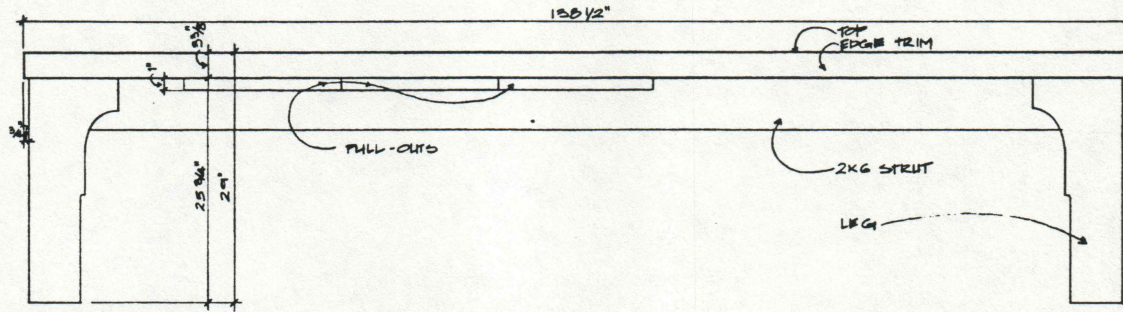


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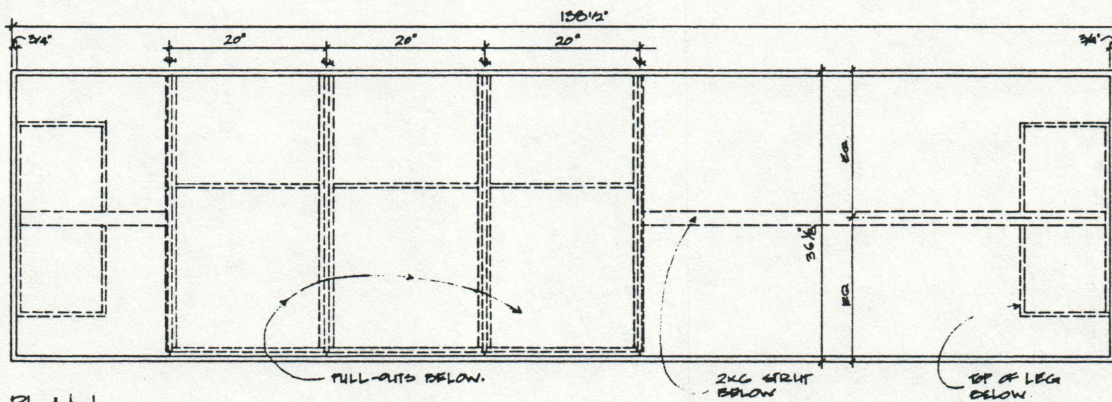
THE CONSTRUCTION PROCESS
ENGINEERING RATIONALE, DESCRIPTION AND SPECIFICATIONS

CUTTABLE WORKSURFACE

'CUTTABLE WORKSURFACE'



ELEVATION.



PLAN.

The cuttable worksurface is a box girder type structure for use as a horizontal worksurface which can be cut to any length in the field. The ability to field fit this piece of furniture to exacting dimensions is crucial to the overall furniture system. This feature, will allow a person to connect other pieces of furniture together which otherwise would remain separate items and thereby begin to surround themselves with a more unified fabric of built objects.

The worksurface is designed to span a maximum of twelve feet without any intermediate supports. The structure is light weight, solid and can be arranged in a variety of configurations. The worksurface can be supported at its ends either on legs, or on brackets which are attached to a wall, or on brackets attached to other pieces of furniture.

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The writing surface is of high quality linoleum which is edged by a solid cherry trim. The trim pieces are also cut to length and attached to the top in the field.

A variety of pull-outs can be attached to the underside of the worksurface anywhere along its length depending upon the requirements and wishes of the customer. The pull-outs are field attached as well. The pull-outs developed so far include; a shallow drawer with compartments for stationary and writing material, a cutting surface or additional writing surface and a light-table.

The cuttable worksurface is available in three standard widths and in lengths ranging from six feet to twelve feet in two foot increments. The customer should order the next size up from the length they want and have the piece cut to measure at the time of installation.

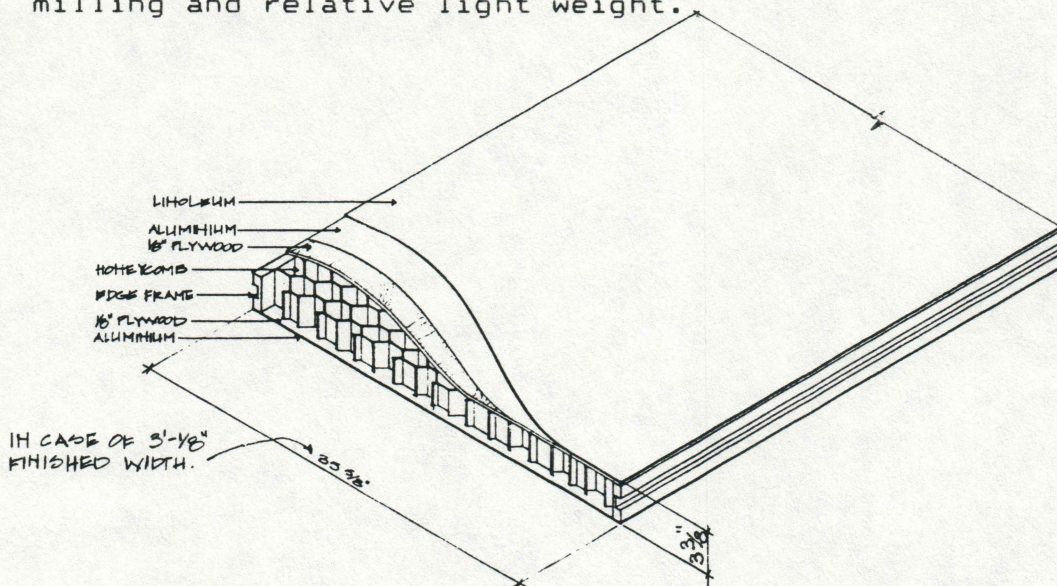
A complete description for the construction, fabrication and field installation for this piece of furniture is given under the following five sub-categories.

