

**LET'S BREAK TRADITION—AND SAVE MORE LIVES.  
USING SNOWMOBILES FOR AVALANCHE RESCUE.**

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Rider: Jeremy Mercier. Location: Grand County, CO. Photo by Brian Brown.

**ABSTRACT:** Traditionally, snowmobiles have been used for decades to access accident sites. Once on site, the search is traditionally conducted on foot. We have developed techniques to use snowmobiles in the search stage to cut rescue times. We present three ways sleds can be used to cut precious minutes in an avalanche rescue: 1) accessing the debris for immediate visual/signal search; 2) moving searchers to locations quickly; and 3) performing a perimeter signal search by snowmobile, taking measures to prevent electrical interference from the snowmobile engine.

We have used these techniques in numerous environments: avalanche incidents, organized rescues, AvSAR trainings, and in practice scenarios with BCA employees. In timed tests at the Silverton Avalanche School, searchers using snowmobiles have recovered five buried “victims” within five minutes. Without snowmobiles in these scenarios, it would have taken at least 15 minutes for a SAR team on skis to even reach the accident site.

Helicopters are an important tool in AvSAR organizations around the world. But they are not always available and weather can often suspend operations. Snowmobiles can operate in a variety of weather conditions. AvSAR organizations should ensure that their teams are trained in the use of snowmobiles for avalanche rescue in addition to the use of helicopters, skis, and other methods of transport. Once on scene, when used properly, snowmobiles can significantly reduce search times, especially in large avalanche scenarios.

**KEYWORDS:** Snowmobile, snowmachine, Ski-Doo, avalanche rescue, snowmobile rescue, avalanche search and rescue, AvSAR.

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## 1. THREE WAYS TO SPEED UP AVALANCHE RESCUES USING SNOWMOBILES.

### 1.1. Accessing the debris for immediate visual/signal search

Get right to the debris—and through it—faster with a snowmobile. A sled can cover ground very fast through most avalanche debris and makes uphill travel much faster. You can get right to the last-seen-point and then continue downhill on foot or skis (assuming the snowmobile is equipped with a ski rack).



Figure 1. North Ptarmigan avalanche, Vail Pass, CO, 2013.

The photo above is from an avalanche on Vail Pass in 2013. The body had been recovered, but members of Vail Mountain Rescue needed to “clear” the area in case someone else had been buried. The avalanche had not run full path for many years. Therefore hundreds of trees were taken out, many in places considered to be “islands of safety.” Despite the rough surface conditions, the snowmobile proved to be extremely effective. I was able to ride the sled up the debris, starting from the bottom and do a quick visual and transceiver search in approximately ten minutes. We then switched to skis (with skins) and had five searchers cover the same area using parallel search strips, also starting from the bottom. It took the 5 searchers 45 minutes to cover the same area that the snowmobile had covered in 10 minutes.

### 1.2 Moving searchers to locations quickly

Rescue organizers can use snowmobiles to get multiple searchers to the most likely burial areas right away. Nothing is worse than taking 15 minutes to get to the most likely burial area, then finding a visual clue—but too late for a live recovery. A snowmobile can get you and several others there in a matter of seconds. The bigger the avalanche, the more effective sleds can be for this purpose.

At Silverton Avalanche School we set up an avalanche rescue scenario on a hill with five victims (three with transceivers and two without transceivers, but with visual clues). Four or five rescuers are usually involved. We typically have two on snowmobiles driving to the farthest most likely burial areas, performing a visual search on the way. Once they get to that area, they step off the snowmobile, turn it off and do a transceiver/visual search on foot. Level I students are consistently pulling off these scenarios in under ten minutes, with the record being in the four-minute range. These scenarios are on relatively large slopes well exceeding 100 x 100 meters.



