GENERAL INSTALLATION

AND SAFETY GUIDE

FOR ZIP LINES

DISCLAIMERS

ACTIVITIES INVOLVING THE INSTALLATION AND USE OF ZIP LINES, TROLLEY, HANRESSES, BRAKING SYTEMS AND OTHER RELATED GEAR ARE POTENTIALLY HAZARDOUS BY THEIR VERY NATURE.

ALL INSTRUCTIONS IN THS MATERIAL ARE EXTREMELY IMPORTANT. OVERLOOKING OR IGNORING ANY OF THE FOLLOWING INSTRUCTIONS COULD RESULT IN RIDER INJURY OR DEATH. PLEASE TAKE ALL THESE INSTRUCTIONS SERIOUSLY.

ANYONE PURCHASING, INSTALLING OR USING EQUIPMENT FROM ZIP LINES CANADA MUST:

- *READ ALL INSTRUCTIONS REGARDING ITS CORRECT INSTALLATION AND SAFE USE;*
- *ENSURE PROPER OVERSIGHT, SUPERVISION AND INSTRUCTION (INCLUDING THE USE OF APPROPRIATE SAFETY EQUIPMENT) FOR THEMSELVES AND OTHERS USING THE EQUIPMENT;*
- *ENSURE ALL EQUIPMENT IS PROPERLY MAINTAINED AND INSPECTED FOR DAMAGE OR WEAR PRIOR TO EACH USE;*
- *ASSUME ALL RISKS AND ACCEPT FULL RESPONSIBILITY FOR ANY DAMAGE OR INJURY, INCLUDING DEATH THAT MAY ARISE FROM ITS USE.*
- *READ AND FOLLOW IMPORTANT INFORMATION AND CHECKLIST SHOWN ON PAGE _____*

****WARNING**** *DO NOT ATTEMPT TO RIDE YOUR ZIP LINE WITHOUT FIRST TESTING*

****WARNING**** *DO NOT ATTEMPT INSTALLATION OF USE OF ZIP LINE EQUIPMENT WHILE UNDER THE INFLUENCE OF INTOXICANTS OR WHILE DRINKING ALCHOL, SINCE THESE IMPAIR JUDGEMENT AND REASONING, THEREBY MAKING INSTALLATION MISATAKES MORE LIKELY.*

SECTION ONE: BEFORE YOU BEGIN

Please note these are guidelines only. No information provided in this booklet shall be viewed as professional instruction or advice. All written or spoken material is opinion and does not guarantee safety. All persons are wholly responsible for the safe selection, installing and operation of their zip line equipment. Obtaining professional advice and instruction when installing your zip line is strongly encouraged.

SITE SELECTION

The site selection process must be performed by a competent adult after all instructional material has been completely reviewed and understood.

Determine the most accessible locations for your rider to ***launch*** and ***dismount*.** This will dictate the installation of your zip line. Depending on the terrain, the dismount location may be at the end of the zip line rather than the low point of the cable. A platform may be required for access.

CLEAR THE ZIPLINE AVENUE of obstructions at least 7 feet below and 5 feet on both sides of the zip line over the entirety of the zip line avenue while supporting the heaviest riders. Remove large rocks, logs, branches, sharp objects, and other potential hazards.

SAFETY RIDING GEAR IS REQUIRED FOR ANY HEIGHT AND TERRAIN WHERE A FALL COULD RESULT IN INJURY.

ANCHORS

A typical zip line cable can apply 800 to 3,000 pounds of horizontal force to an anchor when loaded.

Do Not Use

- Building or Playground structures unless specifically built for zip lines
- Live power/telephone poles
- Dead trees or stumps
- Trees with rot, disease, structural cracks, excessive lean or exposed roots
- Trees in boggy, wet, sandy or loose soil.

This is only a partial list, you must use your good judgement to determine as to what is an appropriate anchoring point. If in doubt, call us to discuss.

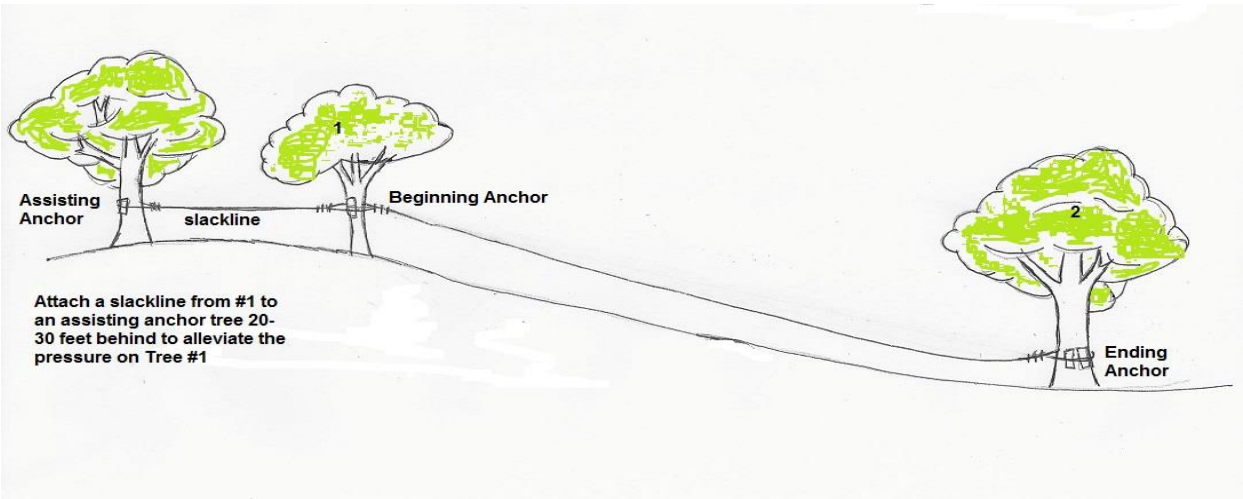
ANCHORING OPTIONS

TREES:

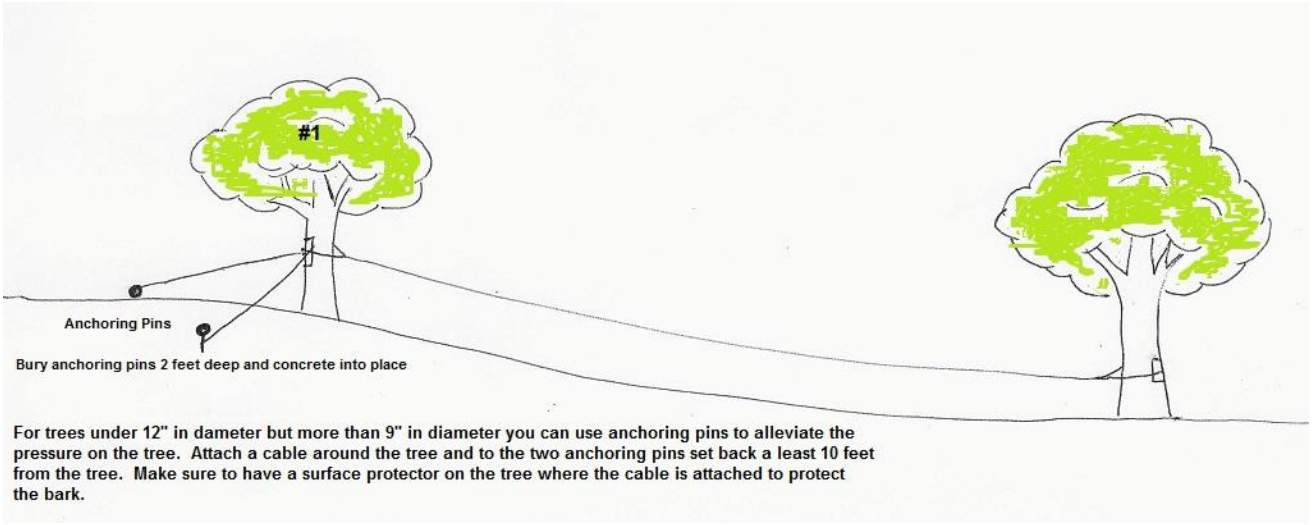
Tree trunks must have a ***minimum 12 inch diameter,*** at the attachment point. Do not attach to any limbs/branches other than a central trunk.

