Bakersfield Community College
Industrial Technology

Woodworking Technologies
Intermediate Cabinetmaking: Wood B5

Professor S. J. Hageman, M.A.

Project/Procedure Booklet

Drop-Leaf End Table

Plan borrowed with permission from:
Gary E. Cox
Bakersfield Community College
Department of Industrial Technology

Revisions by S. J. Hageman
Revised 11/24/10
Project Sheet
Drop-Leaf Table

**Given:**
Necessary equipment, materials, supplies, and all related instruction.

**Performance:**
To construct a drop-leaf table from raw materials to finish product, utilizing all hand tools and machines.

**Standard:**
All measurements to be within reasonable accuracy, quality, or finish appearance to meet with the acceptance of the Instructor. Length of time should not exceed one semester.

**Motivation [Why?]:**
The following pages this procedure/packet contain most of the information to construct a drop-leaf end table. This project has been selected for the beginning machine woodworking student because of the variety of experiences gained. Among these are: measuring, layout, joinery preparation, gluing, clamping, and finishing.

It is our belief that you will receive the maximum benefit from this course by adhering to the guidelines within this packet. There will be time for short cuts and self-expression at a later date.

**Evaluation:**
The Drop-leaf Table will be the major project for our furniture and cabinet making students. This project is required and reflects a significant percentage of your final grade.

The evaluation will be based upon: joinery, preparation, adherence to plans, over-all construction quality, bill of materials, and your Daily Work Performance Evaluation.

**Safety:**
All safety tests shall be completed with 100% accuracy and all required signatures obtained prior to the student starting any laboratory work.

**Timeline:** The average student will be at the following junctures during the course of the semester.

- **End of Week Four (4):** All six (6) panels glued up, glue scraped, surfaced to NET thickness and belt sanded by Mr. Hageman to 80 grit.
- **End of Week Nine (9):** Front/Back glued to bases, two (2) drawer frames to NET dimensions, sides and leg supports to NET dimensions and rudders bandsawed to shape, splined and sanded through 120 grit.
- **End of Week Thirteen (13):** Case unit sanded through 220 grit, all parts of case stained, case assembled and buttons applied. Rudders are sanded through 220 grit, stained and dowels trimmed to fit case unit. Top and leaf units are sanded through 220 grit, rule joint machined and pieces stained.
- **End of Week Fifteen (15):** Rule joint hinges attached to top/leaf unit, top/leaf unit and rudders attached to case unit. Drawer construction, assembly, staining and filling to case unit. Drill hole in drawer front for knob.
## ROUGH CUTTING LIST
### DROP LEAF TABLE

**Wood B5**

<table>
<thead>
<tr>
<th>PROJECT PIECES</th>
<th>ROUGH CUTTING DIMENSIONS</th>
<th>NET B.F.</th>
<th>ROUGH B.F. (Round Up)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top</td>
<td>1 ea - 1&quot; X 13½&quot; X 30&quot;</td>
<td>2.2 B.F.</td>
<td>3 B.F.</td>
</tr>
<tr>
<td>R/L Leafs</td>
<td>2 ea - 1&quot; X 13½&quot; X 30&quot;</td>
<td>4.5 B.F.</td>
<td>6 B.F.</td>
</tr>
<tr>
<td>R/L Sides</td>
<td>2 ea - 1&quot; X 6½&quot; X 28&quot;</td>
<td>2.2 B.F.</td>
<td>3 B.F.</td>
</tr>
<tr>
<td>Back</td>
<td>1 ea - 1&quot; X 11&quot; X 22&quot;</td>
<td>1.4 B.F.</td>
<td>2 B.F.</td>
</tr>
<tr>
<td>Front</td>
<td>1 ea - 1&quot; X 11&quot; X 17&quot;</td>
<td>1.0 B.F.</td>
<td>2 B.F.</td>
</tr>
<tr>
<td>R/L Rudders</td>
<td>1 ea - 1&quot; X 11&quot; X 20&quot;</td>
<td>1.3 B.F.</td>
<td>2 B.F.</td>
</tr>
<tr>
<td>R/L Bases</td>
<td>4 ea - 1&quot; X 3&quot; X 18&quot;</td>
<td>1.2 B.F.</td>
<td>2 B.F.</td>
</tr>
<tr>
<td>Drawer Frames</td>
<td>4 ea - 1&quot; X 2½&quot; X 29&quot;</td>
<td>1.6 B.F.</td>
<td>2 B.F.</td>
</tr>
<tr>
<td>R/L Leg Supports</td>
<td>2 ea - 1&quot; X 3&quot; X 28&quot;</td>
<td>.9 B.F.</td>
<td>2 B.F.</td>
</tr>
</tbody>
</table>

