Trailer Chains for Towing
"The Ties that Bind"

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PLEASE NOTE

This document may have been updated with new information, changes, or corrections.

Be sure to visit my presentation web site and download the latest version of this document. It could make an important difference in your work!

http://aviation.derosaweb.net/presentations

Thank you, John

My Back Story

My story begins driving back from Utah in 2013. I was traveling at 60+ miles an hour in a highway construction area in downtown Omaha, Nebraska. I suddenly felt my glider trailer doing a rather wild dance. What is going on?

I looked in my rearview mirror and saw my trailer was moving violently side to side. It took me a second or two to realize that my trailer's coupler had **come off the tow ball**!! **Holy @#$%!**

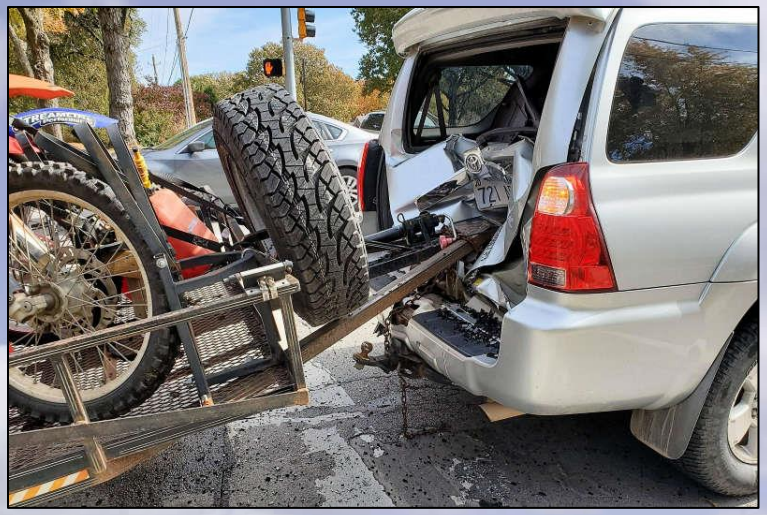
Steer straight! Let off on the gas! NO BRAKING! And slowly pulled over.

I was very lucky that day. I was lucky that the trailer didn't completely disconnect from the tow vehicle. I was lucky the trailer didn't topple end-over-end or pull the vehicle (and me) into the guardrail. I was lucky that my glider wasn't destroyed. I was lucky that I wasn't hurt. I was so very lucky that innocent nearby drivers or passengers weren't injured … or worse.

I was very lucky that day. What saved me from disaster that day in Omaha were the stout chains and other strong equipment that connected my vehicle to my trailer.

So, how good are your chains?

Please Don’t Let This Happen To you



Video: https://www.youtube.com/watch?v=iCDt4tjxp-E

Lousy Chains That I have Seen They GREATLY Worry Me

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  - http://aviation.derosaweb.net/presentations/#trailerwiring
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Introduction

