

Design for a Portable Reindeer Crush

by

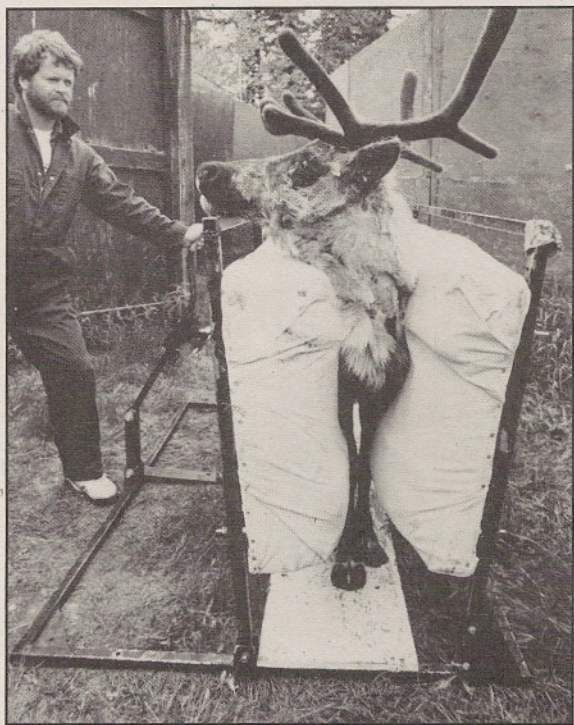
Greg Finstad

Research Associate

and

Dr. Lyle Renecker

Associate Professor of Animal Science



UNIVERSITY OF ALASKA FAIRBANKS

Agricultural and Forestry Experiment Station
School of Agriculture and Land Resources Management

Tools needed for construction

- Arc welder
- Metal band saw or cutting torch
- ½" electric drill or drill press
- Circular saw
- Grinding wheel or file
- Hammer
- Set of SAE or metric wrenches
- Paint brush
- Tape measure
- Screw driver or electric drill
- Wood glue

A complete list of materials is located on pages 10 and 11 (Tables 1a & 1b).



*Front photo: Greg Finstad
restrains a reindeer using the
portable reindeer crush.
Photo by J. Stephen Lay*

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INTRODUCTION

In Alaska, reindeer are managed under both free-ranging and farm conditions. Where reindeer are herded, they are handled twice yearly to harvest velvet antlers and to perform health and record-keeping duties. Under farm conditions, reindeer are handled more frequently to provide routine health care and monitor weight gain. In both types of management there is a need to efficiently and safely restrain the animal with minimal stress to it.

A pneumatic crush for red deer is manufactured in New Zealand and has been used in Alaska for years to restrain reindeer. However, this crush is both expensive and cumbersome to transport between locations.

The University of Alaska's Fairbanks Reindeer Research Program designed a lightweight, portable reindeer crush that can be built locally. This crush can be manufactured with materials that are readily available and assembled in eight- to-12 hours with minimal welding and construction skills. The materials can be purchased in most areas for less than \$500.

The design is offered as a prototype for the builder and should be personalized and improved upon to meet the needs of each handling facility. If the crush is to be stationary, heavier materials can be incorporated into its construction and additional bracing can be added at stress points. Also, smaller or larger versions can be built to specialize in restraining calves or bulls.

CONSTRUCTION OF COMPONENTS

Frame

All items listed in the materials section (Tables 1a & 1b, p. 10, 11) are specified in finished English (metric) measurements and no further cutting is necessary. Round pipe can be substituted for the square tubing.

It is much easier to drill all holes in the frame components before it is welded. While a drill press makes this job easier, it can be done with a 1/2" (13 mm) drill and a good-quality SHARP drill bit.

Remember, the RPM's should be low when drilling so the bit does not overheat causing it to loose it's temper. Drill all holes $\frac{1}{16}$ " (1.6 mm) larger than the recommended bolt diameters.

The builder must take extra care to "square" the frames before welding. If not, the crush will be difficult to erect in the field and the frame will bind during operation.