### DRAWER

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DIMENSIONS</th>
<th>NET B.F.</th>
<th>ROUGH B.F. (Round Up)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drawer front</td>
<td>1 ea - 1&quot; X 5&quot; X 8&quot;</td>
<td>.3 B.F.</td>
<td>.5 B.F.</td>
</tr>
<tr>
<td>Sides</td>
<td>2 ea - 1&quot; X 5&quot; X 26&quot;</td>
<td>1.8 B.F.</td>
<td>2 B.F.</td>
</tr>
<tr>
<td>Back</td>
<td>1 ea - 1&quot; X 5&quot; X 8&quot;</td>
<td>.3 B.F.</td>
<td>.5 B.F.</td>
</tr>
<tr>
<td>Bottom **</td>
<td>1 ea - ¼&quot; X 5&quot; X 28&quot; (Plywood)</td>
<td>1.0 sq. ft.</td>
<td>1.0 sq. ft. **</td>
</tr>
<tr>
<td>Guide</td>
<td>1 ea - 1&quot; X 3&quot; X 28&quot;</td>
<td>.6 B.F.</td>
<td></td>
</tr>
<tr>
<td>Runner</td>
<td>1 ea - 1&quot; X 2&quot; X 28&quot;</td>
<td>.4 B.F.</td>
<td>1.0 B.F.</td>
</tr>
</tbody>
</table>

**TOTAL B.F. for Table and Drawer**

19.7 B.F. 28 B.F.

Rudder supports 2 ea – use short ends to customize

ORDER 28 B.F. 20__-20__ Costs: _____/B.F. = $ ____________

### Approximated Final Cost of Drop-Leaf End Table

1. Rough 4/4 Ponderosa Sugar Pine (or equivalent) @ 28 BF X ________/BF = $_______/student
2. Miscellaneous materials (screws, adhesive, abrasives, buttons/plugs, oil stain, hardware, dowels, etc) $ 10.00
3. Facility Usage (electrical power, wear/tear equipment, heating/cooling Maintenance/labor, insurance, etc.) $ 50.00
4. Student Labor (180 hours X $6.75/hour) = $1,215.50
5. Instructor (Approx. hourly rate divided by number of students) $ 491.00

**TOTAL PROJECT COST:**

$1,781.00

Bakersfield College
Industrial Technology
Introduction to Furniture/Cabinetmaking
Professor S.J. Hageman, M.A.

Name: ____________________
Semester: ____________ Fall  ____________ Spring
Week ____________________
# Woodworking B5

## Drop Leaf Table Evaluation Rubric

**Note:** Number values in the following rubric are represented as plus-or-minus parts of an inch. For instance: 1/64 represents plus or minus one sixty-fourth of one inch.

<table>
<thead>
<tr>
<th>Drop Leaf Table</th>
<th>Percent Earned</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>All sizes are NET</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Top:</strong> ¾ X 11-1/2 X 28</td>
<td>100 95 90 85 80 70 60</td>
</tr>
<tr>
<td><strong>Leaves:</strong> ¾ X 11-1/2 X 28</td>
<td></td>
</tr>
<tr>
<td><strong>Front:</strong> ¾ X 9-1/2 X 15-1/2</td>
<td></td>
</tr>
<tr>
<td><strong>Back:</strong> ¾ X 9-1/2 X 20-1/4</td>
<td></td>
</tr>
<tr>
<td><strong>Sides:</strong> ¾ X 6 X 25-1/2</td>
<td></td>
</tr>
<tr>
<td><strong>Leg Supports:</strong> ¾ X 2-1/12 X 25-1/2</td>
<td></td>
</tr>
<tr>
<td><strong>Case Sub-panels:</strong> ¾ X 6-1/2 X 24-1/2</td>
<td></td>
</tr>
<tr>
<td><strong>Rudders:</strong> ¾ X 8-1/2 X 17-1/16</td>
<td></td>
</tr>
<tr>
<td><strong>Bases:</strong> 1-1/2 X 2-1/2 X 16</td>
<td></td>
</tr>
<tr>
<td><strong>Drawer Front:</strong> ¾ X 4-1/2 X 6-1/2</td>
<td></td>
</tr>
<tr>
<td><strong>Drawer Sides:</strong> ½ X 3-3/4 X 24</td>
<td></td>
</tr>
<tr>
<td><strong>Drawer back:</strong> ½ X 3-3/4 X 5-3/4</td>
<td></td>
</tr>
<tr>
<td><strong>Drawer Guide:</strong> ¾ X 1 X 25</td>
<td></td>
</tr>
<tr>
<td><strong>Drawer Runner:</strong> ½ X 2-1/2 X 25</td>
<td></td>
</tr>
</tbody>
</table>

