

# **SIDE TILT DIY INSTRUCTIONS**



\$15.00

# MURPHY®

WALL-BEDS HARDWARE INC.



## **SIDE TILT DIY Do-It-Yourself Mechanism Kit & Instructions**

Available in    **Single/Twin**                      **Double/Full**                      **Queen**

Lift Mechanism, and Folding Leg System.  
Designed to International ISO 9002 standards to  
exceed residential specifications.

15 Year Warranty.

Established 1975

Trading as

**Tilt-Away Beds of America®**

**Tilt-Away Beds of Canada®**

**Murphy Wall-Beds of Canada®**

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TOLL FREE 1-800-667-6336

PHONE: (604) 576-7880 • FAX: (604) 576-7867

E-mail: [info@murphybeds.com](mailto:info@murphybeds.com)

Websites: [murphybeds.com](http://murphybeds.com) • [spacebeds.com](http://spacebeds.com) • [wallbedco.com](http://wallbedco.com) • [tiltawaybeds.com](http://tiltawaybeds.com)

**Thank you for purchasing our DIY Wall Bed Mechanism System. The Mechanism is made to International ISO 9002 specifications from a company in business since 1975. We trust you will find our instructions very explicit and you will enjoy your project.**

**BEFORE YOU START**

- Before beginning to construct your Murphy Wall Bed, we suggest you unpack your SIDE-TILT DO-IT YOURSELF (ST-DIY) Bed System so that, as you continue to read through this manual, you will familiarize yourself with the system’s components.
- Read through this manual thoroughly, studying the illustrations as you go.
- If you are building a single/twin bed and choose to use a one-piece Bed Panel, you do not need the Panel Stiffeners. Disregard all further references to that item as well as any to multiple BED PANELS. See the note following the **Single/Twin Bed Cut List**
- Because the kind of handles used to pull the bed open is a matter of personal taste, they are not included in the System component. You need not immediately purchase this item but should have it on hand before beginning section 7 of the STEP-BY-STEP INSTRUCTIONS.
- Panels must be 3/4" plycore (particle board is not suitable). If you wish to paint cabinetry use 3/4" Birch plycore. Light weight decorative face moulding or crown moulding may be added to the bed cabinet after assembly is completed.
- Once you begin the construction, assembly and installation process, follow the instructions carefully. Pay particular attention to the items marked with italics.
- Hardware is patented. **Duplication is illegal.**

**CONTENTS OF SIDE TILT DO-IT-YOURSELF (ST-DIY) SYSTEM**

<b>Qty.</b>	<b>Item</b> .....	<b>✓</b>
2	Lift Mechanisms, left & right .....	<input type="checkbox"/>
2	Tilt-Away™ Legs, left & right, with the following attached to each leg .....	<input type="checkbox"/>
	1 - 3/4" x 1 1/4" (OD) “Lexan” black plastic washer .....	<input type="checkbox"/>
	1- 5/16" x 7/8" (OD) flat washer .....	<input type="checkbox"/>
	1- 5/16" Nylock hexagon nut .....	<input type="checkbox"/>
14	Lift Mechanism springs .....	<input type="checkbox"/>
2	Lift Mechanism safety cover plates, left & right .....	<input type="checkbox"/>
1	13" Plastic pipe .....	<input type="checkbox"/>
1 pr.	“Velcro” straps .....	<input type="checkbox"/>

**Bag # 11...**

4	5/16" x 1 1/4" hexhead machine bolts .....	(attach Bed Unit to Mechanism) .....	<input type="checkbox"/>
2	Allen key sockethead bolts .....	(as above) .....	<input type="checkbox"/>
6	5/16" x 7/8" flat washers .....	(as above) .....	<input type="checkbox"/>
6	5/16" Nylock hex nuts .....	(as above) .....	<input type="checkbox"/>
2	3/16" x 3/4" (OD) flat washers .....	(attach “Velcro” straps) .....	<input type="checkbox"/>
2	2" lag screws .....	(attach leg crossbar) .....	<input type="checkbox"/>
2	1/4" star washers .....	(as above) .....	<input type="checkbox"/>

**Bag # 27...**

3	#8 x 2 1/2" flathead wood screws .....	(secure Cabinet to wall) .....	<input type="checkbox"/>
1	Warning Label .....	(attach to Back Apron) .....	<input type="checkbox"/>
5	flat Bumper Buttons .....	(3 on Front Apron Backer, 2 for Leg Bumpers) ...	<input type="checkbox"/>
8	5/16" x 1 1/4" flathead slot machine screws .....	(mount Mechanism to Side Panel) .....	<input type="checkbox"/>
2	5/16" x 7/8"(OD) flat washers .....	(as above) .....	<input type="checkbox"/>
2	3/4" hexagon cam washers .....	(as above) .....	<input type="checkbox"/>
8	5/16" plain hexagon nuts .....	(as above) .....	<input type="checkbox"/>
4	4 mm x 1/4" flathead slot machine screws .....	(attach Mechanism covers) .....	<input type="checkbox"/>

## CONTENTS OF SIDE TILT DO-IT-YOURSELF (ST-DIY) SYSTEM CONT'D

### Bag # 29...

- |     |  |                          |
|-----|--|--------------------------|
| 28  | 1" x 1" x 1 3/4" assembly brackets ..... (assemble cabinet) .....        | <input type="checkbox"/> |
| 118 | #8 x 3/4" panhead screws ..... (112 for above, 6 for Panel Guards) ..... | <input type="checkbox"/> |

### Bag # 30...

- |    |   |                          |
|----|---|--------------------------|
| 2  | Panel Guards, left & right .....                  | <input type="checkbox"/> |
| 12 | Confirmat screws ..... (attach Rails) .....       | <input type="checkbox"/> |
| 6  | Confirmat screw caps ..... (for Front Rail) ..... | <input type="checkbox"/> |

## MATERIALS REQUIRED

Wood panelling (plycore) 3/4" x 48" x 96":

- |                   |   |                          |
|-------------------|---|--------------------------|
| 3 sheets          | Single/Twin<br>- or -   |                          |
| 3-4 sheets        | Double/Full/Queen (use 4 sheets if grain-matching Bed Panels) .....   | <input type="checkbox"/> |
| 1                 | 15/16" x 84" strip of 1/8" ply <sup>‡</sup> .....   | <input type="checkbox"/> |
| 200               | #8 x 1 1/4" flathead wood screws .....  | <input type="checkbox"/> |
| 1 pint            | Carpenter's glue .....  | <input type="checkbox"/> |
| 6 sheets          | 120 grit sandpaper .....  | <input type="checkbox"/> |
| 6 sheets          | 180 grit sandpaper .....  | <input type="checkbox"/> |
| 20-24 linear feet | 3/4" x 3/4" Spruce, Birch or Fir (see Cut List for exact lengths) .....   | <input type="checkbox"/> |
| 1 piece           | 1" diameter hardwood dowel (see Cut List for length) .....  | <input type="checkbox"/> |
| 1 piece           | 1" diameter shower rod plastic wrap cover (cut to dowel length) .....   | <input type="checkbox"/> |
| 130 linear feet   | 13/16" iron-on preglued wood-grain edge tape .....  | <input type="checkbox"/> |
| 1                 | Coil spring mattress (maximum 10" thick). We recommend a quality 'gently firm' inner coil <b>Platform Mattress</b> . These mattresses ventilate right through the mattress as you move in bed. .... | <input type="checkbox"/> |

Optional:

- |                |  |  |
|----------------|--|--|
| 26 linear feet | 3/4" half round moulding (two lengths of 6' & two lengths of 7') |  |
|----------------|--|--|

<sup>‡</sup> Not required if you are constructing a **Single/Twin** bed with a *one-piece* Bed Panel.