Welding of the triangular corner bracing is important to ensure reliability of the crush (Fig. 1). Without the bracing, stress on the framework will eventually break the welds at the corners. A steel tube-to-tube weld did not hold up on an earlier prototype.

Holes can be drilled through the bottom framework of the crush to attach a Tru-test electronic scale. Weights can be gathered easily and quickly whenever an animal is held in the crush. After construction has been completed, all sharp edges and burrs must be ground or filed from the frame and painted with a coat of rust-proof paint.

The plywood floor and lower side panels can be cut and painted with wood enamel (Fig. 2). The upper side panels, pads, can be made adjustable by drilling sets of holes four-inches apart through the frame uprights (Fig. 3). Remember to cut the lower side panel down far enough for the lowest adjustment. The panels can be placed at the lowest adjustment for handling calves.

The crush can be disassembled into components for transportation from one location to the next. It will easily fit in the back of a pickup truck or a 2' x 4' x 6' (0.6 x 1.2 x 1.8 m) space.

If the crush is to be transported by boat, plane, or snowmachine, the components can be cut into 24" (0.6 m) sections. The crush can be reassembled by using pins made from 1" (2.5 cm) tubular steel inserted into the cut ends of the 1 $\frac{1}{4}$ " (3.2 cm) frame components. Bolts, 1 $\frac{1}{2}$ " (3.8 cm), can be inserted through the frame and pins to hold them firmly in place.

Pads

One of the 4' x 8' (1.2 x 2.4 m) sheets of plywood can be cut into two pieces measuring 2' x 6' (1.2 x 1.8 m) (Fig. 3). These pieces of plywood are to be used as the backing for the pads of the crush. They can be painted at this time with enamel paint.

Holes should be drilled at the corners of the plywood so they can be bolted to the frame. The $\frac{5}{16}$ " x 3" (0.8 x 7.6 cm) bolts should be inserted into the holes while using the fender washers.

