

WOODWORKER'S JOURNAL

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Classic Project



In this plan you'll find:

- Step-by-step construction instruction.
- A complete bill of materials.
- Construction drawings and related photos.
- Tips to help you complete the project and become a better woodworker.

Mountain Dulcimer

PROJECTS

Mountain Dulcimer

Our thanks to Jim Siliman of Pippa Passes, Kentucky, for this lovely mountain dulcimer. Jim not only designs and builds dulcimers, but also shares his knowledge with others. For those who might think that building a musical instrument is a daunting undertaking, consider this: Jim tells us that more than 90 folks, most with no woodworking experience, have successfully built their own dulcimers in the dulcimer building workshop that he conducts in conjunction with the Elder Hostel Appalachian Awareness Program at Alice Lloyd College in Pippa Passes.

The mountain or lap dulcimer is a simple-to-build, easy-to-play stringed instrument. First mention of the dulcimer is in biblical texts, and although the exact origin of the mountain dulcimer is obscure, in design, style and string placement it resembles the German zither and the Scandinavian hummel. Depending on the tuning and manner of play, the dulcimer's sound can be made to resemble the bagpipes, guitar or harpsichord.

Start by getting together the wood and parts that you'll need. The Bill of Materials lists a mail-order source for the dulcimer parts—specifically the fret wire (K), tuning pegs (L) and strings (M)—that must be purchased. Many music stores also carry these parts. The Bill of Materials also lists a source for the thin wood parts—the soundboard (C), back (D) and sides (E), and for the ebony that's used for the bridge (H) and nut (I).

Though many woods are acceptable for dulcimer building, our instrument was crafted mainly in mahogany, a wood that is easy to work, finishes nicely and renders a good, consistent musical tone. Other popular woods are walnut, yellow poplar, cherry and maple. Note that a much harder wood, such as ebony, is recommended for the bridge and nut, two parts that must bear considerable pressure from the strings.

The dulcimer shown uses traditional wooden 4/4 violin pegs, friction-fit into tapered holes. A peg reamer, available from Stewart-MacDonald Guitar Shop Supply (see Bill Of Materials for address; order their part no. 344, cost is \$29.99) is the ideal tool for establishing the proper taper in the peg holes. However, low-cost tuning machines

