BADLAND®

GUIDE TO WINCHING

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Read the <u>ENTIRE</u> IMPORTANT SAFETY INFORMATION section beginning on page 4 of this guide including all text under subheadings therein before use of this product. The instructions that follow are basic guidelines only and cannot cover all situations encountered during use. The operator and assistants must carefully plan usage to prevent accidents.

WARNING SYMBOLS AND DEFINITIONS	
⚠	This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.
⚠ DANGER	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
⚠ WARNING	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
NOTICE CAUTION	Addresses practices not related to personal injury.

Symbol	Property or Statement
	Wear heavy-duty, cut- and abrasion-resistant leather gloves.
	Wear ANSI-approved safety glasses.
	Cut or sever hazard.
	Roller entanglement hazard.
	Hot surface burn hazard.
	Fire hazard.
	Caustic chemical (acid) hazard.
	Explosion hazard.
	Do not loop the wire or synthetic rope around object and hook onto itself.
	Do not place finger(s) through hook. Fingers may be caught and get pulled into fairlead or drum.
	Pull hook using strap only.

Symbol	Property or Statement
	Do not use winch in overwind orientation. (Rope enters/ exits at the top.)
	Use winch only in underwind orientation. (Rope enters/exits at the bottom.)
VDC	Volts Direct Current
A	Amperes
CCA	Cold Cranking Amperes
HP	Horsepower
fpm	Feet Per Minute
mpm	Meters Per Minute
RPM	Revolutions Per Minute
IP	International Protection rating Classifies the degrees of protection provided against the intrusion of solid objects, dust, accidental contact, and water.
G8	Grade 8 A fastener strength rating.

IMPORTANT SAFETY INFORMATION

WARNING! Read all instructions. Failure to follow all instructions listed on pages 4 to 6 may result in fire, serious injury and/or DEATH.
The warnings and precautions discussed in this manual cannot cover all possible conditions and situations that may occur. It must be understood by the operator that common sense and caution are factors which cannot be built into this product, but must be supplied by the operator.

Operation Precautions

1. Do not exceed load capacity. **Be aware of dynamic loading!** Sudden load movement may briefly create excess load causing product failure.
2. **Do not maintain power to the Winch if the motor stalls.** Verify load is within rated capacity for the wire or synthetic rope layer. Make sure the battery is fully charged. Use double line rigging whenever possible. Refer to *Double Line Winching* on page 18.
3. Wear ANSI-approved safety goggles and heavy-duty leather work gloves during operation.
4. Do not disengage clutch under load. Engage clutch before starting.
5. Keep clear of fairlead when operating. Do not try to guide rope.
6. **Do not place finger(s) through hook.** Fingers may be caught and get pulled into fairlead or drum. Use included strap to hold hook instead.
7. Stay out of the direct line that the rope is pulling. In case it slips or breaks, it will “whiplash” along this line.
8. Do not use for lifting or moving people.
9. Use a spotter to assist you in assuring that it is safe to operate the Winch. Make sure the spotter is out of the way of the vehicle and the rope before activating the Winch.
10. Do not use vehicle to pull on the rope and “assist” the Winch.
11. Place a heavy blanket or winch damper over the rope span 6 feet from hook to help absorb the force released if the rope breaks. Refer to Figure A.

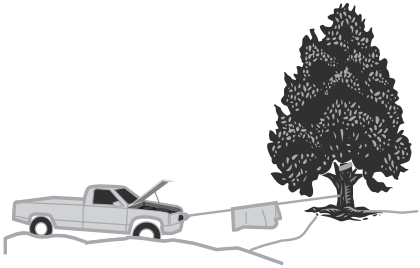
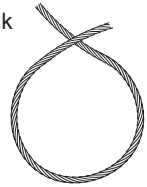


Figure A: Whiplash Dampening Blanket or Winch Damper

12. Use as intended only. Do not lift items vertically or use for aircraft purposes.
13. Prevent entanglement. Do not wear loose clothing or jewelry, as they can be caught in moving parts. Non-skid footwear is recommended. Wear restrictive hair covering to contain long hair.
14. Disconnect remote control and turn off wireless function before working near the rope, drum, fairlead or load, to prevent accidental starting.
15. Inspect before every use; do not use if damaged or parts loose. Examine the Winch for structural cracks, bends, damage, frayed or kinked wire rope, frayed or cut synthetic rope, and any other conditions that may affect the safe operation of the Winch. Do not use the Winch even if minor damage appears.

16. A kink permanently weakens a wire rope, even after it is straightened out; kinked wire rope can fail suddenly and must not be used. Keep wire rope straight to avoid kinking the wire rope. The illustrations below show how a kink forms:

   a. This illustration shows a kink about to form. At this point the winch should be stopped and the wire rope should be straightened out to prevent kinking.



   b. This wire rope is kinked. It is too late to reverse the damage at this point, the wire rope must be discarded. It is permanently damaged and must not be used.

   c. This is a kinked wire rope that has been straightened out. Even though it has been pulled straight, some wires in the wire rope are stretched, and others are severely bent, if not broken. The unstretched wires will take more load and can fail suddenly before the rope reaches its capacity. This wire rope must be discarded and not be used.