Figure 2. Completion of avalanche rescue scenario at Silverton Avalanche School, CO. Five victims were found and uncovered in under ten minutes

### 1.3 Searching from Snowmobiles

Using snowmobiles to do transceiver searches? How does that work? Quite well: we’ve found that you can easily cut search times in half. Let’s say you’re the first on scene and have a large area to cover. Use the sled to cover ground faster for the visual and/or transceiver search. Here are some techniques we have developed, practiced, and found to reduce search times

considerably:



Figure 3. Using a snowmobile to find a signal in Montezuma, CO.

- a. Keep the ignition switch tether unhooked, so you can keep the engine running when you get off the sled. Use your best judgment here on safety.
- b. Keep your transceiver easy to access. Several brands of snowmobile vests feature an easily accessed, yet well-protected transceiver pocket on the outside.
- c. Drive quickly to the debris and get up on it with the snowmobile. Stop and set the parking brake.
- d. Keep the snowmobile running (it can be awkward to pull start when tilted). Step at least three feet away from your sled, to avoid electrical interference from snowmobile electronics. BCA testing has found that searching within one meter of most sleds (and two meters of the Polaris Axys) will often reduce receive range and/or cause “false triggers” in the distance/direction display. The snowmobile can be turned off to stop the interference, but many need to “power down” for 20-30 seconds for the interference to subside. Usually it’s faster to leave it running and get off the sled to resume searching.
- e. Rotate your transceiver on the x and y axis as early as possible to begin the signal search. Look for visual clues.
- f. If you capture a distance reading and directional arrow on your transceiver, walk a few steps to see if the numbers decrease, to confirm direction.

g. Get a visual on the direction/distance the transceiver is pointing, then use the snowmobile to get to that location.

h. No signal from your transceiver? Continue your search pattern, stopping within transceiver range. Ride into the middle of the debris or continue around the perimeter, depending on the size of the avalanche and range of your transceiver. You can also use a signal search pattern (see transceiver owner’s manual). It all depends on the size of the avalanche. Stop your sled within the range of your transceiver and repeat steps d, e, and f. You should be looking for visuals the entire time.

i. Once you get closer on the coarse search, stop the snowmobile and proceed on foot with the coarse and fine search. Probe to pinpoint and start digging using strategic shoveling techniques.

j. If using an airbag, we recommend carrying an extra shovel on your sled—preferably secured to a tunnel bag—so if your sled gets stuck and you need your shovel to dig it out, then you don’t have to take off your airbag pack.

## 2. CASE STUDY: Grand County, CO

In a timed exercise near on Jan. 7, 2018, four searchers using snowmobiles were able to locate five buried “victims” in less than five minutes. Without using snowmobiles, it would have taken 10 to 15 minutes just to walk or skin up to the accident site.

Rescue Scenario 1/7/18

Elevation: Top 11,470'. Base 11,100'

Scenario: 5 victims caught, old avalanche debris

1 victim = corner of airbag sticking out of snow, up high, lookers’ right.

1 victim = deep burial of transceiver in duffel bag, 1 meter deep, up high, lookers’ left.

3 victims = shallow burial transceiver, 0.5-0.7 meters deep. Spread out over bottom 2/3 of area.

Note: Students were given a few minutes to come up with a plan before starting. Starting area was below the toe of the avalanche.



Figure 4. Four searchers snowmobiled to the locations indicated and worked downhill on foot.

Results: Record time!

5 victims in 4:30 by 4 searchers in level I class  
by Avalanche1.com

- :44 airbag
- 2:26 1st transceiver uncovered.
- 2:49 2nd transceiver uncovered.
- 3:50 3rd transceiver uncovered.
- 4:30 4th transceiver uncovered.



Figure 5. Searching on foot after parking the snowmobile.

### 3. LEARNING TO RIDE

Advanced riding skills are needed for most of these techniques when riding on avalanche debris. A rider accustomed to sledding on groomed terrain will have a difficult time. If the riding skills aren't there, it will be faster to travel on foot or skis. The good news is that there are backcountry snowmobile riding schools. These schools will teach you advanced skills in one or two days. It will change your perspective on what a snowmobile can do and will increase your skills enough so your sled can be a valuable and fast tool for avalanche rescue.