The Woodworker's Journal

Published in *Woodworker's Journal* July/August 1991



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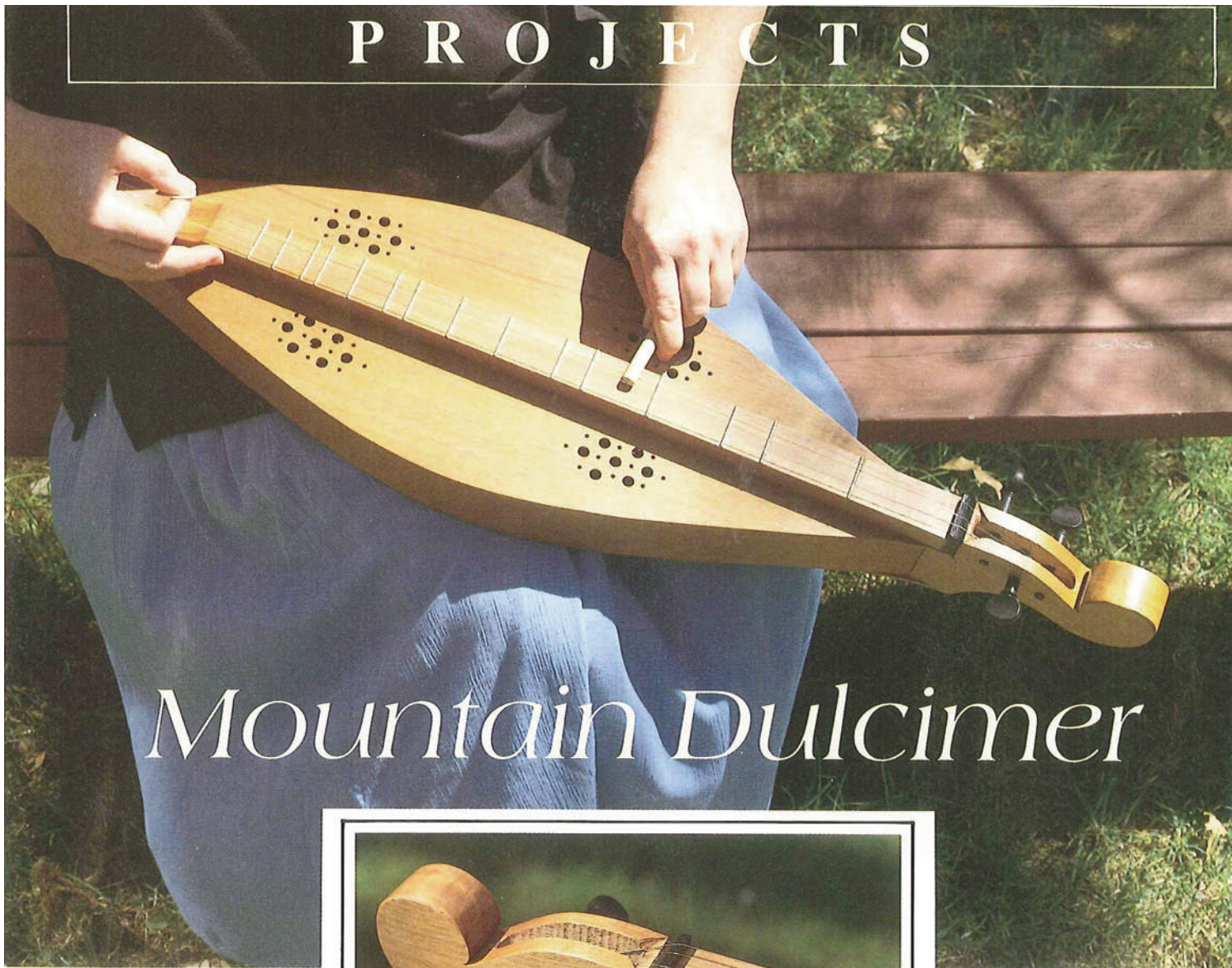
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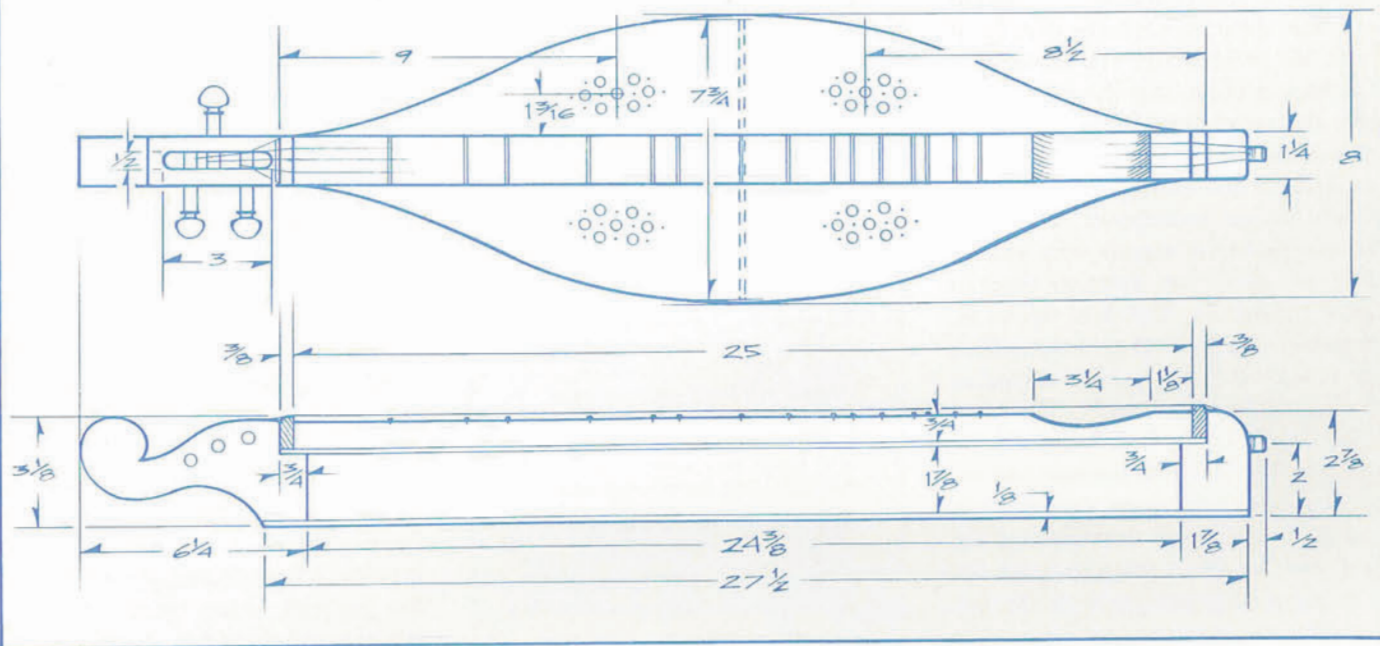
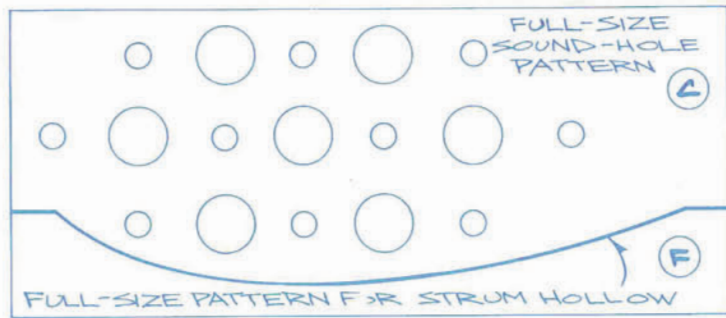
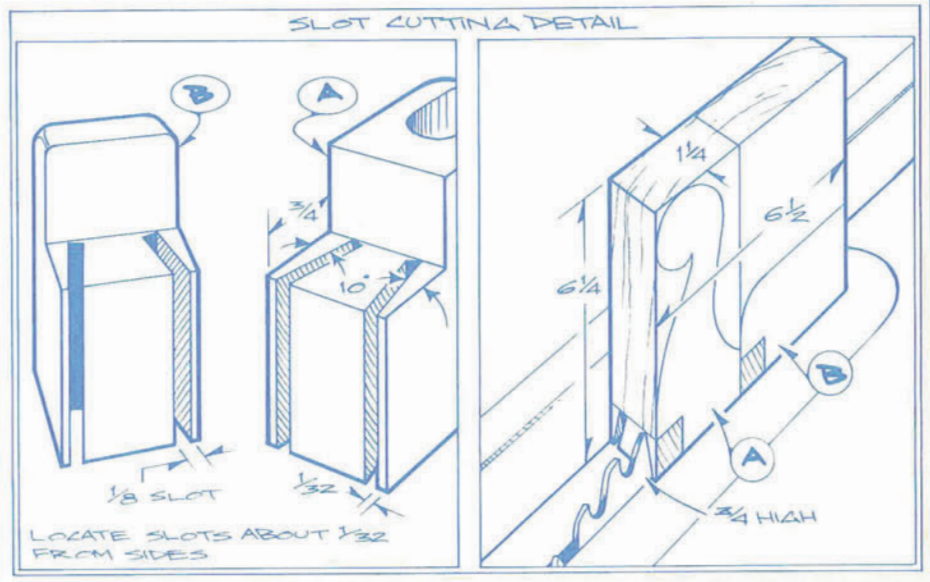
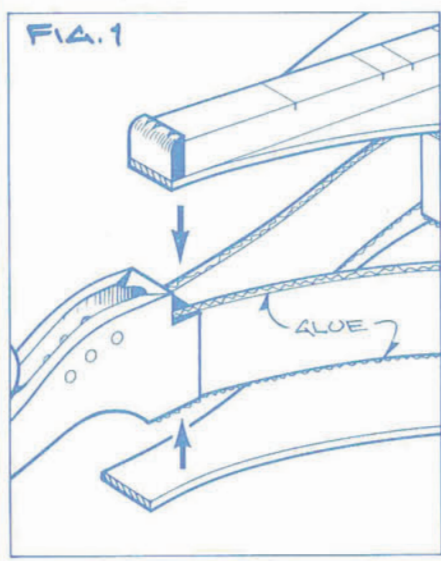
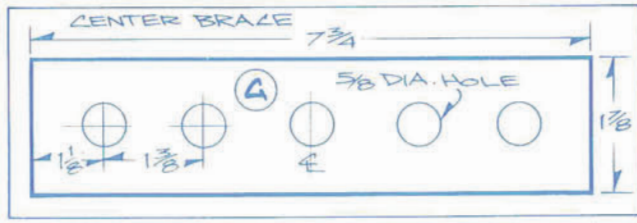
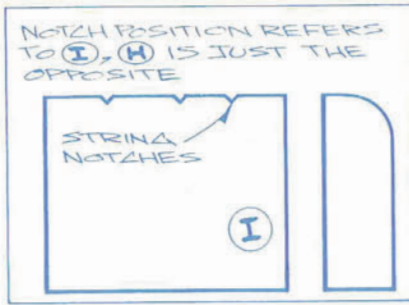
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(available from Stewart-MacDonald or your local music store) can be substituted for the pegs. If you order the tuning machines from Stewart-MacDonald, ask for their part no. 936; cost is \$6.28. You'll receive a set of six tuning machines, three left and three right side, but you'll only need two of the left and one of the right side for the dulcimer.