   A kink permanently weakens the wire rope, even after it is straightened out; kinked wire rope can fail suddenly and must not be used.

17. Keep children and bystanders away while operating. Distractions can cause you to lose control.

18. Stay alert, watch what you are doing and use common sense when operating. Do not use a winch while you are tired or under the influence of drugs, alcohol or medication. A moment of inattention while operating winches may result in serious personal injury.

19. Do not overreach. Keep proper footing and balance at all times. This enables better control of the Winch in unexpected situations.

20. Hook onto the object using a pulling point, tow strap or chain. Do not wrap the rope around the object and hook onto the rope itself. This can cause damage to the object being pulled and kink or fray the rope.

21. **Do not use a Recovery Strap while winching.** They are designed to stretch and can suddenly whip back towards the operator during a winching operation.

22. Do not operate the Winch at extreme angles. Do not exceed the angles shown in Figure B for a roller fairlead and Figure C for a hawse fairlead.

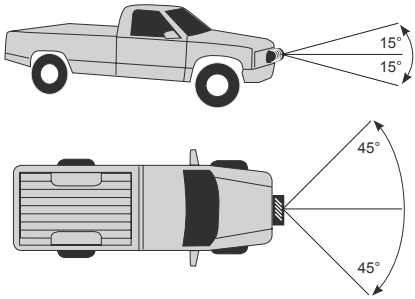


Figure B: Roller Fairlead Maximum Winching Angles

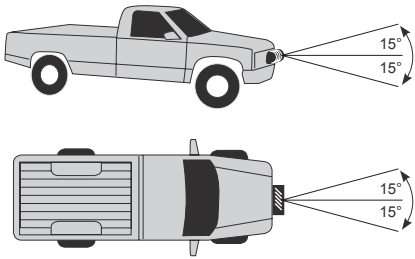


Figure C: Hawse Fairlead Maximum Winching Angles

23. If the object to be pulled must be pulled at an angle in relation to the Winch, use a snatch block (sold separately) and an anchor point directly in front of the Winch, as shown in Figure D, to keep the rope pull straight.

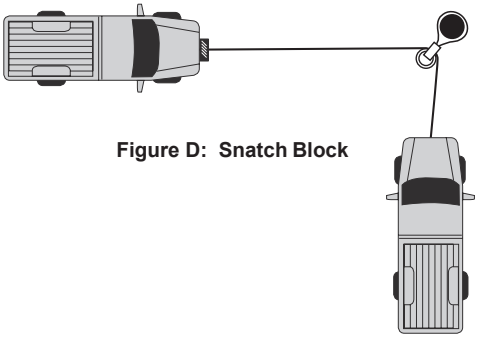


Figure D: Snatch Block

24. Wrap rope under tension before use. Otherwise, rope may bind during operation.

25. Keep clear of rope, hook, and load while winching. Do not step over rope. **Do not push sideways against rope under tension; rope might break under this load and recoil back, striking the person pushing against it or a bystander.**

26. If rope begins to get entangled, stop Winch immediately and release rope using switch.

27. Only winch with the winching vehicle's transmission in neutral. Winching with a vehicle's transmission in gear or park may damage the transmission. A vehicle's transmission is not designed to handle that type of load.

28. Broken strands of a wire rope will be sharp. Wear heavy-duty work gloves when handling a wire rope. Do not slide a wire or synthetic rope through hands, even with gloves on.

29. Winch motor will be hot during and after use. Keep clear.

30. Do not power the hook all the way into the fairlead or Winch.

31. To prevent accidental starting, unplug winch controls and any RF receivers immediately after extending or retracting. This is especially important before rigging, installing, free spooling, or servicing.

32. People with pacemakers should consult their physician(s) before use. Electromagnetic fields in close proximity to heart pacemaker could cause pacemaker interference or pacemaker failure.

Service Precautions

1. Wear ANSI-approved safety goggles and heavy-duty leather work gloves during service.

2. Disconnect power to Winch and allow it to cool completely before service.

3. Use supplied power cords, rope or cables listed in manual only. Do not use thinner/longer cables or link multiple cables together.

4. Have the Winch serviced by a qualified repair person using only identical replacement parts. This will ensure that the safety of the Winch is maintained.

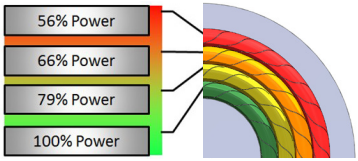
5. Maintain labels and nameplates on the Winch. These carry important safety information. If unreadable or missing, contact Harbor Freight Tools for a replacement.

SAVE THESE INSTRUCTIONS.

Basic Winching Tips

- **ESTABLISH A DANGER ZONE:**
  At least 20 ft on each side of the winch line and beyond the vehicle and anchor point. Make sure no people enter during the winching operation or when the line is under tension.