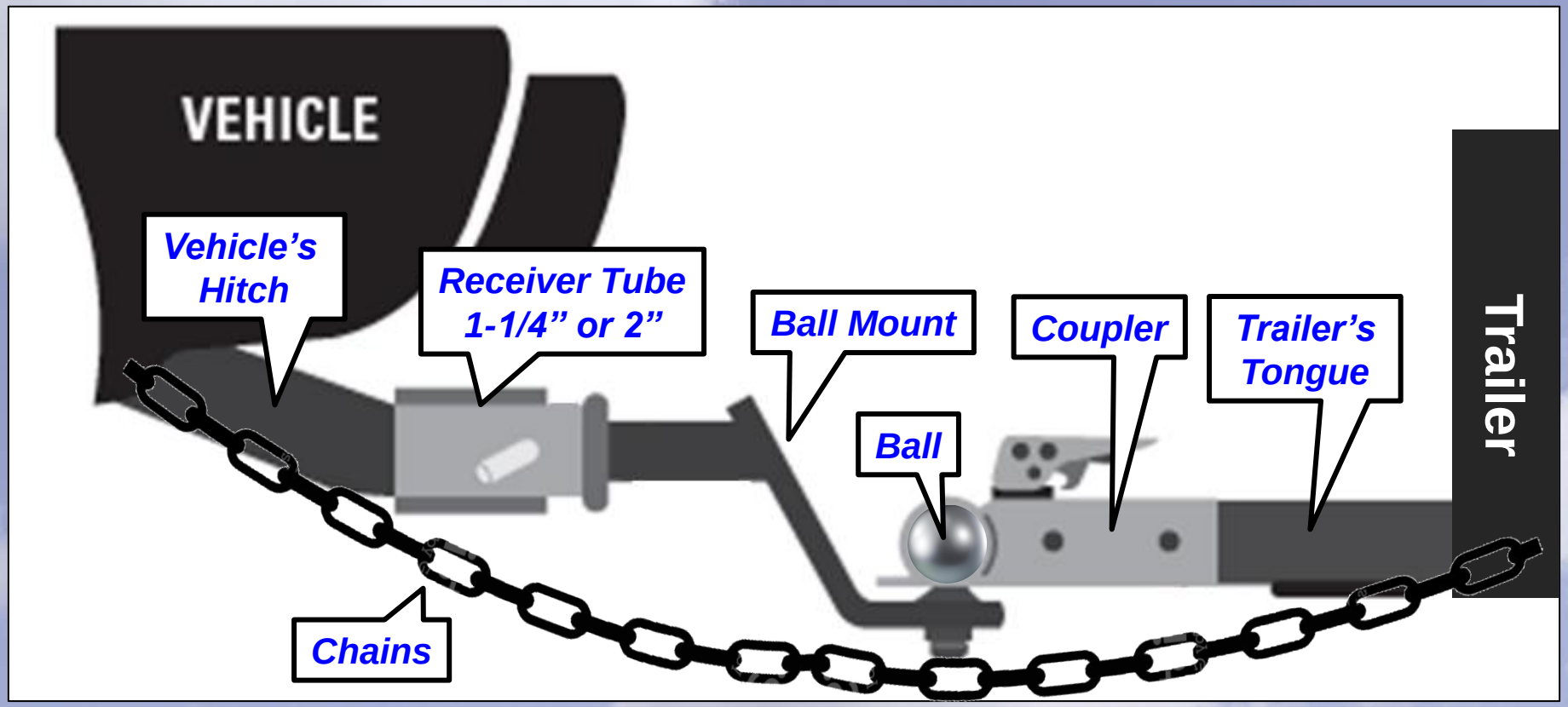
You just purchased a glider that you are so very proud of. It cost you many months of your hard-earned money. The trailer it came in is now attached to a vehicle that also cost you many months of hard-earned money.

These two rather valuable pieces of property are connected to one another with possibly the cheapest, weakest, rustiest, hardware possible. Does this make any sense at all?

Of course, the answer is obviously “no”. Maybe you truly have connected the vehicle and trailer with what you believe is a safe and robust assemblage of components. Are you sure?

By taking some time, and the advice of this presentation, you will make sure that your next “soaring safari” ends up as happily as you felt when you bought that glider in the first place.

Trailer/Vehicle Components Nomenclature



NOTE: Every State in the U.S.A. requires chains to be used on all Trailers!

Assumptions for this Presentation

As part of this presentation I will assume that your trailer and vehicle is already equipped with the following minimum equipment and capacities.

The following topics will not be covered in this presentation.

1) A vehicle with the towing capacity sufficient for your trailer's weight
2) A vehicle hitch/receiver with towing capacity for your trailer's weight
3) A ball mount with the appropriate "drop" for your trailer
4) The trailer has a good quality coupler
5) A ball sized to fit your trailer's coupler (2", 50mm, etc)
6) Your vehicle has a trailer lighting connector *
7) Trailer lighting connector that matches your vehicle *
8) Details on the trailer brake mechanism (electric or mechanical)

If you do not have all of these items in place, or to the incorrect capacity, or you are unsure if you do, you must contact your local trailer accessory dealer and make things right.

* For more details on trailer wiring see my presentation:
http://aviation.derosaweb.net/presentations/#trailerwiring

Warning About Mismatched Sizes of Couplers and Balls!

NEVER, EVER, EVER, EVER, EVER

… have a coupler that does not
exactly match the size of the ball!

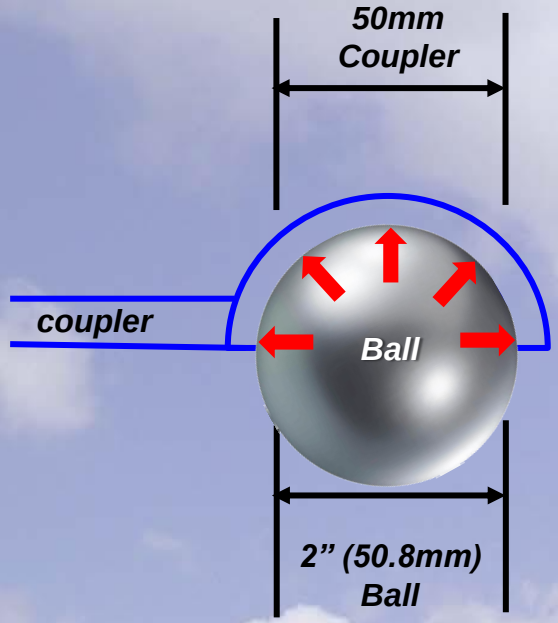
A coupler/ball **mismatch** is incredible dangerous and can **EASILY** cause the trailer to depart from the vehicle!

