Hidden Door Bookshelf

by **kenbob** on May 6, 2007

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intro: Hidden Door Bookshelf

Wall to wall bookshelves that conceal a hidden door. Made without casters. Some people call this a bookcase.

My home office was messy. After I am done it will still be messy but now it is finished AND it has the secret feature. Well it was secret, till I wrote this.

In one wall of my home office is a 5 feet tall 2 feet wide door to access the storage area and crawl space under the garage. This is where we put holiday decorations, old stuff, and junk.

This wall was the perfect spot for floor to ceiling bookshelves, which I have done lots of, but it had this door in the middle of the wall. The perfect answer was a bookshelf that opened.

One day my father in law visited and we started drawing pictures of how book shelf hidden door could work, how to hinge, where to hinge, how to hide opening, etc. Following are the highlights from the journey that followed.

Image Notes
1. finished product - now they are full of books, and computer parts, and nifty stuff i must save...

Image Notes
1. before shot - note door to storage area and disaster like piles of stuff...

step 1: calculate dimensions

First thing I did was figure out how big and where a bookshelf would need to pivot in order to clear walls and neighboring shelves with minimum gaps. I positioned the hinge point 7" in from the right and 2" in from the front of the cabinet. For sanity I made a scale drawing of shelves and cut out the rotating shelf shape.

With a pin I tried different pivot ideas, validating my measurements. The goal was to have the vertical gap between moving shelf box and fixed shelves be covered with a single 4.5" trim piece.

I added a better drawing of the key part of the unit, the moving center. The left and right side shelves are not to scale. This was made with visio, which lets you adjust the rotation point, so i could simulate the shelves opening to show clearance.The visio file is attached if can read it. the close up is where i notched the vertical trim to allow the horizontal trim to pivot "through" it.

---Ken

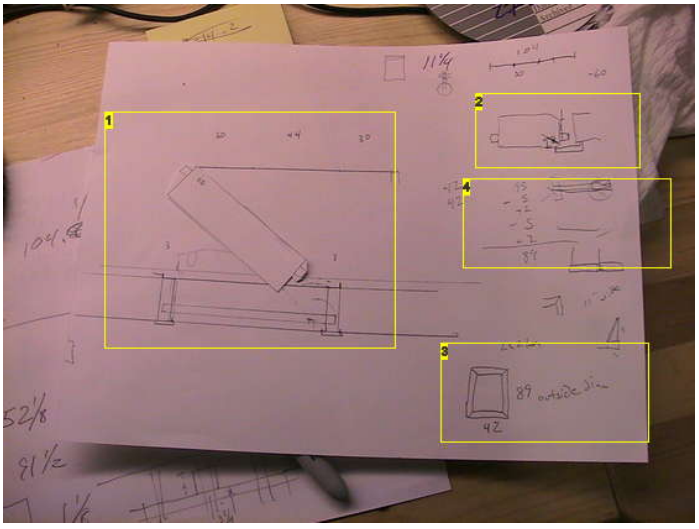
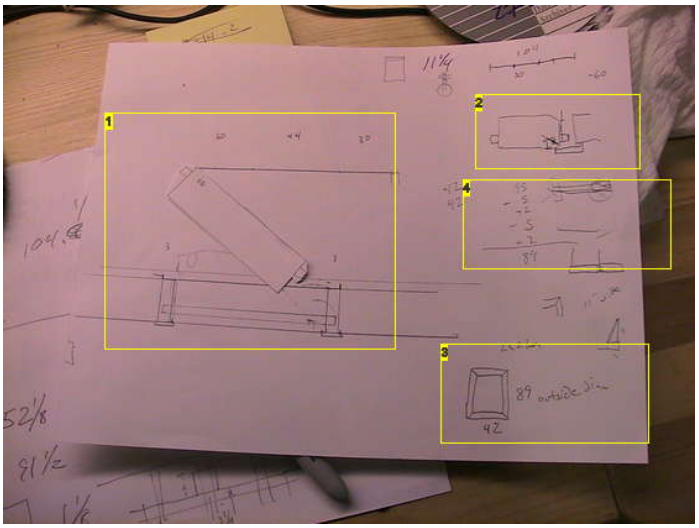
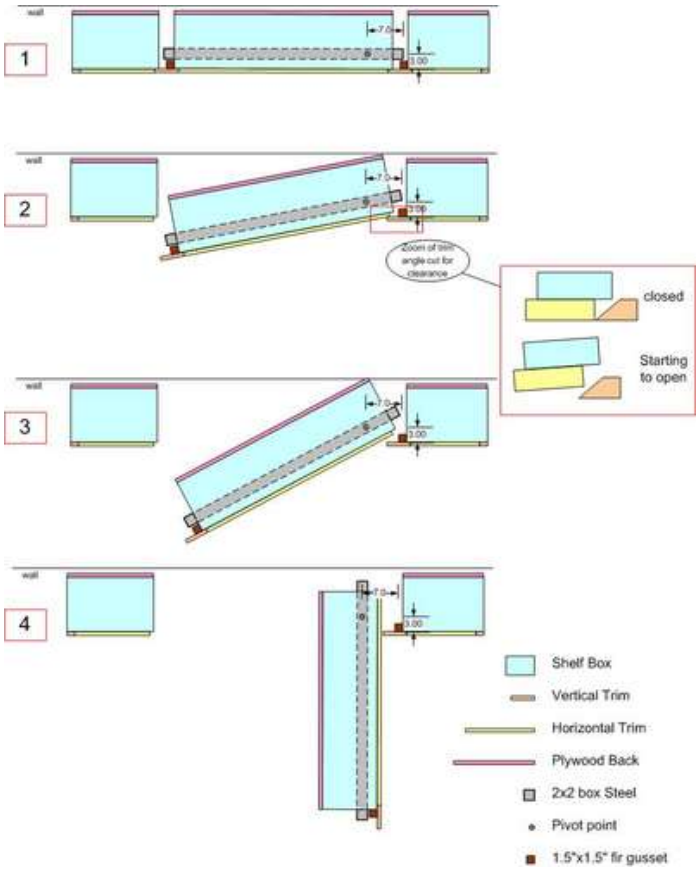


