Designing And Building A Computer Table

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Introduction

I use a Tower "desktop" computer in my home office. Originally I set up the computer using a standard wooden desk (28-1/2" x 59-1/2" x 29" HWD = 12 ft^2 working area,). The desk has two sets of side drawers, but no center drawer. It was obviously designed for office use because it has a vanity panel across the back center section. This panel is inset 8-1/2" from the back as may be seen in figure one. I drilled a 2-1/2" diameter centered hole in the top of the desk just inside this "unused" space for monitor, speaker, power, and USB wiring. I also attached a lengthwise board that had

Fig. 1 – office desk used as a computer table.

holes and slots cut along its length to provide lead dress. This "cable board" also supported AC Adapters (bricks) and power strips - see example in figure one. I do not like having wires and cables on the floor under my feet. The computer was on the floor (elevated on a wood platform) under the desk. This made things a bit leg cramped, but manageable. See figure two.

Fig. 2 – Computer "desk" has too little work space.

I put two book shelves (35-1/2" x 24" x 9-1/2", HWD) on the back of the desk for book and bound references because I do a lot of technical writing. The front of the computer desk may be seen in figure two.

After just a few months of use I realized that just about everything I do involves using the computer. The computer desk space needed lots of room for books, tools, and instruments.

The first "improvement" I made was building a printer stand to raise the printer up eight inches to also use the space under it. At first I just used an extra stool[1] on my left side to hold a few reference items. I soon added a two foot square

table top with a raised edge to the stool to act as a temporary side table as shown in figure three. This soon became full of paper printouts of various writing projects. After 18 months of use I realized that my computer usage space was still very ineffective.

Using this small side table I was reminded of the efficient table designs used in cubicles at AMF - a medical R&D research firm where I worked before I retired in March of 2007. The basic cubicle idea is to have shelf and table space all around you.

By November 2008 it became clear that I needed to greatly increase my computer work space in my long narrow (33' x 10') office. I have tables on both long sides of my home office which are typically 30 inches from the wall. The four and a half feet isle space between the tables is very comfortable in terms of chairs, walking, and moving items in and out of the room.

A very unusual aspect of my home add-on office is a two foot deep alcove on the outside wall located (centered) just to the left of the computer desk. I used this space for a book shelf on one two foot wall and a cabinet on the opposite wall. The space in between was used for a row of pegs to hang cables and test leads. See figure four. At first I thought that I could put the desk in the alcove and still have 30 inches in front of it for additional table space.

When I measured the width of the alcove, however, it was not a standard five feet but only 56 inches. The more I thought about the computer table space problem I realized that I could build a custom computer table to fit into the alcove and include two front side tables. This photo essay describes the building of this odd shaped eight foot long by four foot deep table. There are six windows and five doors (two of them are double French doors) so wall space is limited.

Fig. 3 – A temporary two foot square table[3] became permanent.

Designing A New Table

Fig. 4 – Two foot deep by 56 inch wide alcove. The computer desk and paper stacked side table may be seen at the right.

Once I made the mental commitment to building this large table I made a sketch, figure 5, and materials list, table 1. Being retired I have to carefully control expenses so I compared the cost of materials from Lowe's and Home Depot. I have done this with other projects (see notes at the end) that I have described previously, e.g. *Mobile Work Center[2]*, and I concluded that Home Depot had a price edge, often up to 15%. Things have changed recently and as you may see from table one that the pricing is now very similar. I decided to buy the materials at Home Depot because the round dowels were available in four foot lengths at Home Depot and three foot lengths at Lowe's. The four foot lengths considerably reduced the scrap – half the dowels needed.

Table 1 – Basic Computer Table Materials

#	QTY	Description	Lowe's	Home depot
1.	1	4' x 8' x 3/4" plywood, fine finished for staining.	¾" Oak, $ 46.88	18mm, $ 36.88
2.	10	2" x 2" x 8' pine (cut 12 at 29-1/2" for legs).	$ 2.19 ea.	$ 1.92 ea.
3.	8	3/4 " Dowels.	$ 3.48 for 3'	$ 2.56 for 4'
4.	1	Pint Watco dark maple stain/sealer.	$ 7.98	$ 7.99
5.	19'	Edging, 1/2" x 3/4".	None (not totaled)	$ 0.54 per foot
		Totals:	$ 104.60	$102.60

The original plan was to use 12 legs because the 2x2's seemed small for such a large table. The 2x2 finished dimension is really 1-1/2" x 1-1/2". 3x3 material is not common. The greatest concern is the attachment of the legs to the 2x2 frame. In order to avoid braces at the table top I decided to use 3-1/2" long, ¼" diameter carriage bolts with fender washers under the nuts. The spacing of these bolts is more critical because I used two bolts at right angles to each other for each leg.

