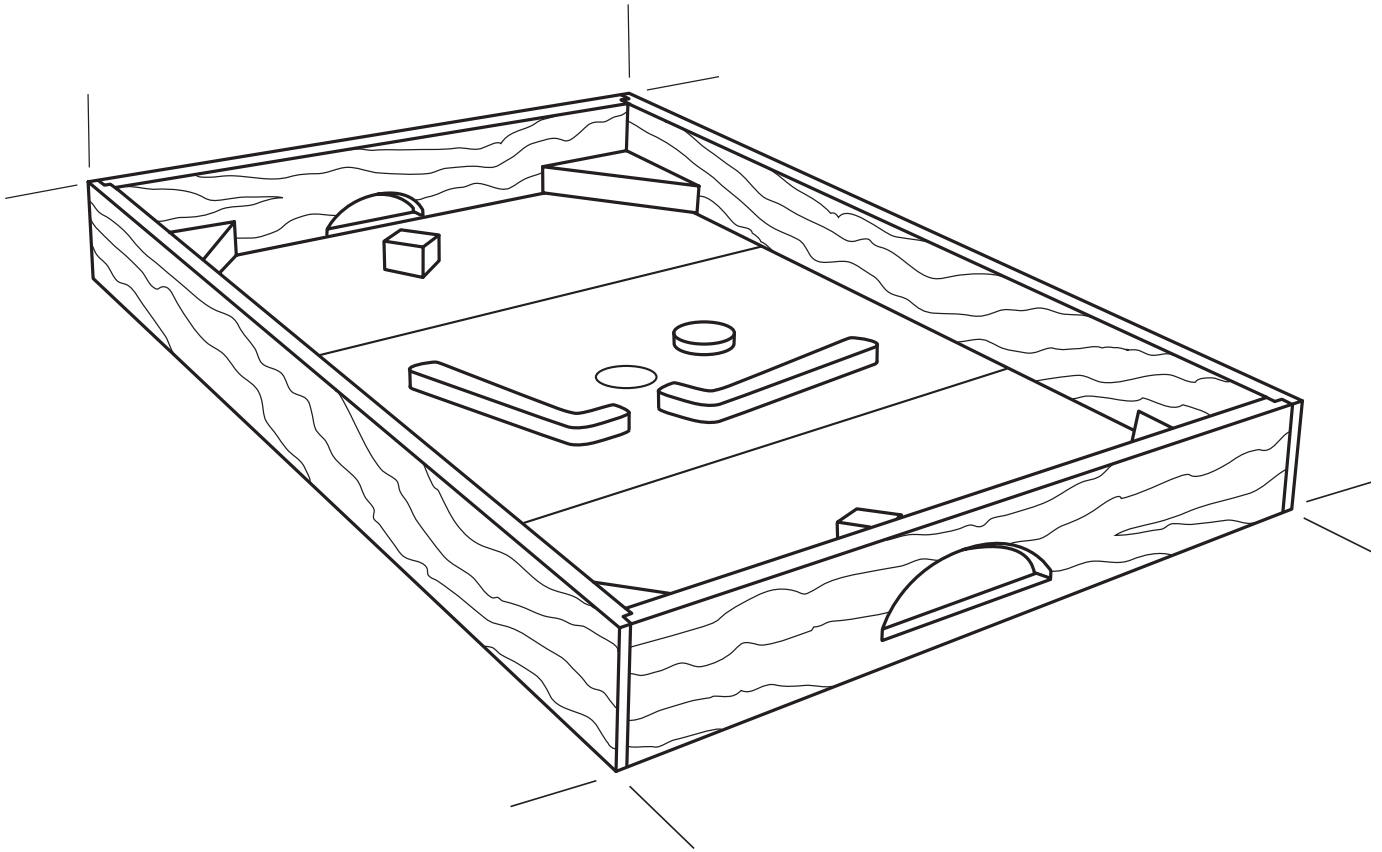




WOODWORKS: BEGINNER PROJECT 2004-2005 TABLE HOCKEY



A classic game you can build in only a day.