1. The top
2. The trim
3. The legs
4. The pull-outs
5. In-field installation

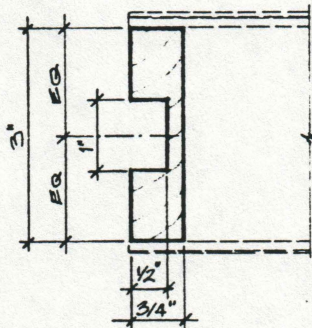
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I. THE TOP

The structure of the top is fabricated from 1/8" plywood skins (laminated with 0.010 aluminum sheets for spans over eight feet), 3" cardboard honeycomb and 3/4" x 3" pine edges. Pine is selected for its ease of milling and relative light weight.



1. Mill the pine edges as shown in the drawing below. This step is performed to reduce weight.



2. Assemble the edge frame with aliphatic resin using simple butt joints at the corners. Do not use any metal fasteners because they will be in the way of the router at a later point in the fabrication.

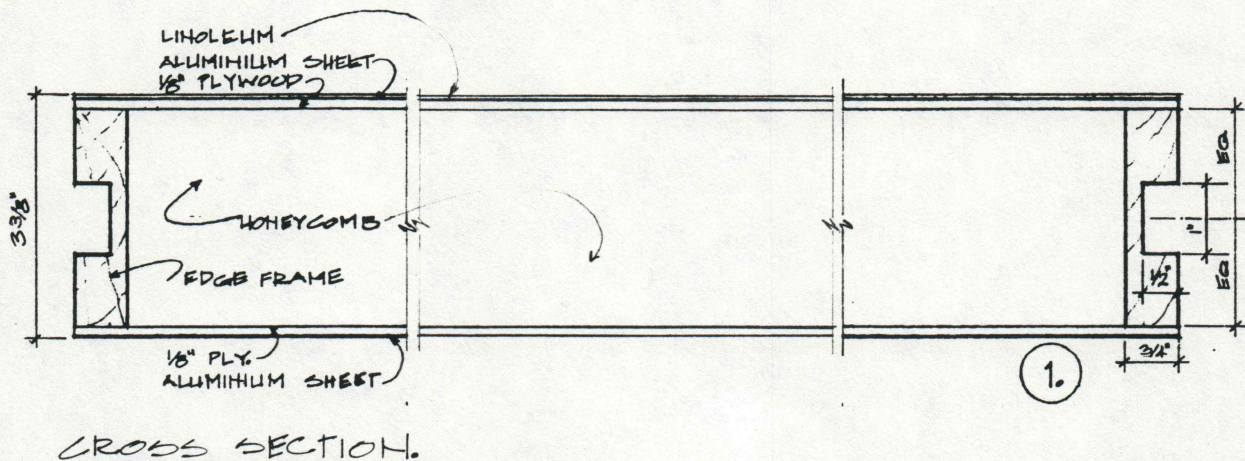
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3. Rough cut the 1/8" plywood sheets (luan mahogany) to the outside dimensions of the edge frame and glue the edge frame to one of the sheets. CES used plastic resin for this step.

4. Lay the assembly from step 2 on a laminating table (a flat surface with a maximum deviation of 1/32"), and glue and clamp the honeycomb and second sheet of plywood in place. Plastic resin was used in this step as well because it gave the best bond between the cardboard honeycomb and the plywood.

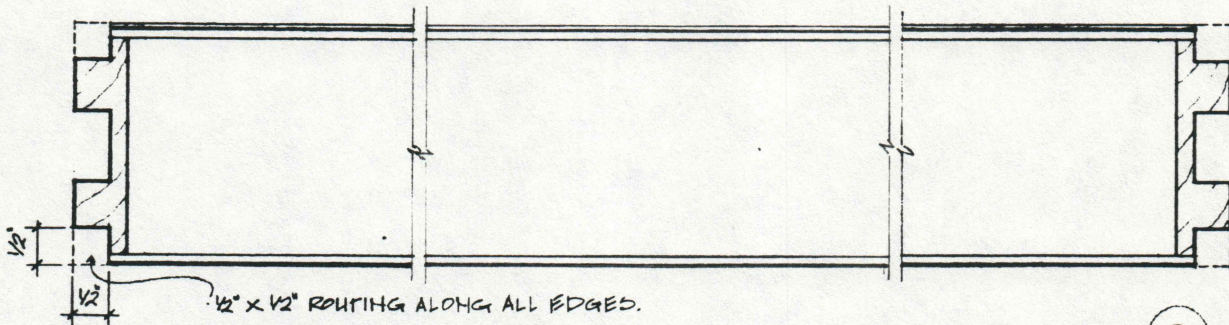
5. If the top is greater than eight feet in length, glue 0.010 inch thick aluminum sheets to each of the plywood surfaces. The aluminum is required to add stiffness so that the top does not deflect excessively when someone sits on it. CES used an epoxy resin to bond the two materials together. A calculation reveals that the shear stresses at the glue line is extremely low, however, so another type of glue could be used. The main requirement is that the glue have a high resistance to creep under sustained loads.

