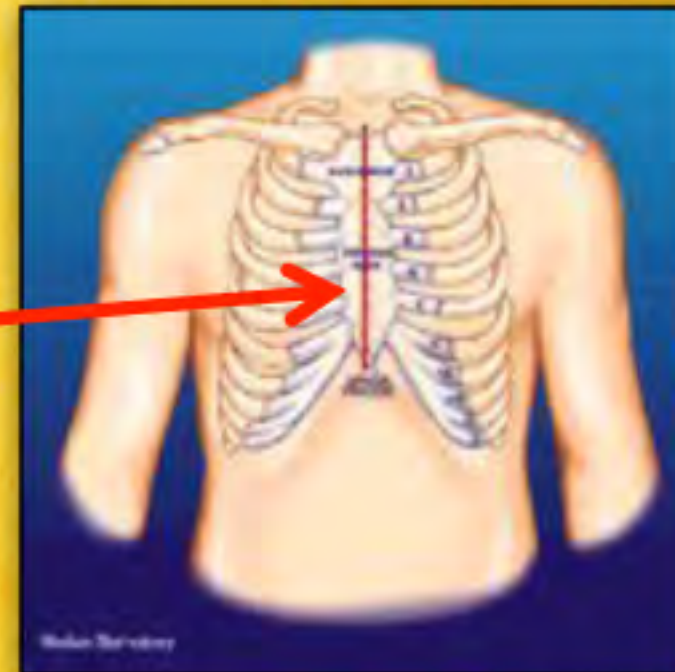
FIA-spec upright seats: pre-cut hole not recommended for 6-point. If use of pre-cut hole mandatory, install belts so they do not pivot on opening.

CONSEQUENCES

What Happens Without A Six-Point Harness?

- The more the pelvis and lower body move in a crash, the greater the subsequent loads on the chest and neck.
- Possible injury to sternum or male organs in a crash with a single anti-submarine strap.
- The driver is more vulnerable to offset, side impacts (“spine not in line”) without two Anti-Submarine Belts.

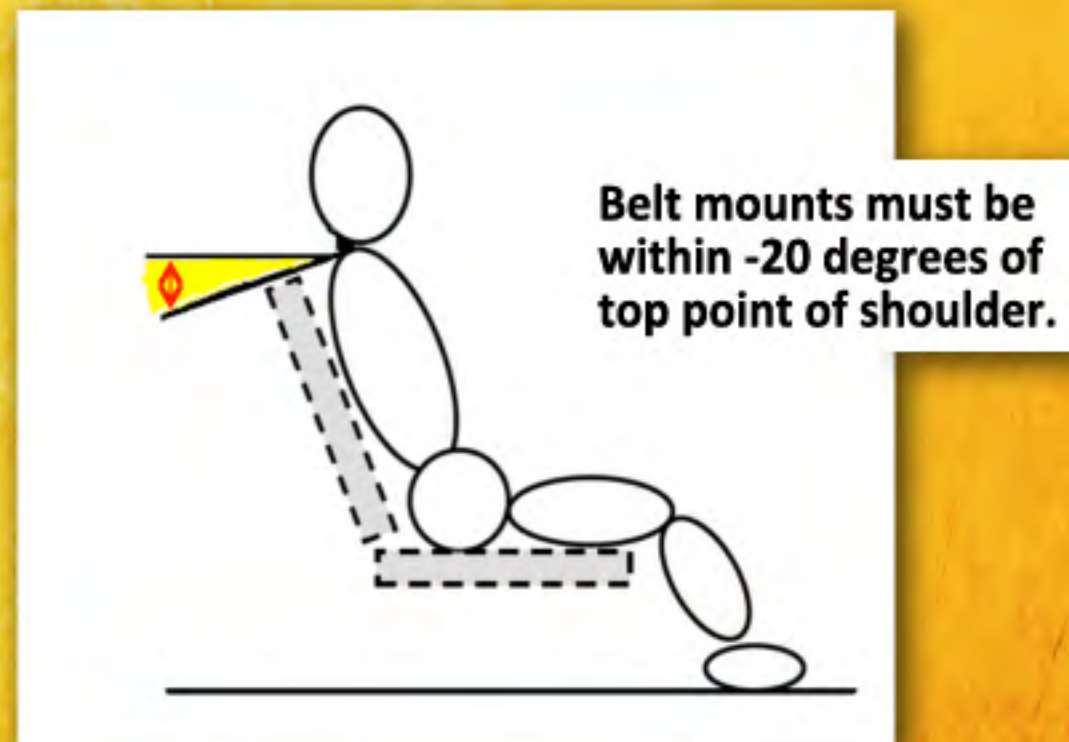
With a single crotch strap, the sternum is at risk due to load transfer.



