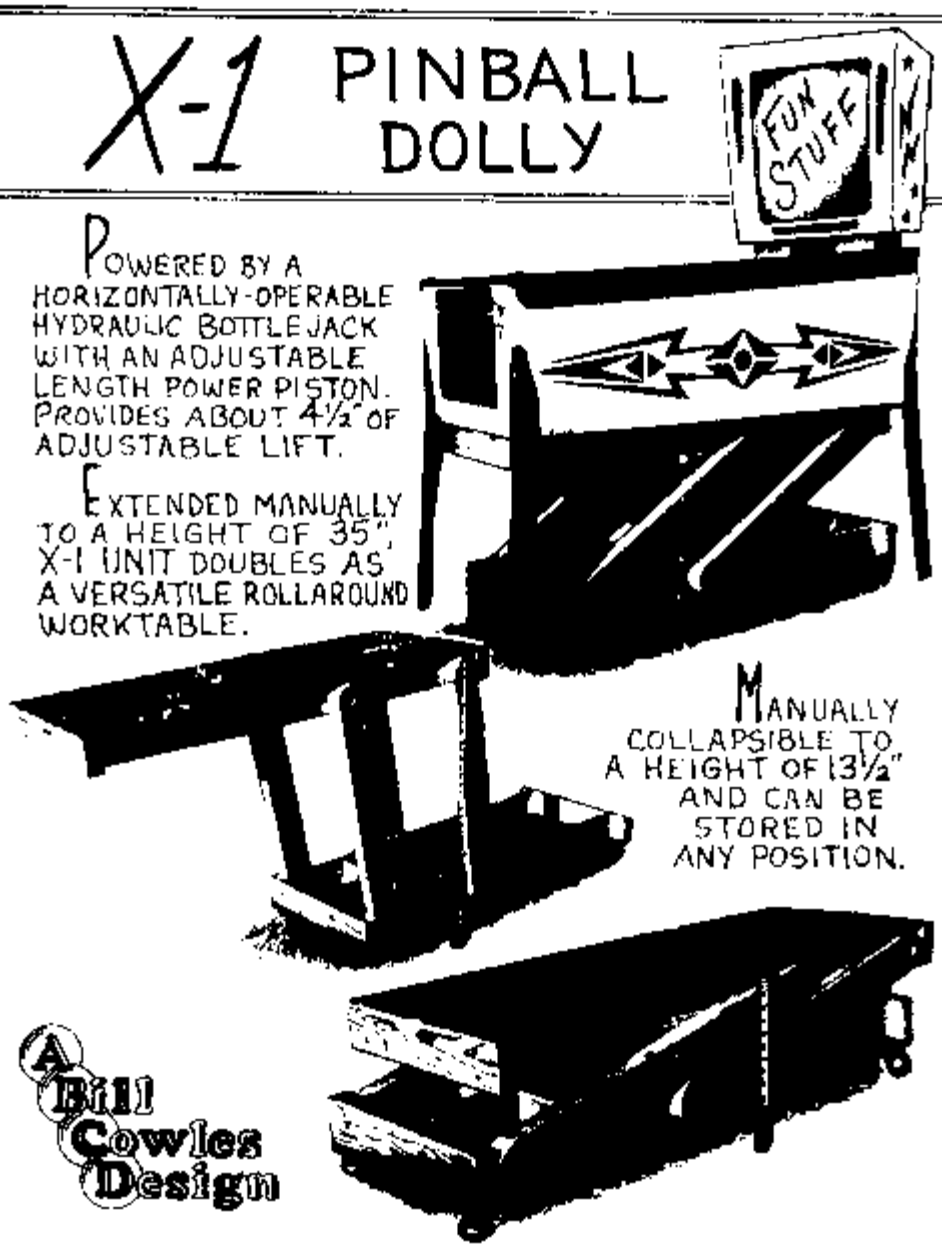
X-1 PINBALL DOLLY



POWERED BY A HORIZONTALLY-OPERABLE HYDRAULIC BOTTLEJACK WITH AN ADJUSTABLE LENGTH POWER PISTON. PROVIDES ABOUT 4½" OF ADJUSTABLE LIFT.

