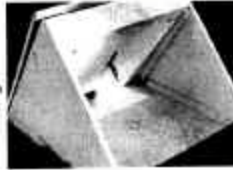


The following are instructions for Competition Flyball Box

DESCRIPTION:



Chakotay's
Competition
Flyball Box
v 2.03



Chakotay's Competition Flyball Box (v2.03) is a wedge type Flyball Box with a 60 degree front pedal. The front face of the box is the pedal and the ball is ejected 15 1/2" off of the ground. The hammer/trigger mechanism will launch a tennis ball 25"-36". The spring tension on the hammer is adjustable. The pedal on this box is covered with padding made of industrial Welcome Mat rubber-backed carpeting, glued to the pedal. The Box dimensions are: 24" wide x 30" long x 17 7/8" high.

Box Instructions:

Materials List:

- 1 - 48" x 48" Sheet of 5/8" or 3/4" plywood (Recommend CD grade or better)
- 4 - 2 1/2" corner braces (with mounting screws) The preferred type of corner brace has the holes inline. Do not purchase ones with off set holes.
- 1 - 3" dia x 3" long PVC pipe
- 2 - Springs, compression type 7/8" x 4" long, 1/8" [.125] wire [1/16" [.062] wire for a training box)
- 2 - Springs, tension type, 1/2" x 2 5/8" long, D95 [3/32" wire
- 1 - 1/4-20 threaded rod, 2 1/2" long
- 2 - 1/4-20 x 2" eyebolts (optional instead of threaded rod)
- 2 - 1/4-20 Hex Head bolt, 1 1/2" long
- 8 - 1/4-20 Hex Head Nuts
- 1 - 1/4 ID x 5/16" OD x 1/2" long steel (or brass) bushing
- 9 - Assorted 1/4" washers
- 4 - 1" x 1" x 20" (fir strips)
- 1 - Cabinet elbow catch (with attached screws)
- 1 - 24" x 21" (min) carpet, matting, or rubber, for pedal cover
- 30 - #8 x 1 1/2" wood screws (Philips Head preferred)
- 1 - Piano hinge (will need to cut to length, approx. 20"), although any type of gate or door butt hinge will work (w/mounting screws) This is for the pedal to swing.
- 2 - steel washers, 1 1/4" OD x 1/4" ID (this is for holding down the pedal compression spring. Any thing will do as long as it gets the job done.
- 1 - Pt. can of contact cement (To glue down pedal matting)
- 1 - Qt. white primer (optional)
- Paint, Sandpaper, White Glue (optional)

WHERE TO BUY:

Some pieces are hard to find. If all else fails, contact [Cornell's True Value Hardware](#). Speak to [John Fox 3rd](#) (914) 961-2400. They carry all the hardware needed to build the box. Sorry, but this is the only Web site I have found to date. If there is enough interest, I can have a hardware kit made up by these folks.

Cabinet Latch

- Ives model SP2A3 in stock. Retail is \$2.19 each. You could also order it from a local True Value store... item number is 510024, and it is an aluminum catch with a brass finish.
- Try to find a steel catch if you can. The above mentioned catch may wear prematurely.

Pad Material

- Anti fatigue matting is available at Office Depot.
- The pad I use is a welcome mat size carpet Berber bonded on a rubber back. This product is found at Home Depot for less than \$8.
- Borderpups offer excellent rubber matting products, not only for box padding, but indoor running mats as well. In addition, all profits go toward BC Rescue! Contact Marti at borderpups@aol.com

Tools Required:

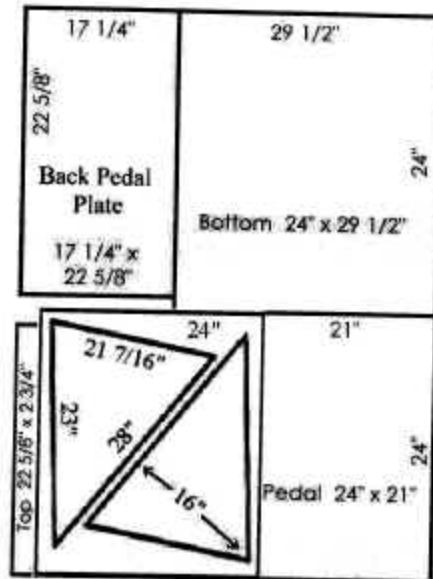
- Circular Saw, or Table saw. (A jigsaw will work, but a Carpenter's Saw would be better :-)
- Drill motor w/ 1/8", 1/4", and 5/16" drill, 3/4" wood drill bit, 3" hole saw (optional)
- Screw driver (cordless preferred)
- Half round wood rasp.
- Half round rough, single cut, Bastard File.
- Pliers, and 7/16" wrench (for the 1/4-20 nuts)
- Bench Vise and a hammer (optional)
- Tape measure and pencil (pen)

Instructions for assembly:

Layout work

- Lay out the 48" x 48" of 3/4" (23/32") sheet of plywood using the following dimensions for the cut list: NOTE: If you use 1/2" or 5/8" plywood, you will need to adjust the width dimensions of the top and back pedal plate. CDX grade plywood is made to the nearest 1/32" of listed size.
- 29 1/2" x 24" Bottom
- 17 1/4" x 22 5/8" Back Pedal plate
- 24" x 21" Pedal
- 2 3/4" x 22 5/8" Top plate
- 24" x 24" Sides

See attached drawing (Figure 1) for suggested cut pattern. Save the scrap plywood.

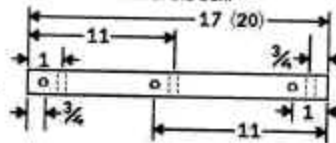


Attach the pedal to the bottom

- Align the front edge of the pedal perpendicular with the front edge of the box.
- Place the hinge behind the pedal and mark with a pencil.
- Attach the hinge first to the pedal, then to the bottom of the box.

Make the fir strips

- Cut 2 of the fir strips to 17".
- Drill 1/8" holes in all four fir strips per attached drawing. (Figure 2)



Make the sides of the box

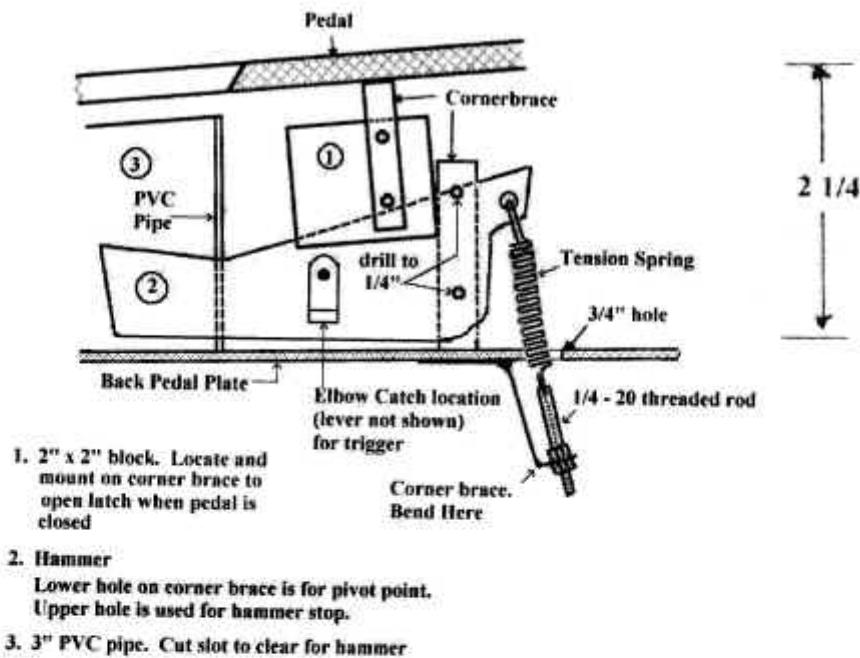
- It would be best to make a cardboard template of this piece and draw it on the 24" x 24" side sheet. This is to give you a rough line to work from.
- Double check the dimensions before cutting.** This will end up being a triangle with the following angles: 52, 50, and 78 degrees. The 52 degree angle on the shortest side will be the edge facing the pedal. The longest side will face the bottom, and the front edge is approx. 1" from the front edge of the bottom plate of the box. The finished length of the sides will be approximately 28 1/4" x 21 7/16" x 23". From the bottom (longest side) to the top of the side will be approx. 16". Cut out the triangles from this square piece to make the sides of the box.
- On the shortest side (21 7/16") draw a line parallel to this edge 3" back. This is where the front edge of back pedal plate will be.
- Locate the 17" fir strip behind the back pedal plate, and attach the sides and back pedal plate with screws.
- Attach the 20" fir strips on the bottom (longest side) of the sides, and to the bottom of the box and attach with screws.