Using the full-size patterns provided, lay out the peghead (A) and tailpiece (B) profiles on 1¹/₄ in. thick stock. We suggest that you start with a piece about 6¹/₂ in. wide (see Slot Cutting Detail), lay out both profiles, cut the two slots, and then separate the two pieces. The table saw with the blade angled 10 degrees is used to establish the 3³/₄ in. deep slots (a standard saw blade should produce the 1¹/₈ in. wide slot). Lay out the peg hole locations on the peghead, then use the drill press with a 1¹/₄ in. diameter drill bit to establish the initial peg holes (the final hole size is established later with a reamer, if you opt for the wooden tuning pegs). Also use the drill press, with a 1¹/₂ in. diameter bit, to rough out the string recess in the peghead. Then square the sides of the recess with a chisel. The chisel is also used to cut the transition bevel for the strings at the end of the recess. Finally, cut the scroll shape and notch the peghead, and notch and round the tailpiece. If you plan on doing some ornamental carving on the peghead, this is probably the best time.

Now cut the soundboard (C), back (D), sides (E), fretboard (F), center brace (G), bridge (H) and nut (I) to size. All these parts, except for the soundboard and back, should be cut to the sizes listed in the Bill of Materials. The soundboard and back are cut slightly oversize for now, and are trimmed to final size later, after assembly. This is a good time to lay out and cut the decorative sound hole pattern in the soundboard. Using the full-size pattern as a guide, bore a series of 1¹/₈ in. and 5¹/₁₆ in. diameter holes to create the pattern. Also bore the 5¹/₈ in. diameter holes in the center brace, which are necessary for good resonance throughout the sound box.