- **Fit of all joinery:** glue joints, dovetails, drawer grooves, dowel joints, biscuit joints, splines, rabbit/dados and mortise/tenon joinery.
- **Accuracy of all router machined details:** including rule joint, bull-nose, chamfers, drawer guide groove, etc.
- **Accuracy of bandsaw machined parts, machine spindle sanding, hand chamfering of edges, fit/location of rudders, button placement**
- **Overall appearance/impression of the project assembly (based on the knowledge gained as a result of this course and as an informed consumer).**

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Project Assembly: _______________ 100 Percent Completed

_______________ Incomplete: (Note the percent completed)
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*Drop Leaf Table*

Evaluation Rubric

<table>
<thead>
<tr>
<th>Drop Leaf Table</th>
<th>Actual project dimensions and/or observations/notes</th>
<th>Actual Score: 1 (Woodworker)</th>
<th>Actual Score: 2 (Colleague)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top: ¾ X 11-1/2 X 28</td>
<td></td>
<td></td>
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</tr>
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<td>Rudders: ¾ X 8-1/2 X 17-1/16</td>
<td></td>
<td></td>
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<td>Bases: 1-1/2 X 2-1/2 X 16</td>
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<td></td>
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<td>Drawer Front: ¾ X 4-1/2 X 6-1/2</td>
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<td>Drawer Sides: ½ X 3-3/4 X 24</td>
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<td></td>
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<td>Drawer back: ½ X 3-3/4 X 5-3/4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drawer Guide: ¾ X 1 X 25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drawer Runner: ½ X 2-1/2 X 25</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:** Utilizing the appropriate measurement tools, accurately notate the following dimensions relative to the required project “Drop Leaf Table” by measuring to the nearest 1/64-inch. Two sets of measurements will be recorded. One set from the actual woodworker who manufactured the piece of furniture and the second set from a colleague in the class. Measurements in the following table will be recorded in inches.

- **Fit of all joinery:** glue joints, dovetails, drawer grooves, dowel joints, biscuit joints, splines, rabbet/dados and mortise/tenon joinery.
- **Accuracy of all router machined details:** including rule joint, bull-nose, chamfers, drawer guide groove, etc.
- **Accuracy of bandsaw machined parts, machine spindle sanding, hand chamfering of edges, fit/location of rudders, button placement**
- **Overall appearance/impression of the project assembly (based on the knowledge gained as a result of this course and as an informed consumer).**

**TOTALS**
Evaluation No. 1 (Woodworker):
Project Assembly: 100 Percent Completed
Incomplete: (Notate the percent completed)
Surface Finish [As achieved vis-à-vis scrapers and/or abrasive papers]: (Circle One)
100%  95%  90%  85%  75%  65%

Observations/comments:

Evaluation No. 2 (Colleague):
Project Assembly: 100 Percent Completed
Incomplete: (Notate the percent completed)
Surface Finish [As achieved vis-à-vis scrapers and/or abrasive papers]: (Circle One)
100%  95%  90%  85%  75%  65%

Observations/comments:

-USE BACK SIDE OF THIS PAPER FOR ADDITIONAL COMMENTS-
Steps of Procedure
Drop-leaf table

1. Sign, date, review, and demonstrate all machines and safety tests reflected in the Student Safety Portfolio.

2. **STOP** … If you are wanting to “venture out” and customize your Drop Leaf Table by utilizing one or more species of lumber, NOW is the time to PLAN for this possibility. SEE MR. HAGEMAN … your creativity is your limit. See photos of last year student examples.