Prime Example: The coupler on European made glider trailers are often 50mm. This 50mm coupler should **NEVER EVER** be connected to a 2” ball because the fit is too tight and can unscrew the ball from the mount.

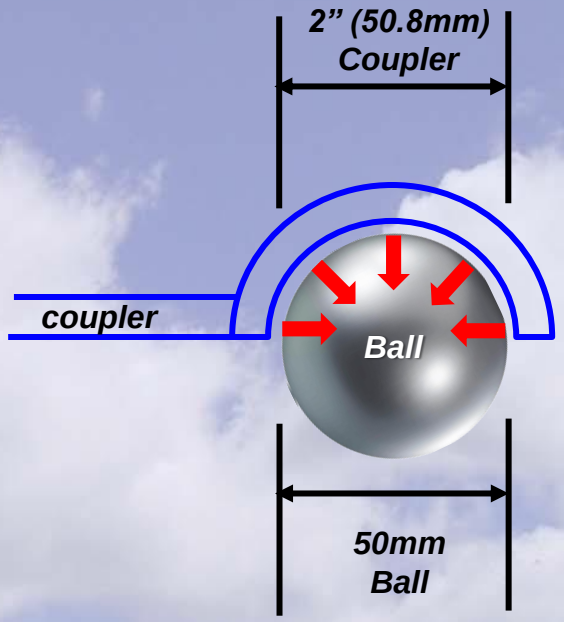
Details on the next slide.

Warning About Mismatched Sizes of Couplers and Balls!

50mm Coupler and 2” Ball



2” Coupler and 50mm Ball



Difference: +0.8mm = TOO TIGHT
Friction may unscrew the ball from the ball mount and/or jam the ball onto the coupler

Difference: -0.8mm = TOO LOOSE
The coupler may release the ball

Trailer Chains

"Chains are Only as Strong as the Weakest Link"

Let's start with the basics - your chains. The act of your trailer becoming detached from your vehicle will exert a TREMENDOUS impact force on your chains as they become taut in an emergency.

Choose chains that are STRONGER than the total weight of your trailer. I personally like to use chains that are **twice as strong** as required.

Attach safety chains to the trailer and vehicle in a way that is stronger than the chain. Also, all the other parts, hooks/connections/hitch/etc, must also be as strong as the chain.

Choosing Trailer Chain

Chains come in many different strength ratings which can all look similar. Shown here are chains rated from 800 to 6600 lbs. Again, always choose a chain that is stronger than what your glider weighs. I personally like to use chains that are rated **twice** as strong as required.

Use of Chains Versus Safety Cables

While convenient these coiled cables have the same issue as chains that are too long.

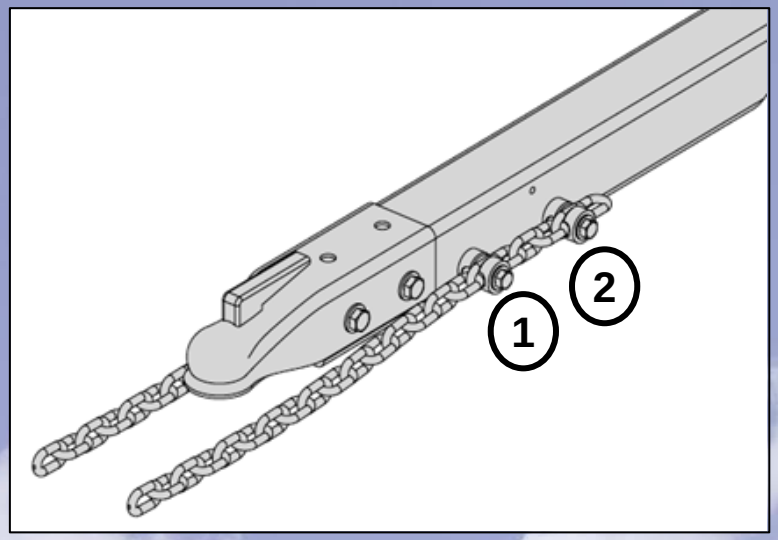
Reason: If the coupler comes off the ball the extra length of the cable increases the impact force which can break the connection between the vehicle and the trailer