- **FIRST LAYER WINCHING:**
  Winch with the most rope out possible to utilize the maximum power of the winch and prevent overloading and overheating.



- **WINCH RECOVERIES ARE SLOW:**
  Take time to properly evaluate the situation, and take all safety precautions. The loads that the winch can generate are extreme.

- **USE A SNATCH BLOCK:**
  When in doubt of the recovery load or if the two vehicles are within 20 ft of each other, use a snatch block for a double line pull.

- **KEEP THE LINE STRAIGHT:**
  Winch with the rope as straight as possible to the winching vehicle. Use a snatch block if needed.

- **KEEP VEHICLE RUNNING:**
  The winch will place an enormous amount of strain on the vehicle electrical system. Keeping the engine at 2000 RPM can provide some help from the alternator.

- **KEEP THE VEHICLE IN NEUTRAL:**
  The parking brake is not designed to hold the loads that the winch can apply. If recovering another vehicle, keep foot firmly on brake. For self-recovery, carefully steer vehicle to avoid obstacles and spotter and keep foot off brake.

Before You Go

1. Check the power cables from the battery to the winch for abrasion and heat damage. Replace if worn or damaged.
2. The winch is an intermittently used product—over time the grease may settle in the gear train and make it difficult to freespool. Before a trip, check the winch for proper operation in three modes:
   • Power-IN • Power-OUT • Freespool
2. Inspect the rope for signs of abrasion damage, knots or kinks, or compression damage. Replace if damaged. See *Rope Inspection* on page 13 for more detail.
3. Ensure you have basic rigging hardware and safety gear such as: shackles, winch line damper, tree strap, safety glasses, and gloves. A snatch block is highly recommended.

Shackle

Damper

Tree Strap

Safety Gear

Snatch Block

Estimating Load

The ability to determine the load that the recovery will take is an important skill to learn. It allows you to properly setup rigging for a successful recovery the first time and reduces the chance of equipment damage and danger to bystanders.

Resistance Types

- ***Grade Resistance:*** The resistance of pulling a vehicle up a slope.
- ***Mire Resistance:*** The resistance of pulling a vehicle from soft terrain, such as mud, sand or snow.
- ***Tackle Resistance:*** The added resistance of snatch blocks during winching.

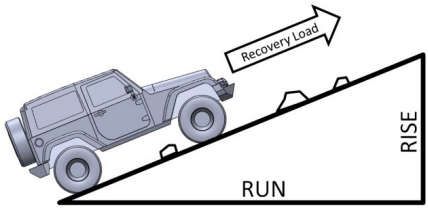
Grade Resistance

For recoveries or applications that pull a vehicle up a slope, grade resistance is a factor in the recovery load. This is because there are many other variables to consider off-road that add resistance. For example, the ground is not smooth or solid like pavement, the vehicle's wheels may not turn smoothly, the vehicle's steering may be broken, and a host of other factors.

For the majority of off-road recoveries, the grade resistance can be equal to the gross vehicle weight (GVW).

For smooth ramps used to load a trailer or other situations that are not as varied, you can use the following to estimate the recovery load. To estimate load you will need the gross vehicle weight (GVW) and the grade of the terrain.

- GVW can be found on the nameplate of the vehicle, or by a weigh station scale.
- % Grade = Rise / Run
  Example: Rise 4 ft / Run 10 ft = 40% Grade



Reference the chart to find the estimated recovery load resistance.

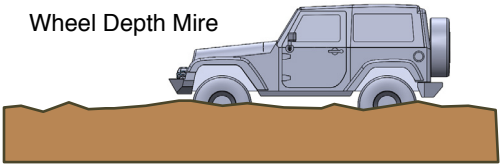
Example: GVW of 6000 lb on a 60% grade = recovery load of 51% of 6000 lb = About 3060 lb

Grade	Angle	% of GVW
20%	11	20%
40%	22	37%
60%	31	51%
80%	39	62%
100%	45	71%

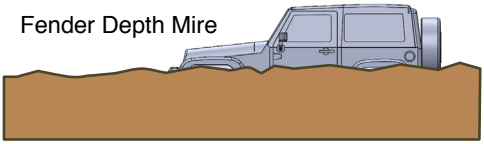
Mire Resistance

For recoveries in mud, sand, or snow, mire resistance becomes a factor. Mire resistance is the added resistance that the soft terrain adds as the vehicle is submerged beneath the ground level. The vehicle's GVW is used to estimate the recovery load.