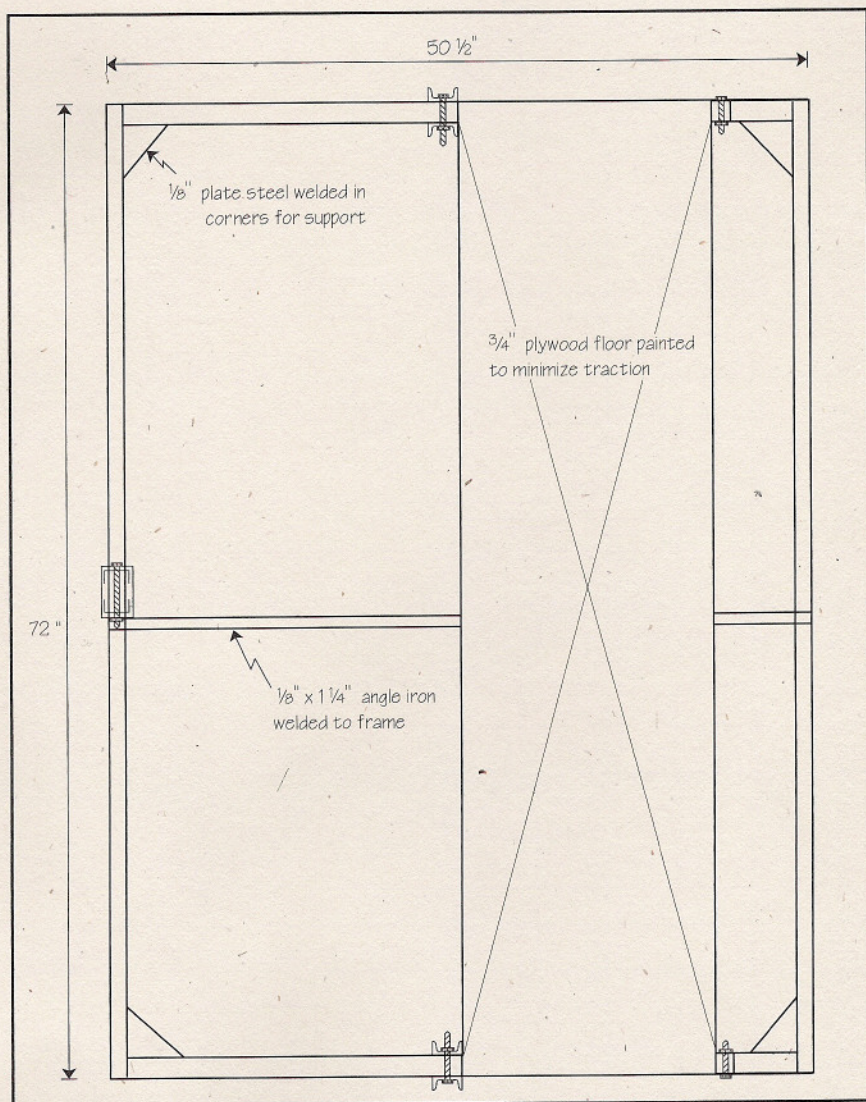


Figure 1. Top view of the portable reindeer crush.

The bolts and washers should be glued, with an epoxy resin, firmly to the plywood; once the padding is applied the head of the bolt will no longer be accessible. Remember not to over tighten the nut when bolting the pads to the frame or the bolt will break free of the epoxy and spin in place.

The wood 2" x 4" (3.8 x 8.9 cm) should be cut and attached to the bottom edge of the plywood with the 2" (52 mm) sheetrock

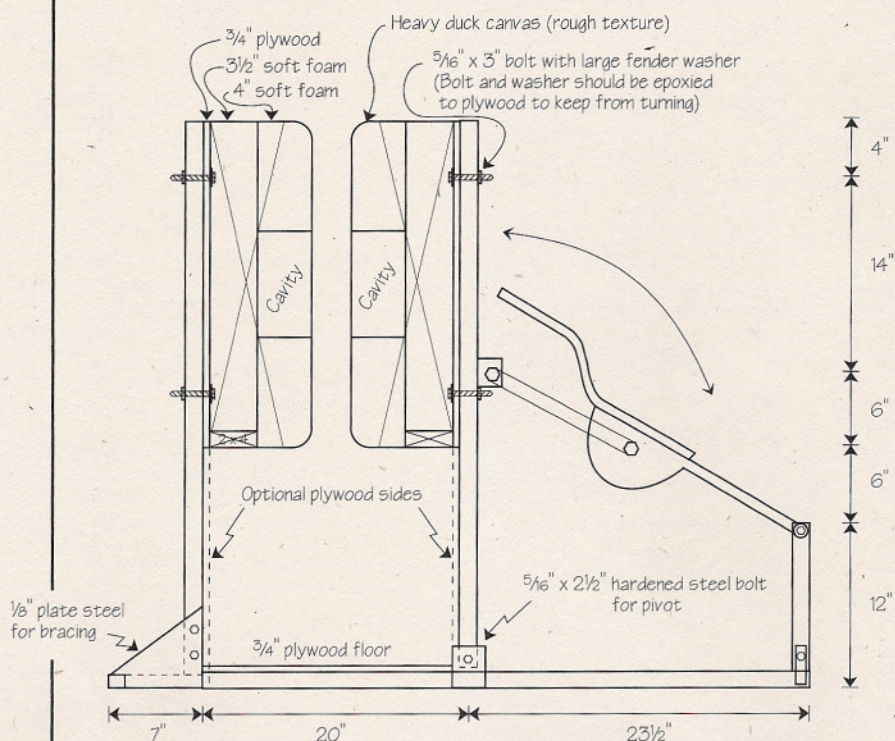


Figure 2. Front view of the portable reindeer crush.

screws (Fig. 2). Often, a reindeer will “collapse” in submissive posture while in the crush and this 2" x 4" (3.8 x 8.9 cm) acts as a ledge for supporting the animal and will not allow it to fall to the ground.

The 2' x 6' (0.6 x 1.8 m) pieces of foam can be glued to the plywood backing. The 8' x 6' (0.2 x 1.8 m) pieces are then glued flush to the top of the larger piece of foam and the bottom of the 2" x 4" (3.8 x 8.9 cm) leaving a cavity to enclose the reindeer (Fig. 2).