Next up is the fretboard. Lay out the strum hollow using our full-size pattern, cut and smooth the shape, then measure and mark for the fret slots. Refer to the Fret Position Chart (page 32) for the distance of each fret (K) from the nut. Note that the distances are expressed in

both decimals and in fractions up to 1¹/₃₂ in. The decimal dimension is carried out in thousandths, and if you can use these numbers they are the most accurate way to locate the fret slots. We've also included the same dimension rounded off to the nearest 1¹/₃₂ in. A steel rule or a tape measure with 1¹/₃₂ in. markings can be used to lay out the frets. If your rule or tape measure only has the 1¹/₁₆ in. markings, just split the distance between each 1¹/₁₆ in. mark to arrive at a 1¹/₃₂ in. location. Use a square to insure that the location line for each fret is at a perfect right angle to the side of the fretboard.

The fret slots can be cut with a fine

backsaw, or a special fret slotting saw (available from Stewart-MacDonald, their part no. 660, \$9.95). We used a Japanese backsaw, which has a narrow blade and exceedingly fine teeth, producing just the right width slot. If you plan on using a thicker backsaw, check the fret wire in a test slot first. Since the fret wire relies on small teeth on the tongue to hold it in place, a too wide slot won't hold the wire securely. The slot depth should be just a little under 1¹/₈ in., which leaves a deep enough slot to accept the fret wire without danger of it bottoming. Once all the fret slots have been cut, use a metal nipper or a jeweler's saw to cut the frets to length (about 1³/₈ in.). Use a block of wood and a hammer to seat the frets, then file the excess fret length flush with the edges of the fretboard. Glue usually isn't required to hold the frets in place, but for an extra measure of strength, a little epoxy in each of the slots can't hurt.

Now glue the nut and bridge on the ends of the fretboard. On our dulcimer, both the nut and bridge are identical, just blocks with a roundover on one edge. Position the nut and bridge so the high point of each faces the fretboard, then file three shallow V-notches in each for the strings. Use the full-size pattern to properly size and locate the notches.

You are now ready to assemble the dulcimer. First, glue the fretboard/nut/bridge assembly to the soundboard. Place the soundboard on a perfectly flat surface and weigh the fretboard down with books. When dry, trim the soundboard ends flush with the nut and bridge.

Next, insert the sides into the slots in the peghead and tailpiece, and use the center brace to spread the sides apart. The tension of the sides holds the center brace in place. Test-fit the soundboard/fretboard assembly between the notches in the peghead and tailpiece. If the assembly doesn't fit between the notches, adjust the seating of the sides in the peghead and tailpiece slots. If the sides are fully seated in the slots, but there's a gap between one of the notches and the nut or bridge, you'll need to shorten the sides a bit.

Use a pencil to trace the outline of the sides on the soundboard and back, then cut just outside the line with the band saw. Run a bead of glue on the bottom of the peghead, sides, center brace and tailpiece and place that assembly on the