## TOOLS REQUIRED

- |   |   |                                     |
|---|---|-------------------------------------|
| 1 | 1/16", 1/8" and 5/16" drill bits .....                    | <input checked="" type="checkbox"/> |
| 1 | 3/16" or 5 mm drill bit .....                             | <input type="checkbox"/>            |
| 1 | 9/32" or 7 mm drill bit .....                             | <input type="checkbox"/>            |
| 1 | 3/4" spade bit .....                                      | <input type="checkbox"/>            |
| 1 | 1/4" or 6 mm Allen key .....                              | <input type="checkbox"/>            |
| 2 | 72" Bar clamps .....                                      | <input type="checkbox"/>            |
| 1 | Awl .....   | <input type="checkbox"/>            |
| 1 | Countersink bit (3/16" - 3/4") .....                      | <input type="checkbox"/>            |
| 6 | G-clamps (6" minimum capacity) .....                      | <input type="checkbox"/>            |
| 1 | Hammer .....  | <input type="checkbox"/>            |
| 1 | Old household iron .....                                  | <input type="checkbox"/>            |
| 1 | Pencil .....  | <input type="checkbox"/>            |
| 1 | Phillips screwdriver (head width 1/4") .....              | <input type="checkbox"/>            |
| 1 | Power drill .....   | <input type="checkbox"/>            |
| 2 | Slot screwdrivers (large and small) .....                 | <input type="checkbox"/>            |
| 1 | Table saw (or have material cut accurately for you) ..... | <input type="checkbox"/>            |
| 1 | Tape measure (10' minimum) .....                          | <input type="checkbox"/>            |
| 1 | Wide wood file .....                                      | <input type="checkbox"/>            |
| 2 | Wrenches (one 1/2", one 8" adjustable) .....              | <input type="checkbox"/>            |

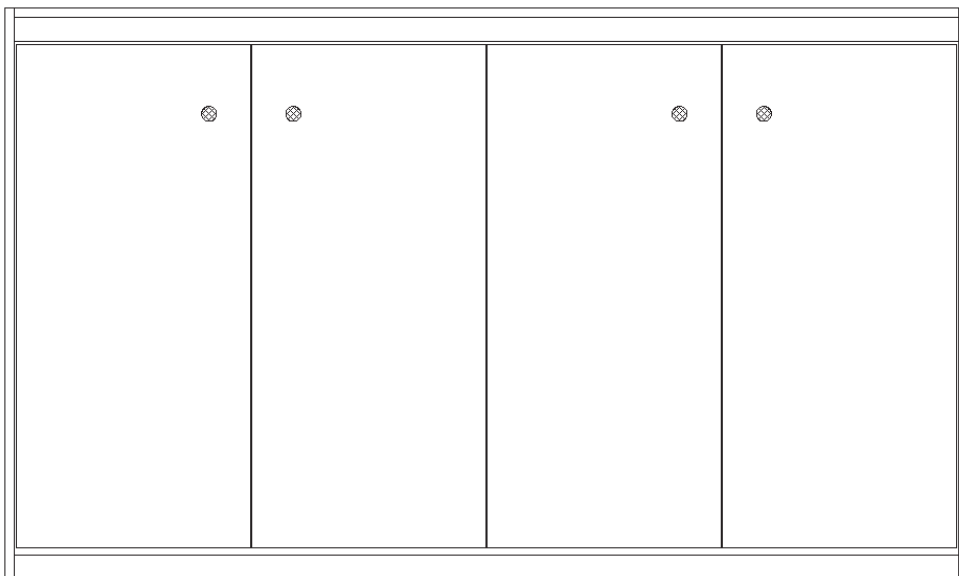
## STEP-BY-STEP INSTRUCTIONS

### 1. Prepare Cut List Components, Finish & Assemble Bed Cabinet

- 1) *Be sure to use the section of the SIDE-TILT DO-IT-YOURSELF (#ST-DIY) CUT LIST that corresponds to the size of bed you are constructing.*
  - 2) *With the exception of gluing the BACKBOARD STIFFENER to the BACKBOARD and the FRONT APRON BACKER to the FRONT APRON, do not glue together any other Bed Cabinet components.*
- Cut pieces exactly as specified in the Cut List. As each piece is cut, identify it with a pencil as indicated by the capitalized type in **Figures 2** and **7**. These names will be used throughout the instructions to reference the particular items.
  - Clear and/or sand all the pieces. Tape the following edges:
    - 1) TOP STRETCHER - front edge
    - 2) SIDE PANELS - front & top edges
    - 3) FRONT & BACK APRONS - bottom edge
    - 4) FRONT APRON BACKER - bottom edge
    - 5) BACKBOARD - both long edges
    - 6) BOTTOM STRETCHER - top edge
    - 7) KICK - both long edges (to prevent bowing)
    - 7) BED PANELS - all edges

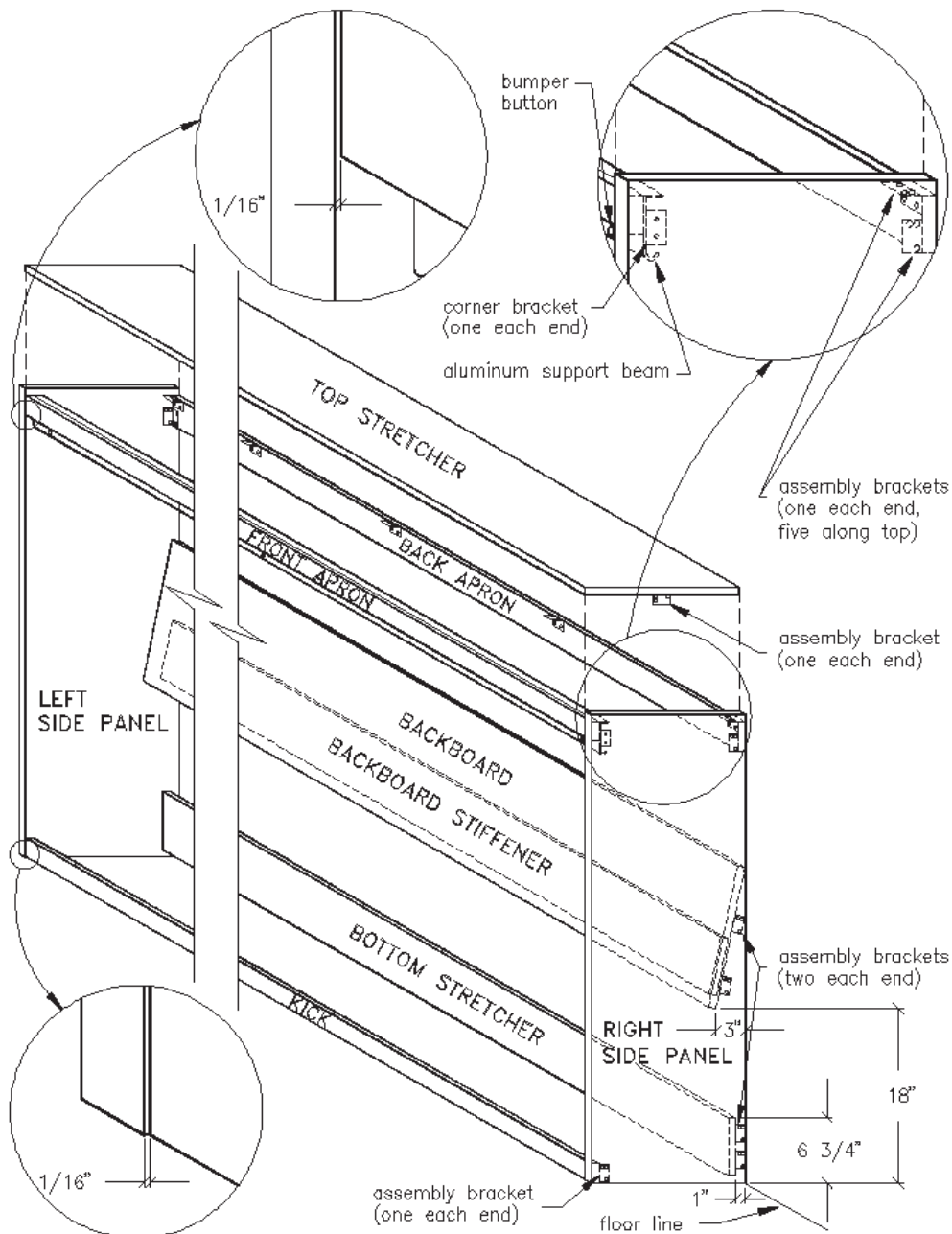
The simplest method is to use pre-glued, iron-on tape appropriate for the construction material you are using.

- This is an optional step. Cut a groove down the center of each BED PANEL, running the *length* of the panels, and about 1/16" to 1/8" both wide and deep so that the assembled panel unit simulates two pair of cabinet doors, see **Figure 1**.