EXTENDED MANUALLY TO A HEIGHT OF 35", X-1 UNIT DOUBLES AS A VERSATILE ROLLAROUND WORKTABLE.

MANUALLY COLLAPSIBLE TO A HEIGHT OF 13½" AND CAN BE STORED IN ANY POSITION.

A Bill Cowles Design

FABRICATING THE PIECES (THE HARD PART)

1) CUT ALL LUMBER TO SIZE, SAVING A SCRAP (OF 2"×9") FOR A PILOT HOLE TEMPLATE, TO AID IN MARKING & DRILLING OF 1/4" HOLES.
   ★(MARK EACH PIECE SO THEY DON'T GET MIXED UP)

2) DRILL ALL HOLES AS SHOWN, BEGINNING WITH A (W) 1/4" (OR SMALLER) BIT.
   NEXT DO THE COUNTERSINKING WITH THE 1" BIT AS SHOWN.
   ⇨ THIS MUST BE DONE BEFORE THE 3/8" BIT IS USED, OR THE 1" BIT WILL WOBBLE ALL AROUND A 3/8" HOLE!
   AFTER ALL HOLES HAVE BEEN COUNTERSUNK, (ON BOTH SIDES IN MOST CASES), GET OUT THE 3/8" BIT AND REAM THE HOLES TO SIZE, BEING CAREFUL TO MAINTAIN "SQUARENESS" TO THE WOOD.

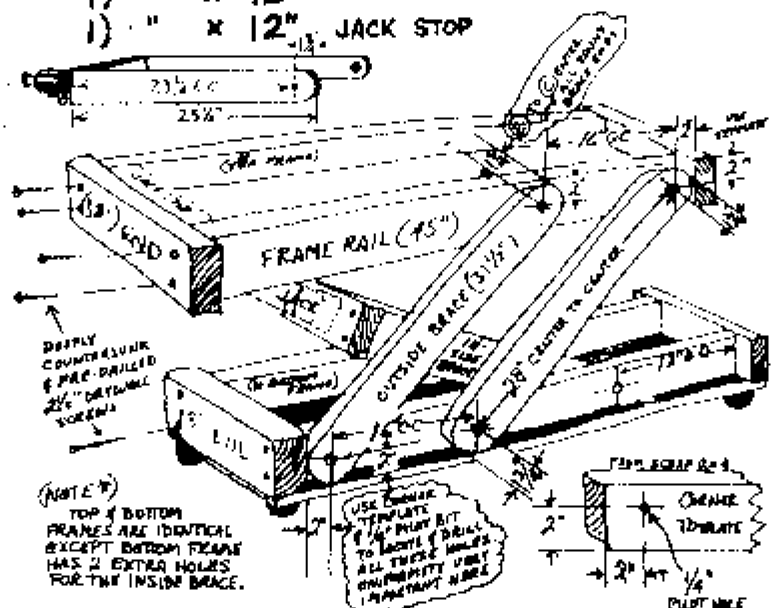
★ LOCATING & DRILLING THESE HOLES PROPERLY IS PROBABLY THE MOST CRITICAL PART OF THIS (W)HOLE PROJECT. SO A LITTLE EXTRA TIME SPENT HERE TO BE AS ACCURATE AS POSSIBLE WILL PAY OFF IN THE END. A DRILL PRESS WOULD BE IDEAL HERE, BUT IF YOU DON'T HAVE ONE, (LIKE ME), A CAREFULLY DRILLED TEMPLATE WILL DO — AS A GUIDE AND LOCATOR FOR THE 10 HOLES NEEDED IN THE FRAME RAILS.