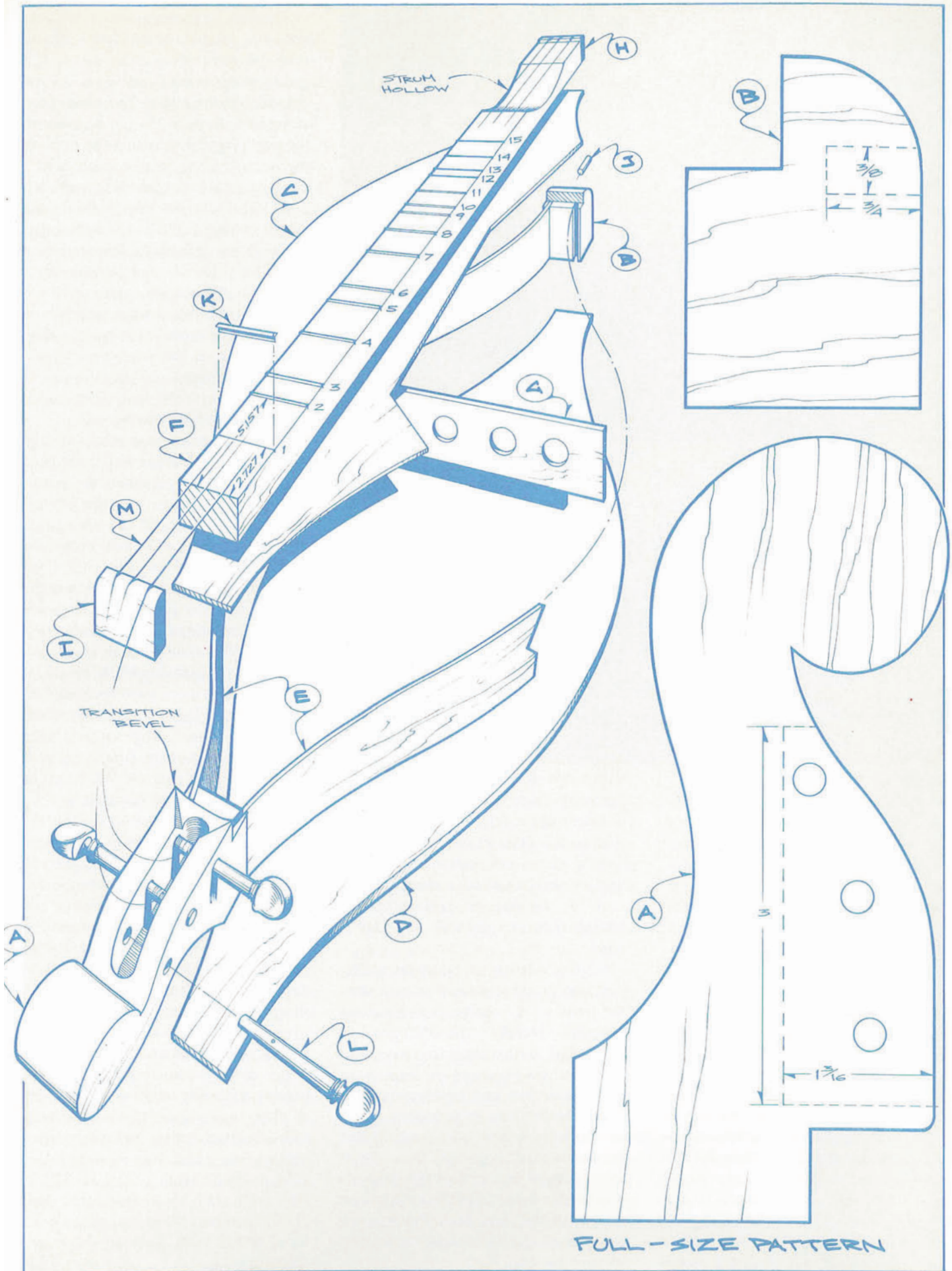
Bill of Materials

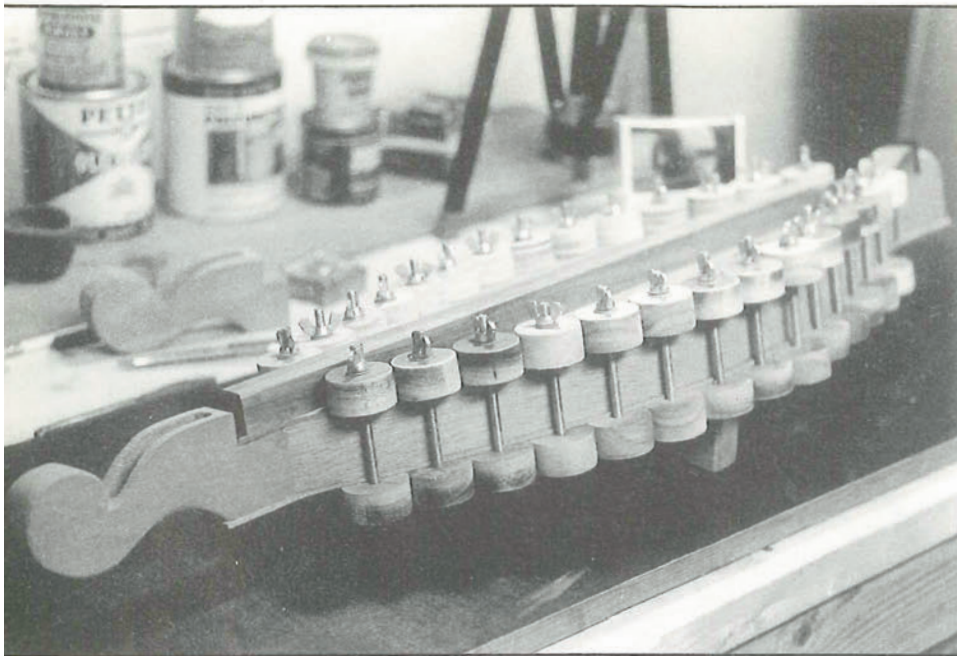
(all dimensions actual)