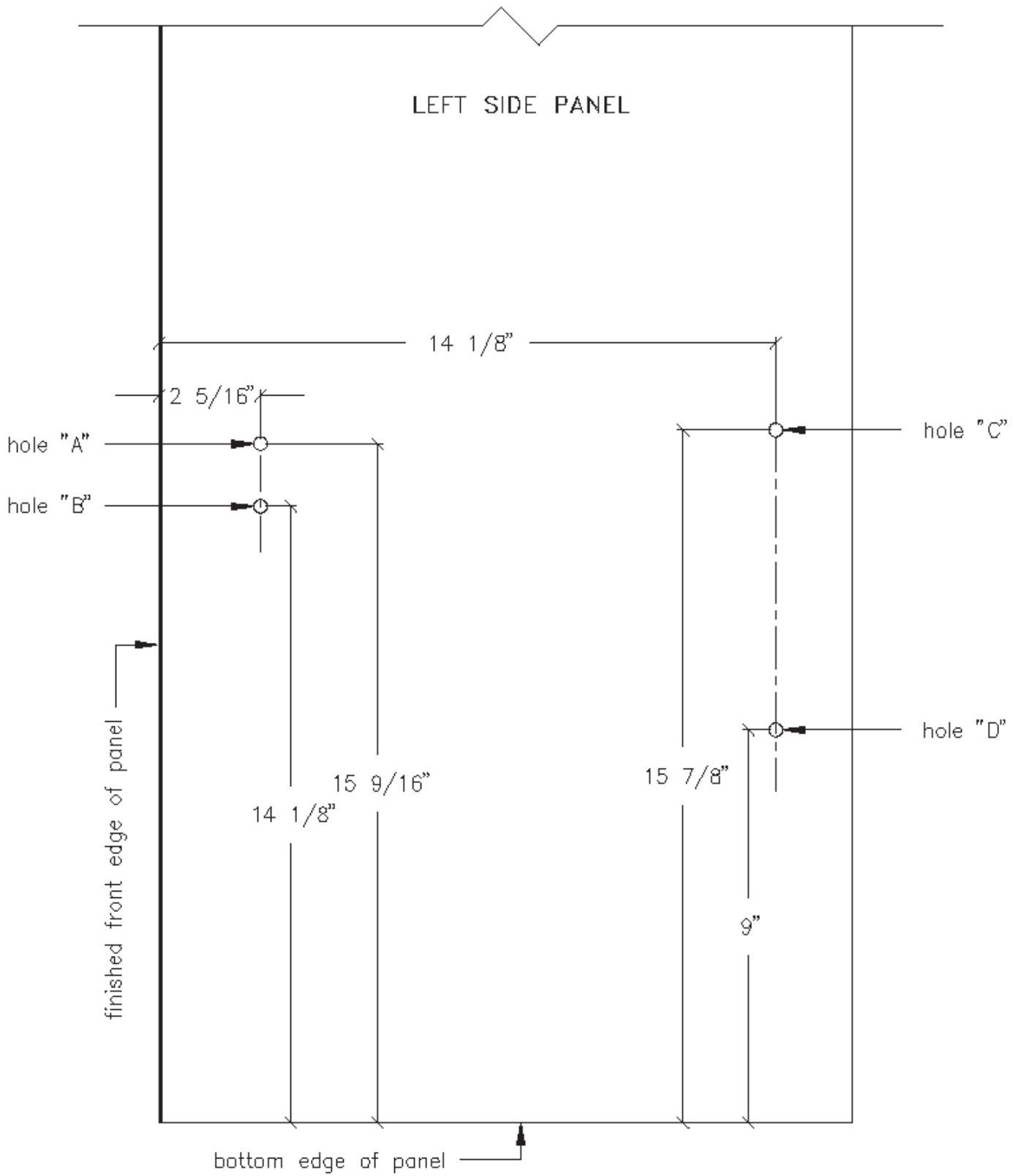


**Figure 1.** Front view of a single/twin Side-Tilt Do-It-Yourself Bed System. The vertical grooves between each pair of knobs are a decorative option - simulating two pair of cabinet doors.

- Layout BACKBOARD line, see **Figure 2**. Make a small mark on the inside of each SIDE PANEL, 3" from the back and 18" from the bottom. From this mark measure up and back 14 7/8" to the back edge of the SIDE PANELS. Make another mark and pencil a line to indicate the back of the BACKBOARD position.
- Layout and drill Lift Mechanism mounting holes, see **Figure 3**. Accurately mark the Lift Mechanism mounting holes on the inside of each SIDE PANEL. When drilling the holes, first drill a 1/16" pilot hole, being careful to keep the bit perpendicular to the panel, then drill the final hole with a 5/16" bit. Countersink (5/8" diameter) each hole on the outside of the panels, just deep enough for the head of the 5/16" x 1 1/4" flathead slot machine screw to sit flush with the surface. (The machine screws' heads can be sanded and painted to match your Cabinet finish.)



**Figure 2.** The parts of the Bed Cabinet.



**Figure 3. Laying out the Lift Mechanism mounting holes.** Note that horizontal measurements are taken from the finished front edge.

- Skip this step if you are constructing a Single/Twin bed using a one-piece Bed Panel. Drill, bevel edges of, PANEL STIFFENERS, see **Figure 6 & 7**. In each PANEL STIFFENER drill and countersink two rows of 3/16" holes about 1 1/2" in from each side and 4" apart, that will accept #8 x 1 1/4" flathead wood screws. Also, to prevent mattress damage, bevel or slightly round all the top edges of these Stiffeners.
- Drill and attach BACKBOARD STIFFENER. Drill eight countersunk holes through the backside of the BACKBOARD STIFFENER to accept #8 x 1 1/4" flathead wood screws. Glue and screw the Stiffener to the back of the BACKBOARD, 1" up from the bottom and 1" in from each end.
- Drill and attach FRONT APRON BACKER. Drill eight countersunk holes through the backside of the FRONT APRON BACKER to accept #8 x 1 1/4" flathead wood screws. Glue and screw the Backer to the back of the FRONT APRON, flush at the top and ends.
- Apply finish. Prior to assembling the Bed Cabinet, you may wish to apply your choice of finish to the individual Cabinet pieces. (*Do not apply a finish to the BED PANELS or PANEL STIFFENERS at this time.*) Once the Cabinet pieces are finished, you can begin its assembly - which should be done in the room where you will install it.

*Note: All remaining Cabinet assembly uses #8 x 3/4" panhead screws.*

- Attach twenty-eight 1" x 1" x 1 3/4" assembly brackets to the TOP STRETCHER, BACK APRON, FRONT APRON BACKER, BACKBOARD, BOTTOM STRETCHER and KICK as shown in **Figure 2** (use two screws per bracket). Note that the top brackets of the BACKBOARD must be set low enough so as not to protrude beyond the back of the cabinet. If you will be notching out SIDE PANELS to accommodate baseboard, attach BOTTOM STRETCHER brackets to front side.
- Lay the TOP STRETCHER top down and attach the BACK APRON *via* the assembly brackets. Be sure that the back and ends of the Apron are flush with the back and ends of the Stretcher.
- Position the FRONT APRON assembly 1/16" in from the taped front edge of the TOP STRETCHER and attach via the top Apron Backer brackets. Be sure that the ends of the Apron and Stretcher are flush.
- Set the TOP STRETCHER and one SIDE PANEL on their front edges, align, and attach panel using the corner and assembly brackets. Similarly attach the other SIDE PANEL.
- Position and attach the BACKBOARD unit and BOTTOM STRETCHER.
- Stand the unit upright and attach the KICK 1/16" back from the finished edges of the SIDE PANELS. If installing the Cabinet in a carpeted room, raise the KICK so that it sits lightly on top of the carpet. *However, under no circumstances raise the KICK more than 1/4", or it will interfere with the operation of the bed.*
- Attach three bumper buttons to the FRONT APRON BACKER. Center one button and position the other two about 2" in from the ends. Position all the buttons so that their bottom quadrants are about 1/16" above the bottom edge of the Backer.



## 2. Secure Bed Cabinet

- Remove the strip of baseboard where you wish to locate the Cabinet (or notch out SIDE PANELS) so that back of Cabinet is flush against wall. (Later you can trim and replace the baseboard.) Place Cabinet against wall. If the floor is off-level or not square with wall, shim or pack the Cabinet with thin strips of wood. Do a preliminary check for squareness by measuring diagonally from corner to corner across the face of the Cabinet. *It is more important that the Cabinet be square rather than exactly level or plumb.*
- Locate three wall studs or some other solid structural members to which you can fasten the Cabinet. Lightly mark the centerlines on the BACK APRON.

**ATTENTION!** *You must secure the Cabinet to solid structural members and not merely to the wall finish. If you are not attaching your bed to a wood stud wall, see your local hardware store for metal stud screws or concrete 2 1/2" x 1/4" expansion bolts and a concrete drill bit. In either case, be careful not to hit electrical wiring or plumbing behind drywall.*

- Drill and countersink three shank holes through the BACK APRON at the stud positions to accommodate #8 x 2 1/2" flathead wood screws. Drive one screw through the middle hole and into the framing member. Recheck the Cabinet for square as in 1st Step. Adjust as is necessary and drive the other two #8 x 2 1/2" flathead screws through the apron holes and into the framing members.
- Peel off the backing and attach the Warning Label to the BACK APRON.