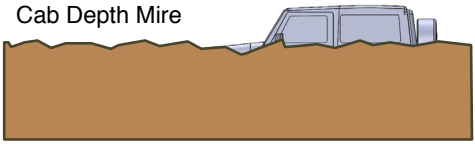
- **Wheel Depth = 1x GVW**



- **Fender Depth = 2x GVW**



- **Cab Depth = 3x GVW**

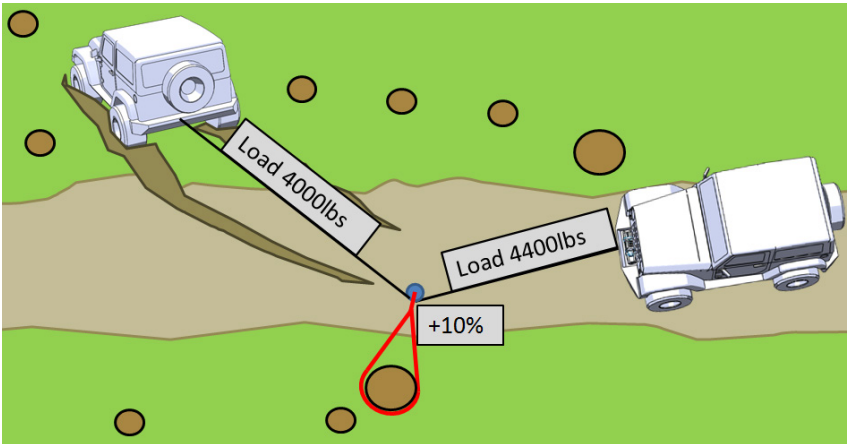


A snatch block is a great way to double the pulling power of your winch.

Tackle Resistance

Each shackle that is used in the recovery rigging adds a small amount of resistance to the winch. Each snatch block used in the recovery adds about 10% to the recovery load—add this to the recovery load on the winch.

Example: 4000lb recovery load +10% = 4400lb winch load



Rope Layer

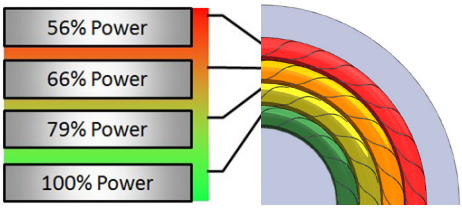
Imagine trying to hold a full length shovel horizontal by the very end of the handle—pretty hard, right?

Now imagine holding a shorter shovel by the end of the handle. Maybe not easy, but certainly easier than the full length shovel.

This is an example of how the winch must exert torque on the drum for the various layers of rope on the drum. The outermost layer of rope is represented by the full length shovel, and the first layer of rope is represented by the short shovel.

The winch and the vehicle electrical system have a limited amount of power available, so it is important to use the power in the most efficient way possible.

The winch can pull to 100% full rated load only on the first layer of rope that touches the drum.



For a constant load, as each layer of rope winds on, the winch must exert more torque on the drum, because of the added leverage of each layer.

<u>WARNING!</u> To prevent serious injury from sudden detachment of the winch rope leave at least 5 full wraps of rope on the drum.

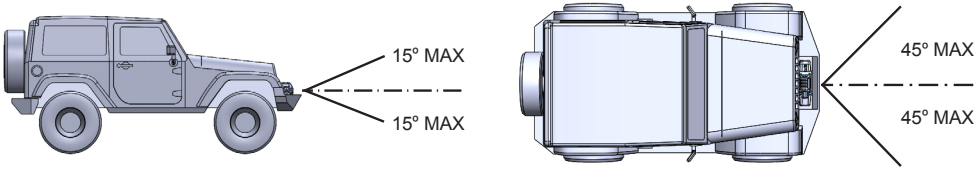
Rope Angle

Your winch is designed to handle off-angle pulls for brief periods. However, extended pulls on one side of the drum can cause damage to the winch and rope. Use a snatch block to change the direction or move the anchor point.

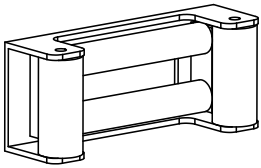
Try to winch with the rope as straight into the winch as possible.
If you do have to winch off-angle, do not exceed the angles shown below.

Spotter must be outside danger zone. Have spotter watch for even winding of rope on drum. If rope starts winding unevenly on the drum, stop winching and adjust rigging or vehicle position. Freespool the winch to remove the rope bunching on the drum flange and evenly spool the rope back on the drum, then continue the recovery.

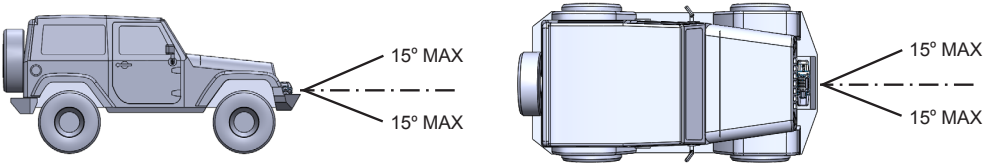
Or, plan ahead and use a snatch block to ensure that an off-angle pull will be avoided. Periodically check your fairlead for wear and replace as needed.