BCA has recently produced an instructional video on using snowmobiles for avalanche rescue. It can be downloaded and used for instruction by visiting [www.backcountryaccess.com/education](http://www.backcountryaccess.com/education).



Figure 6. Transporting searchers using both the “Canadian” tandem style and a tow rope.

#### 4. TRANSPORTING SEARCHERS

There are several options for transporting searchers. Each rider can ride solo. You can also ride “Canadian” with one person on each running board: one person controls the brake, while the other controls the throttle. The brake is used as a last resort, as it can easily pitch both riders forward and off the sled if used abruptly. A tether switch that cuts the engine is highly recommended.

It’s best to approach the hill straight on, to prevent tipping. If you need to sidehill, it can be better to have one rider straddle the seat while the throttle rider has both feet on the uphill running board. Effective sidehilling requires the snowmobile to be on edge with the downhill ski in the air.

The photo above shows the authors riding Canadian while towing a skier. The skier is being towed with a 7mm-9mm cord 20-30 feet behind the sled. The towed skier has a mountain bike innertube that is doubled over and held around his waist with a carabiner. About four feet from the end of the rope is a butterfly knot with a locking carabiner. The end of the rope goes through the carabiner holding the inner tube around the waist, then to the carabiner on the butterfly knot. This results in a 3:1 quick releasing system that takes very little effort to hold with (cold) hands. The rider holds the tail of the rope; if he or she falls and lets go, it self-releases. The innertube absorbs shock from the snowmobile as slack is removed.

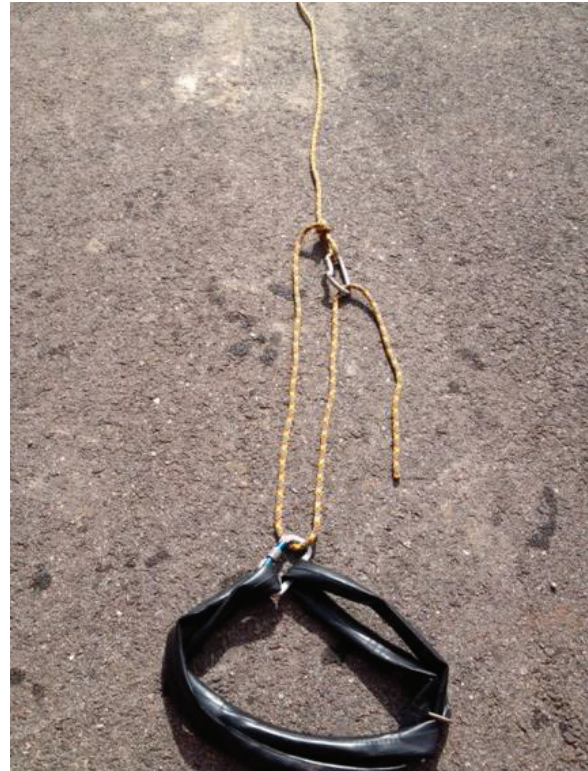


Figure 7. Example of a tow rope using innertube, carabiners, and butterfly knot.

#### 5. CONCLUSION

Snowmobiles can be used in several ways to reduce search times in an avalanche rescue: accessing the debris quicker, moving searchers to locations, and performing a perimeter signal search by snowmobile. AvSAR organizations should ensure that their teams are trained in the use of snowmobiles for avalanche rescue in addition to the use of helicopters, skis, and other methods of transport.

The efficient use of snowmobiles for rescue requires training in riding skills, especially in transporting searchers. Personnel searching with transceivers should be aware of the potential for electrical interference from snowmobiles—and maintain a minimum of 1-2 meters of distance between the searching transceiver and the snowmobile.