6. Glue the linoleum writing surface to one of the aluminum or plywood surfaces with contact cement.



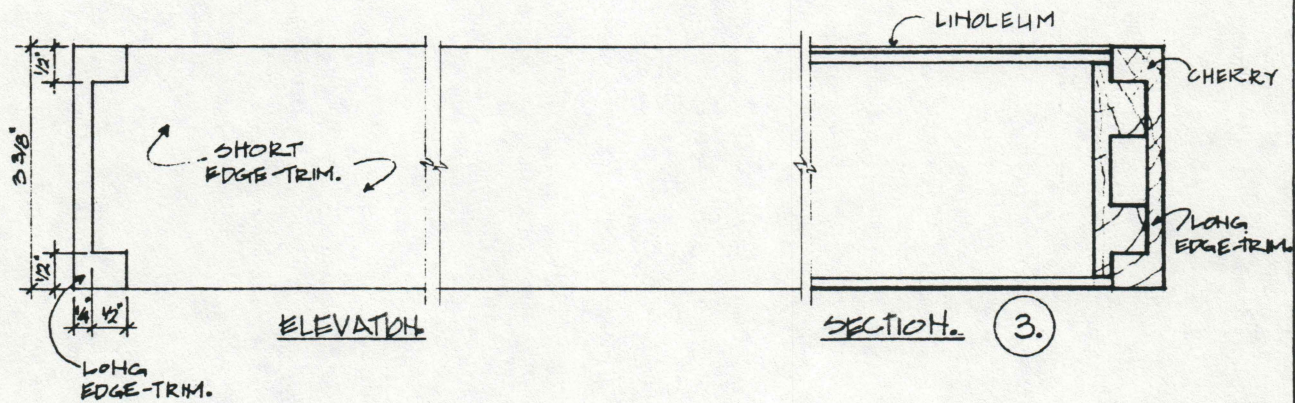
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7. Use a router to cut the edge detail shown below.



CROSS SECTION.

It is not necessary to perform this step on one of the short sides since it will be removed when the top is cut in the field. However, it is probably easier to rout all four sides. This step further reduces weight and provides a seat for attaching the cherry trim.
Note: the cut line along the linoleum must be extremely true, since it will appear as a joint between the linoleum and the cherry trim in the final piece, (see below).

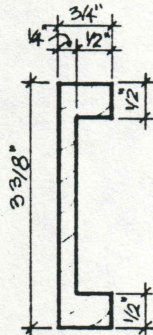


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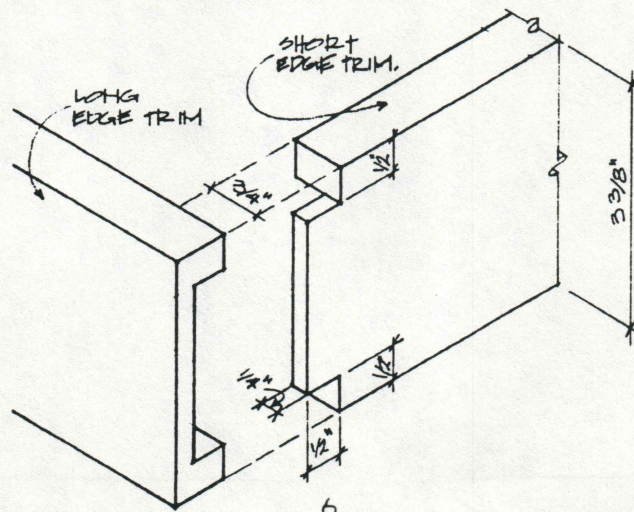
II. THE TRIM

The trim pieces are prepared and shipped along with the top and are installed in the field. The two short sides are cut to length in the factory with the end detail shown below. The two long sides are cut to length in the field. The section of the edge trims is as shown in order to allow for easy attachment to the top and to keep the overall weight of the finished piece to a minimum.

1. Mill the section for the trim pieces out of solid hardwood (Martinez version uses cherry).

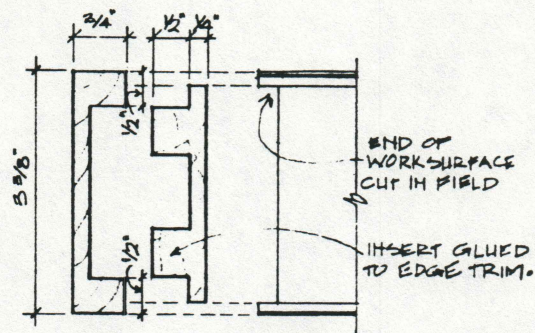


2. Cut the two short pieces to length with the end configurations shown. This detail will allow for easy installation in the field, since the only thing the installer has to do is cut the two long pieces to length with a straight cut. This detail also leaves the work surface with a good edge cut.