The fabric to cover the foam should be rough textured, not smooth, to provide friction to “grip” and hold the animal. A heavy-duty canvas duck works well and is inexpensive. The canvas duck

should be cut two-feet larger than the plywood backing to allow plenty of overlap for attachment. The canvas should be tucked at the corners, making a square corner. It should be stretched tight and attached to the plywood with $\frac{3}{4}$ " (19 mm) roofing nails.

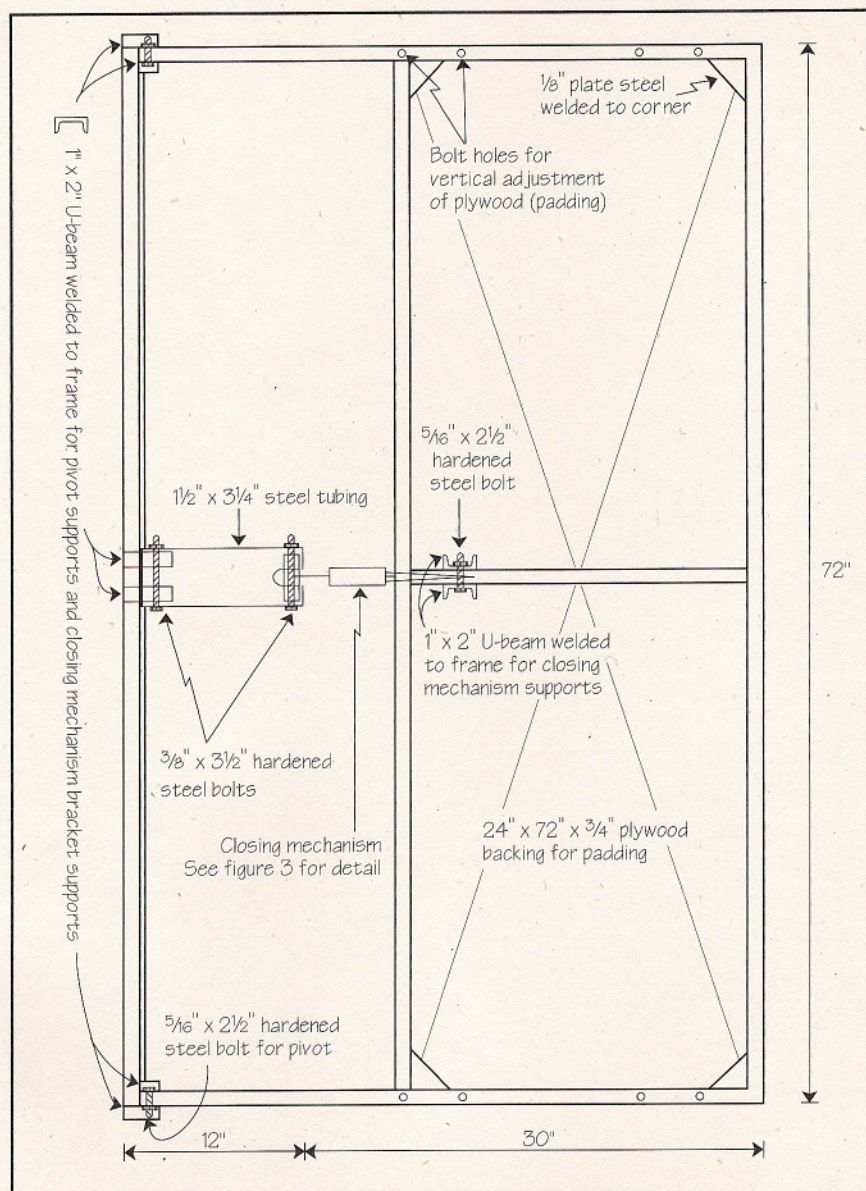


Figure 3. Side view of the portable reindeer crush.