With the Cabinet constructed and secured, the next two sections explain how to install the springs in the Lift Mechanisms, and mount the Mechanisms on the SIDE PANELS.

## 3. Install Springs in Lift Mechanisms

- The number of springs the Lift Mechanisms requires varies with the different weights of mattresses and construction materials. Select the appropriate number from the chart.

Bed Size	Bed Panel Material	
Single/Twin	Wood Veneer/Plywood core	Melamine/Particle board
	2 springs per side	2 springs per side
Double/Full	3 - 4 springs per side	4 - 5 springs per side
Queen	4 - 5 springs per side	5 - 6 springs per side
NOTE: After you have completed installing and checking the operation of your Murphy Wall Bed, you may find it necessary to add or remove springs to achieve the correct lift effort of between 5 and 10 pounds		

As **Figures 4** and **5** on the following pages show the Right Lift Mechanism, you should start with that one.

- If you are installing an *odd* number of springs start at the centerline position shown in **Figure 4**. Numbering down from the top, the centerline runs through spring hole #5. If you are installing an even number of springs start at hole #4 or #6, leaving hole #5 vacant. Note that the hook ends of the springs have slightly different sized openings. Hook the end of the spring that has the smallest opening under the upturned edge of the Mounting Plate. Lay the spring down and slide it under the matching hole in the Tension Arm. Be sure to install the springs so that the hook openings face you, see **Figure 4**.

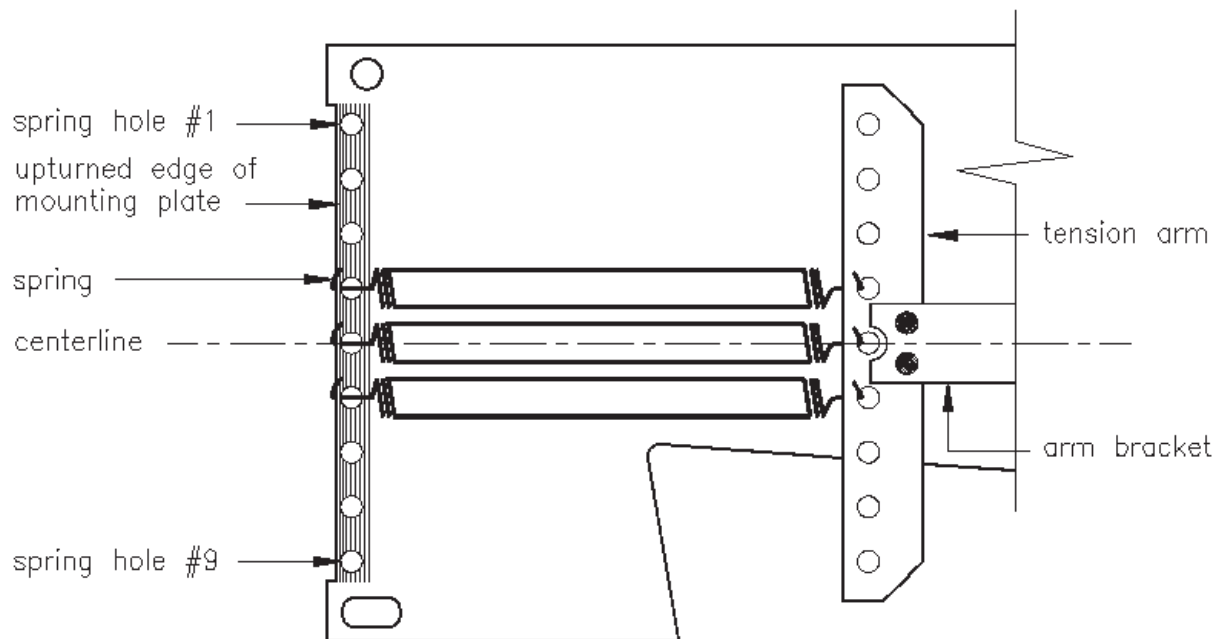
You may find it easier to fit the hooks under the Tension Arm if you pry up the Arm Bracket with a wooden wedge or similar device.

- Continue by working out from the centre, alternating top and bottom, until you have installed the required number of springs. Be sure that holes of the Mounting Plate correspond to the holes in the Tension Arm.

*Ideally, you should install an equal number of springs on each side of the centerline. However, an imbalance by one spring is all right, preferably with the extra spring on the topside. The last spring installed should be #9, if required. See **Figure 4**.*

- Repeat Steps 2 and 3 to install the springs in the Left Lift Mechanism.

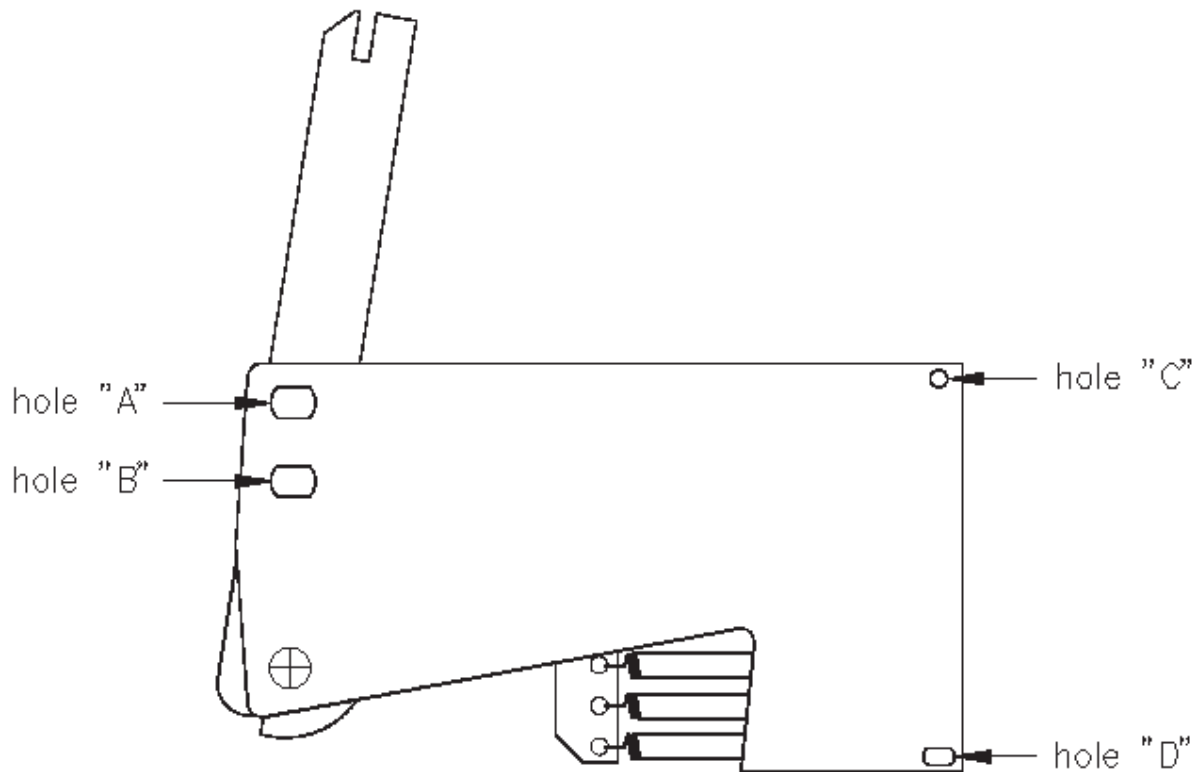
*Use the same number of springs and the same configuration on both Lift Mechanisms.*



**Figure 4.** Installing the Springs. Viewed is the Right Lift Mechanism.

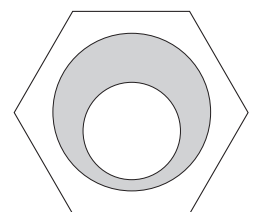
#### 4. Mount Lift Mechanisms

- Insert a 5/16" x 1 1/4" flathead slot machine screw through hole "C" from the outside (countersunk) of the Right SIDE PANEL and position the corresponding Right Lift Mechanism hole, see **Figure 5**, over the screw. Loosely thread on a 5/16" plain hex nut.