Make the ball hole in the pedal

- Draw a center line down the front pedal of the box.
- Place the 3" PVC pipe on this center line with the top of the circle 19 1/4" from the bottom. The bottom edge of this circle will be approx. 16 1/4" from the bottom. This will place the ball approximately 15 1/2" from the floor. This is average height. For an all short dog team, you might want to lower the position of the hole.
- If you are using a hole saw, drill the hole marked. If you don't have a hole saw, drill 1/4 holes around the inside of the circle. Click [here](#) to see more tips on this subject
- Smooth with the wood rasp.

Mount the PVC pipe

- Place the PVC behind the pedal hole onto the back pedal plate, align it with the pedal, and mark its location on the back pedal plate.
- Cut a slot 3/4" to 1" along the length of the PVC pipe.
- Drill two holes about 1" up from the bottom, 90 degrees on either side of the slot. Angle the drill downward so that you can attach the PVC to the back pedal plate with screws. (See attached picture)
- Locate and mount PVC pipe with the slot facing towards the bottom of the box.



Making the hammer assy.

- NOTE:** If you have quality grade plywood, this is a good material for making the hammer. If the wood quality is questionable (such as wood chipping off, or voids in the plywood), then I suggest you use solid wood, or a hard plastic or fiber material such as nylon, kevlar, or phenolic.
- Using scrap plywood, layout and cut the hammer.
- Insert the bushing to accommodate the 1/4" bolt.
- The lower hole of the corner brace where the bolt will go through the corner brace and hammer will have to be drilled out to 1/4" to accommodate the 1/4" bolt.
- Assemble the corner braces to the hammer.
- Place hammer inside of the PVC pipe where the upper tip is a little more than half way in the pipe (~ 1 9/16").
- Align the corner brace on the left side of the hammer to the location of the pivot hole, and mark with a pencil.
- Do the same for the right side.
- Mount the hammer corner braces. Make sure the hammer travels freely. Adjust if necessary.

- Bottom out the trigger against the back of the back pedal plate.
- Take a 1/4" drill and drill through the top hole of the corner brace, the hammer, and the other corner brace. Lift the hammer to it's full upright position, and drill through the corner brace, hammer and other corner brace. This establishes the upper and lower stopping points of the hammer. Continue to make this slot from the low to high point with the drill. Smooth and adjust with file.
- Attach bolt through top corner brace hole.
- Next, drill the hole for the spring to attach to the hammer. You may want to consider using eyebolts if the wood is too thick for the spring to go through.
- Underneath the spring hole of the hammer, locate the spring hole location in the back pedal plate.
- Mark and drill with 3/4 wood bit.
- On the underside, bend over one edge of a corner brace approx. 1/2" below the first hole, and bend it over 90 degrees away from the bottom of the corner brace (like the letter Z, kind of).
- Drill this hole out to 1/4".
- Mount the corner brace where the 1/4" hole is in the center of the 3/4" hole in the back pedal support plate.
- Take the 1/4-20 threaded rod and file a flat on one end.
- Locate and drill 1/8" hole in the end of the threaded rod (this is what the spring will attach to).
- Attach the tension spring to the threaded rod, the other end of the spring to the hammer, and assemble through the bottom corner brace, using (2) 1/4-20 nuts (used as jam nuts).
- Attach the corner brace to the back pedal support.
- Assemble the hammer spring.
- Mount the cabinet latch. **NOTE:** Allow at least 1/8" travel between latch and bottoming out of the hammer. The catch should have a slot and mounting hole.
- Mount the catch in the center of the slot and test the trigger before adding the second mounting screw.