If you can't find two trees with a minimum 12 inch diameter, you can use an assisting anchor to stabilize your anchoring tree by two differing methods. Both methods require the anchoring tree to be a minimum of 9" in diameter.

a) Run a slackline leading from your anchoring tree back to a larger tree behind the anchoring tree. Make sure the slackline is tight and that it runs from the height of the cable that attaches on to your anchoring point. This will relieve some of the horizontal loading pressure of the zip line on your anchoring tree.



b) Attach a second cable to your anchoring tree that leads to two anchoring pins, firmly set into the ground. It is suggested that the anchoring pins be buried 2 feet into the ground and set in concrete or if you have bedrock – drill and set the anchors firmly in place. Run the cable around your anchoring tree and have either end of the cable attached to an anchoring pin – set at least 10 feet behind and off to each site of the beginning anchor tree. Make sure the cable you are wrapping begins at the same height as the zip line so that the horizontal loading pressure of the zip line is equally abated by the anchoring pins.



FREE STANDING POLES:

A free standing pole must be a minimum of 12” in diameter at the top and sunk a minimum of 5 feet in the ground, or 2 feet plus 10% of the pole’s total length if it is greater than 20 feet. Once the pole is put in the hole and is braced to stand straight, fill the hole with concrete 6 inches thick around the post for stability and then back fill.
Soil such as sand, rock or in high ground water environments may require alternative installation techniques and consultation with an engineer.

For wooden poles, eyebolts or cable slings should be anchored 12” or lower from the top of the pole and as close as possible to the zip line attachment point, and any attachment that passes through the wood should have a washer backup on the outside that can be visually inspected.

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- Posts with guy cables and ground anchors must be a minimum of 8 inches in diameter.
- Install guy anchor post at a distance equal to or greater than attachment height.
- Ground anchor posts must be sunk 4 feet into the ground, or 10% of post length plus 2 feet (whichever is greater). Secure with concrete 6 inches thick around post. Soil such as sand, rock or in high groundwater environments may require alternative installation techniques and consultation with an engineer.
- Additional depth, bracing, or guy wires may be needed for soft of unusual soil types.

Ask your power company about “retired” power poles and possible installation.

Installing a ground anchoring pin – make sure tension is tight between the ground anchor and the tree or post it is attaching to.

PLATFORMS:

There are many ideas available on the internet that will give you guidelines on the correct way to attach your zip line to a deck, playground platform or to a platform you can build yourself. For some ideas check out the photos at https://www.google.ca/?ion=1&espv=2#q=platforms+for+attaching+ziplines+photos . Your local building contractor can provide you with guidance as well.

PLEASE NOTE: Most building or backyard play structures are not designed to withstand the horizontal loading of a zip line cable. Design or retrofit accordingly to ensure your structure is not damaged and participants are not put at risk.

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TOOLS

The following tools are recommended for measuring elevation change of your zip line site.

Measuring Tape

Sight Level or Laser

Ladder

We recommend finding a landscape with a natural slope of 3% to 6% (a 3 feet to 6 feet drop per 100 feet)

CABLE SLOPE & SAG

CABLE SLOPE

The maximum allowable slope is 3% (3 feet drop per 100 feet of distance) for zip lines that will not utilize a bungee brake. The maximum allowable slope is 6% (6 feet drop per 100 feet of distance) for zip lines that utilize a bungee brake.

*****WARNING***** *Zip line must never exceed 6% (6 ft drop per 100 ft. of distance) riding slope. High speed collision with end point may cause injury or death.*

CABLE SAG

Cable tension is measured by cable sag:

- The cable, when bearing a test weight, should sag below the end where cable is attached.
- The sag needs to be approximately 2% of zip line's total length (2 feet per 100 feet of cable)
- The sag is measured at the cable's lowest point

WARNING *Do not attempt to ride your zip line without first testing.*

LOCATE ANCHORS

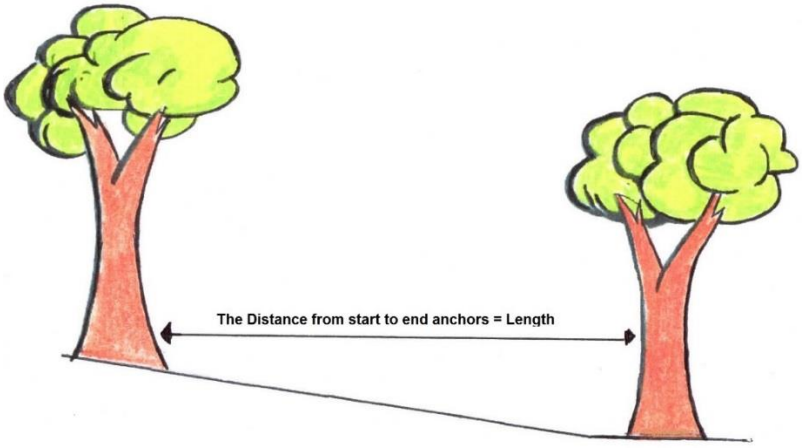
Make sure you have two solid anchors to attach the zip line to (for example 2 trees, minimum 12" in diameter**), that are suitable enough to allow about a 5-6% drop in cable (that is 5'-6'drop for every 100' of cable), and then allow a clear path for the rider. If there isn't a clear line you will want to do some clearing or trimming until it is safe for the rider. Usually you want a minimum of 6' of clearance all the way down the zip line path.

ZIP LINE WORKSHEET

To assist in helping you set up your zip line, follow these steps to determine the length, slope, sag, elevation change (if any) in your landscape and your starting and ending anchor points. Use this worksheet to fill in your information and do your calculations. (A worksheet example follows to provide more information)

STEP 1 - LENGTH

Measure the DISTANCE between START and END ANCHORS.