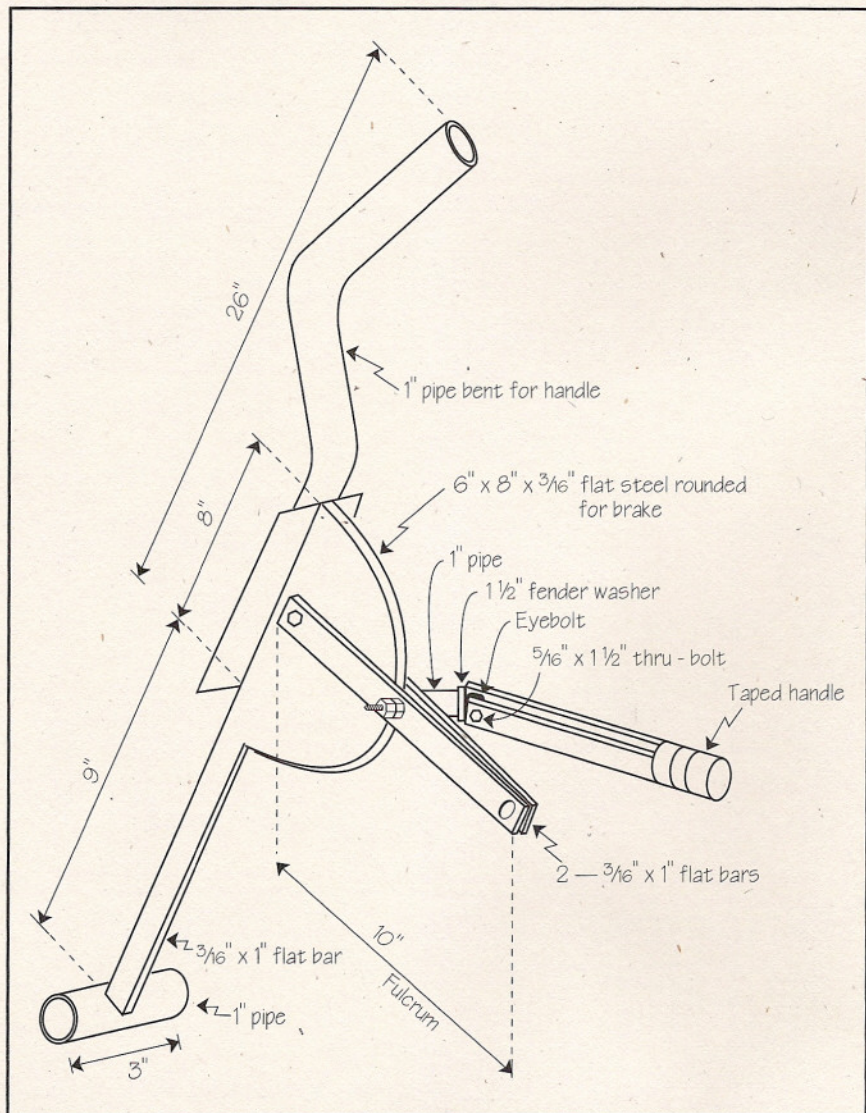


Figure 4. Closing mechanism of the portable reindeer crush.

Closing Mechanism

The closing mechanism consists of an arm to close the crush and another locking arm to brake the movement at any point along the fulcrum (Fig. 4). The arm is made from $\frac{3}{4}$ " (19 mm) pipe welded to a 6" x 8" (16 x 20 cm) plate steel. It should be rounded on one side and welded to the 17" (43 cm) piece of flat bar steel. A

3" (7.6 cm) length of $\frac{3}{4}$ " (19 mm) pipe is welded on the end of the flat bar. It is bolted to the frame and pivots as the crush is opened or closed.

The fulcrum, or locking mechanism, consists of two pieces of flat bar bolted loosely on each side of the steel plate. An eyebolt, a one-inch piece of pipe, and a handle are used to brake the action of the crush by compressing the two pieces of flat bar around the steel plate.

CONCLUSION

This crush design has been tested with good results both at the University of Alaska facility and during a field operation. The crush is lightweight and can be disassembled for easy transportation. It can be fabricated with a minimal amount of welding for less than \$1,500 (including labor).



