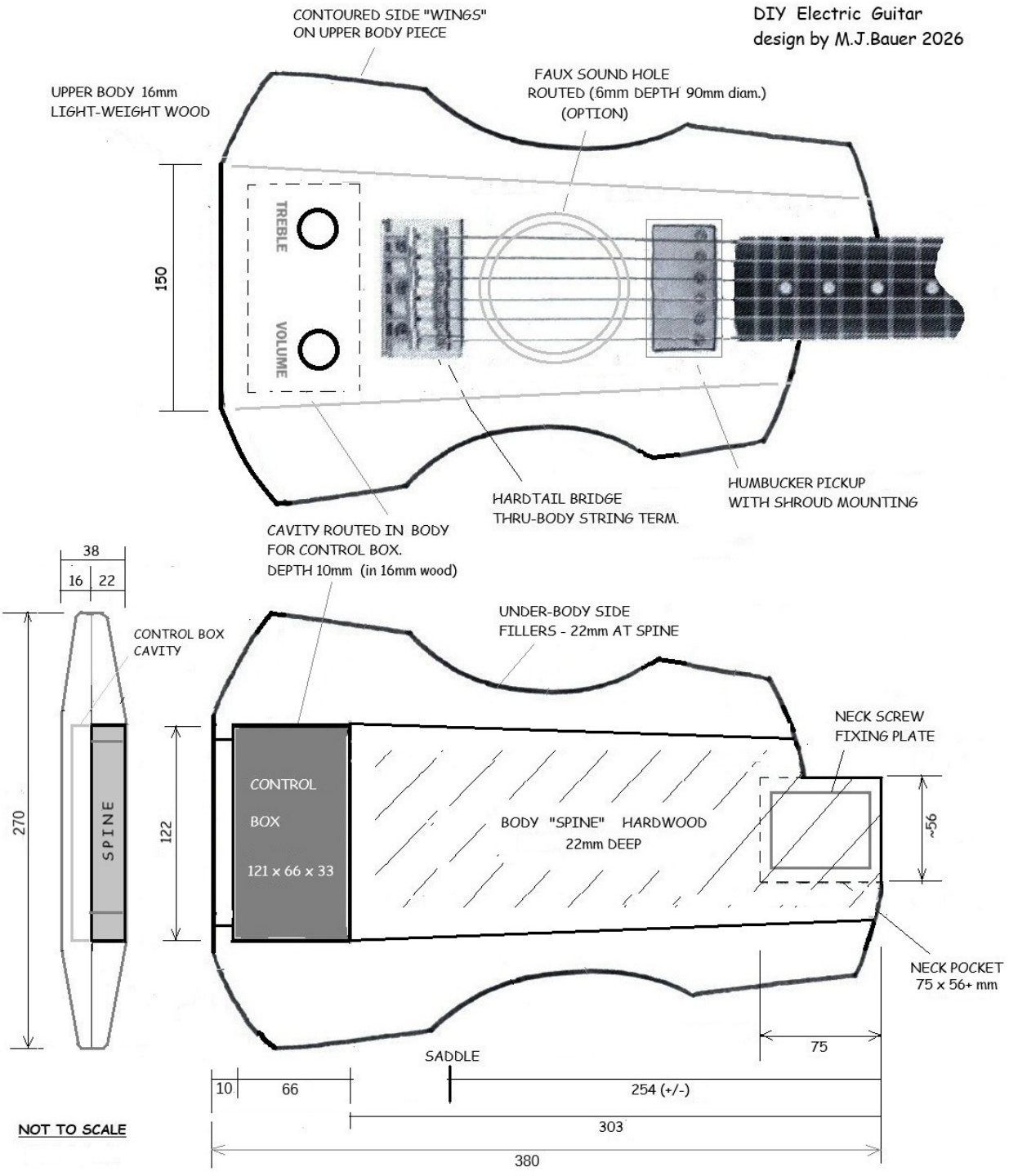
Easy DIY Electric Guitar -- Build Notes

(Solid Body Version)

Reference: www.mjbauer.biz/Guitar_maker_resources.html



Design Features:

- Light-weight solid body construction using dense hardwood “spine” piece layered with softer timbers.
- Build made easier using a pre-fabricated neck/fretboard which bolts directly onto the spine, thereby avoiding the need to use a router to cut the neck pocket.
- Tail-end aluminium control box houses the pickup controls -- volume and tone, etc.
- Optional “active pickup” pre-amp circuit which provides treble boost and headphone amplifier.