3. Rough cut materials:
   (See Process for Squaring Lumber on last page.)
   As close as possible to the following:
   - 3 each 1” x 13” x 30” (Top Left Leaf and Right Leaf)
   - 3 each 1” x 11” x 23” (Front, Back and Rudder)

   **Note:** It is not necessary to find material that is exactly 13” wide or 11” wide. Keep in mind the over-all width of the panel and any widths can make up this total.

4. Rip stock to narrow widths (no less than 3” and no more than 6”: Be advised that widths of 3” to 4-1/2” are preferred).
   a. Make sure the cupped face is down.

5. Joint one face (the most stable face), and then place an “X” on this face lightly in pencil, as per instructor demonstration.

6. Joint two edges.

7. Surface stock to as close to 1” as possible (net thickness of all panels will be no less then ¾”), as per instructor demonstration. Be certain that the face with the “X” is placed face down on the planer table for the first pass through the cutter head … then alternate faces as per instructor demonstration.
   a. Materials should be 70% clean on both surfaces
   b. Think thick!!

8. Joint your best edge as per instructor demonstration and place an “X” on this edge lightly in pencil. Rip each board as wide as possible, removing unwanted defects. Be sure to place the “X” face down on the circular saw table and the “X” edge against the rip fence during this operation as per instructor demonstration.

9. Arrange materials into panels for the top, leafs, front, back, and rudder components as per instructor demonstration.
   a. Alternate annular rings.
   b. Arrange knots and grain pattern of your boards for desired effect.
   c. Number all pieces in the panel consecutively for either machining the glue joint on the shaper or using the plate jointer (as demonstrated by the instructor).

   **Note:** Your instructor will demonstrate either the plate jointer for a biscuit cut and/or the shaper for the glue joint cut. Pay close attention to this demonstration and layout sequence.
10. Machine glue joint using the shaper (or the biscuit cut utilizing the plate jointer), on your top panel, leaf panels, front/back panels, and rudder panel.
   a. Pay particular attention to this process when demonstrated.
   b. Hold material flat on table and machine joint at a steady rate of speed.
   c. Check for excessive stair-step after machining the first two pieces.

   **Note:** Use #20 biscuits on any plate jointer machine joints.

11. Glue materials into individual panels utilizing Weldwood Plastic Resin Glue.
   a. Dry-clamp, using bar clamps.
   b. Check for excessive stair step and any gaps along all edges of your panel glue joints.
   c. Remove clamps, apply plastic resin glue, and re-clamp using 25 psi.
   d. Do not wipe off excess glue.
   e. Allow drying time 3-8 hours… **OVERNIGHT**.

   **Note:** Be sure to label your glued panels with your NAME, DATE, TIME and PERIOD!

12. Sand and/or scrape dried glue from all panels as per instructor demonstration.
   a. Remove all dried glue with 50 or 80 grit abrasive paper, utilizing a sanding block before
      surfacing panels to net thickness.
   b. Glue scrapers can cause serious injury if used improperly.

   **Note:** Instructor must check all panels before next procedure.

   **Note:** Be sure to transfer any template measurements and/or biscuit joints from the face of
   all panels to the edge of each panel … once panels are surfaced to net thickness, all
   markings on the panel faces will be all GONE!

13. Surface panels to net thickness as per your plans and instructor demonstration (REMEMBER
    to measure/check twice and cut once to avoid any disappointment.)
    a. Maintain maximum thickness possible.
    b. Check grain direction prior to surfacing panels.

   **Note:** Once all your panels are surfaced to net thickness, transfer your edge reference
   markings back onto the face of each panel so that your project templates can be
   redrawn.

   **Note:** Average student progress to this point by end of week four (4).

14. Stain knots with desired oil stain as per instructor demonstration.
   a. Apply and remove oil stain with a cotton rag.
   b. Let dry approximately 4-5 hours. THEN …
      ▪ Tape the back side of panels with masking tape.
   c. Fill porous knotholes and cracks with casting resin and allow to dry over-night.
   d. Remove dried resin with glue scraper and/or coarse grit abrasive paper (50/60 grit).