CHECKLIST

Shoulder Belt Mounting Points

- Mounting the Shoulder Belts too high or too low is a common error.
- Optimum is -10 degrees from the top point of the shoulder, including the head restraint.
- Shoulder belts must be within -20 degrees from the top point of the shoulder, including the Head Restraint.



Source: SFI Seatbelt
Installation Guide.

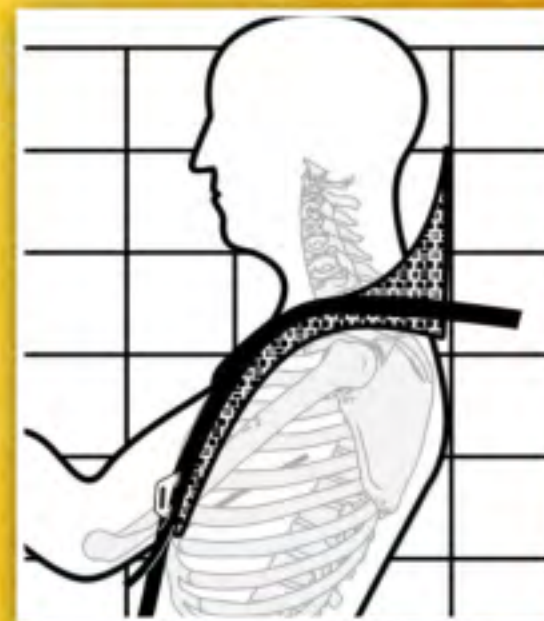
CONSEQUENCES

When Shoulder Belts Are Mounted Wrong

- Shoulder Belts mounted too low can compress the spine, cause injuries.
- Belts can slip off when mounted too low due to elongation.
- The torso can slip under Shoulder Belts when mounted too high.
- A Head Restraint will not work without secured Shoulder Belts.
- If belts slip off, head may move beyond head surround, side nets.

Prevent compression
to the spine.

Mount shoulder belts
within -20 degrees from
top of shoulder, including
Head Restraint.

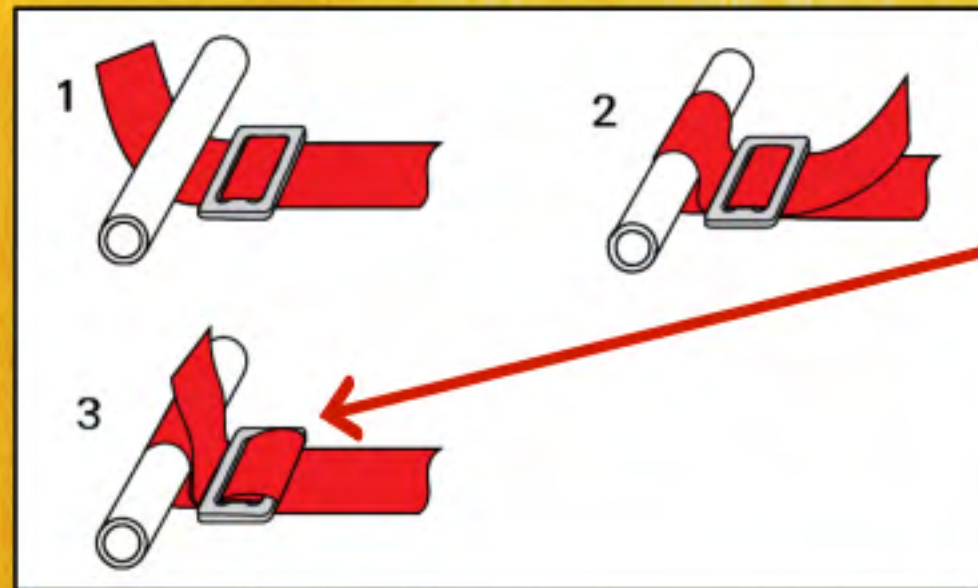
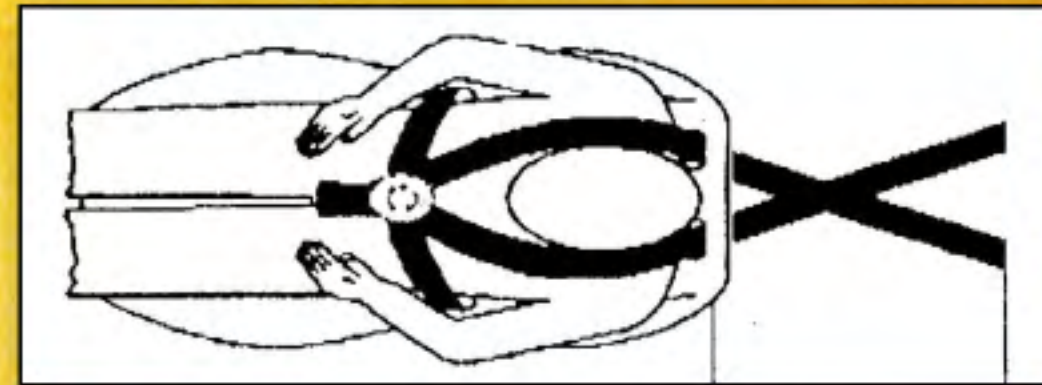