Fig. 5 – Sketch of the computer table using four by eight foot plywood.
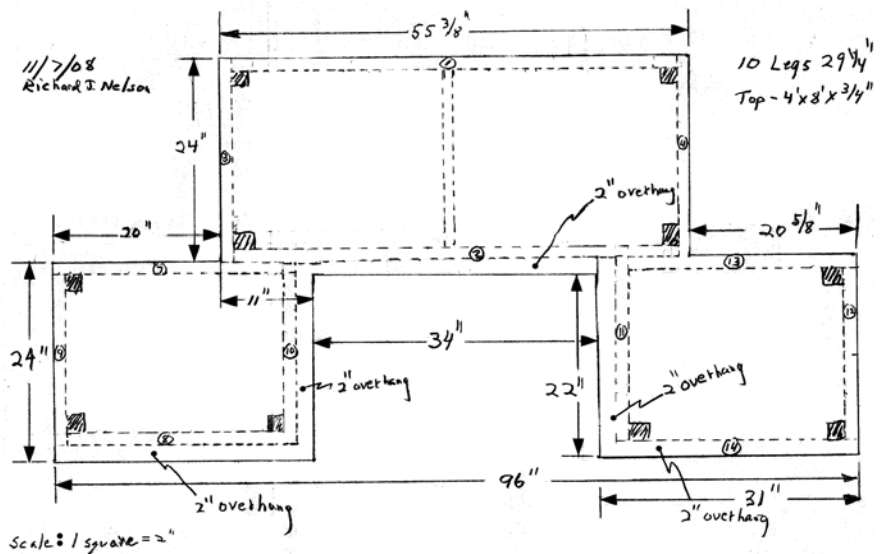
An important part of building a table is the table top plywood edging; formal edging is expensive. Often quarter round is used, but the cost was over $1 per foot (I needed 19 feet) so I used 1/2 " x 3/4 " edge round and it looks good. All wood joints are glued using DAP Welwood® Carpenter's glue. I had a full 16 oz. bottle on hand. I also had 1-5/8" and 2" course thread drywall screws on hand.

Here is the order of the various parts of the construction. I built the table in my car port and moved it into the office through the front (36" wide) door.

1. Cut plywood and verify fit continue the work, with the top down, on towel covered saw horses.
2. Cut the 2x2's for the frame. Clamp, glue and screw to the underside of the plywood.
3. Drill 3/4 " dowel holes (in the Home Depot precut 29-1/4" legs) six inches from the floor using a drill press.
4. Stain/seal the ten legs using Watco dark maple stain/sealer using a cloth.
5. Attach the ten legs by "C" clamping in place and drilling the two 1/4 " holes using an 8" long drill and triangle to keep square.
6. Drill holes for a set screw into each dowel (8 total).
7. Stain/seal the frame (I skipped the table under surface).
8. Turn the table over.
9. Cut ½" x ¾" edging. Use a miter box for the 45 degree cuts. Glue and finish nail onto all front edges (five lengths). Countersink the nails.
10. I used Elemer's Carpenter's® Wood filler to fill the holes. The Elmers filler did not take the stain very well and appears much lighter after staining. Verify that the wood filler is suitable for staining. Sand the top and edging using 220 and then 440 grit sandpaper using a flat wood block.
11. Apply a liberal coating of Watco stain/sealer with a rag. Allow to dry.
12. I Applied a second coating of stain/sealer to finish the one pint can.

Detailed Construction Photos

The attachment of the 2x2 frame to the top was done using the 1-5/8" drywall screws. All screws were predrilled using a drill of the screw root diameter size. See Appendix A. I used a flat washer under the head of all screws put into the table top because it is slightly under 3/4" (18 mm) in thickness and it is easy to excessively countersink the 70 screws into the soft pine if you are not very very careful. I did not

want any points sticking through the top.