*Greg Finstad and Don Hartbauer demonstrate the portable reindeer crush.
Photo by J. Stephen Lay*

Table 1a. Materials list (English units)**No. Item****Portable Crush**

4	1 1/4" x 1 1/4" x 42" x 1/8" thick steel tubing
3	1 1/4" x 1 1/4" x 48" x 1/8" thick steel tubing
2	1 1/4" x 1 1/4" x 23" x 1/8" thick steel tubing
8	1" x 2" x 4" x 1/8" thick steel U beam
14	6" x 6" x 1/8" thick triangular shaped plate steel for corner bracing
1	1 1/2" x 3 1/4" x 11" x 1/8" thick steel tubing
8	5/16" x 3" hex head bolts with fender washer
7	5/16" x 2 1/2" hex head bolt with washer
2	3/8" x 3 1/2" hex head bolt with washer
2	3/4" x 4' x 8' plywood
36	2" sheetrock screws
2	2" x 4" x 8' fir
1	4' x 20' heavy canvas duck
1	1 lb. 3/4" roofing nails
2	3 1/2" x 2' x 6' foam padding
4	4" x 8" x 6' foam padding
2	cans of undercoat spray paint, metal
1	quart of paint, wood enamel

Closing Mechanism

1	1" x 17" x 1/8" thick steel flat bar
2	1" x 10" x 3/16" thick steel flat bar
2	1" x 6" x 3/16" thick steel flat bar
1	1 1/2" x 8" x 3/16" thick steel flat bar
1	1" x 30" x 1/8" thick steel pipe
1	1" x 3" x 1/8" thick steel pipe
1	1" x 1" x 1/8" thick steel pipe
1	6" x 8" x 3/16" thick plate steel
1	3/8" x 1" hex head bolt and nut with washer
1	5/16" x 1 1/2" hex head bolt and nut with washer
1	1/4" x 3" eyebolt and two nuts with washer
1	1 1/2" fender washer

Table 1b. Materials list (metric units)

No.	Item
Portable Crush	
4	3.18cm x 3.18cm x 106.7cm x 3.2mm thick steel tubing
3	3.18cm x 3.18cm x 122cm x 3.2mm thick steel tubing
2	3.18cm x 3.18cm x 58.4cm x 3.2mm thick steel tubing
8	2.54cm x 5.08cm x 10.16cm x 3.2mm thick steel U beam
14	15.3cm x 15.3cm x 3.2mm thick triangular shaped plate steel for corner bracing
1	3.8cm x 8.26cm x 28cm x 3.2mm thick steel tubing
8	8.0mm x 7.6cm hex head bolts with fender washer
7	8.0mm x 6.35cm hex head bolt with washer
2	9.5mm x 8.9cm hex head bolt with washer
2	1.28cm x 122cm x 244cm plywood
36	5cm sheetrock screws
2	3.8cm x 8.9cm x 244cm fir
1	121.92cm x 609.6cm heavy canvas duck
1	5kg 1.28cm roofing nails
2	8.9cm x 61cm x 183cm foam padding
4	10.2cm x 20.4cm 183cm foam padding
2	cans of undercoat spray paint, metal
2	liters of paint, wood enamel
Closing Mechanism	
1	2.54cm x 43cm x 3.2mm thick steel flat bar
2	2.54cm x 25.4cm x 4.8mm thick steel flat bar
2	2.54cm x 15.2cm x 4.8mm thick steel flat bar
1	3.8cm x 20.3cm x 4.8mm thick steel flat bar
1	2.54cm x 76.2cm x 3.2mm thick steel pipe
1	2.54cm x 7.6cm x 3.2mm thick steel pipe
1	2.54cm x 2.54cm x 3.2mm thick steel pipe
1	15.2cm x 20.3cm x 4.8 thick plate steel
1	9.5mm x 2.54cm hex head bolt and nut with washer
1	7.9mm x 3.8cm hex head bolt and nut with washer
1	6.4mm x 7.63cm eyebolt and two nuts with washer
1	3.8cm fender washer

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