Get Shoulder Belts Right



Keep mounting points as close as possible to the shoulders.

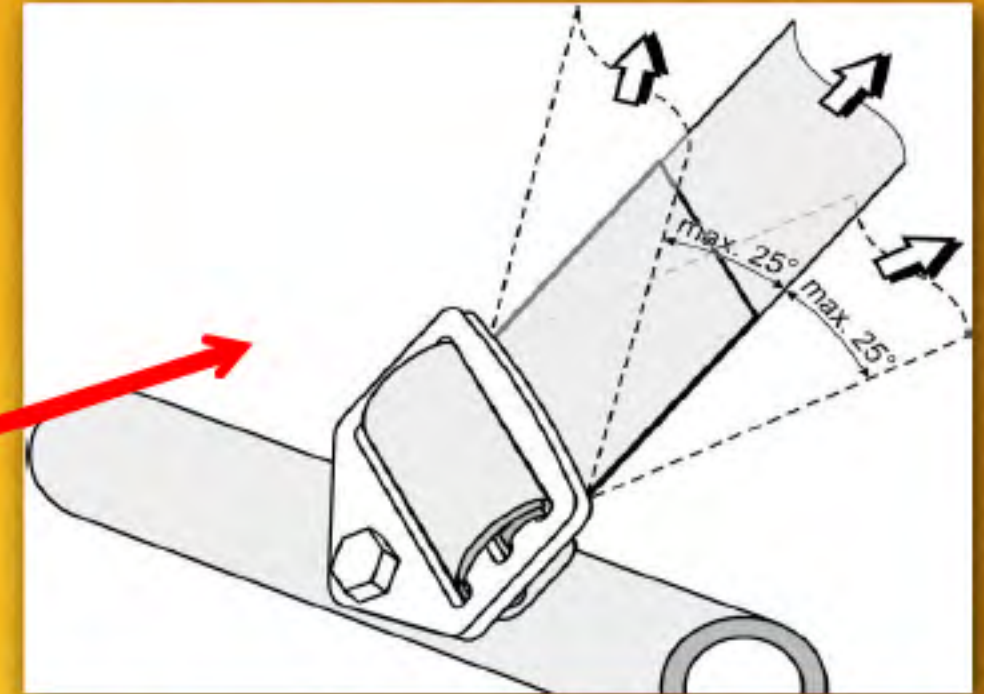
If belts must be mounted more than 18" from the shoulders, cross the tail straps.



When wrapping, place 3-bar adjuster close to wrapping point and always add locking loop (Step 3).

More Best Practices With Safety Harnesses

- Keep a checklist of best practices for belts.
- When mounted, all belts should be as short as possible.
- Always mount the anchors in the direction of pull when in use.
- Shoulder belt adjusters should be low on the chest to prevent contact with neck in an accident or interference with legs of a Head Restraint.
- No part of the belt should rub against an opening in the seat.
- Replace belts after a heavy impact.

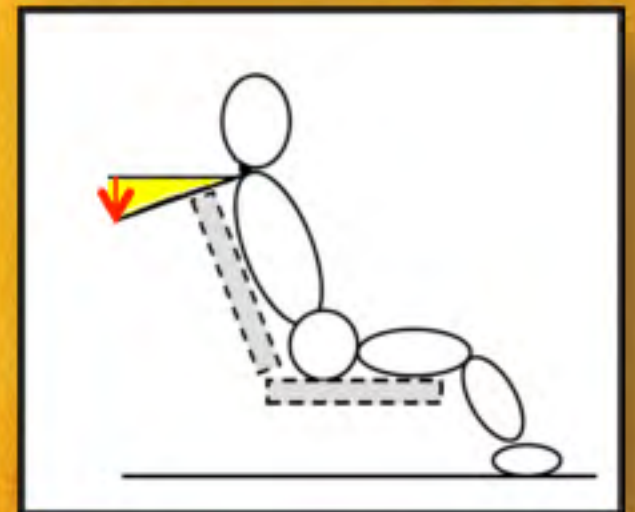
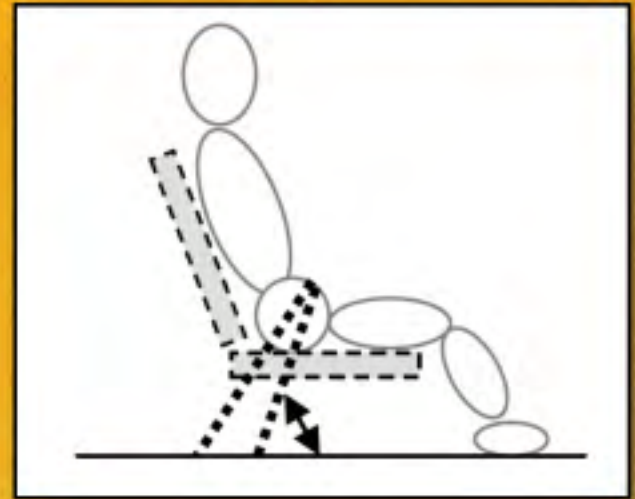


