

Klondike Sled Project

By Steven Maxwell • Illustrations by Len Churchill

Cross-country sled races deliver adventure, endurance and a wilderness challenge. And these plans are your ticket to that world. This sled is specially designed for Klondike Derby races in which boys—not dogs—provide the pulling power. Even though this sled is fast and strong, you don't have to be a master carpenter to build it. Cost of materials is about \$100.

How to Use These Directions

The instructions are divided into four parts: Building the Runners, Installing the Floor, Adding the Rails, and Finishing Up. Read everything at least once before you begin so you know how it all fits together. Then focus on each section as you work. Also, be sure to read "Prepared for Safety," which follows. What's the point in building a Klondike sled if you get hurt in the process?

Building the Runners

The runners take more punishment than any other part of the sled. That's why they need to be made of tough wood. Ash is the material of choice here—the same wood used for snowshoes and old-time cross-country skis. It's tough and flexible, and the open grain holds wax well—an important detail that'll help win races.

If you can't find ash lumber where you live, oak, maple or hickory are good, too. Just don't use pine, cedar or any wood soft enough to be dented easily by your thumbnail. These are fine for other parts of the sled, but softwood won't last long as runners or runner blocks.

When professionals build dogsleds they cook the ends of the runners for about an hour in special steam cabinets, then clamp the softened wood to

form curves when it cools. Sound complicated? It's really not. Since you need to curve only the ends of your runners, you can easily make your own steam cabinet using short lengths of galvanized duct pipe and an electric kitchen kettle. The plans show how. Make sure an adult is on hand to help you.

There's another option for runners. The plans show how to slice partway through the ends of the runners to make the wood flexible without steaming. This is called kerf bending, and it works O.K., though it does weaken the runners. They don't look as cool, either. Use this method only if nothing else is possible.

The fastest, easiest way to get your sled on the snow is to use a pair of old downhill skis as runners. Even though they're usually made of fiberglass, skis can still be drilled and fastened easily to the rest of the sled. They're tough, too.

With runners ready, it's time to drill them for the No. 12 x 2-inch screws that fasten them to the runner blocks. The plans show where each block goes and how the screws are positioned. Because they're hardwood, you'll need to create pilot holes using a $\frac{5}{32}$ -inch-diameter drill bit, to ease the entry of the screw. The plans show how to use screws as they extend through the runners to mark the runner blocks for accurate drilling. Also see "Drilling and Gluing" for more help.

Installing the Floor

At this stage, you have two separate runners with four blocks attached to the top of each one. Now it's time to join these into a single unit using the four main floor supports. Cut these to length, then drill screw holes and fasten them to the runner blocks using glue and just one No. 10 x $1\frac{3}{4}$ -inch screw per joint. Even though the front floor support is the same size as the other floor supports, leave it off for now. The plans show how the edge of the front floor support needs to be angled a bit, but that's a job for later.

Pretty easy so far, right? Don't get too confident because there's trouble lurking ahead, something that could make your sled crooked if you don't avoid it. Luckily, there's a slick trick to do just that:

With the two runners joined by the four floor supports, measure the length of diagonal distances taken from the outer corner of one floor support to the diagonally opposite corner of another. The plans show how. If your growing sled is square, then these measurements will be equal. Trouble is,

they're probably not going to be, though that's no reason to panic. Remember how you put only one screw in each joint? That lets you push and pull the runners until diagonals are equal, plus or minus $\frac{1}{8}$ inch. Once they are, the base of your sled is square. You can count on it! Now add the second

screw to each joint to lock everything in place. Then fasten the floor boards with glue and screws.

The plans include a close-up view of how the front floor support, floor boards and runners come together. Take a close look at this now. You'll need to use a hand plane to angle the leading edge of the front floor support so the floor support and runners are in full contact where they meet. This is the hardest part of the project, but even this isn't a big deal. The plans show the angle to be about 35 degrees, but it will vary depending on the curvature on the ends of your runners. When all looks good, clamp the front floor support in place and drive screws through the runners into it. More screws will be added later through the sloped top rail to secure the floor boards.