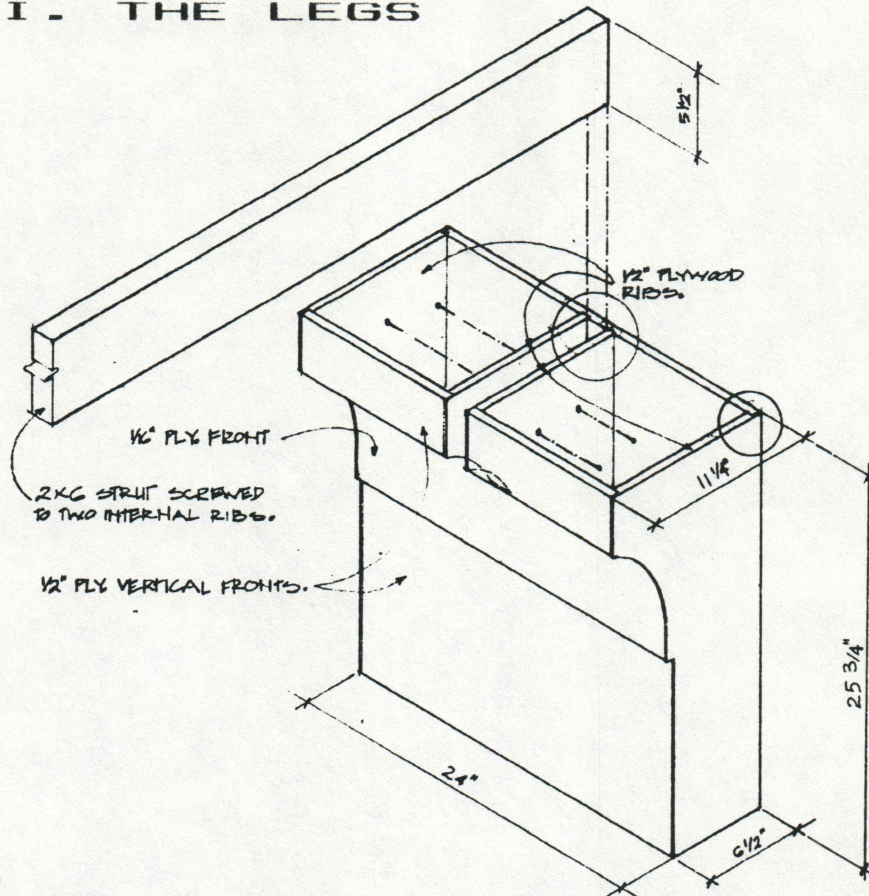
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3. Mill and cut an insert out of pine and glue it to one of the end trims as shown.



4. Apply final finish to all of the trim pieces. For the cherry version, sand with 220 grit sand paper and apply Liberon wax with 0000 steel wool. Buff when dry. *Note: it will be necessary to supply a small amount of finish material with the top to allow for touch up of the pieces that are cut.*

III. THE LEGS

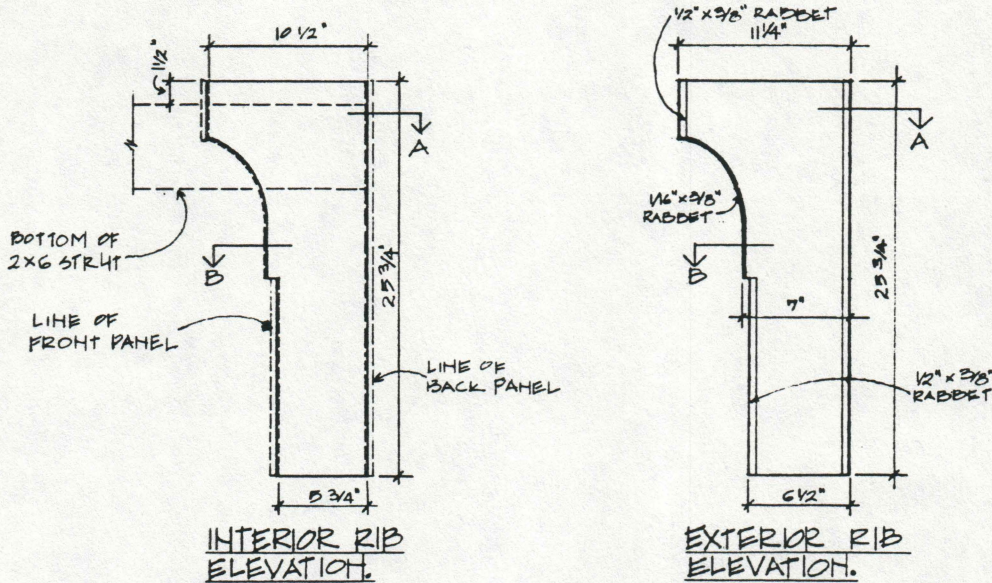


The legs are fabricated from plywood and are essentially a hollow box structure. They can be used in pairs to support the cuttable worksurface in a free standing position or they can be used singly to support one end of an "L" or "T" configuration, when the other two ends are supported either on a pair of brackets or legs. In order to keep the whole system flexible so that the legs can be matched to a worksurface of any length, the legs are not attached structurally to the top. Although not yet tried, it is proposed that the top be kept from moving around on the legs with rubber suction cups. To prevent racking, the two legs are connected together by a 2"x 6" strut which is cut to length and attached to the legs in the field. Note: A 1" x 4" strut may be more desirable but it has not been tried.