Who hasn't played table hockey at one time or another? It's great fun, and you may have noticed how simple the "rink" really is. So why go out and buy a ready-made when you can make one yourself! With its small number of parts and simple joints, this is a great project for those with beginner-level skills. You'll gain experience in making dados and rabbets with a table saw, laying out and making parts from a template and doing multicolor staining prior to assembly and finishing. So go ahead and build, shoot and score!

TOOLS REQUIRED

Hand Tools

- Sanding block
- Wood rasp and file (flat and half-round)
- Clamps

Power Tools

- Table saw
- Jigsaw
- Drill
- Bandsaw or scrollsaw
- Orbital sander

Miscellaneous

- Safety glasses
- 120-, 150- and 220-grit sandpaper
- Clean, lint-free cloths
- Tape
- Respirator
- Gloves for finishing
- Mineral spirits
- Water-filled metal container with tight-fitting lid
- Minwax® Polycrylic® Brush or other good quality, synthetic bristle brush (for water-based stains and finishes)
- Minwax® Wood Finish™ Stain Brush or other good quality, natural bristle brush (for oil-based stains and finishes)
- Carpenter's glue
- 1 can of red spray paint

SHOPPING LIST

Item	Quantity
1/2" maple plywood	1/2 sheet
1" x 4" hardwood	14 feet
8/4 hardwood	1 board foot
1/2" hardwood	scrap for hockey sticks
1-1/4" flathead woodscrews	24
3/8" wood plugs	12 (or make them with a plug cutter)

Recommended Wood

Base – 1/2" maple veneer plywood
Sides, goal and corner blocks – Oak

Alternate Wood

Base – Birch
Sides, goal and corner blocks – Cherry or any moderate to dense hardwood

WOOD FINISHING PRODUCTS

Recommended Finish

Prep: Minwax® Water-Based Pre-Stain Wood Conditioner
Stain: Minwax® Water-Based Wood Stain
Base – Winter Sky*
Sides – English Oak*
Goal blocks and corners – Deep Ocean*
Sticks – English Oak*
Puck – Onyx*

Finish: Minwax® Polycrylic® Protective Finish Semi-Gloss

*Or a Minwax® Water-Based Stain of your choice, available in 6 wood tones, a White Wash Pickling Stain, 60 custom-mixed colors, or 8 bold Accents™ colors.

CUTTING LIST

Overall size: 35" x 47"				
Key	Part	Pcs.	Thickness	Width x Length
A	Playing surface	1	1/2"	34" x 46"
B	Side rail	2	3/4"	3-1/2" x 47"
C	End rail	2	3/4"	3-1/2" x 34"
D	Corner block	4	1-1/2"	6" x 6"
E	Goal block	2	1-1/2"	2" x 2"
F	Stick	2	1/2"	8-1/2" x 2-1/4"
G	Puck	1	1/2"	1-1/2" dia.

Alternate Finish

Prep: Minwax® Pre-Stain Wood Conditioner (if using a soft or porous wood)
Stain: Minwax® Gel Stain
Base – Walnut**
Sides – Honey Maple**
Goal blocks – Honey Maple**
Corners – Walnut**
Sticks and Puck – Honey Maple**

Finish: Minwax® Fast-Drying Polyurethane Semi-Gloss

**Or your choice of 8 Minwax® Gel Stain colors.

NOTE: For both stain/finish plans, field lines and "face-off" circle are made with red spray paint.

BEFORE YOU BEGIN

Good craftsmanship begins and ends with good work habits, so make the following steps part of your routine workshop practice. If you have any doubts or questions about how to proceed with a project, always discuss them with your shop instructor.

- Carefully and fully review plans and instructions before putting a tool to the project lumber.
- Work sensibly and safely. Wear safety goggles when doing work that creates flying chips and sawdust; wear the appropriate respirator whenever making sawdust or working with thinners or other solvents.
- At the end of every work session, clean up your shop area and put away all portable tools.