The photos below show the details of the construction sequence. The three cutouts were marked on the top side with the idea of using a hand saw. This proved to be slow and too much work with an old dull hand saw so I used a skill saw. See figure 6.

Fig. 6 – Skill saw for cutting the computer table top.

Fig. 7 – Masking tape is applied to the table for cutting.

The only blade that I had was a combination blade. This general purpose blade is great for most cuts, but it is not suitable for making smooth fine finished cuts. I did not want to buy another blade just for this project. I also did not want to turn the table over and re-layout the cuts so the rough edge would be on the bottom side. I decided to try to apply masking tape to the table top to reduce the rough edge of the cut.

Figure seven shows an example of the masking tape placed over the pencil lines. The lines were then drawn on the tape, which was just short of the line length to provide a guide for the new line, using a ball point pen . Press the tape firmly on to the oil free, dust free and well cleaned wood. Figure nine shows the results.
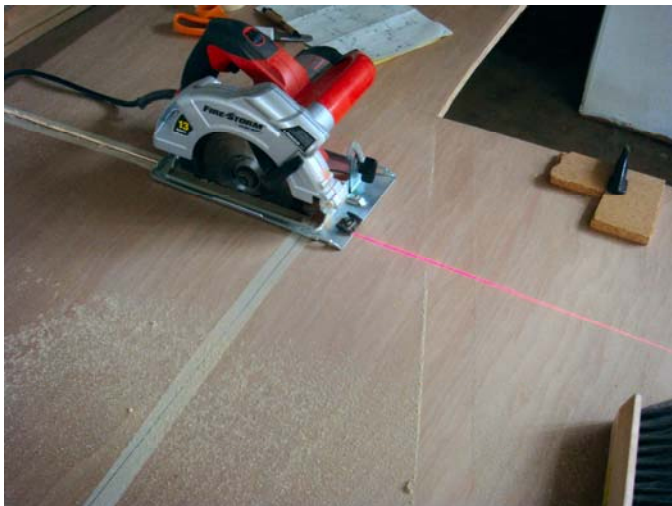

Fig. 8 – Skill saw cutting a masked taped line.

Fig. 9 – Left cut without tape, right cut with tape.

After making the three cut outs the table was turned over to assemble the frame. Figure 10 shows how "C" clamps are used to secure the glued 2x2's while they were screwed using an electric drill. "C" clamps are also used to secure the plywood to the towel covered saw horses. A piece of wood was used under each "C" clamp on the top side to avoid marring the surface.

After the frame was finished the ten legs need to be attached. Each leg was selected to have its best face forward. Once this was done a black alignment line was added with a number. This is required in order to remove the legs and reassemble them again (after moving, storage, etc.). The leg bolt holes are hand drilled and matching the 20 holes later would be a very time consuming task.

Fig. 10 – Gluing and screwing the 2x2 frame.   *Fig. 11 – Each leg is numbered for reassembly.*

The 1-1/2 inch square leg doesn't provide a lot of room for the $1/4^{th}$ inch bolt attachment. Fender washers are used to distribute the load under the nut. Each bolt is drilled off center to avoid interference. I used an eight inch long $1/4^{th}$ inch diameter drill because of the close quarters of the holes. I missed the ideal spacing of the 20 holes on two of them and the fender washer had to be ground with a flat in order for them to fit.   One of these two is shown in figure 13.

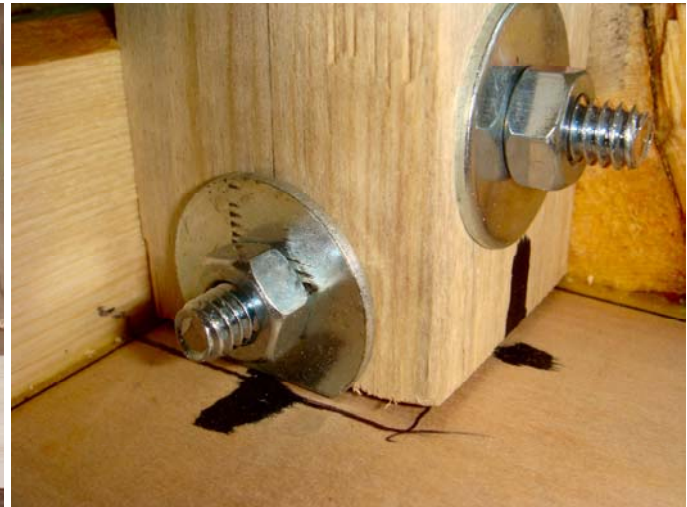*Fig. 12 – A triangle insures leg is square to the table top. Fig. 13 - Leg bolt detail showing fender washers.*

The six front legs have $3/4^{th}$ inch dowel supports and these 3/4 inch deep holes are drilled using a drill press before assembling. See figure 14. The front and side legs have their dowels at the same six inches from the floor and the dowel holes interfere slightly as shown in figure 15. The side dowel end is cut at a 45 degree angle so both dowels are seated (and glued).