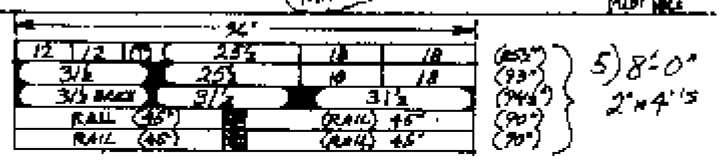
THE 10 HOLES NEEDED IN THE BRACES ALSO NEED TO BE AS STRAIGHT & TRUE AS POSSIBLE, USING THE 1/4" PILOT BIT FIRST. (THE "TEMPLATE" CAN ALSO BE USED HERE TO HELP HOLD THE BIT "SQUARE," AFTER THE HOLE IS STARTED A LITTLE BIT.)

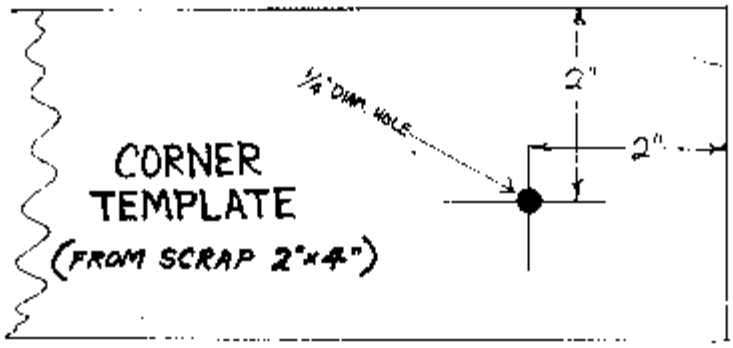
3) THE 4 OUTSIDE BRACES NEED TO BE RADIUS ROUNDED, USING A SCROLL, BAND, JIG, SABER OR ANY OTHER KIND OF SAW THAT CAN ROUND OUT BOTH ENDS. THE 2 INSIDE BRACE PIECES GET ROUNDED ONLY ON ONE END.

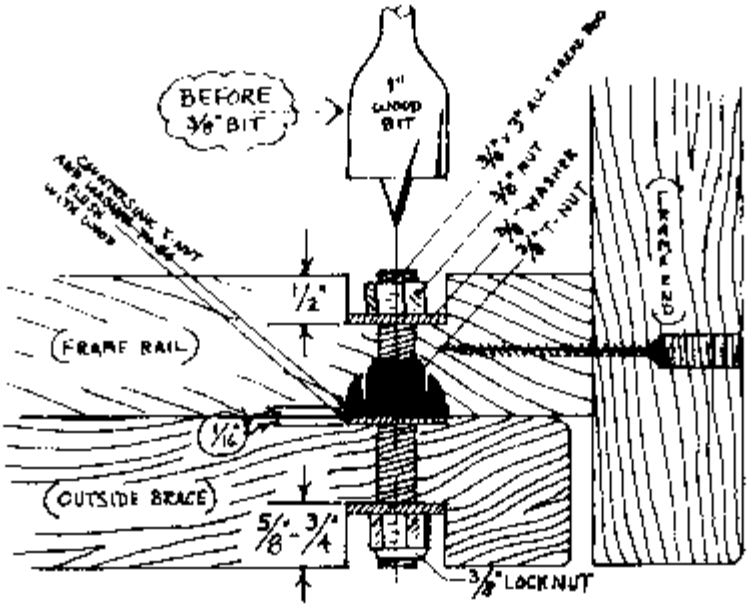
USE STRAIGHT LUMBER & AVOID KNOTS

4) 2"x4" x 31½" OUTSIDE BRACES
4) " x 45" FRAME RAILS
4) " x 18" FRAME ENDS
2) " x 25½" INSIDE BRACE
1) " x 12" " " END (BASE FOR JACK)
1) " x 12" JACK STOP






CORNER
TEMPLATE
(FROM SCRAP 2"x4")
1/4" DIAM. HOLE
2"
2"