**Figure 5.** Back view of the Right Lift Mechanism.

- Insert a similar screw through each of holes "A", "B" and "D". At hole "B" use a 5/16" x 7/8" (OD) flat washer and a 5/16" plain hex nut. At hole "D" thread only a nut on the screw.
- At hole "A", use one of the hexagon cam washers (illustrated at the right) and a 5/16" plain hex nut. Locate the cam washer in the slot of the mounting plate so that the larger part of the cam is upward, as in the illustration.
- At hole "B" install the 5/16" x 7/8" washer with the 5/16" nut.
- Tighten the four nuts evenly, making sure the hexagon cam washer does not rotate.
- Repeat steps 1 through 4 to attach the Left Lift Mechanism to the Left SIDE PANEL.



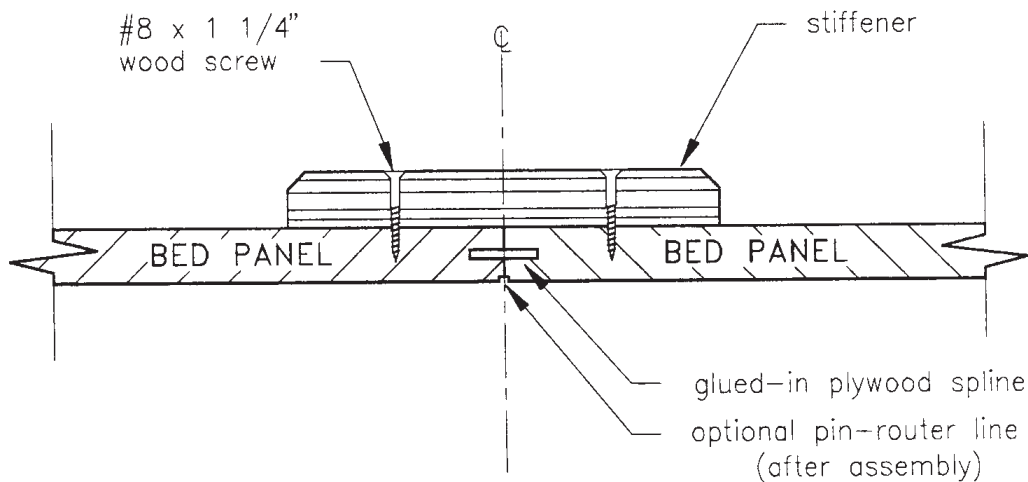
Hex Cam Washer

## 5. Assemble Bed Panel Unit

- *The Bed Panel joints are permanent and must be both glued and screwed. Please follow instructions carefully. In order to achieve maximum strength from the glued joints, do not finish the BED PANELS, Stiffener and Rails until you have attached the Rails and Stiffener to the Panels.*

*Note: If you are power driving the stiffener and cleat screws, be careful not to strip the screw holes.*

- If you are constructing a **Single/Twin** bed using a one-piece Bed Panel, skip the next step below and proceed with the step following. Refer to **Figures 6** and **7**. Join the BED PANELS with a plywood spline 15/16" wide and the same length as the bed panels. Using a table saw or router, cut a groove 1/8" wide and 1/2" deep on the inside edge of both BED PANELS. Test the fit. Position the panels on a flat surface, spread glue on spline and both panel edges and clamp splined panels with bar clamps.



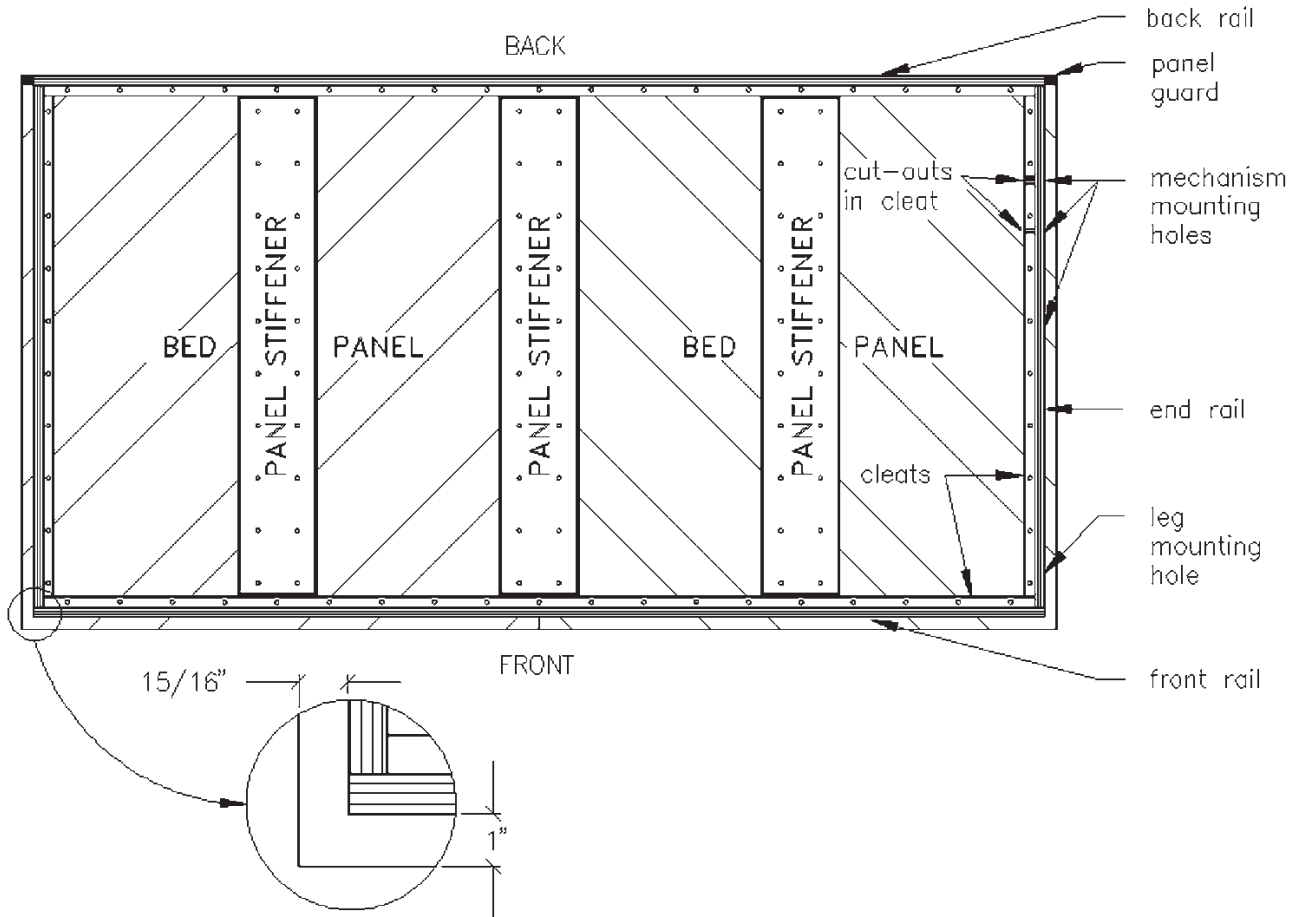
**Figure 6.** Cross section of Bed Panel Joinery

- Spread glue on the down side of the center stiffener and center the stiffener along panels' seam starting 1 5/8" back from the back end of the panels (3/4" for rail, 3/4" for cleat, 1/8" gap). Drive in screws and leave clamped for 12 hours before attempting to attach rails.
- We recommend that before permanently attaching any more components you layout the entire panel unit so that you fully understand the design and clearances. Do this on a blanket or carpet to protect the panels' faces.

Note the following points, see **Figure 7**:

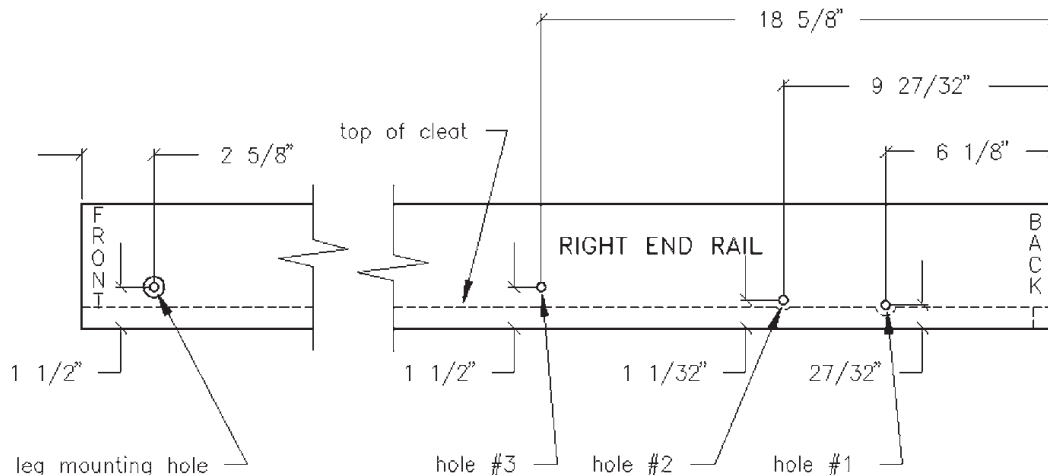
- 1) The Back Rail is centered on the Panels, 15/16" in from the ends of the Bed Panel and flush with the back of the Bed Panel.
- 2) The End Rails run parallel to the panel ends, 15/16" in from the edges.
- 3) All of the Stiffeners have a 1/8" clearance at the Front and Back Rails.