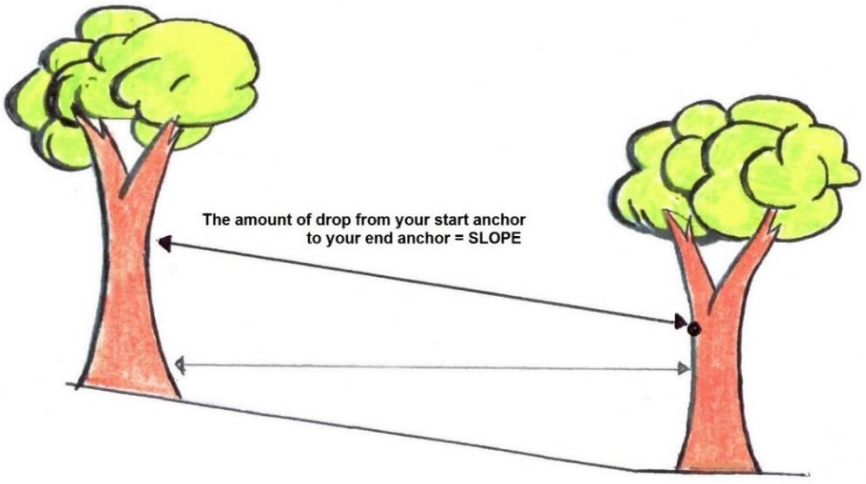


LENGTH = _____

Distance Between Anchors in Feet

STEP 2 – SLOPE

To calculate the SLOPE of the zip line, MULTIPLY LENGTH from Step 1 by .06 if you are using a braking system (multiply length from Step 1 by .03 if no brake is being utilized)



SLOPE = _____

Length x .06 (or .03 if no brake)

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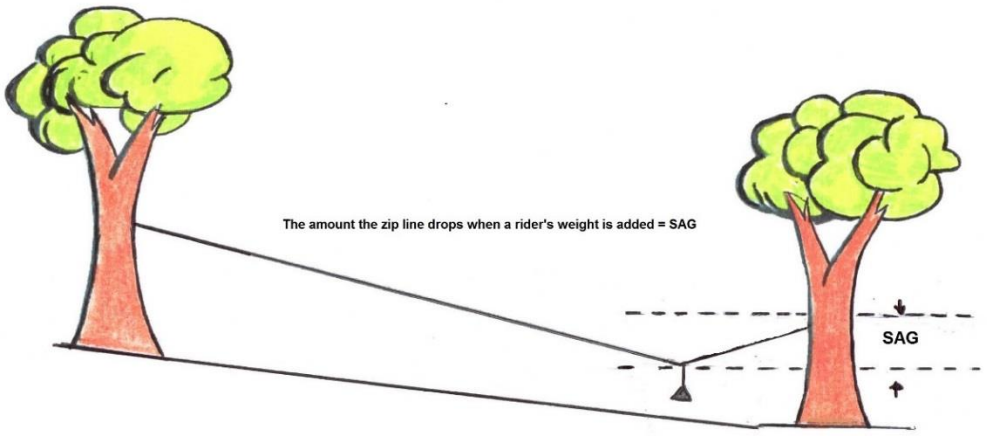
STEP 3 – SAG

To calculate the SAG, MULTIPLY LENGTH from Step 1 by .02



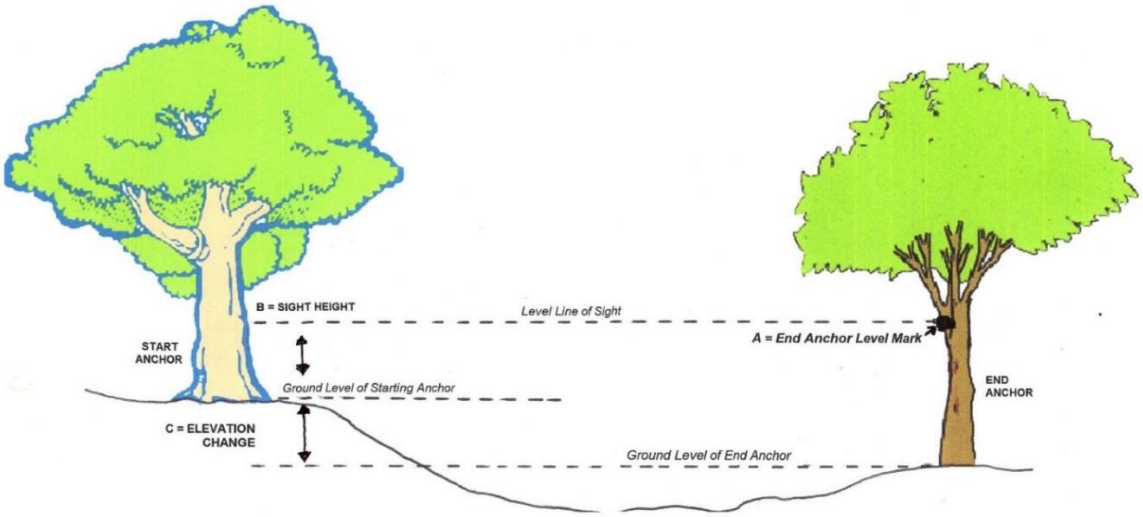
SAG MEASUREMENT = _____ / Length X 0.02

STEP 4 - ELEVATION CHANGE

To measure and calculate ELEVATION CHANGE**. If Ground is level, enter "O" in Box C**. If not, use a sight level and have a friend assist in measuring. *As an alternative to a sight level you can use an Altimeter App.

Determine your SIGHTING HEIGHT and enter it in **Box B.**

Sight a level line to your end anchor through your sight level. Tilt sight level up or down until bubble aligns with centre crosshairs, find a level line and have your friend mark the end anchor. Measure the height of the mark from the ground and enter in **Box A**. A-B = C (elevation change) – not to be confused with cable slope.



ELEVATION CHANGE

A _____ End Level Mark	**minus**	**B** _____ Start Sight Height	**=**	**C** _____ Change

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STEP 5 - ENDING ANCHOR POINT HEIGHT

To determine your ENDING ANCHOR POINT HEIGHT, ADD together SAG calculation from Step 3 plus 7 feet, This is the height of your ending anchor point.

_____	**plus**	**7 feet**	**=**	_____
Sag Measurement				End Anchor Height

STEP 6 - STARTING ANCHOR POINT HEIGHT

To determine the HEIGHT OF YOUR STARTING ANCHOR POINT, add your SLOPE calculation (from Step 2) to your ENDING ANCHOR HEIGHT (from Step 5) and then subtract your ELEVATION CHANGE (from Step 4). This is the height of your starting anchor point.

_____	**plus**	_____	**minus**	_____	**=**	_____
Slope		Ending Anchor Height		Elevation Change		Start Anchor Height

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WORKSHEET EXAMPLE

Nick's backyard is perfect for a zip line. He ordered a 200 foot line and in order to install it, Nick needs to figure out where to anchor the cable on each of his two trees. Here are the steps. First Nick reads through the entire zip line installation guideline. He also asks a friend to come along to help him out

Step 1 **LENGTH**	First he paces off the distance to make sure he knows the exact distance, in this example is will be 180 feet, he fills in this amount as Step 1 - Length	**180** The distance from start to end anchors = LENGTH
Step 2 **SLOPE**	Next, figured out the amount of slope he will need, he is using a braking system, he will be calculating for a 6% slope. He multiplied **180 x 0.06** to get **10.8**, which he then rounded to the nearest whole number and **enters as Step 2 - Slope**	**11** The amount of drop from your start anchor to your end anchor = SLOPE
Step 3 **SAG**	Using his length of **180 from Step 1 he multiplies it by 0.02** to get **3.6** which he then rounds to nearest whole number which is **4** and enters it in **Step 3 - Sag**	**4** The amount the zip line drops when a riders weight is added = SAG
Step 4 **ELEVATION**	To figure out how much his yard elevation changes between the 2 anchor points he is uses a sight level. Nick is 6 feet tall, so he writes **6 in box B,** next he looks through the sight level until the bubble lines up with the center crosshairs on the end anchor tree. Nick's friend sets a ladder against the tree and climbs up and marks the tree where Nick sees the level point. Nick & his friend then measurs with a tape measure from the mark on the tree to the ground. Let's say it is **14 feet**, he pencils **14 in Box A and then calculates what Box C is (14-6=8) and pencils that in Box C.**	A B C 14 - 6 = **8**
Step 5 **ENDING ANCHOR**	Nick then can sit down and calculate his ending anchor height. He takes his SAG amount and adds 7 feet **4 + 7 feet = 11 for the end anchor height**	4 + 7 = **11**
Step 6 **STARTING ANCHOR**	To calculate his starting anchor height he uses the Slope # + Ending Anchor # minus Elevation # to get his starting anchor height **(11+11=22)-(8) = 14 for the start anchor height**.	11 + 11 - 8 = **14**

Now Nick and his friend are ready to move on to the next step, installing the cable

SECTION TWO: CABLE INSTALLATION

The maximum allowable slope is 3% (3 feet per 100 feet of distance) for zip lines that will not utilize a Bungee Brake. The maximum allowable slope is 6% (6 feet per 100 feet of distance) for zip lines that utilize a Bungee Brake.