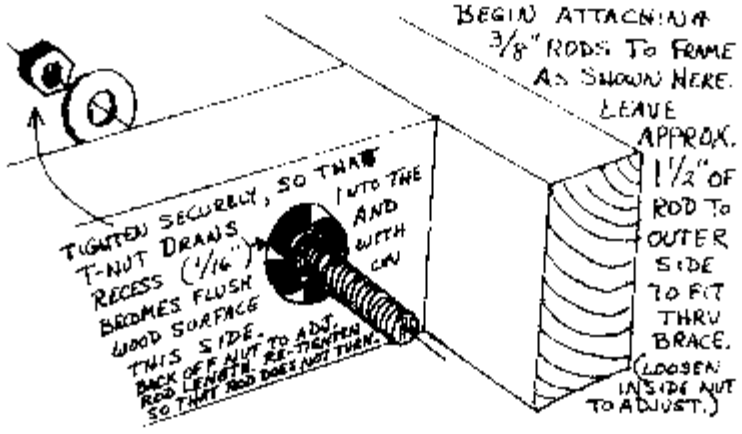

BEFORE 3/8" BIT
1" SPADE BIT
3/8" x 3" ALL THREAD RD
3/8" NUT
3/8" WASHER
3/8" T-NUT
1/2"
FRAME RAIL
1/16"
OUTSIDE BRACE
5/8" - 3/4"
3/8" LOCK NUT

ASSEMBLY (THE FUN PART)

ASSEMBLE THE TOP & BOTTOM FRAMES, USING 2½" DRYWALL SCREWS (COUNTERSUNK DEEPLY FOR MAXIMUM PENETRATION). NAILS COULD ALSO BE USED. A LITTLE "ELMER'S" GLUE HERE COULDN'T HURT.

THIS WOULD BE A GOOD TIME TO ATTACH THE BOTTOM PLYWOOD PANEL, USING SCREWS OR NAILS. I PREFER DRYWALL SCREWS TO WOODSCREWS BECAUSE OF THEIR NARROWER SHANK AND LESS TENDENCY TO SPLIT WOOD. (ALTHO PRE-DRILLING IS STILL THE BEST WAY TO GO.) A LITTLE GLUE WOULDN'T HURT HERE, EITHER.

ATTACH THE CASTERS TO THE BOTTOM, WITH 3 OF THE 4 SCREWS LONG ENOUGH TO PENETRATE THRU THE PLYWOOD INTO THE FRAME. THE 4TH SCREW CAN BE A SHORTER ONE.

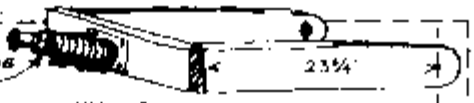


AFTER ALL 8 RODS FOR THE 4 OUTER BRACES ARE ON, THE BRACES CAN BE INSTALLED, CONNECTING THE TOP FRAME TO THE BOTTOM.

IT MAY BE NECESSARY TO LOOSEN A ROD OR TWO TO FACILITATE THE ATTACHMENT OF THE LAST BRACE. AFTER THEY ARE ALL ASSEMBLED AND TIGHTENED TO DESIRED FIRMNESS (OR LOOSENESS), BY TIGHTENING (OR LOOSENING) THE OUTER LOCKNUTS; THE INNER NUTS CAN ALWAYS BE LOOSENED TO TURN THE ROD AND BRING IT JUST FLUSH TO EDGE OF THE OUTER LOCK NUT.

ONE NOTE HERE: YOU CAN USE REGULAR 3/8" NUTS ON THE OUTSIDE AND THEY'LL WORK PRETTY GOOD FOR A WHILE, BUT THEY WILL LOOSEN UP AND EVEN FALL OFF. (MINE DID)

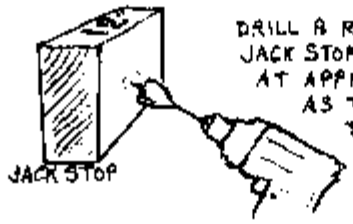
THE INSIDE BRACE RODS DON'T USE THE T-NUT METHOD, JUST A NUT & WASHER ON THE INSIDE AND OUT.



