Long Distance Dog Sled and Iditarod Information
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Types of Dog sleds currently in use at the 2005 Iditarod race

**Basket Toboggan** – This sled is the classic design that’s been around since the Iditarod began. It has a raised, usually by 6” off the runners, cargo bed made typically of wooden slats though the use of other materials is possible. The runners stick out behind the sled for the musher to stand on. This is a lighter more aggressive sled design usually used in sprint races because it excels on hard packed surfaces.

![Basket Toboggan](image)

**Toboggan Sled** – This sled was introduced into the Iditarod about 30 yrs ago, so is a fairly recent addition. Instead of slats it uses a solid sheet for a bed usually made of plastic. This sled also typically has runners that stick out behind the sled for the musher to stand on. This is a more durable type of sled and can carry more. It has a low center of gravity and performs best in deep unpacked snow.

![Toboggan Sled](image)
Raised Toboggan Sled – The raised toboggan has become very popular in recent years at the Iditarod because it combines qualities from both of the biggest designs. It has a solid bed basket like the toboggan and it’s raised like the basket. So it both floats in powder and slides easily across ice and hard packed snow. The musher stands on the runners behind the sled.

Tail Dragger – The most recently developed sled, introduced by Jeff King in the 2004 Iditarod, his design was copied and modified in last years Iditarod by several mushers. Its innovative design consists of a raised body with either a toboggan or basket bed. Behind the bed is a type of cockpit where the musher can stand on the runners or sit on a back seat and storage compartment. The runners do not stick out at the back typically. Connected to the very rear of the sled is a dog cage on skis in which at any time one of the dogs can rest. The stiff part of the sled started at nine feet but Jeff modified it after the 2004 Iditarod to have the dog cage attached directly to the bed leaving the musher to stand on the runners or sit on the cage. He did this because he felt the original design was sacrificing maneuverability in its length for unneeded storage space. With space for a dog to rest in the way back his bed could now be devoted entirely to gear and supplies. The advantages of this design are that the musher can rest a lot more and has more energy to care for his dogs.
**Contemporary Designs** – The contemporary designs usually use more advanced materials such as carbon fiber and aluminum composites because of their weight advantages. Some also have special spherical joints which allow them to tilt in either direction so that the runners dig into the snow adding a limited amount of maneuverability. They are also usually built so that they may be taken apart easily and folded into a compact space. They are less popular in long races like the Iditarod because they tend to be less durable and are geared towards sprint races. Jeff King’s sled is a contemporary design made of aluminum and plastic, it doesn’t fold though the seat and cage detach from the sled. These characteristics make it the best contemporary design for long distance racing because of its toughness and added steer-ability.
Parts of a Dog Sled
(Taken from http://www.expeditionsamoyeds.org/sledbasics.html)
Sled dogs have been pulling sleds for thousands of years. The purpose of the sled is to carry people and supplies over the snow. The traditional materials for sled construction included wood, bone, sinew, and rawhide. Steel bolts came later, and were followed by plastics, aluminum, and today, materials like Kevlar and carbon fiber. Regardless of the materials, all modern dog sleds have certain common characteristics.

These characteristics include:

- **Runners**--the skis that slide along the snow and support the rest of the sled. Runners traditionally were made of wood or wood laminate, but aluminum and other composite materials are becoming popular. Contemporary dog sleds have plastic on the bottom of the runner. This provides a slick surface and reduces drag. The plastic slides on and off easily, facilitating quick changing.

- **Cargo Bed**--the portion of the sled designed for carrying the load. Most sleds have

- **Sled Bags** which are placed on the cargo bed and serve as "backpacks" to hold and protect equipment and supplies.

- **Brushbow**--the "bumper" of the sled that deflects trees and brush and takes hits in collisions. The brushbows were traditionally made of wood and were semi-circular in shape. Most modern sleds have plastic brushbows that are both stronger and more resilient, and usually more triangular in shape (as shown in photos).
• **Handle Bar**—hey, we've got to hang on somehow!

• **Footboards**—usually made of rubber or some non-skid material, these are the narrow boards mounted on the ends of the runners where the musher stands.

• **Brake**—again, pretty self-explanatory, but very important. The brake is an aluminum or steel bar in a U-shape. Two metal claws hang down from the bar. When the bar is stepped on, the claws dig into the snow to slow and stop the team.