Step-by-step Build Procedure:

1. **Source timber** – Dense hardwood 22mm thick for the “spine” piece, plus a lighter timber, e.g. pine, spruce, cedar, for the upper body, 16mm t hickness to suit neck heel height 25–26mm. The underside body filler pieces are also made from light-weight wood, thickness 22mm (maybe comprising two layers, e.g. 18mm + 4mm).

2. **Machine (or layer) upper body piece(s)** to obtain required thickness, normally 16mm. Overall size of the blank piece should be at least 420 x 300 mm.

3. **Machine tapered hardwood spine piece**, 122–>100 x 22 x 330+ mm. *(Precise length TBD.)*

4. **Print the template** actual size on A3 paper. Tape template to upper body piece and mark outline plus cutouts for neck pocket, pickup cavity and (optionally) the faux sound hole.

5. **Cut the upper body piece** around the periphery.

6. **Cut out neck pocket for a “snug” fit.** First measure the heel width on the neck. Cut corners with 6mm radius. Ensure neck can be aligned with centre line on the body.

7. **Cut cavity for pickup**. The cavity goes right through the upper body piece.

8. **Mark outline of control box cavity** on underside of upper body. First measure the actual dimensions of the box 10mm up from the bottom. (The walls are not perpendicular.)

9. **Cut spine to required length:** Measure distance from body tip at neck pocket to control box. (Should be 303 ±2mm.) Add 25mm for contour at neck => 330mm overall spine length.

10. **Measure depth of pickup...** If greater than 22mm (typically 25mm for a humbucker), cut a slot across the spine, 42mm wide x 3mm deep, aligning with pickup cavity in upper body.

11. **Route channel for pickup cable in spine** (6 x 6 mm) running from pickup cavity to control box cavity, about 10mm in from the edge of the spine.

12. **Route or cut control box cavity** in the underside of the upper body piece. If routing, thickness of body in cavity floor should be 5–6mm. Check that the box fits in OK.

13. **Mark on the body the area of the “faux sound hole”** (90mm diameter) located half-way between the bridge and pickup.

14. **Route or cut the faux sound hole...** If routing, make a circular depression 90mm diameter, 6–8 mm deep using a half-round router bit, diameter 12mm (½ inch).

15. **Make the under-body side filler pieces:**
Clamp the spine in place on the upper body. Cut the 2 under-body side fillers (22mm thickness) to shape so that they fit snugly against the spine and around the control box. Cut the side fillers as marked, allowing a little overhang (1–2mm) to be trimmed off later.

16. **Glue the spine and under-body fillers onto the upper body.** Push a piece of plastic tubing through the pickup cable slot to clear out excess glue. Clamp lightly until glue sets.

17. **Contour the body side "wings"** using a hand plane and/or power sander. First place masking tape on body to mark edges of taper. The outer extremities of the side wings should be about 22–30mm thick. Edges may be rounded to 3mm radius.

18. **Contour the spine at the neck pocket** to follow contour in neck. Hold neck in place temporarily in the pocket and mark on spine area to be contoured.

19. **Attach neck to body spine**:
Determine position of neck fixing plate. Mark positions of screws and drill pilot holes (3mm) in spine using a drill press. Mark centre line on upper body in bridge area. Align neck with centre line and clamp lightly in pocket using a jig to prevent damage to frets. Drill pilot holes through the spine into the heel to a depth of 15–17mm.

20. **Remove the neck**. Widen the pilot holes in the spine to a size equal to the outer diameter of the neck fixing screws. Attach neck to spine with screws, aligned with centre-line.

21. **Determine position of bridge on body**:
Adjust one or two bridge saddles to their fully forward position (end of screw travel) then back up 2mm. The bridge is positioned correctly when the distance from the nut to the adjusted saddles is equal to the scale length (normally 648mm for a "Tele" neck).
This position allows more adjustment toward the rear of the bridge than forward. Locate the correct bridge position laterally using a straight-edge on the neck sides. Mark bridge mounting holes and the six "thru-body" string access holes.

22. **Drill bridge mounting holes** to suit screw gauge. Also drill the 6 holes (3.5mm) to feed the strings through. Drill a 4mm hole under the bridge beside the mounting hole nearest to the high-E string for a ground wire to pass through to the control box. On the underside of the spine, enlarge the 6 string "feed-thru" holes to suit retainer ferrules (6.3mm drill). Use a stopper on the drill bit to avoid drilling too deep.

23. **Smooth the guitar body surfaces with sandpaper.** Start with P120 grit. Apply wood grain filler and sand off when dry. Finish with P240+ grit. The neck should be removed during this step and the following step (24).