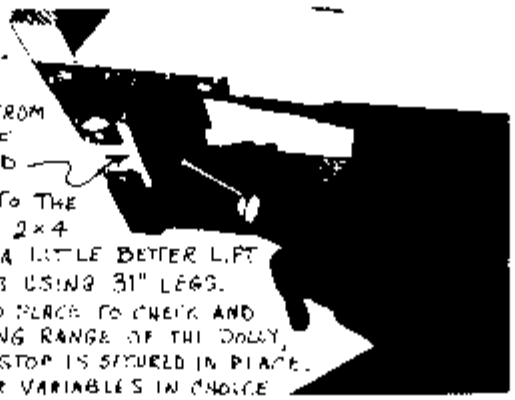
WHEN SELECTING A BOTTLE JACK, MAKE CERTAIN THAT IT WILL OPERATE IN A HORIZONTAL POSITION. SOME WILL NOT.

ALSO NOTE THE POSITION THE HANDLE WILL BE IN TO DETERMINE IF IT WILL BE SUITABLE FOR THIS PURPOSE.

ALSO LOOK FOR ONE WITH A FLAT ENOUGH SURFACE AT THE BASE WITH ROOM TO DRILL AT LEAST 2 HOLES FOR MOUNTING SCREWS.



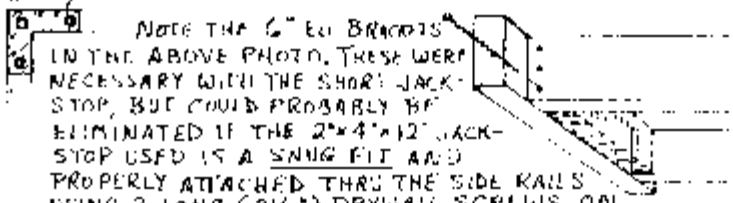
DRILL A RECESS INTO THE JACK STOP ABOUT 1/3 WAY THRU, AT APPROX. THE SAME ANGLE AS THE JACK WILL BE. THIS WILL SECURE THE TIP OF THE JACK.



THIS PHOTO SHOWS THE ORIGINAL JACKSTOP, WHICH WAS CUT FROM A SMALL STRIP OF 3/4" PLYWOOD

CHANGING IT TO THE THICKER PIECE OF 2×4 GIVES THE DOLLY A LITTLE BETTER LIFT UNDER THE SAMES USING 31" LEGS.

THIS IS A GOOD PLACE TO CHECK AND ADJUST THE LIFTING RANGE OF THE DOLLY, BEFORE THAT JACKSTOP IS SECURED IN PLACE. COMPENSATIONS FOR VARIABLES IN CHOICE OF PLYWOOD THICKNESS, CASTER SIZE, JACK PISTON TRAVEL, ETC., CAN BE EASILY MADE HERE (OR UNDER THE BASE OF THE JACK, MOVING THE WHOLE JACK FORWARD.)



NOTE THE 6" L BRACKETS IN THE ABOVE PHOTO. THESE WERE NECESSARY WITH THE SHORT JACKSTOP, BUT COULD PROBABLY BE ELIMINATED IF THE 2"×4"×12" JACKSTOP USED IS A SNUG FIT AND PROPERLY ATTACHED THRU THE SIDE RAILS USING 3 LONG (2½") DRYWALL SCREWS ON EACH SIDE, PRE DRILLED & COUNTERSUNK DEEPLY, (AS DONE ON THE FRAME ENDS).

BEFORE DRILLING, NOTE THE LOCATION OF THE 2 SCREWS FROM THE FRONT TO AVOID CONFLICT WITH THEM. ALSO A LIBERAL AMOUNT OF GLUE HERE WOULD BE A DEFINITE PLUS.

ABOUT ALL THAT'S LEFT NOW IS TO ATTACH THE PIECE OF PLYWOOD TO THE TOP.

USING SHORTER (1½") DRYWALL SCREWS AND NO GLUE SHOULD MAKE IT A SNAP TO CHANGE THE TOP IN THE FUTURE.