In addition to these common features, most sleds also have a few important additional components. These include:

• **Snow Hook**—an anchor made of metal used to keep the team stopped. The hooks are angled so that continued pulling digs them deeper into the snow. This helps keep an excited dog team stopped. *(See photos for shape and design of snow hook.)*

• **Track or Drag**—a rubber mat that is dragged between the runners. This is a second braking mechanism. The advantage of a drag is that the resistance it supplies is much more uniform than the resistance supplied by a regular claw brake. This is because the track drags over the top of the trail to slow the team while the claw brake digs into the trail. Many tracks contain bolts that stick about an inch into the trail to give them extra "bite."

• **Snubline**—a rope that is used to secure the sled and team to a tree or other stable object. This is very handy when hooking up a dog team, or when stopping for extended periods. Most snublines also contain a quick-release snap, which eliminates the need to tie knots to secure the sled.
How the dogs are bound to the sled

The Towline or Gangline connects the dogs to the sled. The most common style of towline (or gangline) is the Tandem Hitch. Every race requires that this type of hitch be used because it is a safe, simple, and very functional means of harnessing the power of a dog team and transferring that power to pulling a sled.

As the name implies, dogs are paired together in a tandem hitch. Figures 1 and 2 (page 9) show the general layout of a tandem hitch.

The number of dogs in a team varies. Some recreational teams are just two or four dogs while some large sprint racing (short, fast style of racing) teams can be 20 or 22 dogs in number. Uneven numbers of dogs are fine, too. In the case where a team has an uneven number of dogs, one dog runs alone in a position in the team. This single dog can be in any of the positions in the team.

Additionally, some mushers elect to add in "blank spots." For example, a 14-dog hitch could be used with a 12-dog team, allowing for 2 positions to have only one dog. This is done for a number of reasons, but the basic advantage is that the "blank spots" allow for more flexibility in where dogs are positioned in the team.

Dog positions

A dog’s position in the pack is usually quite flexible. Most mushers want their dogs to be as adaptable as possible in order to be able to switch in and out of different positions. Rotating the dogs through the positions has two advantages: First, some positions require additional physical or mental exertion. Revolving dogs through these positions spreads this additional duty across all the dogs. Second, most races do not allow mushers to switch dogs in the middle of the race. If a dog in a race team gets tired or sick, it can be sent home, but can't be replaced. This means that other dogs in the team must do the "dropped" dog's job, and the team goes on with one less dog. Having dogs than can run in many positions is essential in this case.

Lead Dogs: Contrary to popular belief, there is usually no one lead dog or “alpha male”. Leaders must think about where they are going and always listen to the musher for commands. The fact that the lead dogs must set the pace, while finding and following the trail adds mental strain to the physical strain the dogs must endure. Again, rotating lead dogs is important when in long races so that the same two dogs don't have to think so hard the entire time.

Swing Dogs or Point Dogs: Swing dogs help the leaders set the pace and aid in turning the team. If only the leaders wanted to turn in the direction of the musher's commands, the team may not turn, so the swing dogs back the leaders up in these cases.

Team Dogs: The job of team dogs is to follow the dog in front of them and steadily pull. They provide the "horsepower."
**Wheel Dogs:** Wheel dogs play a big role in control of the sled. While the musher steers the sled usually by leaning in the direction desired, this tends to skid the sled to the outside on corners. A combination of leaning and good wheel dogs is necessary to successfully negotiate any trail.

**Towline (Gangline) Construction**

The towline is the term given to the combination of the lines that are used to connect the dogs to the sled. See figure 2 for how the various lines are incorporated into the dogs' positions. A towline has five major parts:

- **Mainline (Centerline)** This is the central line that runs the length of the team from the leaders to the sled. This part of the towline is usually made of 3/8” or 1/2” thick rope and reinforced with steel cable.
- **Tugline** This is the line that connects the dog's harness to the mainline.
- **Neckline** This is the line that connects the dog’s collar to the mainline. This line is important as a safety measure because it prevents a dog from going too far out to the side and potentially going the wrong way around a tree or obstacle in the trail. If a dog were to go the wrong way around an obstacle or tree, the snap on the neckline is designed to break away, allowing the musher time to react and stop the team and move the dog to the correct side of the obstacle.
- **Leader Lines** The center line ends at the swing dogs' necklines. From there, two tuglines extend forward to connect the leaders. A neckline not attached to the rest of the towline is then used to connect the collars of the two lead dogs.
- **Shock Cord** This is essentially a gigantic rubber band that is place between the sled and the rest of the towline. If the sled stops suddenly or hits a tree, the shock cord absorbs the impact and prevents the impact from jarring the dogs. A safety line accompanies the rubber band and acts as a stretch limiter.