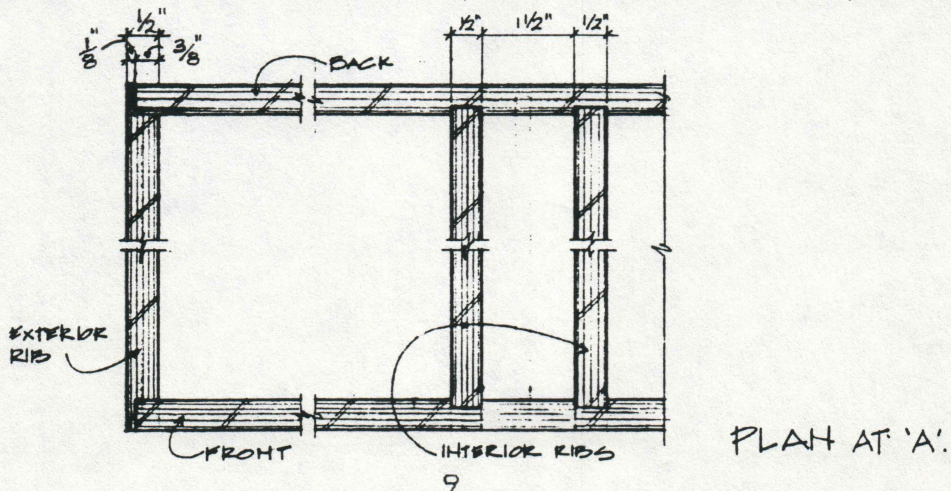
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The construction sequence at CES was as follows.

- Using templates (1:1 templates for the exterior ribs will be provided) cut the four ribs from 1/2" plywood. The two exterior ribs must be made from plywood (finish birch) which is "good" one side. Run the rabbet shown in the two exterior ribs.



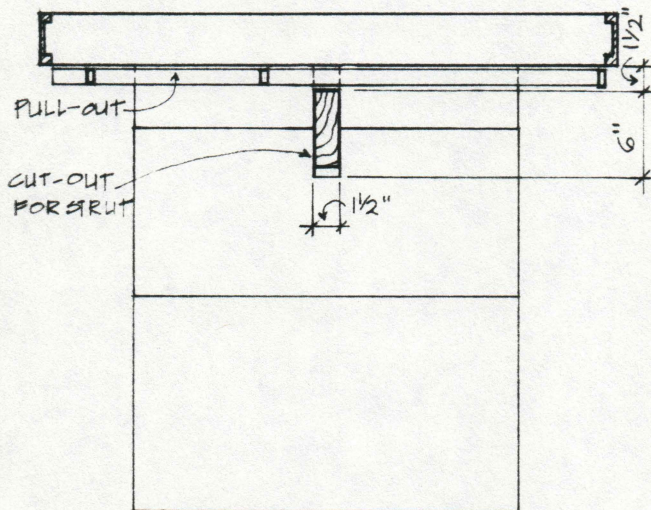
- Cut a sheet of 1/2" finish birch to the correct width for the front and back panels. Run the two vertical dados for the interior ribs. Slice up the sheet to form the two front panels and the back panel.



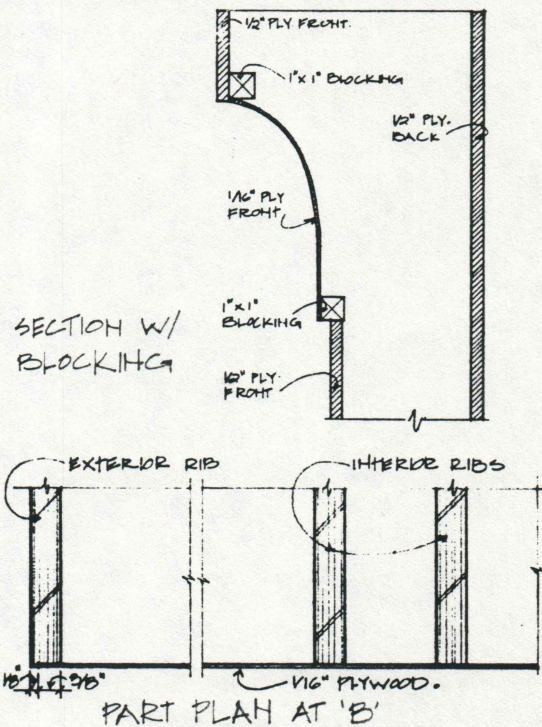
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3. Cut the front curved surface of the leg out of 1/16" bending poplar. If bent in the "weak" direction, the plywood will take the required radius without any heat bending and without splitting.

4. Assemble and glue the four ribs and front and back panels of the legs with aliphatic resin. Cut and install blocking. Glue the bending poplar to form the curved surface.



FRONT ELEV. OF LEG.



5. Cut the opening for the beam. We have found that it is both more accurate and easier to assemble the leg if the opening is cut at this stage rather than pre-cutting and assembling the pieces.