X-1 DOLLY PARTS

5) 2"×4"×8'-0"
2) ½" or ¾" PLYWOOD, 18"×48"
4) 2½" SWIVEL CASTER WHEELS (HARD RUBBER BEST)
(2) 6" STEEL ANGLE BRACKETS – OPTIONAL)
1) HYDRAULIC BOTTLEJACK, HORIZ.-OPERABLE
8) ⅜" WOOD NUTS (T-NUTS)
28) ⅜" WASHERS (1" DIAM.)
12) ⅜" NUTS
8) ⅜" LOCKNUTS
30") ⅜" ATR (ALL-THREAD ROD) CUT INTO 10 PIECES 2⅞" LONG
36) 1½" DRYWALL SCREWS
24) 2½" " "
(1) ELMER'S GLUE – OPTIONAL)

TOOLS NEEDED

TABLESAW OR SKILSAW
SABRESAW (TO ROUND 2×4'S)
HACKSAW (TO CUT ⅜" ROD)
FILE (TO ROUND OFF BURRS)
⅜" DRILL MOTOR
BITS: 1/16" ⅛" ¼" 5/16"
1" WOOD-BORING BIT
COUNTERSINK BIT (OPTIONAL)
PHILLIPS-HEAD DRIVER BIT

VINTAGE PINBALLS
(901) 359-4805

How to Display Your Translite/Backglass

By Mark Bakula

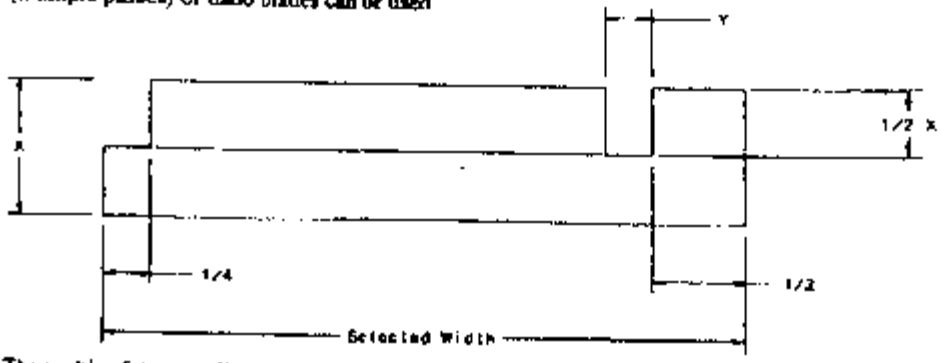
Safety First! **Working with power tools requires eye protection, understanding of the tool instructions and a clear head. Safety must be the number one priority at all times during construction.**

Equipment: Table saw or radial arm saw / tape measure / carpenter's square / corner clamps / hand saw / hammer / drill and bits / screwdriver. NOTE: A miter box can be used to make the corner cuts, but it cannot make the grooves.

Material: Wood for sides – 8' long, 3 or 4" wide / 1" stock thickness (actually ¾"). For a clear finish or stain: I use oak, maple or clear stock fir (pine). For a Painted finish: I use fir - clear stock or with knots / Back (light) panel: ¼" thick plywood or masonite / clear Plexiglass (plastic) to support translite: 1/16" acrylic (Plexiglass) / glue / nails / screws / finishing materials (paint or stain) / aluminum foil / hot glue or staples / one string clear x-mas lights.

Template/Plastic First thing to do in construction is to select the translite/back glass to be backlit. Then measure the item and cut a piece of cardboard for a template or cut the back panel to the exact same size as translite/back glass and use it as the template. Cut two clear Plexiglass (plastic) panels to exact size of the translite. The translite will be sandwiched between the panels. NOTE: You can get away with only one clear Plexiglass (plastic) panel if the translite is very stiff. Backglasses do not require plastic panels.

Saw Grooves Set the saw up to cut 2 grooves into the board. A translite/back glass groove and a back board groove. **Be safe doing this!** See below for sizes of the translite/back glass groove. Single blade (multiple passes) or dado blades can be used



The width of the translite/Backglass groove ('Y') is calculated by.

Y = Backglass thickness + 1/16"

For a translite with 1 piece of clear Plexiglass (plastic)

Y = clear Plexiglass (plastic) sheet thickness + 1/16"

For a translite with 2 pieces of clear Plexiglass (plastic).

Y = 2 X plastic sheet thickness + 1/16"

Corners: Now you have to make a decision as to which corner design we will use.

