



## **DARLINGTON ROLL**

On occasion vehicles are involved in a motor vehicle collision and come to rest upside down in ditches of varying sizes. Rescuers may be able to utilize frequently used tactics including side removals and tunnel operations. However depending on factors such as ditch size, vehicle construction, vehicle damage, etc., side and trunk access may not be practical. Just short of manipulating the patient and potentially causing further injury this leaves rescuers with one solution which involves the vertical lifting of the vehicle with heavy recovery vehicles or lifting equipment.

The Darlington County Extrication Team strived to develop and refine a tactic that provides a suitable path of egress when there are no other alternatives for a vehicle that has come to rest upside down. We wanted to accomplish this with limited equipment normally carried on rescue vehicles.

After hours of brainstorming and research, the solution involved the application of the basic components of a Res-Q-Jack system, 2 X-Struts®, a 15 foot Grade 80 chain, 1 ratchet strap, and 1 cluster. With this equipment rescuers have perfected raising vehicles from side to side and end to end. It took a redevelopment of these principles applied to a vehicle where the attachment points were several feet below the head of the strut.

The pictures above depict the setup of the equipment along with potential tactics. Although it looks complex it is relatively easy and adaptable to almost any style of below grade situation. Rescuers who are familiar with the tactic can begin pitching the car within five minutes while other rescuers stage equipment for further disentanglement procedures. In a matter of 10 – 15 minutes a path of egress can be made with tactics including a clam maneuver, side removal, dash displacement, and/or tunnel operation.



## 2-SIDED WHEEL RESTING HALF LIFT

An accident victim trapped beneath a wheel resting vehicle can be a time-consuming operation. The application of Res-Q-Jacks® to such a situation may be the answer to speed up the rescue.

If the patient's position allows for application of a single jack at the side of the vehicle near an 'A' post, a single lifting strut along with cribbing may be all that is necessary to free the patient utilizing the Res-Q-Jack® single-sided wheel resting half lift technique. However, the position of the patient may not permit application. Alternate techniques include the application of two res-q-jack® lifting struts in a 2-sided wheel resting half lift configuration. This method can be applied to the front end of the vehicle or the rear end. If purchase points are not readily available, a chain wrap will be the most likely choice for strut engagement.

As always, follow your lift with cribbing adequate enough to handle the load being lifted. Vehicle must be secured to avoid forward or rearward movement

## 2-POINT SIDE-RESTING STABILIZATION

We encourage the application of 3 or more stands for a side-resting vehicle. However the situation may demand that only 2 stands be applied. In the event that only 2 stands are applied, they should be applied in a way that they are directly opposite each other to avoid twisting the vehicle.



### **3-POINT SIDE-RESTING STABILIZATION**

The following guidelines assume that (1) jack stand and (2) adjustable stands are used. This technique will work in most instances with passenger vehicles including sedans, wagons, minivans, pickup trucks, hatch-backs, and SUVs. The techniques described here will not always fit the situation. Ground conditions, obstructions, vehicle type, or vehicle condition may prevent stabilization as described. However, the methods presented here give the rescue team a good starting point to work from.

1. Place wedges between vehicle and ground all around vehicle to increase ground contact.
2. Place (2) adjustable stands on one side of the vehicle using appropriate end fitting. Extend and pin at desired height. Maintain 6" overlap between tube sections.
3. Place (1) jack stand with appropriate end fitting on opposite side of vehicle somewhere between (2) adjustable stands as shown above. Extend and pin at desired height. Maintain 6" overlap between tube sections. Note that as an alternative, jack stand may be placed at undercarriage and adjustable stands may be placed at passenger compartment side.
4. All stands should lean toward vehicle at an angle of approx. 60 degrees and make contact with vehicle above vehicle center of gravity.
5. Attach all straps as low as possible to vehicle. Protect from sharp objects. Cam buckle straps are extended by squeezing buckle lever and pulling out by hook end. To tighten cam buckles, simply pull loose end of strap in line with strap connection points. Ratchet straps may be applied at center of base and attached to the vehicle as well. Situation may require base stakes or other supplemental base restraints.
6. Once stands have a good purchase and all straps are attached, wind jack handle to tighten stands, straps, and vehicle. Wind right to tighten, left to loosen.

Be sure all wedges, stands, and straps are tight.

Monitor throughout operation.





### **4-POINT SIDE-RESTING VEHICLE STABILIZATION**

Follow the same basic procedures & precautions outlined in the 3-point side resting stabilization with exception of using 4 jack stands. Applying 2 jack stands at the passenger compartment as shown will allow for more involved extrication operations later. Orient stands in opposing directions to resist vehicle movement in forward and rearward direction



### **4-POINT SIDE-RESTING VEHICLE STABILIZATION & LIFT**

The vehicle pictured to the left is 8" off the ground. 4-Point stabilization using 2 jack stands at passenger side of vehicle quickly and safely performed this maneuver without lift bags or any other lifting devices. As the jack stands raised the vehicle, cribbing & wedges were adjusted to maintain ground contact. This is a technician level operation requiring a thorough understanding of the equipment involved and it's proper application. The stands are oriented in such a manner as to restrict forward and rearward motion of the vehicle in addition to side to side movement. Redundant base restraints are a must as a safe back-up. Each situation may dictate unique precautions.