Note the blue "paint" on the wood. This is applied at the factory and even though I carefully selected the 2x2's before buying there is still a slight amount of "spillage." A little sand paper removes these marks.
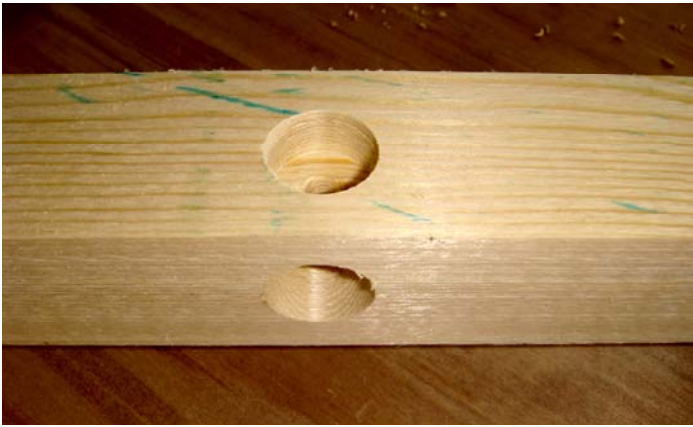
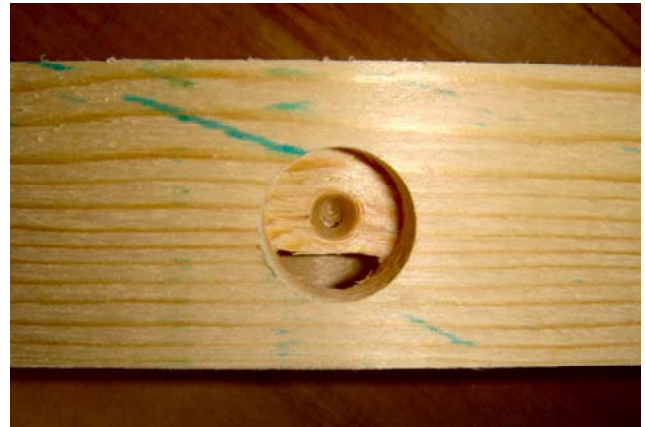*Fig. 14 – Front corner leg dowel support holes example.*

Fig. 15 – Front corner leg dowel hole interference.

Fig. 16 – Finished Computer Table ready to move.

Six, number six by one inch long, wood screws are screwed into the leg near the ends of the dowels, after the legs are all attached, to insure that they will not easily come out.

After the legs are attached and sanded, the table is turned over for table top sanding and staining/ sealing. Grit 220 and 440 sand paper is used with a flat block of wood.

Two coats of Watco dark walnut stain/sealer is used on the top – one pint total for the project.

Installing The New Table

Fig. 17 – Computer table installed in the alcove. Inkjet printers: left HP, right Cannon.

Figure 17 shows the installed computer table with everything moved into place. The total table working space is increased from the desk 12 ft^2 to 23.5 ft^2. This is nearly twice the area of the desk top. Because there is space to the left and the right of the user it is much more convenient to use references, tools, and instruments when working with the computer. If I have to I can still add the stool table (figure three) as shown in figure two.

Figure 18 shows the keyboard, mouse, speakers, cable modem, microphone, web cam, and LCD display in the alcove. The fluorescent light above has a "pull down" light filter that is used for video conferencing. A ceiling mounted pull-down-

Fig. 18 – Keyboard, LCD display and book shelves.

neutral-gray shade[4] comes down just in front of the two side tables. The other end of the video call will typically see me as shown in figure 19. The two side tables may just be seen at the bottom.