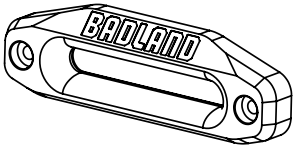
Roller Fairlead Maximum Winching Angles



Roller Fairlead



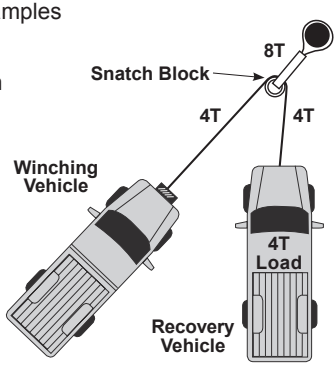
Hawse Fairlead Maximum Winching Angles



Hawse Fairlead

Snatch Blocks

Snatch blocks are the second most important accessory for your winch (the first being shackles). Being able to change the line direction for pulls around corners and multiple line pulls makes them extremely versatile. Let's understand how they work before we show examples of vehicle recoveries.



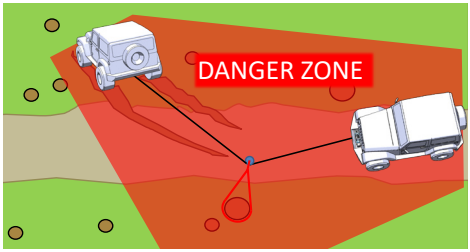
The most basic use of a snatch block is to change the direction of a rope. In the diagram a 4 ton vehicle is attached to a rope which passes around a snatch block to a winching vehicle.

Notice that the tension in each of the ropes is equal to the total load weight, and the snatch block must carry the combined load of the ropes.

This is a simplified example neglecting the angle of pull of the ropes. As the angle between the ropes increases, the load on the snatch block will decrease.

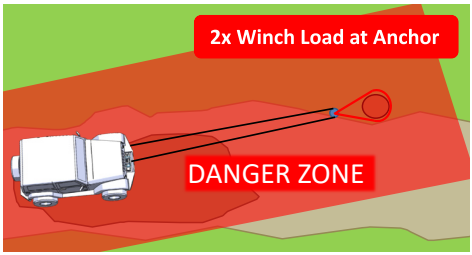
Example 1: Direction Change

In a direction change situation, the objective is to pull from a direction that has a greater impact on the stuck vehicle. In this example the weight is the stuck vehicle and the snatch block is attached to an anchor point. The snatch block does not provide any increase to the recovery force but it does change the direction of the pull.



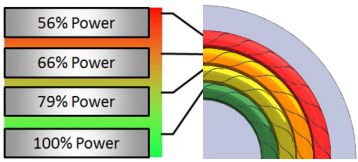
Example 2: Recovery Force Increase

In a situation where the recovery will take more force than the winch can provide, a double line pull should be used. This can help reduce the load on the winch and decrease the electrical load on the vehicle.



In this example the weight becomes the vehicle with the winch, and the snatch block is again connected to an anchor point. The usefulness of this rigging is to leverage the doubled force of the two ropes that the snatch block carries, allowing the recovery force to be double that of a single line pull.

Additionally the double line rigging will require more rope off the drum, allowing the winch to work on lower layers and provide more available pull force.



For technical questions, please call 1-888-866-5797.

Rope Inspection

The rope on the winch is the highest wear item in the winching system, and the most dangerous if not inspected regularly. Wire rope and synthetic rope have different wear and replacement criteria—it is important to highlight both.

Wire Rope–Always Replace

WARNING! To prevent serious Injury from razor sharp broken strands, wear heavy-duty work gloves when handling wire rope. Do not run hands along wire rope, even with gloved hands—some wire strands can be sharp enough to pierce gloves.

- Kinked Strands: Replace

- Separated Strand: Replace

- Broken Strands: Replace

- Twisted Rope: Replace

Synthetic Rope

CAUTION! Wear work gloves to protect from cuts from debris when working with synthetic rope.

- Abrasion: Severe abrasion must be replaced; minor abrasion or a fuzzy look can be monitored.

- Cut Strands: Replace immediately.

- Pulled Strand: Repair—work the strand carefully back into the rope.

- Compression: Commonly seen on drums. Repair—flex the rope without load to remove the compression.

Single Line Winching—Straight Pull

Setup

WARNING! To prevent serious injury from electrical fire: check the electrical cables to your winch for abrasion or heat damage before use. Replace worn or damaged cables immediately.

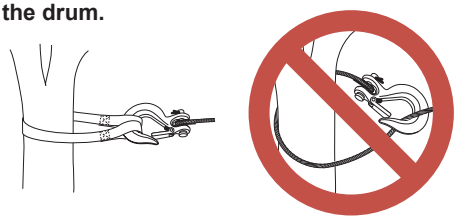
1. MAKE A PLAN. Pick a sturdy anchor such as a large tree, large rock, or other vehicle that is generally straight on and that allows for sufficient rope out to obtain maximum power from the winch.
2. PUT ON GLOVES. Regardless of synthetic or wire rope, heavy-duty work gloves are always a good idea.
3. Place the winch into freespool.