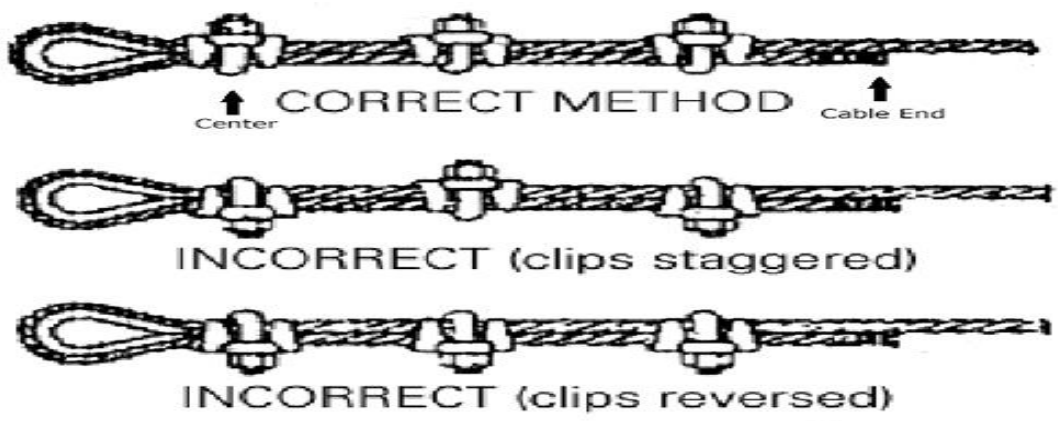
WARNING*!!!* *ZIP LINE MUST NEVER EXCEED 6% RIDING SLOPE. HIGH SPEED COLISSION WITH END POINT MAY CAUSE INJURY OR DEATH*.

First make sure you have your starting anchor ready **It is a good idea to attach 3 or 4 wood blocks (2x4's about 8-10" long will work) to the back side of the **starting anchor tree** where the cable will wrap around. This helps prevent the cable from damaging the tree** You can also use "Tree Huggerz".

Now wrap the chain/wire rope sling around the ***ENDING ANCHOR TREE*** at the point you determined in Step 5 of your Work Sheet. Sometimes it helps to put a few nails in around the anchor to keep the chain in place (it is again good to protect the tree with some wood blocks, Tree Huggerz or feeding the chain through a large piece of rubber hose to wrap around the tree).

Next fully extend the turnbuckle to it's longest length – unscrew the nut from one end of the turnbuckle, place the two loose ends of the chain/sling in between the open jaw, slide the bolt through the chain end loops and then tighten the nut.

Unscrew the one nut from the other end of your turnbuckle. Attach the thimble end of the zip line cable using 3 of the cable u-bolt clamps/wire rope clips spaced about 3" apart to hold the thimble in place and insert the cable wrapped thimble into the open end of the turnbuckle and replace the bolt and nut**. Use a wrench to tighten the nuts at both ends of the turnbuckle.**



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***Protecting your tree's health will preserve the structural integrity. Putting wood blocks between your cable and your tree ensures that the tree won't be damaged. The living, vital part of the tree is the thin layer under the bark, a tree can slowly starve if constricted by a cable. It may take years to notice the damage, but fewer leaves, fewer branches are eventual collateral. Dead trees become a safety hazard.*

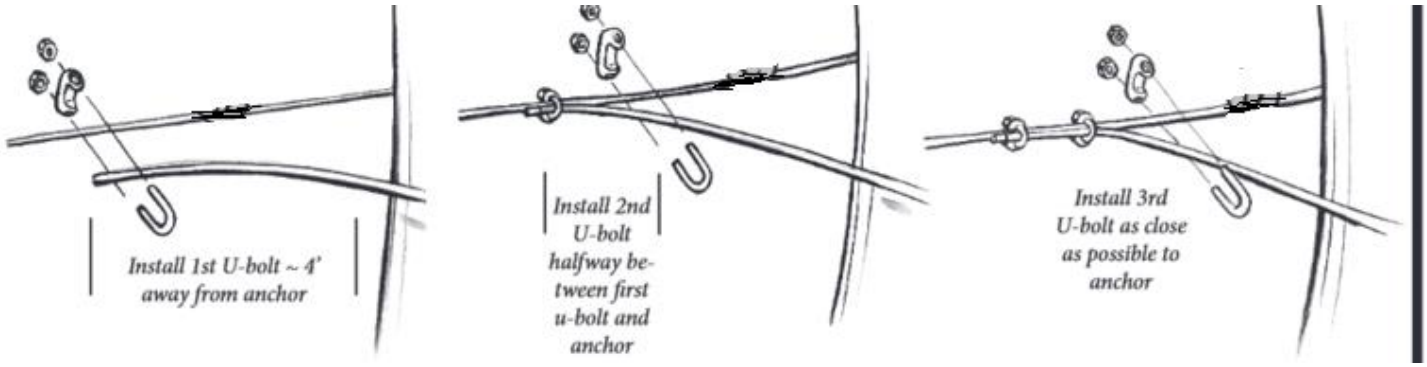
Now to wrap the cable around the ***STARTING ANCHOR***. This may take two people depending on the length of the cable you are using. Wrap the loose end of the cable around the starting anchor tree (that already has the tree protection on it) and pull as tightly as possible. A cable puller will help you with this step but is not always necessary.

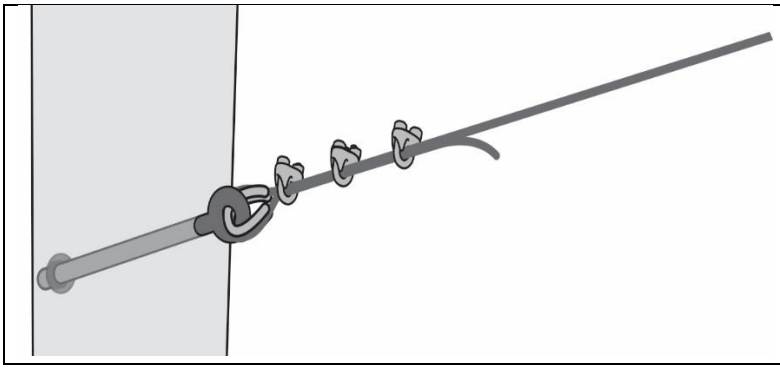
Complete the loop in the cable using 3 more wire clamps. Attach the first clamp to the cable about 4 feet from the tree trunk – put the u-bolt clamp/wire rope clip around the cable and the loose end making sure the u-bolt clamp/wire rope clip part of the clamp is on the loose end of the cable, do not tighten yet.