Adding the Rails

The sled's rail assembly is made of 8 uprights, 2 angled tops, and a hand rail. Like everything else on the sled, these parts fit together in strong, simple ways with screws and glue. Cut the four kinds of rail uprights you'll need now—two of each type—then fasten them to the runner blocks, straight up and down, with glue and two screws per joint. The rail uprights are listed longer than necessary so you can trim along the sloped top rails with a handsaw to remove a triangular block of waste after installation. Follow the plans for the location of these parts and fasten them now. You may be tempted to trim all the rail uprights now, but don't do it. Trim only the back rail uprights so you can install the rail handle, also using

screws and glue. Leave the other rail uprights until the glue dries.

Finishing Up

Your sled's looking pretty good by now, right? But there are still a few things to take care of. The plans show the two $\frac{5}{8}$ -inch-diameter holes you'll need to drill through the floor boards, behind the front floor support, for the tow rope. You should also sand the sharp corners off the rail handle and sloped top rails, so no one gets slivers. Painting or varnishing your sled is optional. It'll look better if you do, but it is a lot of work, and it won't make the sled last any longer. Whatever you do, don't coat the underside of the runners. See "Wax Works" below for a speed-demon trail-tip.

PREPARED FOR SAFETY

Woodworking is fun—it may even become your career one day—but there's one thing you must remember. Always be careful. You must wear safety glasses when using any wood-working machinery, even if an adult is helping you. And don't forget ear protection. Earmuffs or foam earplugs work fine. And if you're ever uncertain about how to use any tool, ask for help.

WAX WORKS!

You can build the best sled in the world, but it'll never win races unless you've treated the runners right. It's a make-or-break detail, and wax is the key. The best kind is cross-country ski wax—the hardest type you can find, rated for 30 degrees below zero temperatures. Rub the wax onto bare-wood runners (not varnished) when the sled's indoors, smoothing the surface with a piece of cork to get rid of the lumps. Your runners won't feel slippery after this, but that's O.K. Once they get outside, on the cold snow, they'll slide along the trail like a lightning bolt. And the guys pulling will certainly appreciate that. Just remember to let your sled cool down before setting it in the snow. Warm runners can melt snow, forming water droplets that freeze, making the runners rough and slow.

DRILLING AND GLUING

Glue and screws hold this project together, and both are easy to use if you understand a few key points. First of all, don't use ordinary white, yellow or brown carpenter's glue on this project. They're great for indoor projects but are guaranteed to turn to mush when they get wet outside. Even some brands rated as water-resistant on the label won't last long if the snow turns to slush. What you need is something called type II wood glue. It's weatherproof and available under brand names like Titebond II and Weathertite. Polyurethane glue works well outdoors, but it's more expensive. Drilling screw holes is always more accurate if you hammer a nail lightly into the wood before you bore each hole. This makes a little crater so the drill bit won't wander off the mark as the bit starts spinning. After drilling holes in the runners you'll need to flare out the bottom end with something called a countersink bit chucked into your drill. This creates a cone-shaped pocket for the screw head, so it doesn't extend below the underside of the runner and drag on the snow. Holes drilled in soft wood parts don't need to be countersunk because the screws draw themselves level with the surrounding wood.

Materials List

FOR THE RUNNER ASSEMBLIES

RUNNERS	hardwood $\frac{1}{2}$ "-thick x $3\frac{1}{2}$ "-wide x 89"-long	2
RUNNER BLOCKS	hardwood $1\frac{1}{2}$ " x $3\frac{1}{2}$ " x $3\frac{1}{2}$ "	8

FOR THE FLOOR

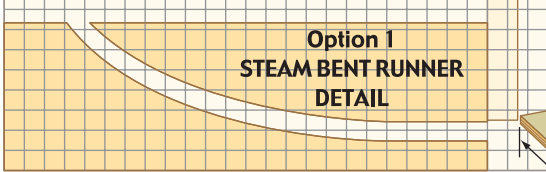
FLOOR BOARDS	softwood $\frac{3}{4}$ " x $3\frac{1}{4}$ " x 73"	5
MAIN FLOOR SUPPORTS	softwood $\frac{3}{4}$ " x $3\frac{1}{2}$ " x 18"	4
FRONT FLOOR SUPPORT	softwood $\frac{3}{4}$ " x $3\frac{1}{2}$ " x $19\frac{1}{2}$ "*	1