CUTTING AND ASSEMBLY PROCEDURE

1. Cut parts A, B and C to length and width.
2. Set up dado blade on the table saw to make 1/2"-wide cuts. Cut grooves into parts B and C, located as shown in Fig. 1.
3. Set up dado blade for 3/4"-wide cuts. Cut rabbets on ends of B as shown in Fig. 1. Use a backer block behind the end you're cutting to prevent blowout.
4. Set up the dado blade for 3/8" cuts. Cut 1/4" x 1/4" rabbets on all edges of part A, ends first, then sides. Because this is a flush cut to the table saw fence, you'll need to attach a sacrificial wood fence. Set the fence for the right cutting dimension and then raise the dado head into the sacrificial fence. Make test cuts to assure the dimensions are correct.
5. Clamp together parts A, B and C to test fit. If needed, adjust the size of part A for proper fit.
6. Cut the goal openings in parts C so that the bottom of opening is dead flush with the top of the 1/2" groove. One way would be to drill a 1/2" access hole in the waste, then use a jigsaw and fine-tooth blade to cut the opening. Make sure not to cut too close to the line at the bottom edge, where it meets the dado. Then clamp both ends (C) together, and clean up the cuts with files (flat and half-round).
7. Drill the ends of parts B for the 3/8" plugs, then drill the clearance holes for the woodscrews.

Making the Corner and Goal blocks, Sticks and Puck

8. Cut the corner and goal blocks to the dimensions shown in the CUTTING LIST. Instead of using 8/4 hardwood, they can be glued up from the width of two pieces of less expensive 3/4" wood. Sand the edges smooth and even.

9. Make a cardboard template of the hockey sticks as shown in Fig. 2. Trace the shape onto 1/2" hardwood. Lay out the puck on 1/2" hardwood or plywood. Cut the sticks and the puck using a bandsaw or scrollsaw; round corners with a file, sand.

NOTE: Assembly must be done after all the pieces except the outsides of B and C are stained and finished, so proceed now to STAINING AND FINISHING.

10. Dry clamp the sides and playing surface together one last time to check the fit.

11. Apply carpenter's glue to the grooves and rabbets, clamp the pieces together and set the assembly aside to allow the glue to dry.

12. Drive screws into the joints, apply glue to plug holes and drive in the plugs. Remove the clamps. Trim the plugs flush using a small handsaw, then sand flush. You can now sand, stain and finish the outside.

13. Screw on blocks to the plywood, positioned as shown in Fig. 1.

14. For a no-scratch base, add felt or rub-on buttons to the bottom four corners.

STAINING AND FINISHING

Woodworker's Tip: *Though you may be tempted to cut short your sanding, preparation and application time, don't do it. These tasks are very important steps in obtaining a high-quality finish. Remember, it is the finish, just as much as the fit and smoothness of the parts that will have great bearing on how people judge your craftsmanship. To ensure an excellent result, follow the steps listed in this section and also the instructions the finish manufacturer puts on its products.*

FINISHING TIPS

- Test the stains and finishes you are planning to use on scraps of wood. On the back of the scrap, mark the stain/finish combination and the type of wood. Allow all samples to dry thoroughly before making your final finish selection. Save your samples for quick reference on future projects.
- All stains and finishes must be allowed to dry thoroughly between coats. Remember that drying times can vary due to humidity and other climatic conditions.
- If you have some leftover stain or finish, wipe the can rim so that stain or finish in the rim won't dry out and prevent the lid from forming a tight seal.
- Brushes used for water-based products, such as Minwax® Water-Based Wood Stains or Minwax® Polycrylic® Protective Finish, should be cleaned with warm water and soap; for oil-based finishes, brushes must be cleaned with mineral spirits.

15. Sand all pieces with 120-grit sandpaper, then move up to 220-grit to complete the pre-finish smoothing. Use an orbital sander and with-the-grain sanding strokes to remove any marks or scratches. Dust off the piece and wipe it carefully with a clean, lint-free cloth lightly dampened with water.

Recommended Finish

16. Before applying Minwax® Water-Based Wood Stain to a hardwood or softwood, apply Minwax® Water-Based Pre-Stain Wood Conditioner following the directions on the can. Applying it will help to ensure even absorption of stain and prevent blotchiness that can occur with some woods. After 1 to 5 minutes, wipe off all excess conditioner using a clean, soft cloth. Wait 15 to 30 minutes then use 220-grit or finer sandpaper to sand off any "whiskers" raised by the conditioner. Wipe-off any sanding dust with a clean, soft cloth. Proceed to the staining within 2 hours.