Have your partner pull the cable as tight as they can, then tighten the first clamp at this point.

Next loosely put the next u-bolt clamp on the cable on the tree side of the first clamp. Slide the clamp about half way towards the tree then tighten at this point.

Finally put the last clamp on the cable on the tree side of the second clamp. Slide the clamp as close as you can get to the tree. Tighten at this point. Now go back and tighten all the u-clamps with a wrench moderately past snug.





Another option is to place a large eye bolt through your tree. **DO NOT PARTIALLY** imbed an eyebolt into your tree and expect it to hold a zip line and a rider. Eyebolts are technically less invasive to the tree's health then wrapped cable and are an acceptable anchoring method. The bolt must penetrate the trunk entirely to be reinforced by a washer and nut on the back. Zip lines have failed because the installer didn't back up the anchor bolt, don't let that installer be you.

At this point the cable should be fairly tight. To make it even tighter you need to go back to the turnbuckle end and tighten it down about as far as you can. To make it easier to turn, you can put a bit of lube on the threads of the turnbuckle. This will help ensure that the turnbuckle spins smoothly.

Note ***Sag can be used to your advantage*** at this step to slow down the rate of the rider at the end of the run. A tighter zip line give you a more consistent speed throughout the length of the run.

A rider's weight can be multiplied several times when placed on a horizontal cable between two anchors, and this increases with higher cable tension. Be sure your anchors are sufficient to withstand the sheer loads, and be careful to not over-tension your cable. A good rule of thumb is to make sure your cable (while being ridden) hands below the ending anchor by about 2% of the zip line's length. So the trolley on a 100 foot zip line should, at it's lowest point, be about 2 feet lower than where the cable is anchored on at the ending anchor point.

Now it's time to do the **CABLE WEIGHT TEST**

Mark the cable at each cable clamp, after using test weight to test zip line, inspect marks for indication of clamp slippage.

ATTACH A TEST WEIGHT, equal to the weight of the heaviest participant, to the trolley mounted on the cable.

WARNING!!! *Never place more than 350 lbs on zip line*
WARNING!! *Never use a person as a test weight when performing the weight test.*

Bounce TEST WEIGHT up and down. Observe ANCHORS at each end of the cable for excessive movement.

Allow **TEST WEIGHT** to settle at the lowest point of the cable.

CABLE SAG is measured from the lowest point on the cable to the attachment height on the cable on the ending anchor.

Detach test weight and **inspect** termination hardware and anchors for proper configuration and strength.

Check for any slippage of cable through cable clamps/wire rope clips to verify they are adequately tightened. Check anchors for deformation.

WARNING!! Do not use zip line if any slippage, deformation, misconfiguration, inadequate cable sag or other potentially hazardous condition is found when performing the above test. The clamps must be retightened, equipment replaced or reconfigured, cable sage increased, anchors reinforced with guy cables or different anchors chosen, or further professional advice sought as appropriate for the situation before a participant is allowed on the zip line.

Once you have tried this non-human rider test run and made sure that the heights and speed appear to correct and there is not sign of cable slippage, it is time to put yourself in the seat. If you think the zip line might be too fast you will want to wear very heavy leather gloves. This way you can grab onto the cable **BEHIND** the trolley to slow down the speed you are travelling (only attempt this if you are sitting on a seat or strapped into a harness, **NEVER** attempt to hold on to just the handle with only one hand!). This is your chance to gauge the speed of the ride and decide if you need slow it down or speed it up.

If your zip line ride as a whole is a bit slow, tightening the turnbuckle just might do the trick. If it's running a little fast and you have some room to adjust your turnbuckle, try giving it some slack. If this doesn't do the trick you may have to adjust the height of either the beginning or ending anchor point.

After you have completed the test run it is important to make sure the cable is still tight. Make sure that the cable didn't slip down the tree. You may have to add a few nails to the tree to prevent the cable from slipping down.

SECTION THREE:
IMPORTANT INFORMATION/CARE/WARNINGS AND DISCLAIMERS

READ THIS INFORMATION AND REVIEW WITH ALL ZIP LINE USERS BEFORE INSTALLING OR USING ZIP LINE

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ANYONE PURCHASING, INSTALLING OR USING ZIP LINE EQUIPMENT MUST:

- ***READ ALL INSTRUCTIONS REGARDING ITS CORRECT INSTALLATION AND SAFE USE****;*
- ***ENSURE PROPER OVERSIGHT, SUPERVISION AND INSTRUCTION*** *(INCLUDING THE USE OF APPROPRIATE SAFETY EQUIPMENT) FOR THEMSELVES AND OTHERS USING THE EQUIPMENT;*
- ***ENSURE ALL EQUIPMENT IS PROPERLY MAINTAINED AND INSPECTED*** *FOR DAMAGE OR WEAR PRIOR TO EACH USE;*
- ***ASSUME ALL RISKS AND ACCEPT FULL RESPONSIBILITY FOR ANY DAMAGE OR INJURY, INCLUDING DEATH THAT MAY ARISE FROM ITS USE.***

REMEMBER SAFETY FIRST AND ALWAYS

INSPECTING YOUR ZIP LINE AND GEAR

INSPECT OFTEN!

Check your cable to make sure there is no fraying or excessive rusting.

Check your hardware (wire rope clips, turnbuckle) on a regular basis to ensure that nothing is loosening and adjust accordingly.

Check your tree anchoring points to make sure the trees are healthy and the bark has not abraided (rubbed off).

Check below your zip line run to make sure no trees have begun to grow under the cable, and that the area is clear of all rocks and hard surface items.

Inspect all your gear often. Look for improper configuration, damage, fraying, bending, tearing, cracking, slipping or anything that would indicate that the equipment's performance or strength has been comprised. **DO NOT USE THE ZIP LINE IF THERE IS DAMAGE TO ANY OF THE GEAR. REPLACE ITEMS IMMEDIATELY.**

Check your trolley. Do the wheels spin smoothly? Does your trolley sit straight and upright on the cable and are the wheels centered on the cable? Look for excessive roughness, loose hardware and check inside the sheathing for

excessive wear from cable abrasion. The side plates sit centered on the cable and should not rub against the cable or wheels. Replace your trolley if you see excessive friction marks from the cable or wheels.

Check the handlebar grips are they tight? If they move or slip it is time to replace.

Check your harness and lanyard. Carefully look at all the straps, tie in points and seams – make sure there is no loose stitching, unravelling of materials or abrasion. Ensure that the metal buckles are solid and have no cracks, bends or sharp spots/edges. Replace if you see any wear and tear.

Check the seat. Carefully inspect the rope to make sure the knots have not loosened and that the rope has not frayed. If you are using a sling swing make sure that the seat does not show any cracking and that the straps are solid with no fraying or loose stitching.

Check your Bungee Brake. Make sure it is not cracked or damaged and that the bolts remain solidly in place. Ensure the bungee cord is not frayed or that the elastic along the length of the bungee cord is not exposed (if you notice an increase or decrease in part of the diameter of the bungee this could indicate that there is internal damage to the cord). Check to make sure the bungee still has stretchability, if it doesn't stretch it is time to replace your bungee. Also check the spring clips to ensure that they are solid and closing completely.

WARNINGS

Never allow children to use the zip line without adult supervision.

We recommend wearing a helmet when riding the zip line. Children must wear a helmet.

Keep hair away from the cable. Long hair should secured with an elastic and tucked into your collar or under a helmet for safety. Catching your hair in the trolley or on the cable can have serious life threatening consequences.