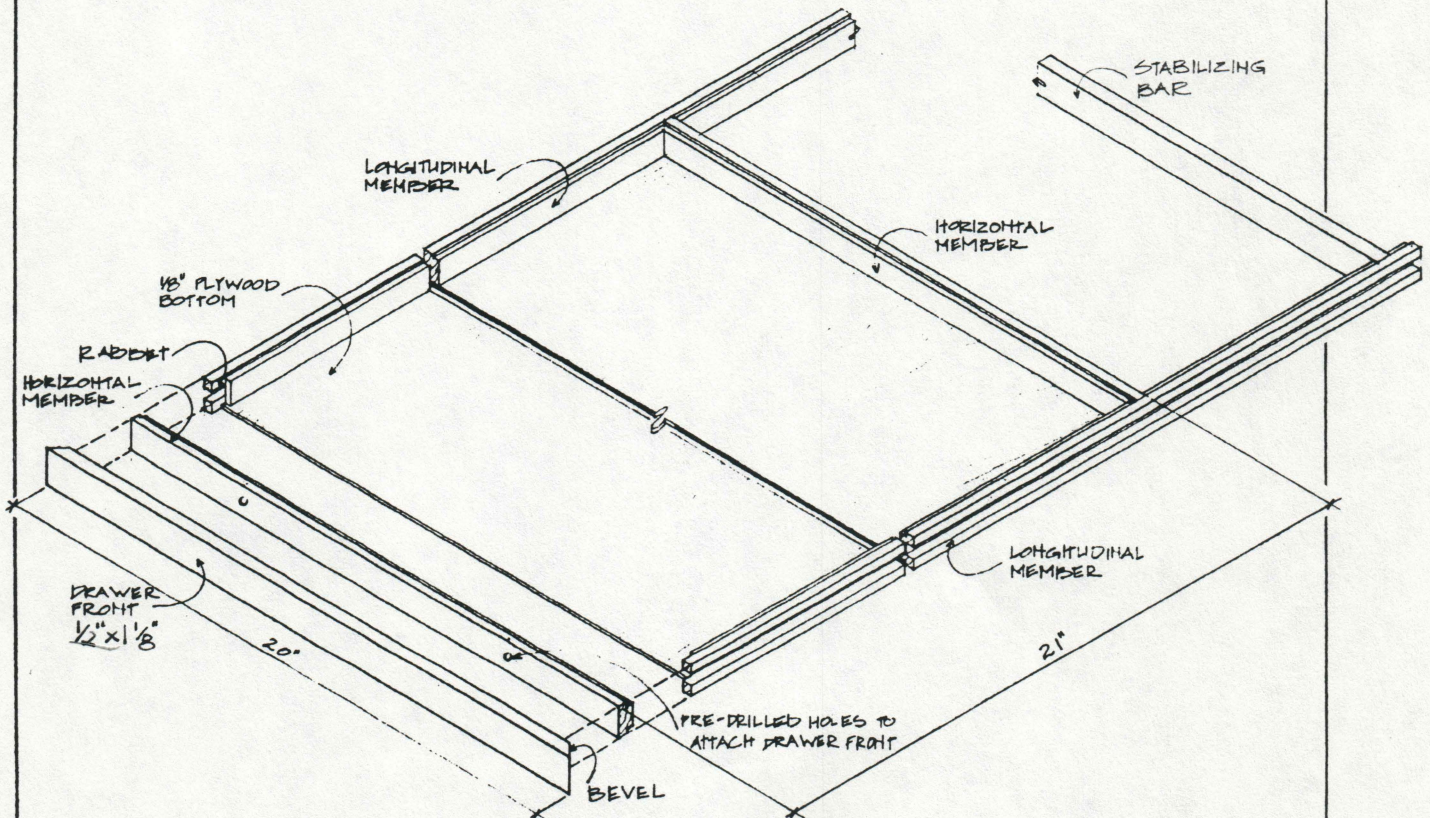
6. Prime the legs with 2-3 coats of a high build primer-surfacer and finish with 2 coats of acrylic lacquer.

7. Cut the 2" x 6" strut to the length of the worksurface and paint with one coat of melamine.

IV. THE PULL-OUTS

A variety of pull-outs are available with the cuttable worksurface. All of the pullouts are standard 20" wide and 1" deep. A customer can order the pullouts at any time, not necessarily at the time of ordering the top. The pull-outs are installed in the field using double sided tape and pop rivets. They can be installed anywhere along the length of the cuttable worksurface totally at the discretion of the customer.

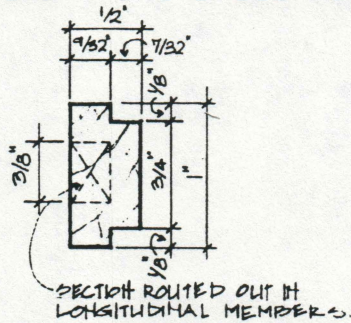
Within the standard dimensions, three different pull-outs are currently built at the martinez mock-up site. These are; 1) a drawer for holding pens, pencils, rulers, stationary varying from 8 1/2" x 11" to 11" x 17" size sheets. 2) a surface for writing with an extra pad for cutting. 3) a light table for viewing slides, tracing etc.



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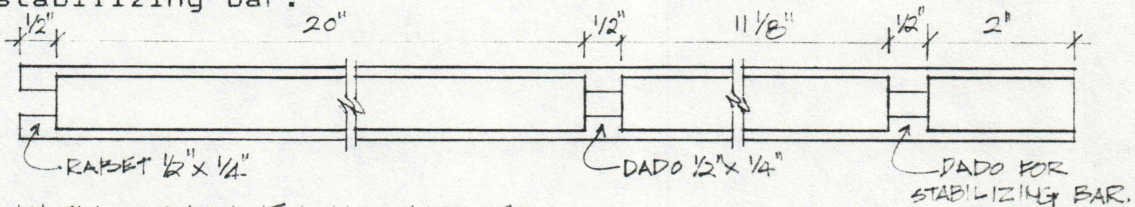
The fabrication and construction sequence for the standard pull-out is as follows.

1. Mill the standard section for the pull-outs out of solid maple. *Note: teak provides a better glide, but it is more difficult to glue up reliably.* Cut the cross members (front, back and rear stabilizing bar) and longitudinal members to length as shown on Page 14. Drill two oversized holes in the front cross member for attaching the fronts later.



STANDARD SECTION.

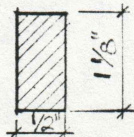
2. Cut the sliding groove in the longitudinal members. Cut a rabbet in the front end of each member and a dado for the back of the drawer and another for the rear stabilizing bar.