- After 12 hours, remove clamps and draw a pencil line on the mattress side of the joined BED PANELS 15/16" in from each end edge and 1" in from the front edge, see enlarged detail in **Figure 7**. These lines mark the locations of the end and front rails. The back rail will be flush with the panel ends.



**Figure 7.** The Bed Panel Unit. Enlarged detail shows offsets (to unfinished edges of Bed Panels) for End & Front Rails.

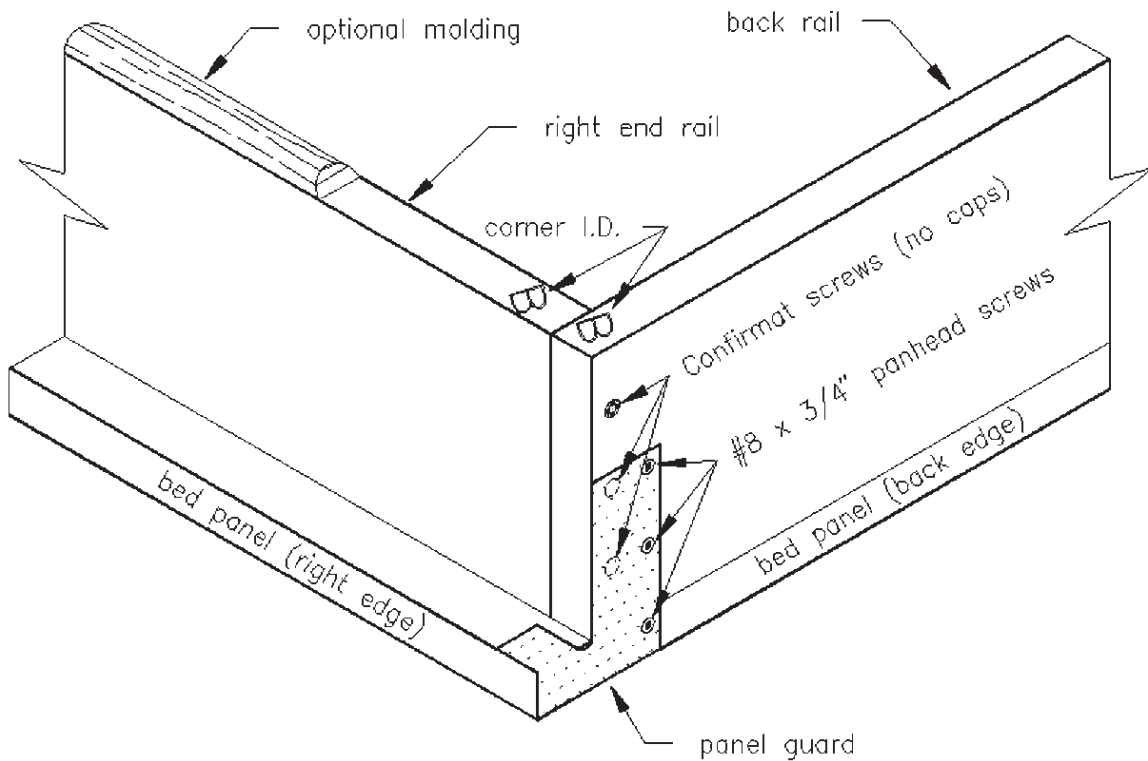
- Using a 1/16" bit, *very accurately* drill four pilot holes in each of the end rails. Three at the back end for the Lift Mechanism and one at the front end for the leg attachment, see **Figure 8** for locations.



**Figure 8.** Locating the Lift Mechanism & Leg holes.

- Lay out rails on joined BED PANELS. Mark top corner joints A-A, B-B, etc., so that you don't mix them up. Keep in mind that you will be hand drilling for Conformat screws and that joints will not be interchangeable.
- Drill three 3/16" holes at each end of the front and back rails for Conformat screws. The holes should be 1" away from the top and bottom edges and 3/8" in from the ends. Center the middle hole between the other two. Separate rails and redrill 9/32" shank holes in front and back rails.
- Drill the cleats at 4" intervals both horizontally and vertically with a 3/16" countersink bit. Avoid drilling holes at the #1 & #2 Lift Mechanism hole sites.
- Center the cleats 3/4" in from each end of their respective rails and set them flush with the bottom of the rails. Glue and attach the four cleats with #8 x 1 1/4" flathead screws.
- Position all four rail/cleat sections along the pencil line you drew to mark the outside of the rails and check fit. Glue and assemble the rail corners with Conformat screws. Ensure screw heads are flush with rail surfaces.
- Glue and screw rail sections to Bed Panel using #8 x 1 1/4" flathead screws. When attaching the front and back sections, leave open the fourth cleat-hole from either end (it doesn't matter which) for later attachment of the Velcro straps. Let glue set six hours before continuing.
- Skip this step if you are constructing a **Single/Twin** bed using a *one-piece* Bed Panel. Position the two remaining Stiffeners midway between the center Stiffeners and the end rails. Glue and attach using #8 x 1/4" flathead wood screws.
- Clamp a piece of 3/4" scrap ply to the inside of each end rail and on top of the cleat at the Lift Mechanism mounting holes #1 and #2. From the outside of rails, use the #1 and #2 pilot holes as guides and drill a 1/16" hole through the clamped 3/4" scrap. Using a 3/4" spade bit, drill into the pilot holes from the scrap side until you come to the inside rail surface. This will notch the cleats to give clearance for washers and nuts.
- Using the 3/4" spade bit, ream out the leg mounting pilot holes from the *outside* of the rail to a depth of 3/16".
- Using a 5/16" bit, redrill the three Lift Mechanism mounting holes and the leg attachment hole in each end rail (using the previously drilled pilot holes as guides).
- Tape all exposed edges of the Bed Panel Unit. You may wish to add a 3/4" half round moulding to the top of the bed rails instead of taping them.
- Attach the Velcro straps to the front and back cleat-holes that you left open in Step 11 using 3/16" x 3/4" (OD) flat washers and #8 x 1 1/4" wood screws screwed through the folded-over Velcro ends. Make sure that the Velcro "hooks" and "loops" face each other.
- Press in the Conformat screw caps at the six visible positions in the front rail. Sand and color as desired.
- Position the left and right Panel Guards against the outer ends of the Back Rail so that the bent tab sits on the inner surface of the corner of the BED PANEL, see **Figure 9**. Attach using #8 x 3/4" panhead screws.

*Do not add anything other than lightweight decorative trim molding to the face of the Bed Panels because the Panel Unit may become too heavy to lift easily.*

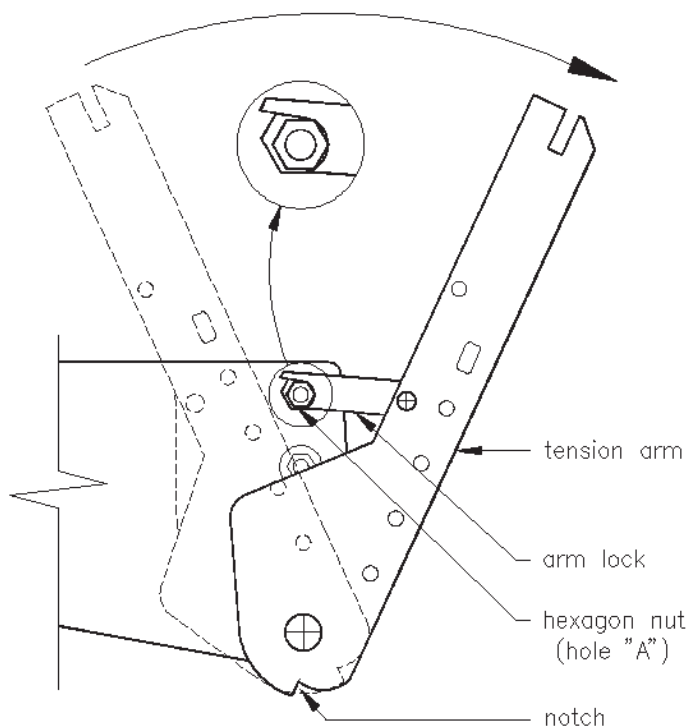


**Figure 9.** The Right Panel Guard.

## 6. Install Bed Panel Unit in Cabinet

The Bed Panel Unit connects to the Cabinet *via* the Lift Mechanism Tension Arms. You will need someone to help you both set the Arms and lift the Panel Unit into place.