Riders must **never spin** while connected with a harness or seat.

If you are using more than one trolley, **never attach a rider to the zip line until the previous rider has dismounted** and provides clearance. A second person may be required to hold participant in place to prevent them from descending down the zip line before their turn to ride.

DO NOT ATTEMPT to switch riding gear between riders or put riding gear on while standing on an elevated launch platform where a fall could result in injury.

Never jump from a ladder or platform onto the zip line. If no hazards are seen along the cable run and if your riding gear securely and safely holds the weight of the rider, the rider may slowly push away from the platform and allow gravity to propel them down the zip line.

NEVER, EVER place hands in front of trolley, we recommend using handlebars at all times. DO NOT touch the cable with your bare hands.

If braking with leather gloves, grab BEHIND the trolley, NEVER in front of the trolley.

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At the end of the run:

Riders must wait until they have come to a complete stop before dismounting from the zip line. Riders must dismount by transferring their weight off the cable and onto the platform, ramp or ground. **Children must be assisted by an adult.**

BE AWARE the zip line cable may spring upwards when rider dismounts, be sure any equipment attached (trolley, separate handlebar, seat/harness) is removed or raised up slowly to avoid injuring the rider.

If trolley remains attached to zip line cable a tow line can be attached to the trolley AFTER COMPLETING THE RIDE. Do not ride with the tow line attached to the trolley, harness or rider. **DO NOT** coil or loop the tow rope during the ride, it may become entangled or cause strangulation. **DO NOT** allow the tow line to drag behind the participant during zip line ride as it may become entangled with the rider or with objects along the zip line run causing serious injuries.

Never place more than 350 lbs on the zip line.

ACTIVITIES INVOLVING THE INSTALLATION AND USE OF ZIP LINES, TROLLEY, HARNESSES, BRAKING SYTEMS AND OTHER RELATED GEAR ARE POTENTIALLY HAZARDOUS BY THEIR VERY NATURE. EXTREME CAUTION AND CARE AT ALL TIMES ARE IMPORTANT FOR THE SAFETY OF YOUR RIDERS.

SECTION FOUR:
TYPES OF BRAKING SYSTEMS

BUNGEE BRAKE BLOCK

There are 4 kits available:

Brake Block Kit #1 with 1/2" bungee for zip lines under 300 feet

Brake Block Kit #2 with 5/8" bungee for zip lines between 300 and 400 feet.

Brake Block Kit #3 with two 5/8" bungees for zip lines between 400 feet and 500 feet for 350+ feet zip lines with faster slope/runs to enable safe stoppage. The bungees would go to two different anchoring points 5-10 feet of the side of the zip line.

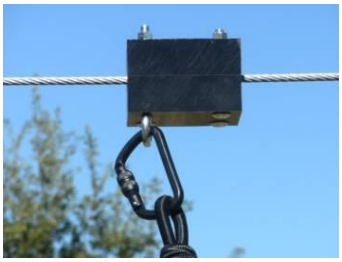
Brake Block Kit #4 with two 3/4" bungees for zip lines over 500 feet or for faster slope/runs to enable safe stoppage. The bungees would go to two different anchoring points 5-10 feet off the side of the zip line.

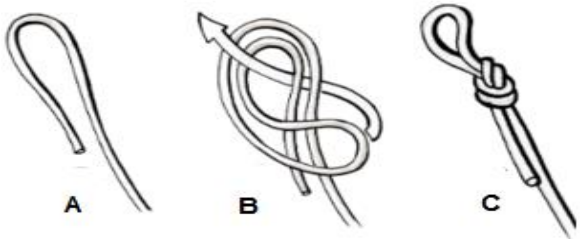
Step 1

UNBOLT the 4 bolts holding the Brake Block together and pull the Brake Block apart.

STEP 2

BOLT the Brake Block back together with the zip line cable running through the middle. Make sure the eye bolt is closest to the start of the zip line and facing downwards. (see photo on next page) Tie one end of the bungee using a double knot (review diagram on next page showing the proper way to tie your knot) leaving a loop at the end, hook a spring clip into the look and connect onto the eye bolt on your brake block ensuring that the spring clip is securely closed.



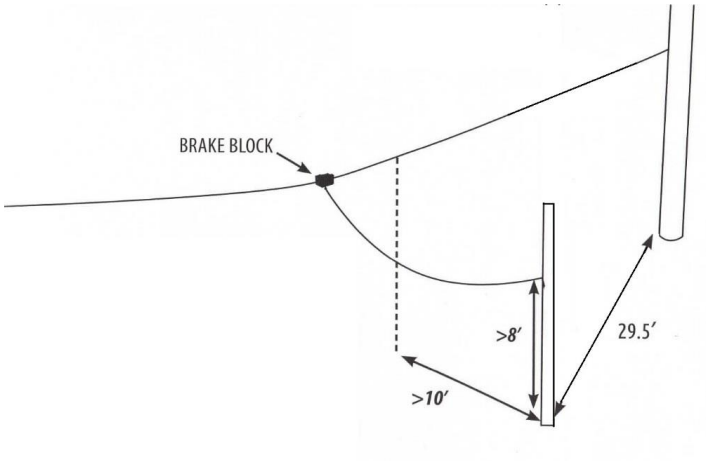


STEP 3

DETERMINING where to place your bungee anchoring point. Your bungee anchoring point can either be a tree or a pole strongly embedded in the ground.

Kits 1 & 2 includes 20 feet of bungee cord. The bungee stretches approximately 175% of it's length.

Kits 1 & 2



The formula for placement of your bungee anchor if your original bungee cord is 20 feet long:

20 feet minus 3 feet *(accounts for knots)* x 1.75 = distance from Bungee anchor to End Anchor Point
(20 - 3 = 17 x 1.75 = 29.5 ft).

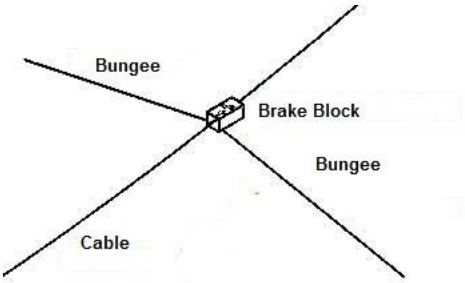
This anchor must also be located at least 10 feet off to the side of the zip line run.

Screw the eye screw about 8 feet up from the bottom into a tree or pole. [Drilling a ¼" pilot hole can be helpful for screwing the eye screw into your brake anchor tree or pole] Tie the other end of the bungee using a double knot (review diagram showing proper way to tie your knot) leaving a loop at the end, hook a spring clip into the loop and connect onto the eye screw that you have placed on your bungee anchor, ensuring that the spring clip is securely closed. ***The eye screw can be replaced with an eye bolt which can be inserted right through the tree or pole and tightened with a washer and nut.

****WARNING**** Eye screw must embed to full depth in solid wood. Gently scrape away any bark that prevents the screw from embedding fully into the wood.

Kits 3 & 4 utilizes a brake block with two eye bolts and includes two 20 ft bungee cords. As with Kits 1 & 2 you want to find your bungee anchoring points, using the same formula place one bungee anchoring point on each side of your zip line and continue with same directions as Kits 1 & 2 for securing your point. This will provide a safe stop for your rider.

Kit 3 & 4



DO NOT ALLOW THE BUNGEE TO SAG INTO THE RIDER'S WAY, IT CAN ENTANGLE THE RIDER.