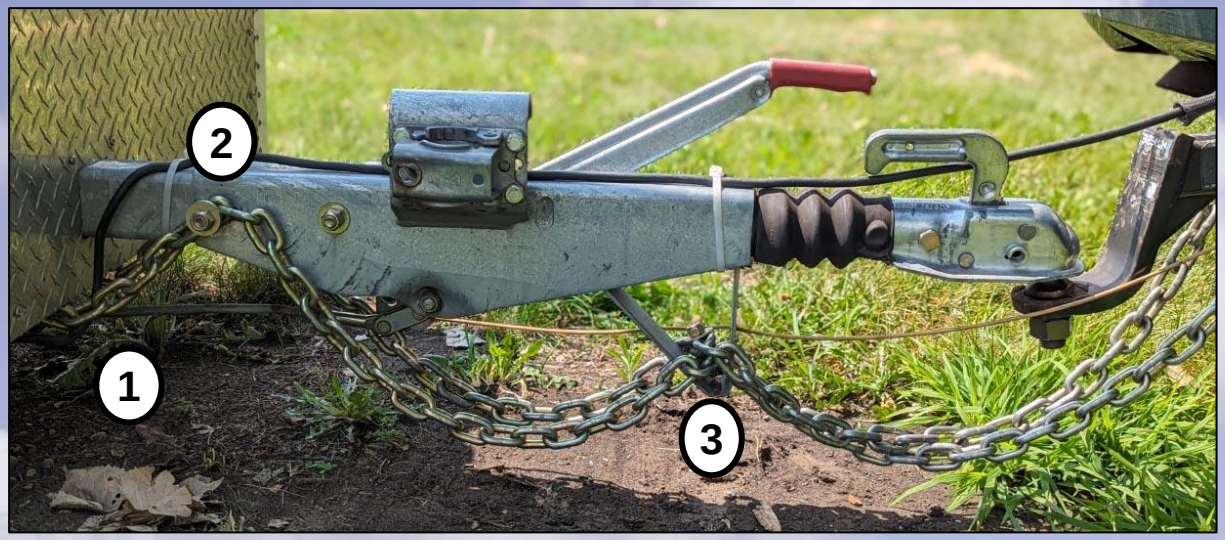
https://pacifictrailers.com/blogs/boat-trailer-tips-advice/safety-chains-vs-safety-cables

Attaching Chains to Your Trailer

Many trailers have the chains attached in only one place. I believe that attaching chains to the trailer in more than one location is the best plan.

Attaching chains in multiple places increases redundancy so if one bolt breaks then the others can help to save the day!



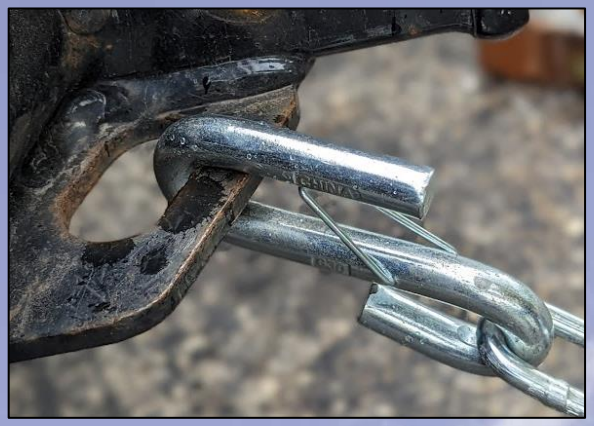


Used strong bolts to attach chains (grade 8 or stronger)

Sources: ***https://mechanicalelements.com/how-to-attach-safety-chains***
https://mechanicalelements.com/improving-safety-chains-attach-connections

Connecting Chains to Your Vehicle's Hitch

It is always best to make a connection directly to your hitch's "loops" with safety "S" hooks which have spring latches. This prevents the hook from bouncing out of the loops on rough roads.



Non-loop through

Loop through

Connecting Chains to Your Vehicle's Hitch

There are times where the vehicle's hitch's "loops" are too small to allow your chains to fit through.

In that case the use of strong quick links or shackles can be used to allow room for the chain to fit through.

Snap Link
"Good" up to 350 lbs.

Quick Links
Good up to 3,250 lbs.