Put on the top plate

Attach the top plate with screws. Trim to make sure the height does not go over 18".
NOTE: *Some box builders have found that by making this board extra wide, it provides a nice carrying handle.*

Mounting the bumper springs

- Mount the bumper springs on the back pedal support. The location of these springs are approximately 2" down and 2" over from the top edges of the back pedal plate.
- Mount using a screw through a washer holding down the last wind of the 4"e springs. **NOTE:** The spring tension for this box is designed for competition, i.e. hard / medium hitting dogs on the run. For training purposes, choose a spring of less strength. The box will still work for competition, but the smaller trigger force will aid in new dogs learning the box.

Make the trigger

- Make a 2" x 2" piece of plywood.
- Mount a corner brace on the back side of the pedal on the same side as the cabinet latch.

- Mount the 2" x 2" wood onto the pedal corner brace where this piece of wood will depress the cabinet latch and release it 1/4" - 3/8" from full pedal depression.

The Shadoe Trigger

As an option, and one I highly recommend, you can put a screw in the end of the trigger so that the screw is the part that pushes on the elbow catch. This makes for an easy adjustment of the firing point. (Thanks to [Don Ferguson](#) and his dog, Shadoe, for the tip.)

The final touches

Drill several 3/4 holes above the PVC pipe and below the top plate to make a carrying handle. This also provides a hole to tie down the pedal while in transit. If you don't have enough room to drill these holes, you may want to consider adding a carrying handle to the back of the pedal support plate. You also might want to drill four holes in the bottom plate on the corners for holding the box down when using outdoors.

- Trim the hole in the pedal to make sure a tennis ball will eject freely.
- Debur all sharp edges.
- Use contact cement to glue down your choice of a pedal material. You may consider overlapping the pedal cover and stapling to the back side of the pedal, or even cover the bottom.
- Make sure the height does not go over 18" and the width does not exceed 24". If you want to put pads or cover the bottom and pedal in this fashion with padding.
- For an added touch you may want to put some scrap padding or carpet on the floor of the bottom.

Test the box with your dog, adjust, trim, or modify as needed. For a more sturdy box, disassemble and glue the box together.

Construction Notes

In the fully extended position, the hammer should have a light tension on the spring. Be sure to lock down the (2) 1/4 20 nuts. It will only take a few hits from a dog and the spring assembly will loosen and you will lose power from the hammer. If your dog misses the ball and it goes back into the hole, then this is the problem. Test the box to make sure the free flight is 24"-28" from the front edge of the box.

One team reported that it is hard to get the trigger spring to go through the 3/4 hole in the back pedal plate. It may be necessary to remove the hammer and assemble the spring and threaded rod to the hammer, then attach the hammer to the box.

An alternative to using threaded rod is to use 1/4-20 eyebolts instead. You might need to use a longer cornerbrace, or shim up the one you have to make up for the extra length in this linkage.

Another method for attaching the spring to the hammer is to attach an eye screw in place of the wood extension in the above drawing. Care must be used when using this method, as the plywood has a tendency to split on the glue line. If you drill a large pilot hole before attaching the screw, the plywood should hold up very well. Prime and Paint. Enjoy!