3. Cut the bottom of the pullout from 1/8" plywood (luan mahogany).

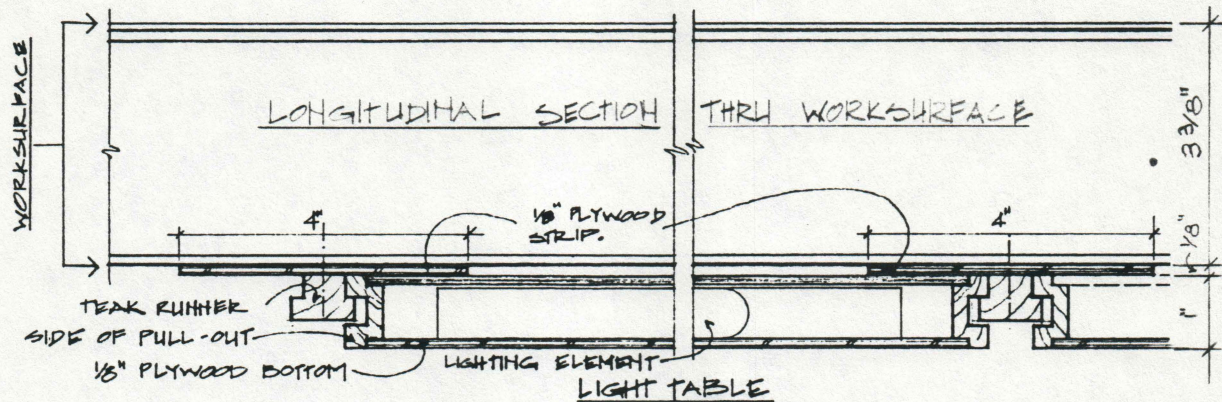
4. Assemble the sides and base of the pull-out with aliphatic resin.

5. Mill and cut (using a 5 degree bevel) the fronts from solid cherry. The fronts must be cut and numbered in sequence from one piece of wood so that the grain will continue across the cuts in the case where two pull-outs are installed side by side. This completes the fabrication for the standard pull-out.



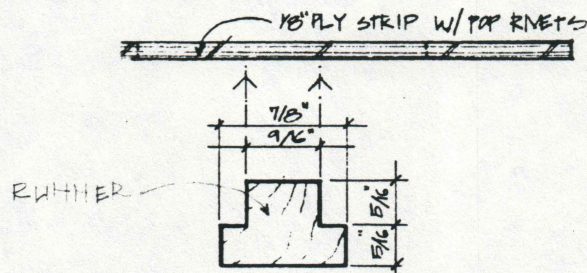
SECTION OF FRONT OF PULL-OUT.
12

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6. Mill the wood for the runners from solid teak as shown.

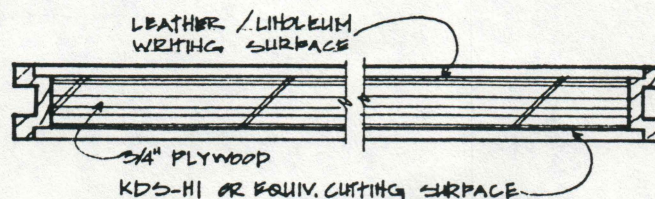
7. Cut plywood strips 1/8" x 4" x 8' and glue the teak to the strips. The plywood will be used for attaching the runners to the top with double sided tape and pop rivets during the installation operation. Cut the plywood/runner assembly to length and attach double sided tape to the surface of the plywood.



8. At this stage the standard pull-out is ready to receive the additional pieces and hardware necessary to make it into a drawer, a writing/cutting surface, or a light table.

WRITING/CUTTING SURFACE

A plywood insert with a writing grade linoleum or leather surface on one side and a cutting surface on the other side is to be inserted into the standard pull-out to provide this feature.

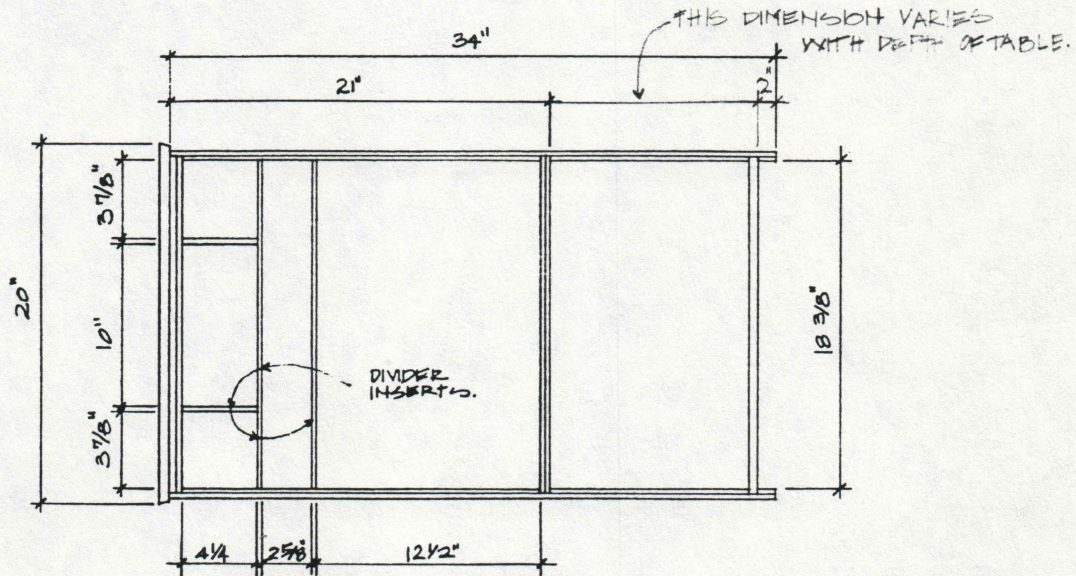


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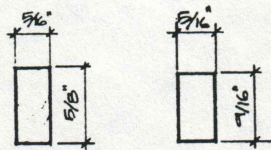
DRAWER

The standard pull-out is divided as shown to provide the drawer. The rear compartment can be divide up in a variety of ways to hold any size standard paper from 8.5"x11" to 8.5"x14" to 11"x17".