Part	Description	Size	No. Req'd.
A	Peghead	1 ¹ / ₄ x 3 x 6 ¹ / ₄	1
B	Tailpiece	1 ¹ / ₄ x 2 ³ / ₄ x 17 ¹ / ₈	1
C	Soundboard	1 ¹ / ₈ x 8 x 25 ³ / ₄ *	1
D	Back	1 ¹ / ₈ x 8 x 27 ¹ / ₂ *	1
E	Side	1 ¹ / ₈ x 17 ¹ / ₈ x 26 ³ / ₄ *	2
F	Fretboard	3 ³ / ₄ x 1 ¹ / ₄ x 25	1
G	Center Brace	1 ¹ / ₈ x 17 ¹ / ₈ x 7 ³ / ₄	1
H	Bridge	3 ¹ / ₈ x 1 x 1 ¹ / ₄ *	1
I	Nut	3 ¹ / ₈ x 1 x 1 ¹ / ₄ *	1
J	Tailpin	3 ¹ / ₈ dia. x 1 ¹ / ₄ long	1
K	Fret	as shown**	15
L	Tuning Peg	4/4 Violin Peg**	3
M	String	as shown**	3

* Length and width dimensions of soundboard and back are after shaping. Our dulcimer was constructed from plainsawn mahogany, but quartersawn stock is often preferred for the soundboard. If you can't find it locally, quartersawn, bookmatched soundboard stock (in Sitka spruce, red cedar, or redwood) can be purchased from The Luthier's Mercantile, P.O. Box 774, 412 Moore Lane, Healdsburg, CA 95448; tel. (707) 433-1823. Luthier's Mercantile also sells bookmatched stock for the back and sides (available in rosewood, walnut, mahogany, cherry and rock maple), and ebony for the bridge and nut. Call for prices.

** These parts can be ordered from Stewart-MacDonald Guitar Shop Supply, 21 N. Shafer St., Box 900, Athens, OH 45701; tel. 1-800-848-2273. The frets are sold as 1 ft. long lengths of 18 percent nickel silver fret wire (you'll need 2 ft. to yield the 15 frets), which you must then cut into 1³/₈ in. lengths. Order part no. 147; cost is 79¢ per foot. The tuning pegs are part no. 356 (\$2.99 per peg). The strings are sold as a 4-string set, which includes one extra .012 gauge steel string. Order part no. 1447 (\$2.52 for the set). The extra string comes in handy, since the thin strings are the ones most likely to break. Include \$3.99 for shipping and handling on orders under \$30, and \$6.25 for shipping and handling on orders between \$30 and \$75.





Fret Position Chart

Fret No.	Position <i>(measured in inches from the nut)</i>
1	2.727 or $2^{23}/32$
2	5.157 or $5^{5}/32$
3	6.271 or $6^{9}/32$
4	8.315 or $8^{5}/16$
5	10.135 or $10^{1}/8$
6	10.969 or $10^{31}/32$
7	12.500 or $12^{1}/2$
8	13.864 or $13^{7}/8$
9	15.079 or $15^{3}/32$
10	15.636 or $15^{5}/8$
11	16.657 or $16^{21}/32$
12	17.567 or $17^{9}/16$
13	17.985 or 18
14	18.750 or $18^{3}/4$
15	19.432 or $19^{7}/16$

back. Next, run a bead of glue on the top of the sides, center brace and into the notches in the peghead and tailpiece, and add the soundboard/fretboard assembly (Fig. 1).