Rigging

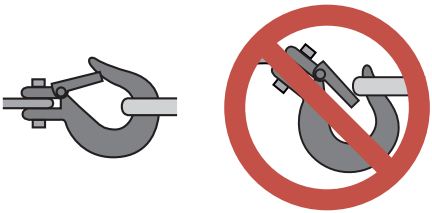
1. Pull the hook out using the strap to the anchor point. Don't forget any rigging you will need, such as a tree strap and shackle.

WARNING! To prevent serious injury from sudden detachment of the winch rope leave at least 5 full wraps of rope on the drum.

2. Secure the winch rope to the anchor point. Do not wrap the winch rope directly around a tree or rock. Not only will this damage or kill the tree, but it will also damage the rope where the hook attaches back to the rope.

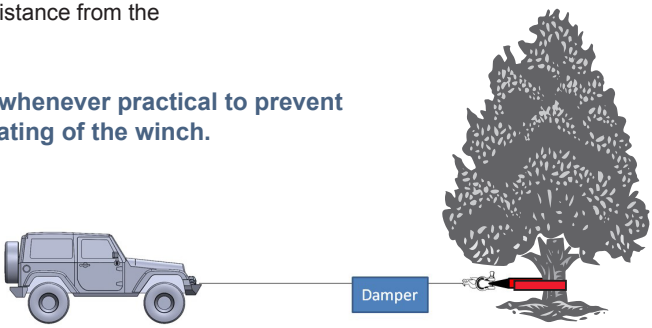


3. If possible, have the latch side of the hook facing up. This will help force the hook to the ground if the hook should fail or slip off the rigging.
4. Make sure the hook is fully engaged on the shackle or vehicle anchor point. THE HOOK LATCH MUST CLOSE.



5. Place a winch damper or other heavy object on the line, 1/3 of the total distance from the hook end of the rope.

Use double line rigging whenever practical to prevent overloading and overheating of the winch.



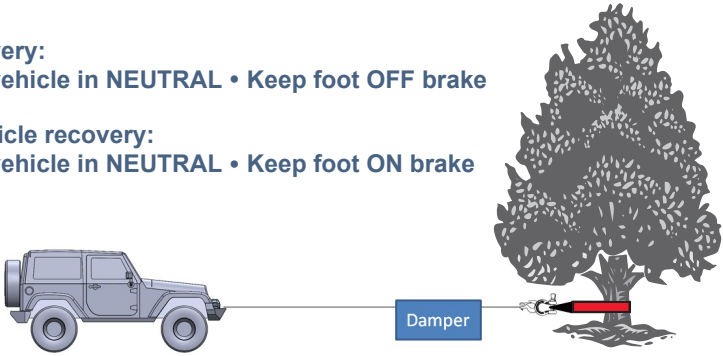
6. ESTABLISH A DANGER ZONE. At least 20 ft on each side of the winch line and beyond the vehicle and anchor point. Make sure no people enter during the winching operation or when the line is under tension.

<u>WARNING!</u> Do not allow anyone to stand near the rope, or inline with the rope behind the winch or anchor point while it is under power. If the rope should slip or break, it can suddenly whip back towards the winch or anchor, causing a hazard for anyone in the area established by the danger zone. Stand well to the side when winching.

Winching

For self recovery:
Place winch vehicle in NEUTRAL • Keep foot OFF brake

For other vehicle recovery:
Place winch vehicle in NEUTRAL • Keep foot ON brake

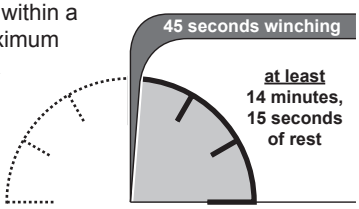


1. Re-engage the freespool clutch, and plug-in or connect the remote to the winch.
2. Slowly take up slack in the winch line to do a final check on the rigging setup. Designate one person as a spotter to watch for vehicle hazards and to make sure the rope is spooling on the drum correctly.
3. Perform the winching operation, with the vehicle in NEUTRAL or DRIVE. Watch your spotter, and monitor the battery voltage while winching. Increase the engine RPM to raise the battery voltage level.
4. When the vehicle is recovered engage parking brakes, remove all rigging and wind the rope fully into the winch USING THE HOOK STRAP.
5. Unplug or disconnect the remote and store it in the vehicle for the next use.

<u>NOTICE:</u> Your winch is designed for INTERMITTENT USE ONLY. If the motor stalls, STOP OPERATION and use a snatch block.

Duty Cycle (Duration of Use)

Avoid damage to the Winch by not winching for more than the prescribed duty cycle time. The Duty Cycle defines the amount of time, within a 15 minute period, during which a Winch can operate at its maximum capacity without overheating. For example, a Winch with a 5% duty cycle at its maximum load must be allowed to rest for at least 14 minutes, 15 seconds after every 45 seconds of continuous operation. Failure to carefully observe duty cycle limitations can easily over-stress a Winch contributing to premature Winch failure.