STEP 4

Testing your Brake. ***DO NOT ATTEMPT TO RIDE YOUR ZIP LINE WITHOUT FIRST TESTING.***

Make sure you test your Brake Block using your trolley with weights attached. Send a test weight from very beginning of zip line to test bungee brake system.

Do not allow bungee to stretch to more than 175% of the bungee's length, bungee may fail and injure zip line riders or bystanders.

First measure to avoid overstretching of the bungee - have a helper stand near the end point of your zip line and have them drop a bright object or marker on the ground below the test weight where the bungee stretches to its maximum point. Measure from the object to the bungee anchor point. You should not have any impact with the ending anchor point (final tree or pole).

Depending on the weight of the riders as well as the speed and distance of your zip line, you may need to adjust your bungee anchoring point

If the bungee is overstretching or impacting with the ending anchor point with too much force, there are some things you can do:

- unscrew the eye screw from the current bungee anchoring point and move it to a new location further away, or
- shorten your bungee, (do not shorten by more than 2 feet), or
- double up the bungee's strength by adding a second bungee cord parallel to the original cord, or
- reduce the cable slope, or
- increase the cable sag to slow the rider's speed down.

This is simply trial and error to get the correct safe stopping point if you have a speedier run. However, the general calculations you used in Step 3 will work if your zip line does not exceed the 6% drop.

REMEMBER TO CHECK ALL YOUR EQUIPMENT AND CONNECTIONS OFTEN TO MAKE SURE THAT NOTHING HAS BEEN DAMAGED, MOVED, STRETCHED OR FRAYED – REPLACE ALL WORN PARTS BEFORE USING YOUR ZIP LINE.

THE SPRING STOP BRAKE

The Spring Stop Brake operates much like a bungee brake, but without the need to anchor off to the side of the zip line. The 3 foot 1-1/4" diameter stainless steel spring compresses, absorbing the inertia of the rider, and then pushes the rider back out.

You will need to thread your cable through the Spring Stop Brake before completing the installation of your zip line.

****Note** the spring stop brake is not recommended for zip lines longer than 100 feet or for zip lines that are more than 3% grade. Riders should have little to no momentum when coming in contact with the Spring Stop Brake. For riding slopes greater than 3% we recommend using a Bungee Brake.

GRAVITY BRAKE

This method works just the way it sounds, gravity is your friend. A zip line cable can be tuned so that the rider will not have enough speed to carry them to the end of the zipline. This can be achieved through creating a large amount of sag with the cable going uphill at the end, or reducing the overall drop of the cable from end-to-end.

LEATHER GLOVE

This requires proper training and practice for a rider to know how to safely bring themselves to a stop. A leather glove is worn on the participants hand and used to push down on the zip line cable **behind the trolley** to create friction, slowing the rider down. Although you may see this method used on You Tube videos we do not recommend this method as damage to your hand can occur due to wear on the glove, inattention or loss of control. **ONLY GRAB CABLE BEHIND THE TROLLEY, NEVER IN FRONT. DO NOT TOUCH CABLE WITH BARE HANDS**.

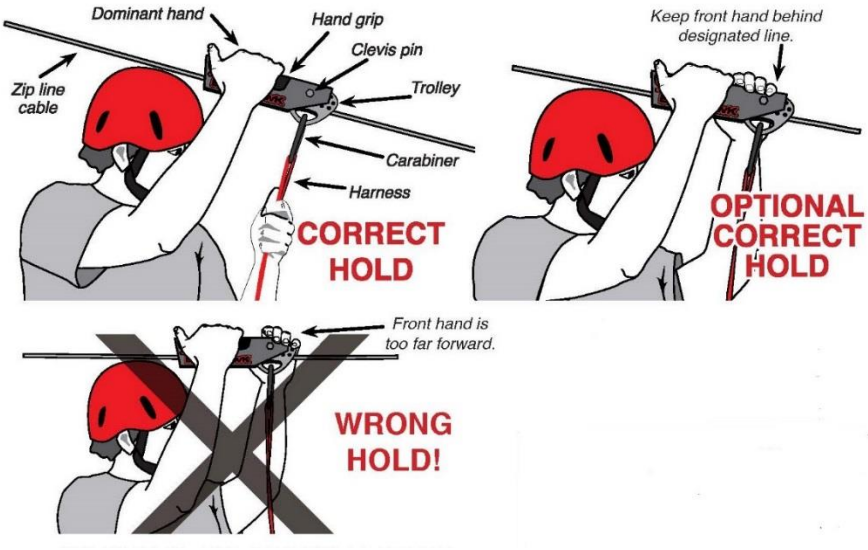
THE BRAKEHAWK

The Brakehawk is specially developed for the Petzl Trac & Trac Plus trolleys and the Fusion TESA speed trolley. This active braking device keeps hands free of the cable and puts the power of braking firmly in the hand of the rider. The rider engages the brake by pulling down on the BrakeHawk and creating friction between the zip line cable and the BrakeHawk brake pad.

We advise the use of the optional tether that can be connected to the Brakehawk, whereby the rider simply needs to pull down on the tether and it will slow or stop the brake as needed and keeps the rider's hands safely away from the cable.

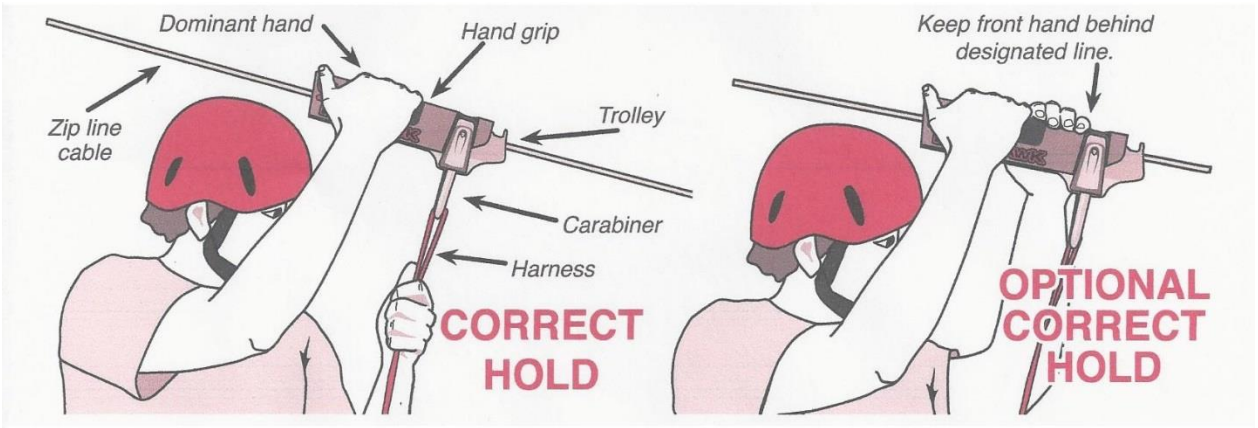
This system does require rubber or leather brake pads to be replaced if wear shows. *see BrakeHawk Brake Pads

How to Use with Fusion Tesa Speed Trolley: Remove provided clevis pin and install BrakeHawk on trolley. Lock clevis pin back in place. Place BrakeHawk and attached trolley on zip line cable (brake travels behind trolley). Attach carabiner and harness to trolley. Place dominate hand on hand grip to the back of the BrakeHawk. For slowing down or stopping apply downward pressure as needed from brake to zip line cable.