24. **Apply stain, varnish, timber oil, or whatever treatment is preferred.**

25. **Cut down the metal control box** to reduce depth to make the lid of the box flush with the surface of the spine (more or less). The overall depth of the box including lid should be the total body thickness less 3–5mm, i.e. 33–35mm to suit body thickness 38mm.

26. **Drill holes (3mm) in control box where the volume and tone pots will be located.** Insert control box into its cavity and drill holes through the body panel. Remove box and enlarge the holes to 12.5mm for the pot shafts (and nuts) to pass through.

27. **Drill holes in the control box for pickup wire entry, control pots, output jack, etc.** Also drill 4 small holes for mounting screws, about 6mm from the top edge (where the lid goes on). Two screws go in the side facing the spine. One screw goes in each of the 2 ends.

28. **Complete assembly and wiring of components inside the control box.**

29. **Insert ferrules into string feed-thru holes**. Use a small wooden block to avoid damage to the ferrules from hammering directly.

30. **Insert the control box into its cavity** and fix in place with screws.

31. **Mount the bridge in place** after fitting and re-aligning the neck. Strip 12mm of insulation from a length (~200mm) of multi-strand hook-up wire. Feed wire through hole into the control box cavity. Ensure bare wire ends make good electrical contact with the bridge when screwed down. (If bridge is painted black, scrape off paint around screw hole.)

32. **Mount the pickup** in its frame and thread the pickup cable through the channel into the control box. Fit the pickup assembly into the cavity and screw the frame in place. Complete wiring of pickup to controls. Connect the screen of the pickup cable and the bridge ground wire to the control box casing.

33. **Fit shoulder strap retainer buttons** at 3 points on the body: one each side of control box and one near the neck heel.

34. **Fit machine heads (tuning pegs) to head-stock.** Attach string tee(s) for treble strings.

35. **Fit the strings.** Be sure to stretch them so they stay in tune better. Check finger-board is straight (frets in-line). Adjust truss rod if necessary.

36. **Tune the guitar.** Adjust the bridge saddles for correct intonation and action. Adjust height of pickup for optimum response.

Alternative construction methods to avoid using a router

The control box cavity can be cut right through the upper body piece using a jig saw.

Here are two alternative options to install the box:

1. Cut the cavity cleanly and precisely. Cut a small piece of wood, thickness 4–6mm, to fit into the cavity precisely. Ideally, this piece should match the upper body timber appearance. Glue the insert in place such that the surface is flush with the upper body, before sanding. If the result doesn't meet expectations, revert to option 2...

2. Use a piece of thin plastic or timber (3mm), or aluminium (1.5mm), to cover the cavity completely, resembling a pick guard. The cover piece may be glued or screwed to the upper body, with holes drilled to suit volume and tone pot shafts. With this option, the box cavity does not need to be cut as cleanly and precisely. Another benefit is that the box (assuming type 1590N1) does not need to be cut down.

The faux sound hole also may be cut right through the upper body piece using a 90mm hole saw, or it may be omitted altogether. If cut, the hole will expose the surface of the spine under, so the spine surface needs to be prepared appropriately before being joined to the upper body. Alternatively, a circular wooden insert, 90mm in diameter, 6–10 mm thickness, may be made to fit snugly inside the hole. This method was chosen for the author's first guitar build, as can be seen in the video clip posted on YouTube.

Parts List and Cost Estimate

Description	**Cost (AU$) ^**
Neck, fretboard, 22 frets, heel 56 x 25mm, scale length 648mm	$80.00
Neck fixing plate + screws	$4.00
Bridge, hard tail, 10.5mm string spacing (thru-body string term.)	$14.00
Pickup, humbucker (pref. Alnico 5) neck position	$22.00
Pickup shroud/frame (*aka* mounting plate)	$4.00
Machine heads (*aka* tuning pegs), set of 6	$15.00
String tee (retainer post on head-stock for B & E strings)	$3.00
Shoulder strap retainer buttons, 2 pairs (3 req'd)	$5.00
Metal box, diecast aluminium, 121 x 66 x 39 mm (part # 1590N1)	$15.00
Volume and tone controls (A250k pots), output jack, etc.*	$10.00
Strings, set of 6 (from China, e.g. Orphee SE3X, Light guage 10-46)	$10.00
Ferrules, set of 6, for string feed-thru holes (6.5/8mm)	$4.00
Total (incl. GST and postage)	**$182.00**

* List does not include parts for optional treble-boost pre-amp and headphone amp.
^ Based on best prices of selected AliExpress items at the time of writing.