   **Note:** This aforementioned procedure applies to all project pieces, not ONLY your panels.

   **Note:** Instructor to rough belt sand all panels with 60/80 grit belt. Instructor to demonstrate
   the sharpening and use of “HAND CABINET SCRAPER” … (Student is referred to
   attached article, “Scraper: Tips for a Close Shave”)
15. Square all panels to “net” sizes as per instructor demonstration.
   a. Joint one edge of all panels and place a “X” lightly in pencil on this edge.
   b. Rip panel to NET width. Be sure to double check that the rip fence is parallel to the miter gauge slot in the table. THEN … Joint the ripped edge one time.
   c. Square one end of all panels.
   d. Cut the net length and width utilizing the rip fence setup and sliding crosscut table.

   **Note:** Remember that once a set-up has been made with the table saw fence, all pieces of that dimension MUST be cut.

16. **PAUSE!!!!**

At this time you should have six (6) panels. As mentioned before, these panels are made from the pieces that you ripped into narrower widths when you began this project.

From the detailed drawing you should have located the correct “net” sizes. Let’s see!!

2 pieces ¾” X 11 ½” X 28” ……………………… Drop Leaves
1 piece ¾” X 11 ½” X 28” ……………………… Top
1 piece ¾” X 9 ½” X 15 ½” …………………….. Front
1 piece ¾” X 9 ½” X 20 ¼” …………………….. Back
1 piece ¾” X 10” X 22” …………………….. Rudders

   **Note:** You probably had difficulty with the last piece indicated on the preceding list. This piece will be used for both rudders. Use the existing template provided by your instructor to transfer the design to this panel.

   • **CHECK LIST:** Once panels are surfaced to NET (as thick as possible), perform these steps:
   ➢ Instructor to belt sand panels.
   ➢ “Wet” any defects and allow to dry. This raises the defect so it can be cabinet scraped.
   ➢ Stain all defects.
   ➢ Resin all defects.
   ➢ Cabinet scrape all six (6) panels.

   **Note:** The next few steps of procedure have no particular order or priority, but students will follow the order as demonstrated by your instructor.

17. Transfer the provided templates onto your R/L Leaf Panes, Front Panel, Back Panel and Rudder Panel. **BE PRECISE – TAKE YOUR TIME !**

18. Rough cut sides and leg supports.
   a. Using knowledge previously gained, machine these pieces to rough sizes. (To be machined to NET size at a later time.)
   b. Take note that these components are not part of the glued-up panels.
   c. Remember to think conservation!

   **Note:** If you cannot find lumber that is 6 ½” wide, then you will need to glue up stock to meet this requirement. I would suggest ripping four pieces, each 3-1/2” inches wide. Once lumber pieces are to rough dimensions, follow CHECK LIST steps under # 15.
19. Rough cut drawer frame pieces. [2 pcs. ¾" X 4 ½" X 29" OR equivalent] (Demo layout and boring)
a. The over-all net size of these frames is determined by the prints.
b. Make out a cutting list from these drawings and confirm the sizes with your instructor.
c. Machine to net sizes including cutting to duplicate lengths where necessary.
d. Layout and mark for the dowel joints, bore dowel holes utilizing the dowel jig and portable electric drill motor and assemble with bar clamps (do not dry clamp).
e. Check for square and twist.

Note: Utilizing the shaper, run an edge detail on both sides of your drawer prior to assembly as per instructor demonstration.

Note: To add extra quality to your drawer unit, ask Mr. Hageman to discuss with you the procedure for manufacturing an “UPPER DRAWER KICKER”. This will keep your drawer from “sagging” when fully extended.

20. Rough cut bases for front and back panels. [4 pcs. 13/16" X 3" X 18" or equivalent]
a. Determine size from plans.
b. Be careful to cut enough over-size to enable you to square to “net” size.

a. Layout with instruments.
b. Machine these dados ¼” deep and wide enough to accept the thickness of your drawer frames. Use ¾” straight carbide bit in conjunction with the appropriate router jig OR use the 8” carbide tipped dado head on the circular saw.

Note: Superimpose FRONT PANEL onto your BACK PANEL to determine the exact location of the dado joint.

22. Machine blind rabbet and dado joints into the sides previously cut (use machined joint in front and back to determine location for the sides). This operation is to be done utilizing the ¾” dado head on the table saw (watch demonstration).

23. Machine stop dados into bases (sub mortise!).
a. Use the multi-router with a 3/8” carbide milling bit to machine blind mortise.
b. Machine dado 1/2" + deep.
c. Mark design on edge of bases and machine to desired shape.
d. Finish detailed cut with oscillating spindle sander and hand operations.