I previously mentioned that I don't like cables under my feet. Figures 20 and 21 shows the computer cables before lead dressing and after lead dressing respectively. I also added a light in the corner so I may work on the cabling easily. The more light on black cables the easier it is to see them.

Fig. 19 – Amateur Halo studio[4] camera image. A total of four power strips are installed on the Computer Table. Two may be seen in figures 20 & 21. A third one is mounted on the table top on the right and may be seen in figure 17, and partially seen in figure 18. A fourth power strip is mounted on the underside of the right side table just under the power strip on top.
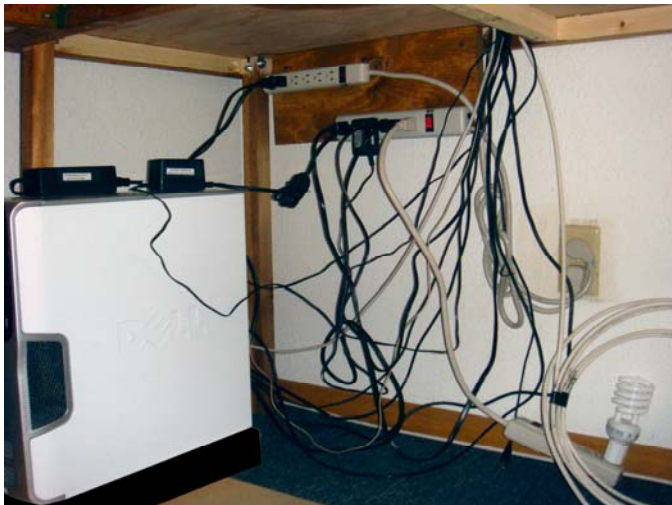

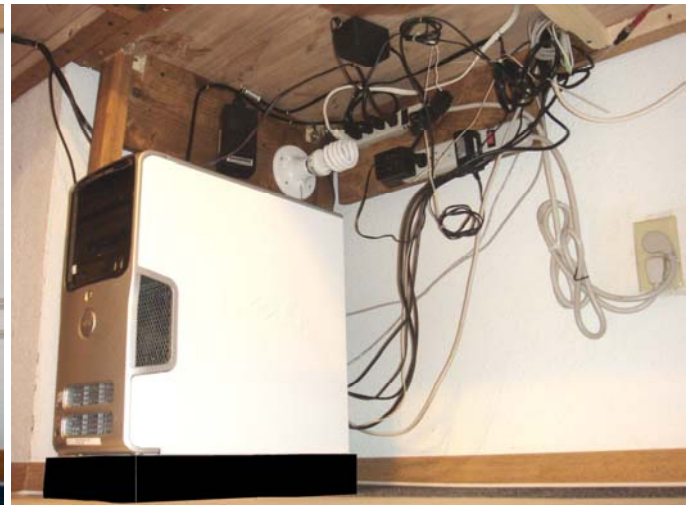*Fig. 20 – Computer cables before cable dressing.*

Fig. 21 – Computer cables after cable dressing.

Organizing (and labeling) the cables and AC adaptors makes troubleshooting and system modification or expansion much easier. Two "tools" are used. The first is 3/4 inch cup hooks as shown in figure 22.

Fig. 22 - Cup Hook.

Fig. 23 – Cable Tie – 5-1/2 inches.

An awl is used to make a starting hole. Excess cable length is coiled and held using a cable tie as shown in figure 23. I bought over 10,000 of these Panduit nylon marvels industrial surplus many years ago at a fraction of a penny each. These may be released by sliding the grip end (using pliers), they are very strong, and they may be chained to make longer lengths if needed.

Conclusion And Discussion

Tearing up the office by relocating a desk, two shelves, a cabinet, and cable pegs is a major project. My initial thoughts were that about $100 would be required for materials if I built an alcove custom computer table. I had many items on hand that I didn't need to buy. As a do-it-yourselfer with more time to spend because I am retired I took the build route. The entire project took about two weeks with the computer table being the primary project. I didn't work on it "full time." See appendix A for additional technical and cost details.

My first project using the new computer table is writing this description. The intent here is not to provide a general set of guidelines for computer tables, but rather to document what I have done to provide ideas for others who may want to build their own. One important consideration is the quality of materials that you use. If you buy furniture grade lumber the cost will be increased by a factor of three or four. I did not have a budget of $600 for a new computer desk/table. I did have specific requirements, however, and building it myself seemed the only solution for increasing my computer working space.