FOR THE RAIL ASSEMBLY

SLOPED TOP RAILS	softwood $\frac{3}{4}$ " x $3\frac{1}{2}$ " x 82"	2
RAIL HANDLE	softwood $\frac{3}{4}$ " x $3\frac{1}{2}$ " x $19\frac{1}{2}$ "	1
FRONT RAIL UPRIGHT	softwood $\frac{3}{4}$ " x $3\frac{1}{2}$ " x 14"	2
SHORT MIDDLE UPRIGHT	softwood $\frac{3}{4}$ " x $3\frac{1}{2}$ " x 22"	2
LONG MIDDLE UPRIGHT	softwood $\frac{3}{4}$ " x $3\frac{1}{2}$ " x 31"	2
BACK RAIL UPRIGHT	softwood $\frac{3}{4}$ " x $3\frac{1}{2}$ " x 40"	2

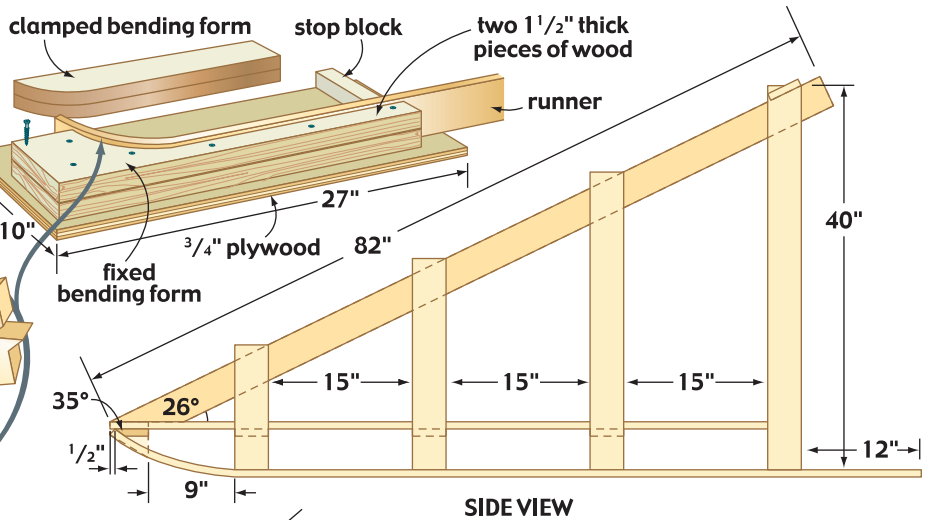
*Trim front edge to fit curve of your runners, about 35 degrees.

RUNNER TIP DETAIL

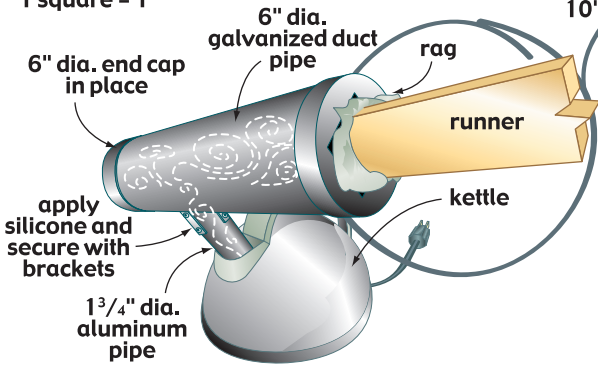


Option 1
STEAM BENT RUNNER
DETAIL

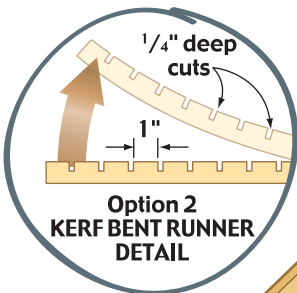
1 square = 1"