17. Do the staining in two steps, starting on the interior surfaces before the piece is assembled and then doing the exterior surfaces after assembly. When staining and finishing the playing surface (A), be sure to keep finish off the 1/4" tongue on each edge. When finishing parts B and C, keep the stain and topcoat out of the grooves and rabbets, so the glue can penetrate properly. After staining part A, make the lines by laying down two masking tape strips, 1/8" apart. Mask off the rest of the playing surface and apply two coats of red spray paint. Paint a 1"-dia. "face-off" circle in the middle in the same way.

18. Apply the Minwax® Water-Based Wood Stain you've chosen to the interior surfaces using either a nylon/polyester brush or a cloth. Allow stain to penetrate no longer than 3 minutes. While stain is still wet, wipe off all excess with a clean cloth that's been lightly dampened with stain. Allow the piece to dry for 2 hours before applying a second coat, if desired. Allow the piece to dry overnight before applying the clear finish.

Woodworker's Tip: *Minwax® Water-Based Wood Stain is available in 6 factory wood tones, a White Wash Pickling Stain, 60 custom-mixed colors, and 8 bold Accents™ colors. This means that you are not limited to just traditional wood tone colors (pine, oak, walnut, etc.). Be sure you look over all of the Minwax® color charts before making your final selection.*

19. After allowing the piece to dry overnight, apply Minwax® Polycrylic® Protective Finish following the directions on the can. Stir the can contents thoroughly before starting and periodically repeat the stirring during your work session.

20. Working a small area at a time to maintain a wet edge, apply the first coat. Work quickly and make the final strokes in each newly finished section using with-the-grain brushstrokes.

21. Allow the finish to dry a minimum of 2 hours. Then sand lightly with 220-grit or finer sandpaper wrapped around a soft backup block. Thoroughly dust off and wipe all surfaces with a cloth lightly dampened with water.

22. Repeat steps 19 and 20 to apply the second coat. To ensure durability, a third and final coat is recommended. Allow the finish to cure overnight.

Alternate Finish

23. Apply the Minwax® Gel Stain you've chosen to the interior surfaces using a clean, lint-free cloth or natural bristle brush. Allow the Gel Stain to set for about 5 minutes, then wipe off any excess. Repeat for the exterior surfaces. To achieve a deeper color, you may apply a second coat after 4 to 6 hours, repeating the application directions for the first coat. Allow the stain to dry for 24 hours before applying the finish.

Woodworker's Tip: *When wiping off stain, make certain that your last wipe with the cloth goes with the grain of the wood. This way, any stain you might miss during wipe-off will be visually minimized by the wood grain.*

24. Apply Minwax® Fast-Drying Polyurethane following the directions on the can. Use a good quality, natural bristle brush intended for use with polyurethane. Allow the first coat to dry overnight.

25. The next day, lightly sand all surfaces with 220-grit or finer sandpaper using with-the-grain strokes. Wipe all surfaces with a clean, soft cloth lightly dampened with mineral spirits. Apply a second coat of polyurethane and set the piece aside to cure.

26. When completely dry, repeat step 25, applying the third and final coat of polyurethane. Allow the game to cure for several days before play begins.

TABLE HOCKEY RULES

OBJECT OF THE GAME

Score by knocking the puck into the opponent's goal.

Goals can be scored by direct shots into the goal, by bank shots off the side rails, or by double bank shots off the corner blocks and goal block.

HOW TO PLAY

The puck is put into play by one of the players dropping the puck in the face-off center circle. A player can hit the puck only when the puck is in his defense zone area or the center free-play zone. A player cannot hit the puck when it lies in the opponent's defense area.

A puck knocked out of the rink is put into play from the defense area of the opponent responsible for the out-of-bounds shot.

A player's play position is directly behind the goal. Play from along the side of the rink is not permitted.

SCORE

One point for each goal on any type of shot. Set your own total to determine the winner.