I also do not have any special skills or talent for such projects. I build rather than buy out of necessity. I have accumulated a lot of "raw" material over 40 years because I often have to "do it myself."

If you use furniture grade lumber (hard woods) you probably should use normal wood screws instead of drywall screws. Drywall screws are not as strong as standard wood screws. Wood screws will be more expensive however. See appendix A for more information on drywall screws.

Comments and ideas are welcome.

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Notes

(1) See *HP All-In-One Printer Stand*, 1 page, by Richard J. Nelson which describes the construction of the printer stand shown in figure 4. Computer desk photos are also included in this short photo essay. A *.pdf copy will be emailed on request.

(2) See *Mobile Work Center*, 9 pages, by Richard J. Nelson which describes the construction of a mobile work space and tool storage modification of a red Harbor Freight Service Cart. This project was completed in November of 2007 and it has proven to be very useful for home improvement projects. See photo at the right. ⇒ A *.pdf copy will be emailed on request.

Mobile Work Center

(3) See *The Usefulness of Stools*, three pages, by Richard J. Nelson which describes how various types of stools are very useful to have around the house. A *.pdf copy will be emailed on request.

(4) See *Amateur Halo - Part I*, 16 pages, by Richard J. Nelson which describes tests to install a web cam as an amateur effort to mimic the famous HP Halo Studio. A *.pdf copy will be emailed on request.

Appendix A – Additional Technical And Cost Details

After moving the computer table into the house I cleaned up the car port. Here is a list of the tools and materials I had used. They are not in any specific order.

Table A1 – Computer Table Construction Tool And Materials List

1 16 oz. Claw Hammer.	18 Drafting Triangle.
2 Hand Saw.	19 7/16 inch socket ratchet wrench.
3 Wood Plane.	20 Broad Tip Permanent Marker.
4 #2 Philips Screwdriver.	21 Wire Brush (cleans wood rasp).
5 #2 Philips Driver Bit.	22 Knife.
6 Five 4 inch "C" Clamps.	23 Nail Set Punch.
7 Three 3 inch "C" Clamps.	24 70 Course 1-5/8" Drywall Screws.
8 DAP Welwood® Carpenter's glue.	25 70 No. 6 Flat Washers.
9 Roll of 1 inch Masking Tape.	26 Wood Rasp.
10 Pair of Scissors.	27 Square File.
11 Number 2 Pencil.	28 1/4 Inch Wood Drill 8 inches long.
12 Pencil Sharpener.	29 Bench Brush.
13 Ball Point Pen (marks the masking tape better).	30 Try Square.
14 Drill Press.	31 Miter Box.
15 Power Grinder (for fender washers).	32 Two Saw Horses.
16 Two Hand Power Drills. (1- pilot, 1 screwdriver)	33 Tape measure.
17 2" Drywall Screws ≈ 16 (2x2 to 2x2 attachment).	34 Elemer's Carpenter's® Wood filler

Every project will require a tool or some hardware that could not be anticipated or was not "on hand."

I keep a one pound box of Grip Rite drywall screws (both course and fine thread) in the six sizes as shown in figure A1. For example, I ran out of the 1-5/8 inch size and I had to buy another box. You should drill pilot holes for all screws. See table A2.
http://www.grip-rite.com/screw_overview.asp

Fig. A1 – A box of drywall screws is essential if you do a lot of home construction projects.

I measured the root diameter of my set of drywall screws. If your drill selection is limited to fractional sizes a good size to use for all Table A2 lengths is 3/32" (94 mils). If this seems tight use the next larger fractional size, 7/64" (109 mils). This is less critical for soft woods like pine.

Table A2 – Drywall Screw Root Diameters

	Pilot Hole*			Pilot Hole*	
Size	Course	Fine	Size	Course	Fine
1"	94	90	2"	106	96
1-1/4"	100	90	2-1/2"	113	102
1-5/8"	100	90	3"	116	102

* Diameter in mils (1/1000ths of an inch).

The 3-1/2" leg carriage bolts (1/4 – 20) were 17 cents each. The nuts were 4 cents each. The Fender washers were 13 cents each. Two leg bolts needed to be 5" long for the two front legs of the largest section (two 2x2's plus leg) and these were 29 cents each. Drywall screws are $5.45 per one pound box.