## **J-HOOKING SIDEWALL, REAR POST OR REAR DECK**

1. Lean buttress stands at a 50 to 70 degree angle with special chain grab end fittings against each rear fender.
2. Hook large J-hook with chain to sidewall at rear side glass or come through rear window and hook rear post or hook rear speaker deck through rear window. Run chain up to chain grab fitting. Chain should nest in slot on end fitting. Secure chain to end fitting with lock-pin. Keep chain length between J-hook and chain grab as short as possible.
3. Note: this step may not be necessary. Tighten slack and pull end fittings to fender using a ratchet strap from one end of chain to other end of chain at undercarriage. Keep strap protected from hot and/or sharp objects. Use lock pin to shorten chain and form chain loop to extend over hot exhaust-  
Step
4. If necessary, restrain chain to restrict end fitting from sliding on fender.
5. Attach a ratchet strap at bases and tighten. Situation may require base stakes or other supplemental base restraints.
6. Place wedges or similar in front of each 'A' post.

If a third stand is desired at the rear center of the vehicle, it may be added at any time. In this case the straps of the third stand may be attached to the bases of the fender stands. In addition to the fender stands being strapped to each other, straps would be run from the fender stand bases up to the front of the vehicle. This configuration would keep the passenger compartment free from strap attachment.



## 2-POINT, 3-POINT, ROOF REMOVAL

NOTE: These are technician level operations requiring a thorough understanding of the equipment involved and its proper application. Stabilization components must restrict forward and rearward motion, side to side and up and down movement. During any operation all stabilization components should be monitored closely. Redundant base restraints are a must as a safe backup. Each situation may dictate unique precautions.



Basic or initial roof resting stabilization performed at Orange County (FL) Fire Dept. Note the straps extending from base up to trunk lid. These straps will help restrain sway



Additional stability can be applied by adding a third stand at the rear as shown here in Dupont, WA. Note the counteracting directions of the straps.



With vehicle properly stabilized, the roof may be removed as shown above at Broward County (FL). A stake in the hood and the tie line at the rear restrict forward and rearward vehicle movement.



A weak floorpan may require intermediate support at the mid-section.



## FULL CHAIN WRAP METHOD

NOTE: This technique will work in most instances with passenger vehicles including sedans, wagons, minivans, pickup trucks, hatch-backs, and SUV's. The techniques described here will not always fit the situation. Ground conditions, obstructions, vehicle type, or vehicle condition may prevent stabilization as described. However, the methods presented here give the rescue team a good starting point to work from.

Lean buttress stands with special chain grab end fittings against each rear fender.

Run chain under rear of vehicle from one stand to the other with slack extending up to undercarriage on each side. Chain should nest in slot on end fitting. Secure chain to end fitting with lock-pin.

Tighten slack and pull end fittings to fender using a ratchet strap from one end of chain to other end of chain at undercarriage. Keep strap protected from hot and/or sharp objects. Use lock pin to shorten chain and form chain loop to extend over hot exhaust.

Restrain chain from sliding off rear of vehicle by attaching a ratchet strap to chain near trunk lid and running up to undercarriage in front of wheel assembly (swing-arm pivot point may be suitable).

Attach a ratchet strap at bases and tighten. Situation may require base stakes or other supplemental base restraints.

Place wedges or similar in front of each 'A' post.

Be sure all wedges, stands, and straps are tight. Monitor throughout operation.

If a third stand is desired at the rear center of the vehicle, it may be added at any time. In this case the straps of the third stand may be attached to the bases of the fender stands. In addition to the fender stands being strapped to each other, straps would be run from the fender stand bases up to the front of the vehicle. This configuration would keep the passenger compartment free from strap attachment.





## MODIFIED 4-POINT SIDE-RESTING VEHICLE LIFT

The traditional 4-Point Side-Resting setup involves two jack stands on one side of the vehicle and two adjustable stands on the opposite side. This would have the effect of lifting the entire vehicle when the jacks were operated.

This setup illustrates the placement of the jack stands across from each other and the adjustable stands across from each other on opposite sides of the vehicle. Naturally, the jack stands would be at the end of the vehicle to be lifted.

The photos here show this technique applied to the rear end of a vehicle. (Note that the cribbing was left out to better illustrate the ground clearance created. Always crib as you lift.)

Another picture shows the vehicle tied to a pole up hill and in front of the vehicle to restrain front to rear movement of the vehicle.



This picture shows the vehicle tied to a pole up hill and in front of the vehicle to restrain front to rear movement of the vehicle.









## **STABILIZATION OF VEHICLES ON SLOPED GROUND USING PICKETS**

If a potential exists for a vehicle to slide or otherwise move in a direction that the buttress system may not provide for, it may be necessary to tie the vehicle off in a manner that will prevent such movement.

The vehicle may be secured to trees, guardrails, other vehicles or any stationary object capable of handling such a load. If such objects do not exist in the vicinity of the crash, stakes, or pickets, may be set in the ground as an anchor point.

The photos above illustrate this technique. It may be necessary at times to apply more than one tie to the vehicle in various directions. Select an adequate stake and use appropriately