If you have enough C-clamps, you can use them for clamping the soundboard and back to the sides. But you can also make your own spool clamps, which work especially well for this type of assembly. To make spool clamps, just use a hole saw to cut a series of disks from $3/4$ in. thick solid stock or plywood and drill a $1/4$ in. hole through the center of each disk. By combining a pair of

disks with a carriage bolt, washer and wing nut, you'll make an effective, low-cost spool clamp. If you don't have a hole saw, you can slice off $3/4$ in. lengths of closet rod (available at any lumberyard) to make the disks. You'll need about 20–30 of these spool clamps for the typical dulcimer assembly (see photo above).

When the dulcimer is out of clamps, trim and sand the soundboard and back flush with the sides. Drill the $3/8$ in. diameter by $3/4$ in. deep tailpin hole, and glue the $3/8$ in. diameter by $1 1/4$ in. long tailpin dowel (J) into the tailpiece. The dulcimer is now ready for a finish.

Start with a sanding sealer, let dry, rub with no. 0 or 00 steel wool, then wipe off with a clean, soft, cotton cloth. Next apply several coats of a clear finish—such as lacquer or polyurethane—rubbing between coats with no. 000 steel wool.

All that's left is to mount the tuning pegs and strings. Use the reamer to ream the holes for the tuning pegs, checking progress carefully with the pegs to insure that you don't ream out too much. Note that two peg holes are reamed out from the left side, and one from the right.

Seating the pegs is important. Good contact area between the peghead and pegs is needed to provide the constant string tension that insures the dulcimer will remain in tune. Don't sand the stem surface of the pegs. Once the pegs are properly seated, drill a single $1/16$ in. hole through each peg stem.

The first two strings on the dulcimer are .012 gauge single-strand stainless steel, the third string is a .020 or .022 gauge wound nickel string. Loop the strings over the tailpin, then thread the string ends through the $1/16$ in. holes in the pegs. Tighten the strings by rotating the pegs away from the sound box, a direction that carries the string over each peg. Make sure the strings are in the proper notches in the nut and bridge as the pegs are tightened. To tighten the peg in the peghead—and hold the string at the desired tension—push in while turning. If the pegs have a tendency to loosen during tuning or playing, a little violin rosin on the peg stems should solve the problem.

Playing The Dulcimer

There are many ways to play the dulcimer, and no single way is the best. One common method is with the instrument placed across the lap, angled slightly so the peghead extends beyond the left knee and the tailpiece rests close to the hip. The first string (the one closest to the player) is used to note the melody; the two remaining strings are called drone strings. Tune the first string to G and the two drone strings to low C.

Strum the dulcimer with the thumb on the right hand, using a sweeping motion across the strings, or use the same strumming motion with a pick. The melody is noted on the first string with the middle finger of the left hand, or with a scrap of $5/16$ in. diameter by 3 in. long dowel (called a noter). Slide the finger along the fretboard to change notes; later on, once some dexterity is gained, you'll find it handy to use the index finger for quick note changes on the frets ahead of the middle finger. For beginners with no callouses, the use of the noter and pick saves wear and tear on the fingers. Sliding the noter up and down the fretboard also yields the distinct twanging sound that many associate with the dulcimer.

For more on dulcimer building and playing, including books of songs, styles of play (such as fanning and chording), videos, compact discs and music tapes, contact Jean's Dulcimer Shop, P.O. Box 8, Highway 32 South, Cosby, TN 37722; tel. (615) 487-5543. Proprietor Jean Schilling tells us that if it's in print or on tape, and it's to do with dulcimers, they've got it.



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