PRODUCT SAFETY

For your safety and the safety of those you work with, always read the safety warnings, which manufacturers print on their labels, and follow them to the letter. Typical safety advice and instructions will contain information such as the following:

WARNING! Removal of old paint by sanding, scraping or other means may generate dust or fumes that contain lead. Exposure to lead dust or fumes may cause brain damage or other adverse health effects, especially in children or pregnant women. Controlling exposure to lead or other hazardous substances requires the use of proper protective equipment, such as properly fitted respirator (NIOSH approved) and proper containment and cleanup. For more information, call the National Lead Informations Center at 1-800-424-LEAD (in US) or contact your local health authority.

When using oil-based wood finishing products:

CAUTIONS: CONTAINS ALIPHATIC HYDROCARBONS. Contents are COMBUSTIBLE. Keep away from heat and open flame. **VAPOR HARMFUL.** Use only with adequate ventilation. To avoid overexposure, open windows and doors or use other means to ensure fresh air entry during application and drying. If you experience eye watering, headaches, or dizziness, increase fresh air, or wear respiratory protection (NIOSH approved), or leave the area. Avoid contact with eyes and skin. Wash hands after using. Keep container closed when not in use. Do not transfer contents to other containers for storage.

FIRST AID: In case of eye contact, flush thoroughly with large amounts of water for 15 minutes and get medical attention. For skin contact, wash thoroughly with soap and water. In case of respiratory difficulty, provide fresh air and call physician. If swallowed, do not induce vomiting. Call Poison Control Center, hospital emergency room, or physician immediately.

NOTICE: Reports have associated repeated and prolonged occupational exposure to solvents with permanent brain and nervous system damage. Intentional misuse by deliberately concentrating and inhaling contents may be harmful or fatal.

WARNING: This product contains a chemical known to the State of California to cause cancer and birth defects or other reproductive harm.

DO NOT TAKE INTERNALLY. KEEP OUT OF REACH OF CHILDREN.

When using water-based wood finishing products:

CAUTIONS: Use Only With Adequate Ventilation. To avoid overexposure, open windows and doors or use other means to ensure fresh air entry during application and drying. If you experience eye watering, headaches, or dizziness, increase fresh air, or wear respiratory protection (NIOSH approved), or leave the area. Avoid contact with eyes and skin. Wash hands after using. Keep container closed when not in use. Do not transfer contents to other containers for storage.

FIRST AID: In case of eye contact, flush thoroughly with large amounts of water. Get medical attention if irritation persists. If swallowed, get medical attention immediately.

WARNING: Contains Alkyl propanols, ethylene glycol, n-methyl pyrrolidone. **VAPOR HARMFUL.** Use only with adequate ventilation. To avoid overexposure, open windows and doors or use other means to ensure fresh air entry during application and drying. If you experience eye watering, headaches, or dizziness, increase fresh air, or wear respiratory protection (NIOSH approved), or leave the area. Avoid contact with eyes and skin. Wash hands after using. Keep container closed when not in use. Do not transfer contents to other containers for storage.

DO NOT TAKE INTERNALLY.

FIRST AID: In case of eye contact, flush thoroughly with large amounts of water for 15 minutes and get medical attention. For skin contact, wash thoroughly with soap and water. In case of respiratory difficulty, provide fresh air and call physician. If swallowed, call Poison Control Center, hospital emergency room, or physician immediately.

DELAYED EFFECTS FROM LONG-TERM OVEREXPOSURE.

Contains solvents which can cause permanent brain and nervous system damage. Intentional misuse by deliberately concentrating and inhaling contents may be harmful or fatal.

WARNING: This product contains a chemical known to the State of California to cause cancer and birth defects or other reproductive harm.

KEEP OUT OF REACH OF CHILDREN.

SAFE DISPOSAL OF RAGS AND WASTE.

Please be mindful of the safe way to dispose of rags and other waste. Rags, steel wool and other waste products soaked with oil finishes or solvents may spontaneously catch fire if improperly discarded. Place rags, steel wool and other waste immediately after use in a water-filled metal container. Tightly seal and dispose of the waste materials in accordance with local trash removal regulations. Be sure to keep the waste out of reach of children.