Shackles
Good up to 4,000 lbs.

Proper Length of the Chains

To prevent damage to the chains they should be a **minimum of 5” above the ground**.

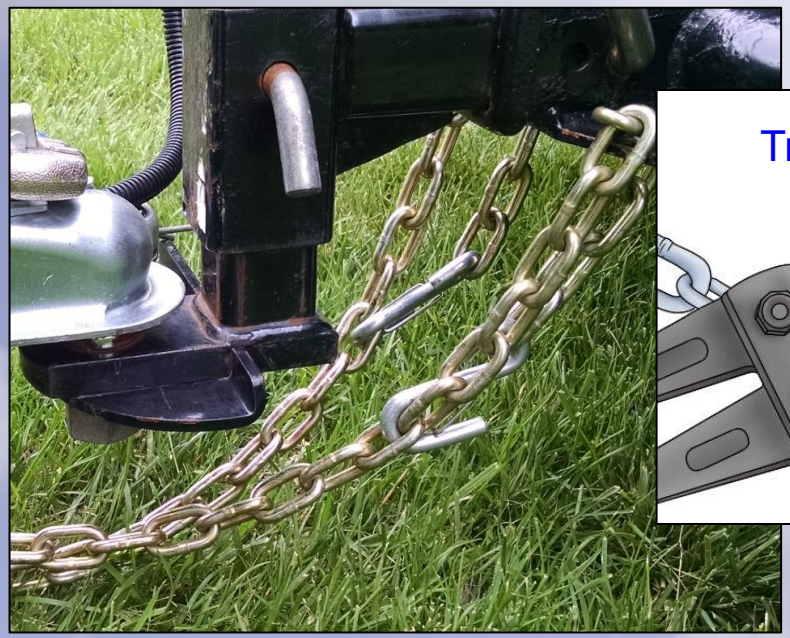
Chains should be **just long enough without** the chains becoming taut during sharp turns.
NEVER allow the chains to drag on the ground.

[See the next slides on the right and wrong ways to shorten chains which are too long]

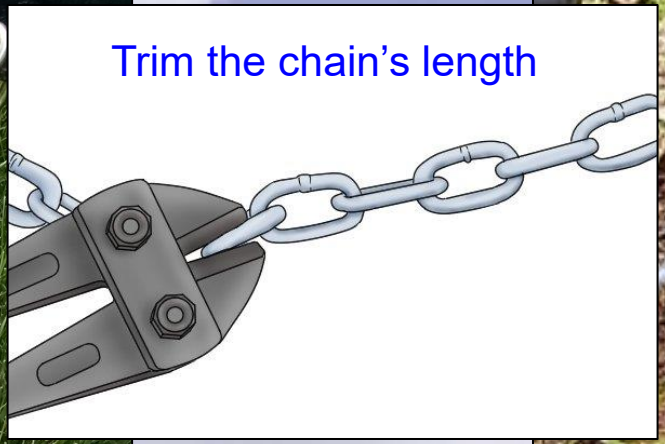
Sources: https://mechanicalelements.com/ways-to-shorten-a-chain/
https://www.youtube.com/watch?v=QMeqZFDFCaI

Shortening Chains – The **RIGHT!** Ways

Loop the chain through the hitch and hooked onto itself



Trim the chain's length



Take up the chain's slack with a Double Clevis

Sources: ***https://mechanicalelements.com/ways-to-shorten-a-chain/***
https://mechanicalelements.com/twisting-safety-chains/

Shortening Chains – The **WRONG!** Ways

Hanging the Chains

Reason: If the coupler comes off the ball the extra length of the chain increases the impact force which can break the connection between the vehicle and the trailer