How to Use With Petzl Trac/Trac Plus: First remove the black retaining clip and carabiner from the Petzl Trac/Trac Plus. Install the BrakeHawk onto the trolley and reinstall the carabiner and retaining clip. Place the BrakeHawk and attached trolley on the zipline cable (the brake travels behind the trolley). Attach the carabiner and harness or seat to the trolley.

For braking, place your dominant hand on the hand grip at the back of the BrakeHawk. To slow down or stop apply downward pressure as needed from brake to zipline cable.



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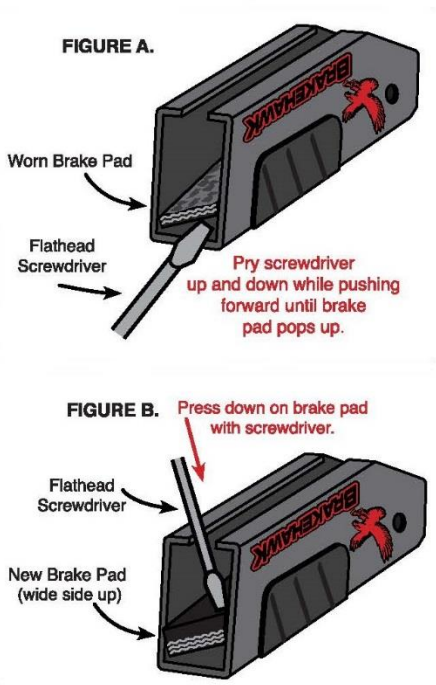
BrakeHawk Brake Pads: Brake Pads are an essential part of the Brake Hawk Braking system. Please replace the pads when they begin to show wear.

Instructions for changing Brake Pad:

- Remove trolley and lay BrakeHawk on a solid surface.
- Place the tip of a flathead screwdriver in the back corner of the BrakeHawk between the brake pad and the brake housing (see Figure A).
- Pry screwdriver up and down while pushing forward until brake pad pops up. Remove old brake pad.
- Before installing the new brake pad make sure the wide side of the wedge is facing up.
- Place new brake pad on the brake ramp at an angle making sure brake pad is even with the back of the brake housing.
- Put the tip of the flathead screwdriver into the cable channel and push down on the high side of the brake pad while moving back and forth until brake pad feels fully seated on brake ramp (see Figure B). Visually inspect to confirm brake pad is fully seated on brake ramp by looking the front and back of the brake pad.
- Reinstall BrakeHawk onto trolley.



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SECTION FIVE:
ZIP LINES CANADA HEAVY DUTY KITS EXPLAINED

For use by both adults and children of all ages you would be looking at our Heavy Duty Zip lines (for up to 350 lb riders).

We have three series of kits available plus a couple of specialty kits, you can view them on-line at www.ziplinescanada.ca under "Zipline Kits". *You can also create your own zip line by choosing your trolley, cable, hardware, seat/harness and zip line accessories.*

The series are:
RAPTOR (which uses the FUSION Tesa Speed Trolley - an aluminum clad trolley);
SKY RIDER (which uses the FUSION Advent Trolley - an stainless steel clad trolley)
ADRENALINE RUSH (which uses the FUSION Z-Max Trolley which has the handle bar integrated into the trolley) - you can view these trolleys and the descriptions under "Trolleys".

Please note that the Adrenaline Rush package is the only package that includes a handle bar. *Raptor and Sky Rider zip lines can have handlebar added.*

After that each series is broken down into what is included:
BASIC *- has 1 trolley, cable (choose your size), 1 carabiner and the hardware: 1 turnbuckle, 1 - 6 ft chain, 6 wire clips & 1 Thimble, plus installation instructions. **handlebar can be purchased separately for Raptor & Sky Rider packages
PRO –has everything noted above in the Basic Kit but adds a disk seat. ***handlebar can be purchased separately for Raptor & Sky Rider packages*
EXTREME - has everything noted in the Pro Kit but adds a Brake Block Kit, The Brake Block Kit - has brake block that bolts onto the cable which is attached by one of the two spring clips to the 20 ft bungee, the other end of the bungee is attached to the 2nd spring clip which would be attached to the eye screw that you would put into a tree or ground anchor. When the trolley comes down the cable it will hit the Brake Block - the brake will go forward a bit as the bungee slows the rider down and then will come back to the approximate point where the trolley connected with the brake. ***handlebar can be purchased separately for Raptor & Sky Rider packages*
OUTBACK - has everything noted in the Extreme Kit but adds a Universal Harness and runner/adjustable lanyard and 1 more carabiner. ***handlebar can be purchased separately for Raptor & Sky Rider packages*
OUTBACK II - has everything noted in the Outback Kit but adds a second Universal Harness and runner/adjustable lanyard and 1 more carabiner. ***handlebar can be purchased separately for Raptor & Sky Rider packages*

SPECIALTY ZIP LINES
RAPTOR DROP ZONE – specifically designed for the rider who wants to drop off into the water – has 1 Tesa Trolley, 1 Dual Handlebar, 1 carabiner to attach the handlebar to the trolley and the hardware: 1 turnbuckle, 1 - 6 ft chain, 6 wire clips & 1 Thimble, plus installation instructions
SUPER FLY – for adults only, allows you to control the speed and stop. – has 1 Petzl Tandem Trolley, 1 Brake Hawk 405, 1 harness & lanyard, 2 carabiners trolley and the hardware: 1 turnbuckle, 1 - 6 ft chain, 6 wire clips & 1 Thimble, plus installation instructions
SUPER FLY X – has everything the Super Fly has plus 2nd Petzl Trolley, 2nd universal Harness and adjustable lanyard and 2 more carabiners
Pricing is then based on the length of cable you choose Click on the Red Select Options under the zip line you are interested in and then on Choose an Option - make your choice and the price will be provided including shipping.

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Please note on larger kits, shipping can't be calculated on the on-line store, simply call us 877-408-1523 or email us with your request info@playoutdoorscanada.ca and we will work out the shipping cost and order total for you.

If you have young children using the zip line under 8 years old or if the zip line is very high up in the air a harness is recommended. Also with younger children, the Adrenaline Rush series is highly recommended, as the handlebar integrated into the trolley allows for more control as the rider goes down the zip line.

SECTION SIX:
PROFESSIONAL ZIP LINE INSTALLERS IN CANADA

Should you not want to install your zip line yourself, there are three professional zip line installation companies in Canada. The average cost to install the cable **begins** at $1,500-$2,000 depending among other things on where you live and how long a zip line you want. This usually includes: a site visit/consultation so they can advise you as to whether your trees are healthy enough, what heights are best for your topography for safe zip lining and whether you will require platforms.

If you are thinking of using your zip line for a commercial/money-making operation, you will require a professional installer to do the cabling work to ensure that all the health and safety measures are followed exactly and to code. A professional installer is trained, insured and knowledgeable about all the legalities involved in installing and operating a commercial zip line. They can also arrange for your employees to receive the proper training necessary to operate your zip line.

The contact information for three of Canada's professional zip line installation companies are:

Ontario

1/ **Elevation Aerial Design & Consulting** http://elevationaerial.com 800-739-4992 **This is the company does installations world-wide

2/ **Challenges Unlimited** https://challengesunlimited.com 705-385-4209

Alberta

3/ **Rocky Mountain Lift Services & Supplies Inc** www.riggingspecialties.com 403-678-8836

PLEASE REVIEW THIS GUIDELINE OFTEN TO ENSURE YOU KNOW ALL THE SAFETY ISSUES AND IF YOU ARE IN DOUBT CONTACT YOUR ZIP LINE PROVIDER.

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