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FIG 1. TABLE HOCKEY DETAILS

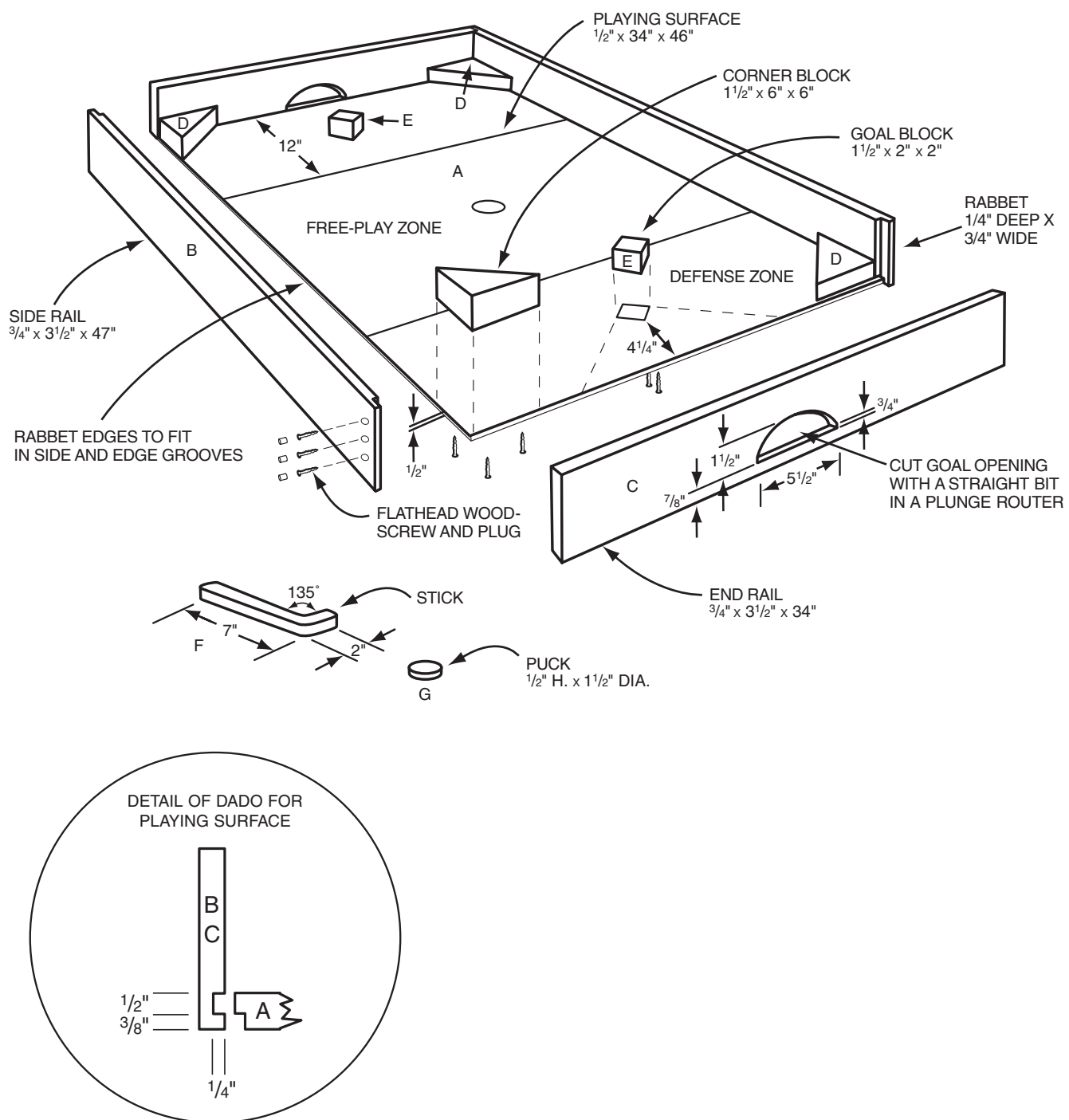


FIG 2. STICK CUTTING TEMPLATE