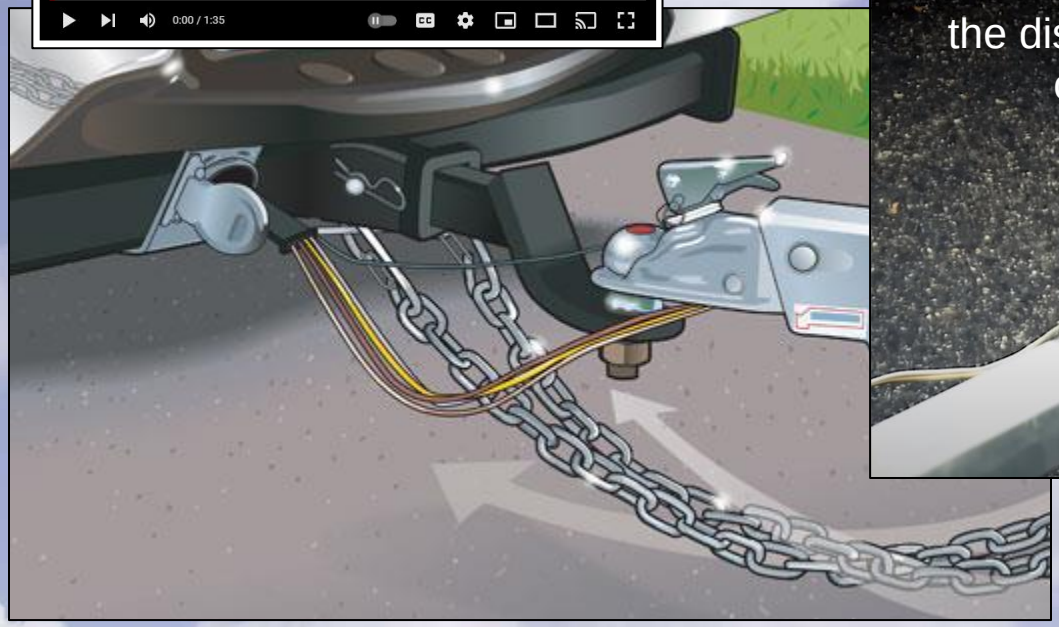
Twisting the Chains

Reason: Twisting weakens the chains. See the link below.

Source: https://mechanicalelements.com/twisting-safety-chains/

Crossing Your Chains

Chains **must be "crossed" over** one another between the trailer and the vehicle. If the trailer should disconnect from the vehicle the coupler/tongue of the trailer will be suspended on the chains and prevent the coupler from impacting the ground.

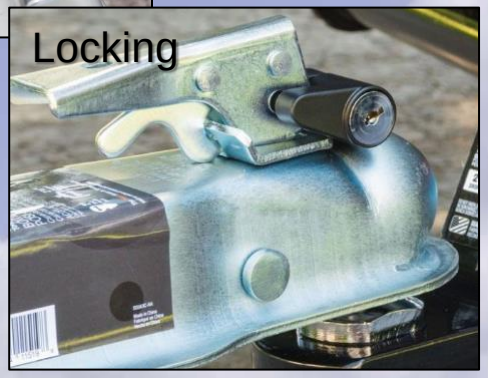


Source: https://nationaltrailerparts.com/2020/02/07/safety-chains
Video: https://www.youtube.com/results?search_query=trailer+chains+crossed

Locking the Coupler

You must always prevent the coupler from opening for **safety** and to prevent an accident.

Capturing Pin for a Standard US Coupler



Lock for a Cobra Trailer Al-Ko Coupler

https://wingsandwheels.com/cobra-coupler-lock-keys.html

Trailer Wiring

For details See …

https://aviation.derosaweb.net/presentations/#trailerwiring

Remember…

"Chains are Only as Strong as the Weakest Link"

Internet Resources

- ***Trailer Laws By State***
  - ***https://trailers.com/state-laws/***
  - ***https://worldpopulationreview.com/state-rankings/trailer-towing-laws-by-state***
  - ***http://exchange.aaa.com/wp-content/uploads/2012/08/AAA-Towing-Laws-8.2012.pdf***
- ***Safety***
  - ***https://pacifictrailers.com/blogs/boat-trailer-tips-advice/safety-chains-vs-safety-cables***
- ***Hardware Sources***
  - ***https://www.etrailer.com/***
- ***Trailer Engineering Details***
  - ***http://aviation.derosaweb.net/presentations/documents/Trailer-Engineering-Guide-for-Safety-Chain-Installation.pdf***
- ***Videos***
  - ***https://www.youtube.com/watch?v=QMeqZFDFCaI***
  - ***https://www.youtube.com/watch?v=iCDt4tjxp-E***

Other Presentations

- Glider Electrical Wiring
- Transceiver Troubleshooting
- Oxygen Systems
- Working with Glider Air Lines
- Trailer Wiring & LED Lighting
- Trailer Towing & Chains
- Soaring Pilot Relief Systems
- Battery Testing
- Emergency Location Devices
- Survival Kits
- Spar Alignment Tool
- L'Hotellier Fittings
- Carbon Fiber Panels
- IGC Filename Decoding
- Blanik L-23 Strut Work
- Removing Painted Lettering
- Open Glider Network
- Instrument Knob Extensions
- Landing Gear Warning

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Let me know of any comments!