As an added feature (not yet tried), a 12" wide x 1/8" glass top can be placed in the channel on the top of the drawer. This surface may be useful for placing a computer key board on to provide the correct level for typing. It can be slid out of the way to reach any of the accessories that a person has in the compartments and it allows a person to see what they have.



PLAN OF DRAWER



TYP. DIVIDER INSERTS.

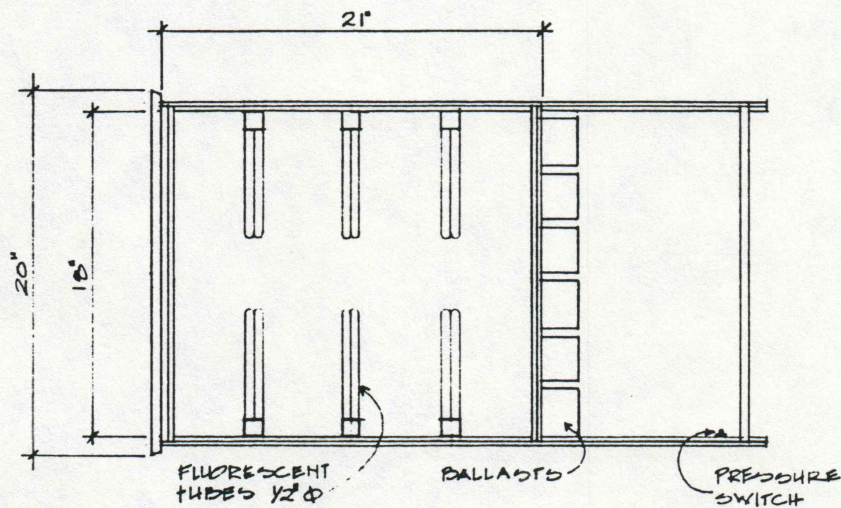
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LIGHT TABLE

The hardware for providing the light table is fitted into the standard pull-out. the main technical problem with the light table is to eliminate "hot spots" on the surface of the glass caused by the extreme thinness of the pull-out. One possibility is to use a 1/4" glass tube laid in a back and forth pattern at about 1/2" to 1" on center. Another possibility is to use some kind of diffuser beneath the surface.

The light table is to be fitted with a pressure switch so that the lights come on when the drawer is opened and goes off when the drawer is closed.

The top surface is to be made from 1/8" milk glass rather than plexi-glass for reasons of stiffness and heat, but mainly to be consistent with the overall feeling of quality which the whole piece has.



PLAN OF LIGHT TABLE

V. IN-FIELD INSTALLATION

Field installation consists of 1) cutting the worksurface to length, 2) cutting and installing the edge trim, 3) cutting the strut to length and attaching to the legs, and 4) installing the runners for the pull-outs and the pull-out fronts.

1. After determining the exact length of the work surface, cut one end. The cut is to be made with a router and a guide which completely surrounds the top. The guide will be a pre-fabricated tool which all of the installers have with them.

2. Break out a portion of the cardboard honey comb so that the edge piece with the attached insert can be inserted into the cut end.

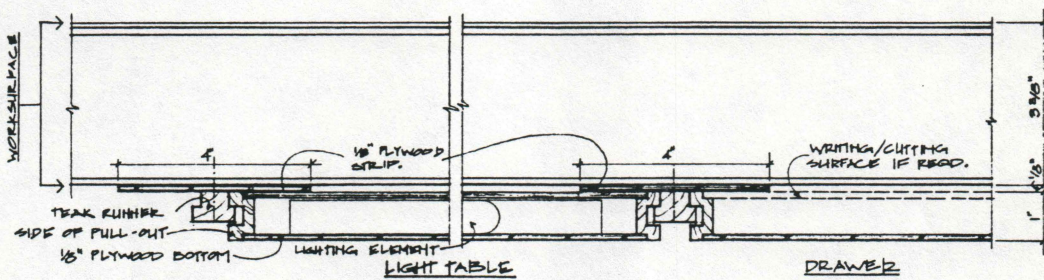
3. Install the edge trim using aliphatic resin. The edge pieces can be held in position with masking tape while the glue is setting. The end pieces should fit perfectly and the long pieces should be fit on one end with the other end running wild. After all of the pieces are glued and taped the long trims can be cut in place with a fine toothed hand saw.

4. Cut the strut which will connect the two legs together to the correct length and attach to each leg using four #12 x 1 1/2" screws.

5. Place the leg and strut assembly in place and install the top. Suction cups are proposed for attaching the top to the leg assembly.

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6. Determine with the customer the best locations for the various pull-outs and install the runners by attaching to the bottom surface of the top with the double sided tape and pop rivets. Six pop rivets should be used on each runner assembly. The two in the front are the most critical.



Note: there are two criteria which must be strictly observed when installing the pullout runners. 1) It is important to place the runners at ninety degrees to the front face of the top, and 2) to set the front end of each runner accurately because the runners provide the stops for the pull-outs.