- Insert the two 5/16" x 1 1/4" Allen sockethead bolts from the *outside* of the End Rails through the #1 holes at the back end of the End Rails (see **Figures 8 & 11**). Place a 5/16" x 7/8" flat washer and 5/16" Nylock nut on each screw end and *tighten securely*. Now insert two 5/16" x 1 1/4" hexhead bolts from the *outside* of the End Rails through the #3 holes. Place a 5/16" x 7/8" flat washer and 5/16" Nylock nut on each bolt end, threading the nut only until it is flush with the bolt end. *Pull the two #3 bolt heads outward so that you have at least a 1/4" space between them and the outside face of the rails.*
- Put a 5/16" x 1 1/4" hexhead bolt, a 5/16" x 7/8" flat washer and a 5/16" Nylock nut by the base of each SIDE PANEL.



**Figure 10.** Setting the Tension Arm. Enlarged detail shows the Arm set securely against the hexagon nut.

**Important: Before Arming Mechanism make sure KICK is securely attached.**

- Brace one foot against the front edge of the SIDE PANEL and, using the 13" length of PVC tubing provided, lever the Lift Mechanism Tension Arm out and down until you can secure the Arm Lock to the hexagon nut you installed at Hole "A". See **Figure 10**. Be sure that the Arm Lock is secured against the hexagon nut before releasing the tension on the pipe lever. Repeat the operation on the other side.

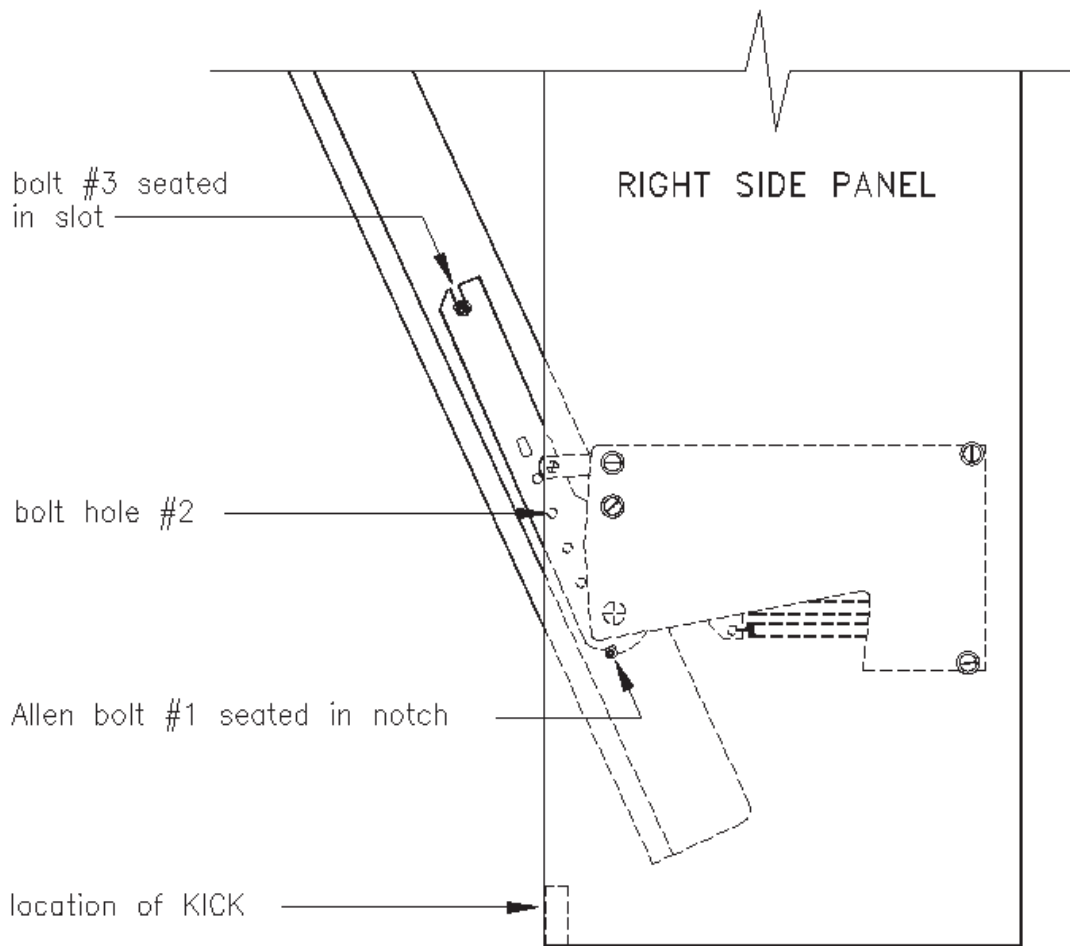
**CAUTION!** *There will be a lot of tension on the Tension Arm. We recommend that two people handle this procedure - one pulling and holding the Tension Arm with both hands while the other sets the Arm Lock. When setting the Arm Lock, avoid reaching behind the Tension Arm.*

- Slip both wrenches into your back pocket then, with you and your assistant on either side of the Bed Panel Unit, lift the front end so that the unit rests vertically on its back end. Align it between, and just in front of, the Tension Arms. *Do not bump the Tension Arms lest the Lock Arms slip off their nuts.*

Now lift the unit vertically to a height where the bolts in holes #3 are a couple of inches above the top of the Tension Arms. Gently fit the unit between the Arms, tilt it back approximately 10° so that the back end of the unit clears the KICK, then lower it so that the #3 bolts slide into the slots at the ends of the Arms. Be sure the bolts seat at the bottom of the slots. Slowly tilt the panel unit back just enough to allow the #1 Allen bolts to be fully seated in the notches at the bottom of the mechanism, see **Figure 11**.



- Continue to tilt the panel unit outward to an angle of about 45°, during which action you will hear a click as the Arm Locks disengage. Hold the bed at roughly this angle and install the #2 bolts, flat washers and Nylock nuts. Still holding the panel unit at this angle, tighten securely the #2 and #3 nuts.
- Holding the upper edge of the panel unit, gently let the bed close. If all is well, you should have even clearance between the side edges of the panel unit and the insides of the SIDE PANELS. If the Cabinet is not square and the Bed Panel Unit binds, try nudging the Cabinet along the floor, pushing from the base of the Side Panel.

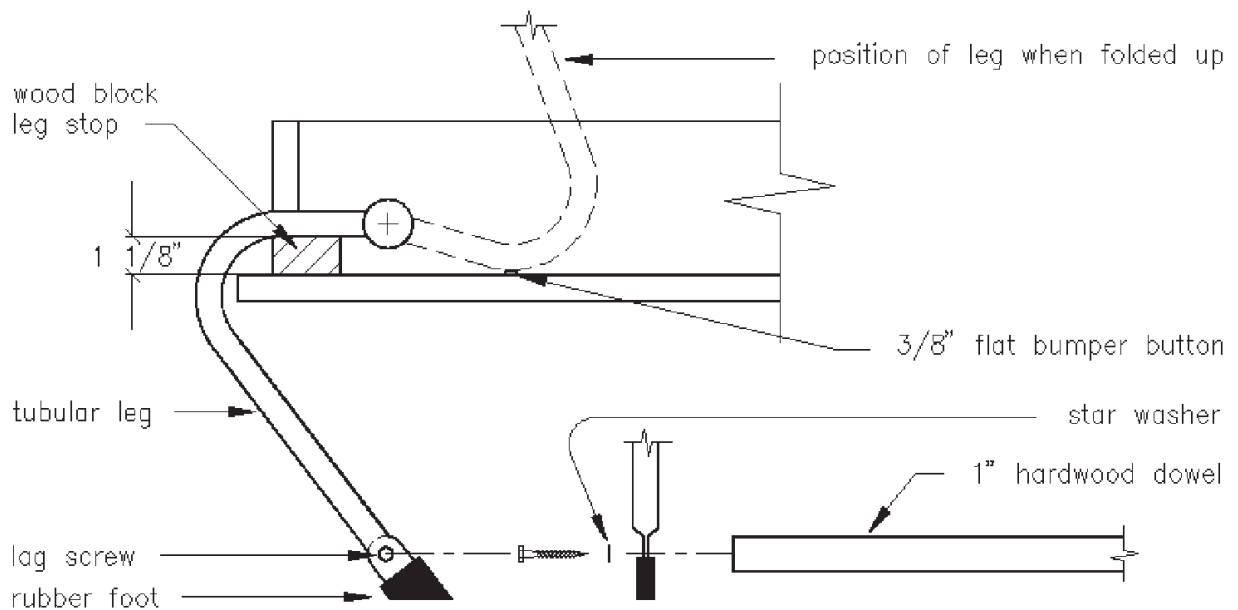


**Figure 11.** Installing the Bed Panel Unit.

And now, all that's left is to attach the handles & legs, put the mattress in place and install the Mechanism Covers. These last few steps will be much easier if your assistant is on hand simply to hold the Bed Panel Unit open.