Commonly, a towline is made up of sections that consist of a mainline with two tuglines and two corresponding necklines. Loops at both ends of the mainline are connected to similar sections. This allows a towline to be lengthened or shortened as needed, and allows for replacement of components without having to replace the entire towline.
Figure 1. Anatomy of a dog team (taken from http://www.ultimateiditarod.com/Dogteam.htm)

Figure 2. Setup of typical dog team and their respective towline or gangline (taken from http://www.expeditionsamoyeds.org/sledbasics.html)
Control and Steering of Dog Sleds

Dog sleds actually drive themselves fairly well as long as the trail is straight and flat. However, no steering system exists for corners and tricky trail conditions. Instead, mushers lean from side to side in a fashion similar to downhill skiing to steer the sleds. Leaning in on corners is especially important because the sleds tend to skid to the outside on corners, especially very tight corners. The brake and track also aid in steering. By applying the brake or stepping on the track, the sled is slowed and pulled to the inside of a corner. By not braking, the sled will swing more to the outside of a corner. The wheel dogs (dogs at the very back of the team) also play a big role in control of the sled. A combination of leaning, braking, and good wheel dogs can be used to successfully negotiate any trail.

Some sled designs incorporate more flexibility into the sleds. This flexibility allows mushers to move the handlebar side to side, which moves the stanchions and then causes the runners to tilt on the snow. By tilting the runners to the right, the sled moves right, and vice versa. This aids in steering, but isn't sufficient by itself on sharp corners.

A final important note on sled control is that the sled is most controllable whenever a force is being applied to it by the dogs. While this seems trivial, imagine a steep hill. If the sled is not slowed enough on the hill, the dogs really are doing no work on the sled. When this happens, the sled doesn't necessarily follow directly behind the dogs or stay on the trail. By using the brakes and maintaining some resistance, the sled is much more controllable, and the dog team itself is much more under control.
About the Iditarod

The race is over 1150 miles from outside Anchorage to Nome. People usually finish the race in 9-17 days. Temperatures along the race range from -60°F to 45°F although the coldest temperature ever recorded was -130°F with the wind chill. There are many check points along the way where each musher must personally sign in before continuing on.

More information and rules

- There are 3 mandatory stops. One 24 hr stop, taken whenever the musher sees fit; and two 8 hr stops, one on the Yukon or Shageluk, and one in the White Mountains.
- Mandatory items a musher must have.
  - Cold weather sleeping bag weighing a minimum 5lbs
  - An Ax at least 22 inches long weighing a minimum of 1 ¾ lb
  - A pair of show shoes with area of 252 inches each and bindings
  - 8 booties for each dog
  - One stove and pot capable of boiling 3 gallons of water at a time
A veterinarian notebook

Enough fuel to boil 3 gallons of water

Cable gang line or cable tie out to secure the dog team

- The sled must be drawn. It must be capable of caring an injured dog under cover, plus food and equipment. It must have breaks that fit between the runners and can not extend beyond the tails of the runners. A maximum of 3 sleds can be used during the race. Sleds can not be powered by sails or have wheels.
- The maximum number of dogs on a team is 16 and the least is 12, at the start of the race. 5 dogs must be on the towline at the finish.
- A minimum of 60 lbs of food a gear must be shipped to each of 19 checkpoints.
- The musher must be 18 years old when starting the race and either completed an Iditarod before or completed two approved qualifying races covering 500 miles and finishing in the top 75% of the field.
- Entry fee is $1,850
- The first place prize is $50,000
- Mushers tend to maintain a six on-six off schedule of running and resting
- The total weight of the sled, food, gear, and musher is between 300-400lbs
- The trail has two paths, on even years it takes the northern route, and on odd years it takes the southern route.
- The team travels at a speed of 11 or 12 miles per hr.
- The trail is broken by some of the most hard-core snowmobilers in the world, and about 10,000 pieces of surveyor’s stakes with orange paint and reflective tape are used to mark the trail.
- 55-80 mushers run in the Iditarod every year
Works Cited Page

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