Single Line Winching—Snatch Block

Overview

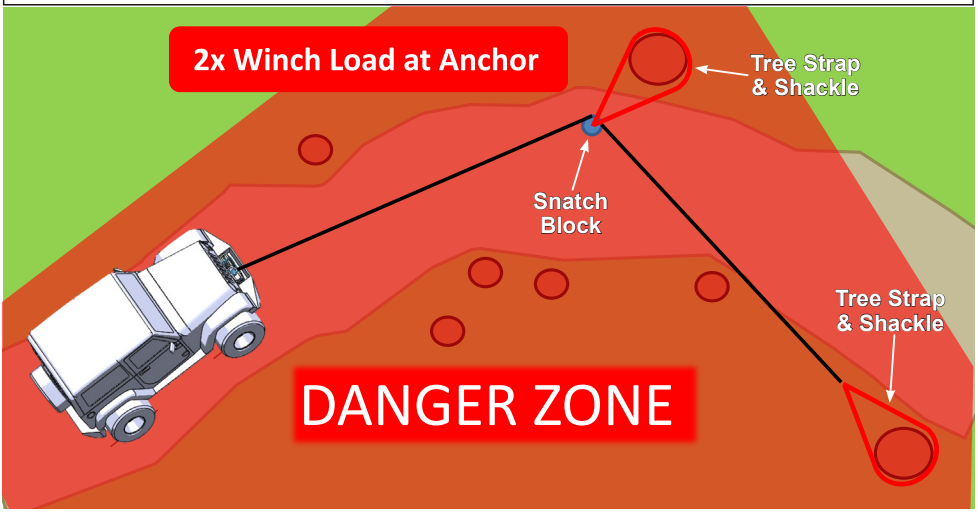
Not every recovery can be handled with a straight line pull. Often the most effective recovery requires an angle that cannot be accomplished from straight on. By using a snatch block on a single line pull, the pull direction can be changed without moving the winching vehicle.

Around a Corner

When stuck on a hill or tight trail and an anchor point is too close to winch effectively, a snatch block can be used. Not only does this lower the rope layer so that the winch can pull harder, it also allows the vehicle to remain connected to the farthest anchor once the snatch block is removed.

Pay special attention to the danger zone, since it is much larger than a straight line pull.

USE ALL OF THE PRECAUTIONS AND STEPS FROM SINGLE LINE WINCHING—STRAIGHT PULL



Rigging Needed:

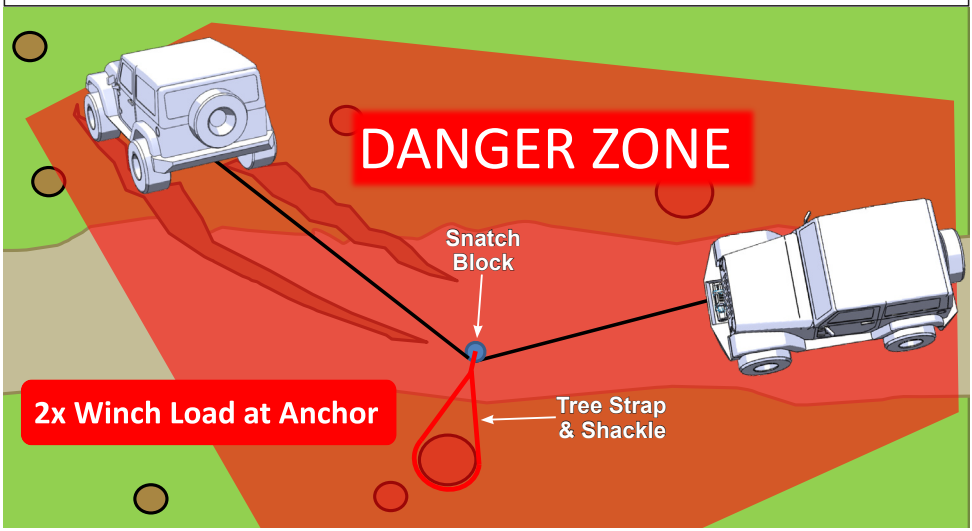
- 2x Tree Straps
- 2x Shackles
- 1x Snatch Block

Vehicle Off Trail

If a vehicle leaves the trail and becomes stuck, often the most effective way to return the vehicle to the road is using an angled pull since this pulls the vehicle most directly onto the trail. Find a suitable anchor on the opposite side of the trail to attach a snatch block to, and perform the recovery.

Pay special attention to the danger zone, since it is much larger than a straight line pull.