Note: Use masking tape to adhere “like” pieces together so they can be sanded utilizing the oscillating spindle sander simultaneously for an exact match; i.e. front, back, bases, and Rudders.
**STEPS** for machining a sub mortise in your bases via the Multi-Router:

1. Accurately lay out your mortises.
2. Secure base to the CL on the table with clamps.
3. Make 9/16” mark from front edge of base with a combination square.
4. Adjust “Depth of Cut” axis to mark in Step 2 and secure slide clamps.
5. Adjust 3/8” bit to width of mortise on your layout and secure the slide clamps.
6. Adjust the left/right lateral cutting path and secure slide clamps.
7. Plug in the Multi-Router and double check your set-up before the actual machining process.

24. Machine tenons on the ends of the front and back to fit the mortises in the bases.
   a. Fit should be snug, not tight. The finished dimensions of the machined tenons should measure 3/8” T X ½” L. NO ROOM FOR ERROR AT THIS JUNCTURE !!

**Note:** Formula for figuring how much material to remove on your Front/Back panels to end up with a 3/8” tenon:

\[
\text{Thickness of Front/Back} - \text{Tenon (3/8")} = \text{TOTAL Removal}
\]

**EXAMPLE:**
- (Front/Back)
- (Tenon)
= 5/8” (Total Removal)

**Removal off EACH face = 5/16”**

**MUST CHECK TENON FIT WITH MORTISE BEFORE CHANGING YOUR SET-UP ON THE TABLE SAW.**

25. Cut front and back panels to detailed specifications.
   a. Use necessary hand tools, marking instruments, and templates.
   b. Use bandsaw “special setup” to machine slots for sides and leg supports as demonstrated.
   c. Cut outline on front and back drawn with template.
   d. Once Front/Back and bases are sanded with 120 grit abrasive paper, bevel edges at 45° as per instructor demo.

**Note:** Use masking tape to adhere “like” pieces together so they can be sanded utilizing the oscillating spindle sander simultaneously for an exact match; i.e. front, back, bases, and rudders.
26. **Rudder Panel**  
(Demo the machining process with router) Machine panel to NET dimensions and trace rudder templates as per instructor demonstration. Following are the steps that need to be completed as per instructor lecture/demonstration:

- Layout where spline is to be machined on the end grain of each rudder. The layout rectangle should be 1" from each end edge and ¼" wide.
- CAREFULLY machine the ¼" X ½" spline using the router table, fence, and spline cutter.
- Machine and custom fit a spline for each rudder using ¼" stock.
- Glue and trim splines for each rudder.

**Note:** You are now ready to bandsaw and machine sand both rudders. Tape them together for better results.

27. Lay out pieces to be drilled and counterbored.
   a. Counterbore marked areas 1/8" to 3/16" deep, using a 3/8" brad point drill bit.
   b. Through drill areas with 3/16" twist drill.

28. Scrape all components with a “flat scraper”.
   a. Pay particular attention to the demonstration of turning a burr on the flat scraper.

29. Finish sand all components except the top members.
   a. After proper scraping you should be able to begin with 120 grit abrasive and progress through 220 grit paper.
   b. Sand all edges and end grains as per demonstration.

30. Attach bases to front and back panels.
   a. Use alphatic resin glue and clamp as per demonstration.
   b. Caution: Excess glue on panel will “size” the contaminated area.

**Note:** Should be at this point by around week nine (9).

**Note:** I would suggest that once you have completed a project piece (through 220 grit), to stain that piece and store in a secure and safe location.

31. Assemble finished “case components”.
   a. Use #8 X 1 ½" F.H. wood screws.
   b. Use 1/8" pilot drill to prevent splitting.
   c. Do not destroy edges of counterbore hold (buttons will not cover).
   d. Stain all “case components”.
   e. Attach leg supports and glue in 3/8" buttons.
   f. Glue and clamp bottom drawer frame with alphatic resin and let dry at least one hour.
   g. Double check fit of right/left sides and upper drawer frame, then glue (using alphatic resin), screw and clamp right/left side and upper drawer frame assembly. THEN glue 3/8" buttons.