## 7. Attach Handles & Legs, Install Mattress & Mechanism Covers

- Attach your personal choice of handles or knobs to the face of the Bed Panel Unit. Keep in mind that the Unit has three 6" Stiffeners spanning the Panels (except for **Single/Twin** beds using a *one-piece* Bed Panel), so don't drill holes within 3 1/2" of the Stiffeners' centerlines. To minimize the pull required to open the bed, locate the lowest part of the handles or knobs not less than 36" from the bottom of the Bed Panel Unit (for a single bed), or 39" for a double or queen.
- Pull the panel unit open to a convenient working height. Prior to installing the legs, lubricate the leg attachment hole with a little candle wax. Remove the 5/16" Nylock hexagon nuts and the 5/16" x 3/4"(OD) flat washers from the legs, leaving the "Lexan" black plastic washers in place. Insert the leg-screws through the rails, replace the washers and nuts and tighten the nuts so that both legs pivot with an *equal*, and just a slight amount of, friction.
- Glue and clamp the legs stops, positioning them so that they align with the outside face of the front rail, are snug against the end rails and are 1 1/8" high, see **Figure 12**.



**Figure 12.** Installing the Legs.

- Pivot both legs upward. Drill a 3/16" pilot hole 2" deep in the center of each end of the dowel. Slip a 1/4" star washer on one of the 2" lag screws, thread the screw through the leg, put a drop of carpenter's glue into the dowel hole and screw into the dowel. Repeat for other end. Cut the plastic shower wrap to fit the dowel and wrap it around the dowel.
- Attach the two 3/8" flat Bumper Buttons to the surface of the Bed Panels where the legs, when folded up, would contact the Panels, see **Figure 12**. Gently close the bed.

Wait about six hours for the glue holding the leg stops to set, remove the clamps and gently close the bed.

*To avoid denting the front edge of the TOP STRETCHER, be sure the legs are folded up before closing the bed.*

- Have the mattress on hand. Open the bed, fold down the legs and hold the bed fully open by placing one foot on the Crossbar. Put the mattress in place. Be sure it lies completely within the Rails. The added weight of the mattress should now hold the bed down.

Note: Using a *thin* coil or light density foam mattress *less than 9" thick* may require a reduction in the number of springs required to balance the bed. You also may feel the Stiffener through the mattress. Should this be the case, the remedy is a simple one! Fill the spaces between the Stiffener and the Frames with 3/4" to 1" Styrofoam or Foamboard, both of which are very light and will not affect the balance of the bed.

- Clip the black plastic Mechanism Covers on each Lift Mechanism so that the tabs hook into the indents on the back plates. Secure with the four 4 mm x 1/4" flathead slot machine screws.
- Trim the Velcro straps so that they overlap about 12" and lightly singe the loose ends with a match to seal the nylon. The bed will close fully made up with the Velcro straps holding the pillows in place. If you installed the correct number of springs in the Lift Mechanisms, the bed should float at an angle of approximately 45°.
- Stand back and admire your new Side Tilt Murphy Wall Bed. Smile.

### **SIDE-TILT DO-IT-YOURSELF (#ST-DIY) CUT LIST**

**Single Twin Bed** (Mattress size 39" x 75" x 10" maximum thickness)

Overall Cabinet Dimensions: 80 7/8"W x 49 3/4" H x 15 7/8"D Protrusion from wall to foot bed: 49"				
No of pieces	Description	Width	Length	Material
2	BED PANELS‡	39 1/2"	42 1/4"	3/4" Plycore
3	PANEL STIFFENERS‡	6"	38"	"
2	SIDE PANELS	15 7/8"	49 3/4"	"
1	BACKBOARD	14 7/8"	79 3/8"	"
1	BACKBOARD STIFFENER	6"	77 3/8"	"
1	TOP STRETCHER	15 7/8"	79 3/8"	"
1	BOTTOM STRETCHER	6"	79 3/8"	"
1	KICK	1 7/8"	79 3/8"	"
1	BACK APRON	3"	79 3/8"	"
1	FRONT APRON	4"	79 3/8"	"
1	FRONT APRON BACKER	4 3/4"	79 3/8"	"
2	FRONT/BACK RAILS	4 1/2"	77 1/8"	"
2	FRONT/BACK RAIL CLEATS	3/4"	75 5/8"	3/4"x3/4" Solid
2	END RAILS	4 1/2"	39 3/4"	3/4" Plycore
2	END RAIL CLEATS	3/4"	38 1/4"	3/4"x3/4" Solid
2	LEG STOPS	1 1/8"	2"	3/4" Ply or Solid
1	CROSSBAR	1" dia.	74 3/4"	Hardwood Dowel

‡If grain-matching or grain direction is not important, you can simplify the construction of your bed by using a one-piece Bed Panel measuring **79" x 42 1/4"**. This eliminates both the need for splining Bed Panels and the use of Panel Stiffeners.

**Double/Full Bed** (Mattress size 54" x 75" x 10" maximum thickness)

Overall Cabinet Dimensions: 80 7/8"W x 64 3/4" H x 15 7/8"D Protrusion from wall to foot bed: 64"				
No of pieces	Description	Width	Length	Material
2	BED PANELS	39 1/2"	57 1/4"	3/4" Plycore
3	PANEL STIFFENERS	6"	53"	"
2	SIDE PANELS	15 7/8"	64 3/4"	"
1	BACKBOARD	14 7/8"	79 3/8"	"
1	BACKBOARD STIFFENER	6"	77 3/8"	"
1	TOP STRETCHER	15 7/8"	79 3/8"	"
1	BOTTOM STRETCHER	6"	79 3/8"	"
1	KICK	1 7/8"	79 3/8"	"
1	BACK APRON	3"	79 3/8"	"
1	FRONT APRON	4"	79 3/8"	"
1	FRONT APRON BACKER	4 3/4"	79 3/8"	"
2	FRONT/BACK RAILS	4 1/2"	77 1/8"	"
2	FRONT/BACK RAIL CLEATS	3/4"	75 5/8"	3/4"x3/4" Solid
2	END RAILS	4 1/2"	54 3/4"	3/4" Plycore
2	END RAIL CLEATS	3/4"	53 1/4"	3/4"x3/4" Solid
2	LEG STOPS	1 1/8"	2"	3/4" Ply or Solid
1	CROSSBAR	1" dia.	74 3/4"	Hardwood Dowel

**Queen Bed** (Mattress size 60" x 80" x 10" maximum thickness)

Overall Cabinet Dimensions: 85 7/8"W x 70 3/4" H x 15 7/8"D Protrusion from wall to foot bed: 70"				
No of pieces	Description	Width	Length	Material
2	BED PANELS	42"	63 1/4"	3/4" Plycore
3	PANEL STIFFENERS	6"	59"	"
2	SIDE PANELS	15 7/8"	70 3/4"	"
1	BACKBOARD	14 7/8"	84 3/8"	"
1	BACKBOARD STIFFENER	6"	82 3/8"	"
1	TOP STRETCHER	15 7/8"	84 3/8"	"
1	BOTTOM STRETCHER	6"	84 3/8"	"
1	KICK	1 7/8"	84 3/8"	"
1	BACK APRON	3"	84 3/8"	"
1	FRONT APRON	4"	84 3/8"	"
1	FRONT APRON BACKER	4 3/4"	84 3/8"	"
2	FRONT/BACK RAILS	4 1/2"	82 1/8"	"
2	FRONT/BACK RAIL CLEATS	3/4"	80 5/8"	3/4"x3/4" Solid
2	END RAILS	4 1/2"	60 3/4"	3/4" Plycore
2	END RAIL CLEATS	3/4"	59 1/4"	3/4"x3/4" Solid
2	LEG STOPS	1 1/8"	2"	3/4" Ply or Solid
1	CROSSBAR	1" dia.	79 3/4"	Hardwood Dowel

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- Extended legs to increase bed height by 2<sup>3</sup>/<sub>8</sub>" and to allow for a thicker mattress.
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