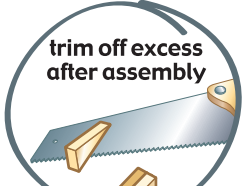
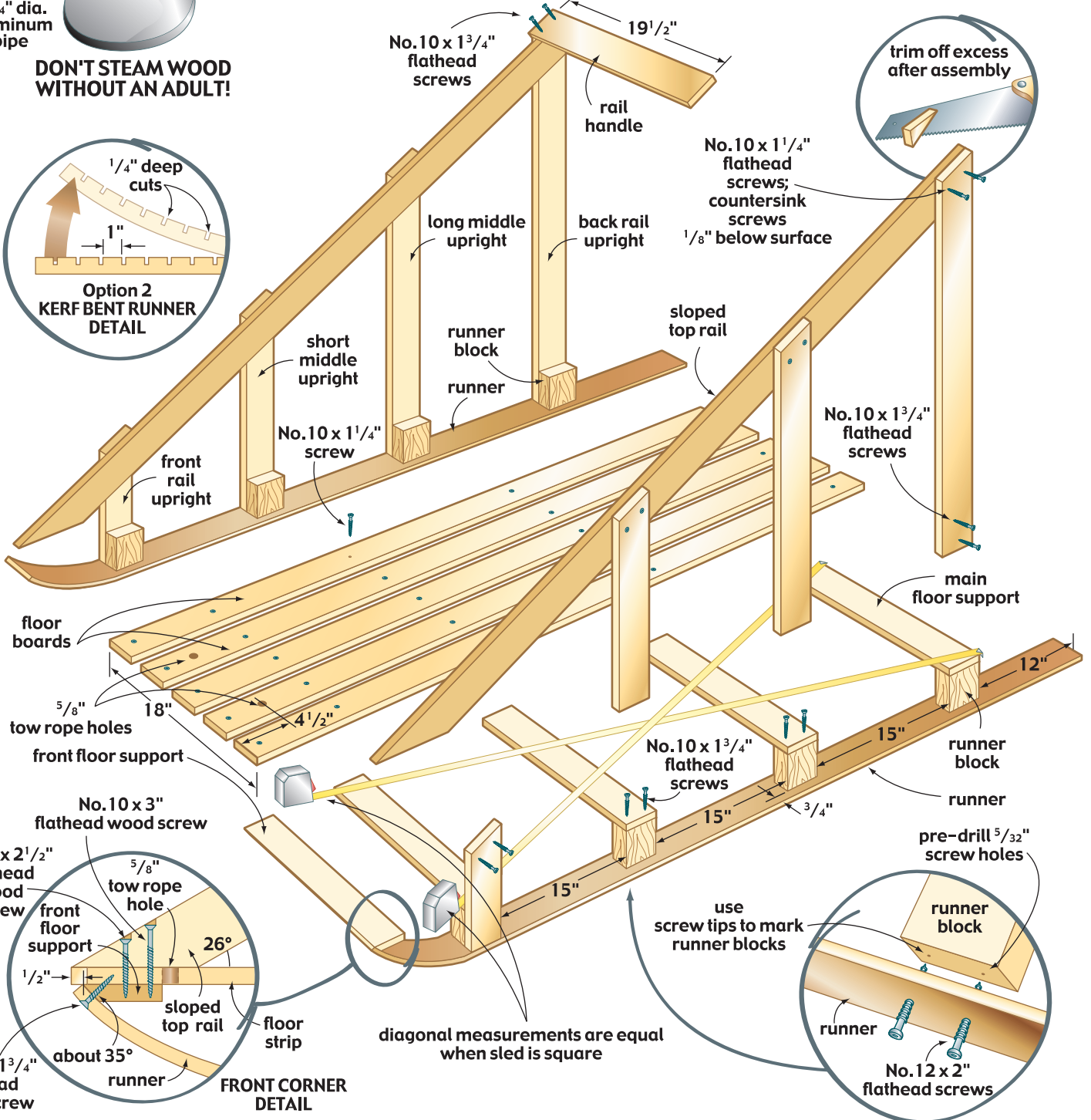
SIDE VIEW



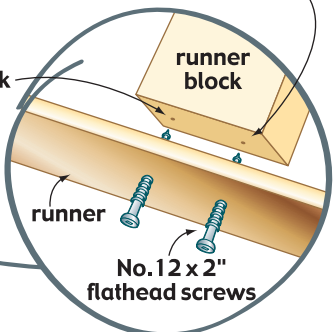
DON'T STEAM WOOD WITHOUT AN ADULT!



Option 2
KERF BENT RUNNER
DETAIL



trim off excess after assembly



use screw tips to mark runner blocks

No. 12 x 2" flathead screws