USE ALL OF THE PRECAUTIONS AND STEPS FROM SINGLE LINE WINCHING—STRAIGHT PULL



Rigging Needed:

- 1x Tree Strap
- 2x Shackles – Possibly more depending on tow points of stuck vehicle
- 1x Snatch Block

For self recovery:
Place winch vehicle in NEUTRAL • Keep foot OFF brake

For other vehicle recovery:
Place winch vehicle in NEUTRAL • Keep foot ON brake

Double Line Winching

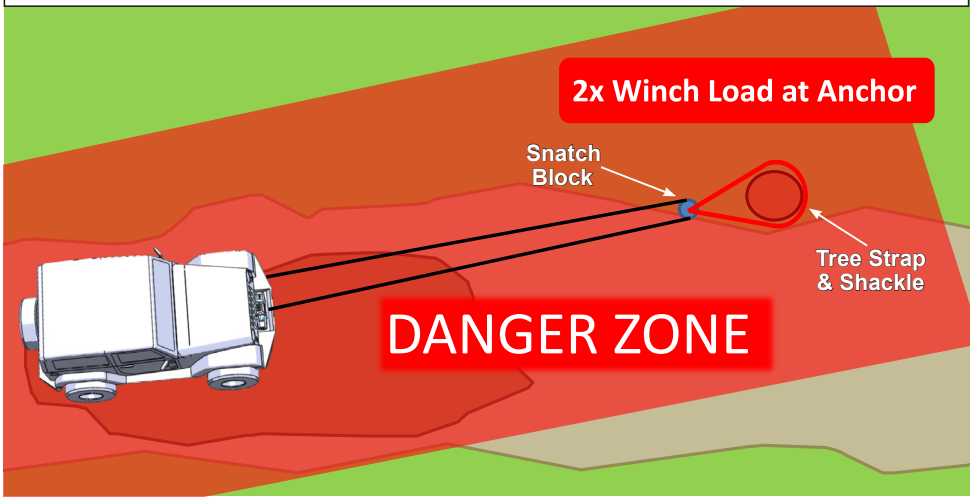
Overview

Certain recoveries require more force than a single line pull can provide. In these situations a double line pull is necessary to develop enough force to recover the vehicle.

Double Line—Self Recovery

For self recovery efforts that require more force than a single line pull can provide, use a double line rigging back to the winching vehicle. Make sure the rigging at the anchor is rated to withstand the estimated load to recover the vehicle.

USE ALL OF THE PRECAUTIONS AND STEPS FROM SINGLE LINE WINCHING—STRAIGHT PULL



Rigging Needed:

- 1x Tree Strap
- 2x Shackles – Possibly more depending on tow points of stuck vehicle
- 1x Snatch Block

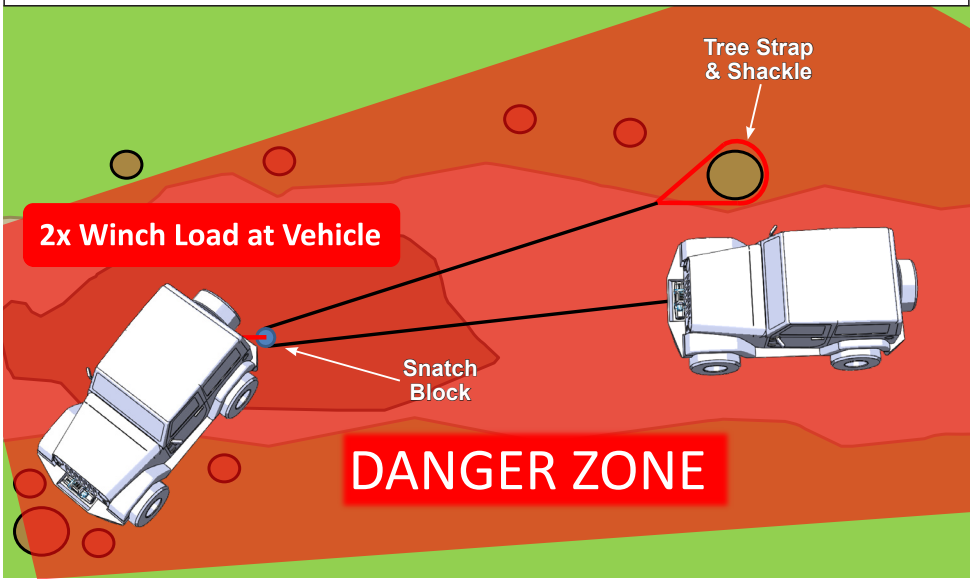
For self recovery:
Place winch vehicle in NEUTRAL • Keep foot OFF brake

Double Line—Other Vehicle Recovery

By placing the hook end at a stationary anchor or other vehicle and attaching a snatch block to the recovery vehicle, the load on the winching vehicle is reduced by 50%. This can be especially helpful in low traction conditions such as snow or mud.

Pay special attention to the danger zone, since it is much larger than a straight line pull.

USE ALL OF THE PRECAUTIONS AND STEPS FROM SINGLE LINE WINCHING—STRAIGHT PULL



Rigging Needed:

- 1x Tree Strap
- 2x Shackles – Possibly more depending on tow points of stuck vehicle
- 1x Snatch Block

For other vehicle recovery:
Place winch vehicle in NEUTRAL • Keep foot ON brake

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