**Note:** Use Jorgensen Clamps to attach upper drawer guide to sides.

   h. Machine a piece of Ponderosa Pine to attach to upper drawer guide for drawer to rest against. Finish sand, then bevel and clamp. Use alphatic resin and a Jorgensen clamp with a caul.
TABLE TOP:

32. Machine TOP and LEAF panels to NET dimensions.
   a. Cut leaf detail with bandsaw and sand edges.
      **Note:** You MAY consider creating your own design for the leafs on your table. If this interests you, see your instructor for NEXT steps.
   b. Machine Rule Joint as per instructor demo.
   c. Cut bevel on edge to match other components. (Use 45 degree carbide bevel bit and machine bevel to 1/16 – 1/8" wide.) **FINAL SAND TOP and LEAFS 220 GRIT**
   d. Layout/drill 21/64” hole in Top Panel for rudders as per instructor demo. ALSO USE 1/8” bit to drill six (6) holes for attaching Top to Case.
   e. Install “rule joint” hinges.
      **NOTE:** The hinge pin on the underneath surface of the TOP, MUST FIT into a shallow slot cut into the TOP PANEL. The pin MUST be in CL with the bead edge of the RULE JOINT. (Text, pg. 686)
   f. Attach to assembled portion.
      **NOTE:** To locate 21/64” Diameter X 3/8” Deep holes on underneath of table top for 5/16” rudder dowel, follow these steps:
      - Measure distance between 5/16” diameter holes in leg supports and call this variable “X”. THEN find ½ “X” and measure from CL of table top on both sides.

![Table Top Diagram]

33. Rough cut parts for the drawer. [Start at fourth Quarter]
   a. “Lip type” fronts should be cut ½” larger than opening size.
   b. Proceed as shown in demonstration with dovetail joints.
   c. Follow demonstration procedures for assembly and installation of drawer.
   d. May want to utilize a different species of wood for interior drawer pieces; however, for drawer front, laminate a piece of 7/16” hardwood to a piece of 3/8” Ponderosa Pine and after dry, cut drawer front to NET and proceed with cutting list for all other drawer pieces.

**Note:** Refer to CHAPTER 42, pages 667-680 in your textbook, *Modern Cabinetmaking*, by Umstattd and Davis.
PHASE ONE: Lip Drawers

1. Make drawer front/s ½" larger than the drawer opening.

Sample:

<table>
<thead>
<tr>
<th>S</th>
<th>False Front</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>G</td>
<td>I</td>
</tr>
<tr>
<td>D</td>
<td>4&quot;</td>
<td>D</td>
</tr>
<tr>
<td>E</td>
<td>Opening</td>
<td>E</td>
</tr>
</tbody>
</table>


2. Machine drawer front to NET DIMENSIONS 7/8” X 4 ½” X 6 ½”

3. Utilize table router to machine a 3/8” X 3/8” rabbet on drawer front.

4. RGH cut sides and back to following dimensions:
   - 1 pc ½” X 4” X 26” [one side]
   - 1 pc ½” X 4” X 33” [one side and back]

5. Machine two (2) sides and one (1) back to NET dimensions:
   - 2 ea ½” X 3¾” X 24” Sides (Measure from back of case to front edge of drawer frame)
   - 1 ea ½” X 3¾” X 5¾” Back

6. Machine the following project drawer pieces:
   - 1 ea ¾” X 1” X 25” Drawer Guide (Length is RGH – will cut to NET after drawer is glued)
   - 1 ea ½” X 2¼” X 25” Drawer Runner (Length is RGH – cut to NET after drawer is glued)

7. "Inside showing – Bottom facing the outside"

8. Layout and label drawer parts to be dovetailed:

   "Note: Only sand the inside faces of drawer parts @ this juncture"
9. Cutting ¼” drawer bottom to NET dimensions:
   9.1 Width of bottom – length of back MINUS 9/16”.
   9.2 Length of bottom – length of side (minus dovetails) PLUS 7/16”.

PROCESS FOR SQUARING LUMBER:

1. Joint the concave face to 70% clean.
2. Surface to rough thickness – 70% clean.
3. Joint the best edge to 100% clean.
4. Rip to width to get rid of any defects.
5. Joint the ripped edge one time.
6. Prep panels for gluing.
   **NOTE:** Check each machining for square / 90°.
7. Square one end.
8. Cut to net length.
NOTE TAKING
NOTE TAKING
NOTE TAKING
FULL SCALE

MEMORIZE!