Miter

Advantages:
Looks like a picture frame corner

Disadvantages
Slightly harder to make (due to the 45 degree cuts)
Requires the box to be partially disassembled after finishing for final assembly.
Miter edge may require touch-up

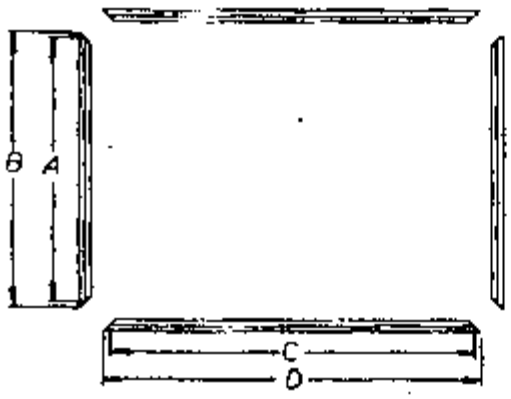
Lap

Advantages
No touch-up required after finishing.
Individual cuts are easy – straight cuts

Disadvantages
View from the top or bottoms reveals glass and back panel grooves

MITER

Cut the 4 frame boards (45 degree angles) per dimensions below.



A = length of the side of the transline/Backglass + 1/16"

B = length of the side frame rail = A + thickness of the board

C = length of the top or bottom of the transline/Backglass + 1/16"

D = length of the top or bottom frame rail = C + thickness of the board

Sand all 4 sides to the desired texture.

Temporarily assemble all 4 sides with the template to ensure proper fit. If fit is not correct make adjustments and trim to fit or recut.

Disassemble and remove template. Select the 2 joints sides to be glued. Glue the two corners, drill and nail in fixture.
Temporarily drill and nail the non-glue side while in fixture.

Finish the frame w/stain/paint etc.

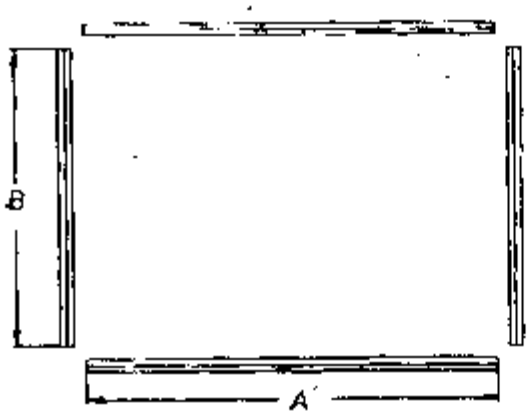
Disassemble non glued side.

Install backglass or translite with clear plastic panels in fixture.

Glue and nail 4th side in fixture.

LAP

Cut all 4 sides frame boards per dimensions below (straight cuts here)



A = the length of the top or bottom of the translite/Backglass + 1/16" – (less) the thickness of one board

B = the length of the sides of the translite/Backglass + 1/16" + the thickness of one of the board

Sand all 4 sides to desired texture

Temporarily assemble all 4 sides with the template to ensure proper fit. If fit is not correct make adjustments to trim to fit or recut.

Disassemble/remove template

Finish the frame w/stain/paint etc

Assemble w/ fixture with back glass or translite and clear Plexyglass (plastic) panels

Drill for screws at each corner (2 screws per corner) and install screws (I use brass screws with brass washers)

Construction of back panel (light panel) I have used 2 different methods. First, cut a small groove in one edge of the panel for cord to exit

A) Cut 4 slots for heat removal
If wanted, paint the light side of the back panel with white paint
Use large clear X-mass tree (C-7) bulbs string of 25
Tack them into the ¾" plywood (tacks or staples being ¾" long) DO NOT STAPLE THROUGH THE WIRES

B) Use a string of 280 mini X-mass tree bulbs
If wanted, paint the light side of the back panel with white paint
Layout and hot glue to masonite
Do not use foil

Put light panel on and attach with screws

Install hanging hardware
If large bulbs are used install standoffs at back bottom corners to keep the back of the frame from touching the wall for better heat removal