More Best Practices With Safety Harnesses

- Advantages of 2” belts are a snugger fit across the pelvis for better retention and possibly a better fit with a Head Restraint.
- For drivers more than 200 pounds or faster than 210 mph -- we recommend the strongest belts available like Simpson Platinum 3-inch belts.
- Polyester belts perform best because of less elongation and more uniform elongation versus nylon belts.

Priority Checklist of Best Practices for Belts

- Mount Lap Belts at -80 degrees to -45 degrees.
- Lap Belts should lie flat across the pelvis.
- Buckle 1 to 2 inches below the navel.
- Install a 6-point harness.
- Or, add 2 Sub Belts to create a 7-point harness.
- Mount Shoulder Belts within -20 degrees from the top of shoulder including Head Restraint.
- Keep mounting points close to shoulders.



No HANS... No Hybrid!

For decades, drivers who died of head injuries in crashes were thought to have hit the wall or some other object with their head and helmet. Then it became clear that basal skull fractures were often killing drivers.



Once a Harness System has been properly installed, drivers need a Head Restraint to prevent the head whip that leads to basal skull fractures.

Stop the Head in Sudden Stops

- Top speed does not always determine vulnerability to a head or neck injury.
- Head whip is caused by the sudden change in velocity (Delta V).
- Sled tests at Delta V of 42 mph confirmed neck tension exceeded the threshold for a fatal injury (4,000 Newtons).

Sled test at 42 mph without Head Restraint:
Neck tension exceeds threshold for fatal injury.



Sled test at 42 mph with Head Restraint:
Neck tension far below threshold for fatal injury.



CHECKLIST

Benefits to Wearing an HNR

- Quickly back racing after repairs to the car.
- Back at work Monday morning.
- Far less likely to pay large hospital bills or worse.

Repairs to
the car are
relatively
easy.



CONSEQUENCES

Not Wearing a Head Restraint

- When you don't have one, it's too late if you need one.

Excuse No. 1 -- 'I don't go fast enough.'

Excuse No. 2 -- 'I need a new set of tires and can't afford one.'

Excuse No. 3 -- 'He had one, but he left it on the truck.'

Head Restraints --
better to have one
before you need
one...



CHECKLIST

Seat, Surrounds, Nets Crucial in Side Impacts

- Head Restraints work in frontal impacts and up to 30 degrees in offset impacts.
- Head surrounds and/or side nets protect head and neck in oblique, side impacts.
- Seats with integrated shoulder supports are needed for side impact protection.



Head surrounds and/or side nets are critical in side impacts.



Side Nets Are Proven Protection



Without Side Net

- Shoulder and pelvis control insufficient.
- Head, neck vulnerable.



With Side Net

- Head, neck, shoulder, pelvis controlled.
- Driver is contained.



Checklist for Head Restraints



- Use an SFI or FIA certified Head Restraint. Comfort is the deciding factor.
- Follow all manufacturer instructions, especially tether use.
- Practice exiting cockpit quickly while wearing *all* your safety gear.
- Review procedures for exiting when the car is resting upside down.
- Inspect Head Restraint after crash for damage or send it to manufacturer.
- Replace tethers after a heavy impact.



Checklist for Head Restraints



- The belts go over the Head Restraint (unless using over/under belts).
- Know the Head Restraint's recertification date.
- Neck collars are not Head Restraints. (But can be worn with one.)



Safety equipment, cars, tracks and speeds all continue to change over time. To keep up with the latest information always check with your trusted supplier. This is our first issue of *15 Minutes Can Save Your Life*. We expect to update it occasionally as racing and safety standards evolve.

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