Image Notes
1. when i knew the size of the shelf/door i made scale drawing and cutout to test pivot points and clearances





2. plan was to have a 4.5 " vertical trim cover the door workings
3. dimensions of steel frame,,, next step
4. subtracting out vertical components for door frame size

File Downloads

shelf.vsd (160 KB)
[NOTE: When saving, if you see .tmp as the file ext, rename it to 'shelf.vsd']

step 2: Door Frame - moving steel frame

The next key insight, thanks Jim, was to build a steel frame rather than trying to hinge the wood shelves directly. This would allow the door to swing easily and support 500-1000lbs without a problem (full bookshelf). I calculated the size for the frame allowing minimum clearance from the floor for trim and base board (2") and enough clearance from the ceiling for the metal frame barely below crown. (5") and the width was set to just cover the access door and be centered (42"). The steel 2x2 box was $90 cut to length with miters. I bought a couple of 3/4" bolts to act as the pivot pins. These were welded 7" in at center of bolt, from ends of the frame , and cut off to fit into 2x2 box anchors. My welding is not super, so I do a lot of welds.

The steel frame would pivot on a upper and lower anchor point, mounted to ceiling and floor respectively.

Image Notes
1. purchased 2x2 1/8 thick box, cut in picture frame miters

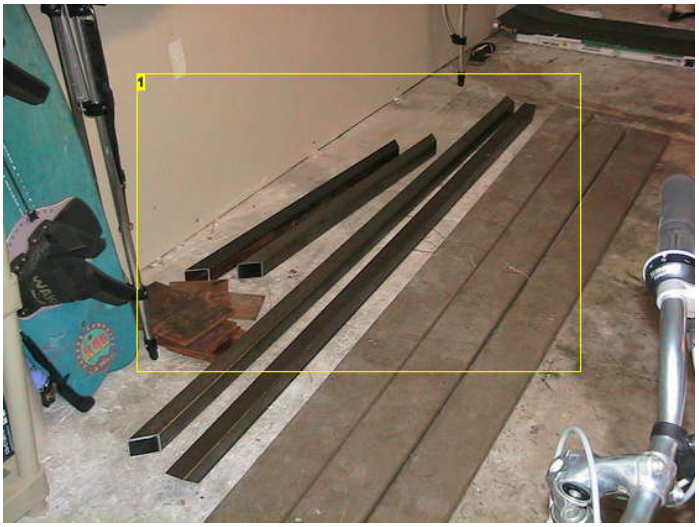


Image Notes
1. had to go get more gas

Image Notes
1. welded a piece of scrap quarter inch plate to pivot points, then welded 3/4 inch bolts to the plate for extra strength. bolts get cut off to ~ 2 inch long

step 3: installing frame

The ceiling anchor was sized to span 3 floor joist and had a short arm out to avoid rocking (scrap steel). The pivot point on both ends was a 3/4 inch brass flange bearing inserted into a 1 inch hole in the 2x2 box. The floor anchor was much smaller as bolting to the concrete floor made it pretty damn solid. Good luck to the person that has to remove this someday.

This let me position and place the top anchor, base anchor, and frame. I attached top anchor loosely letting it rock, slipped in frame and bottom anchor on pin (with 2 washers on pin above bearing), then slid the whole set into place. A plum bob hanging along the edge of the frame made it quick to tell if it was vertical in both directions. When true, I secured bolts on both ends. I tested the swing of the door frame with ~500 lbs of people standing in it. Dead smooth action.

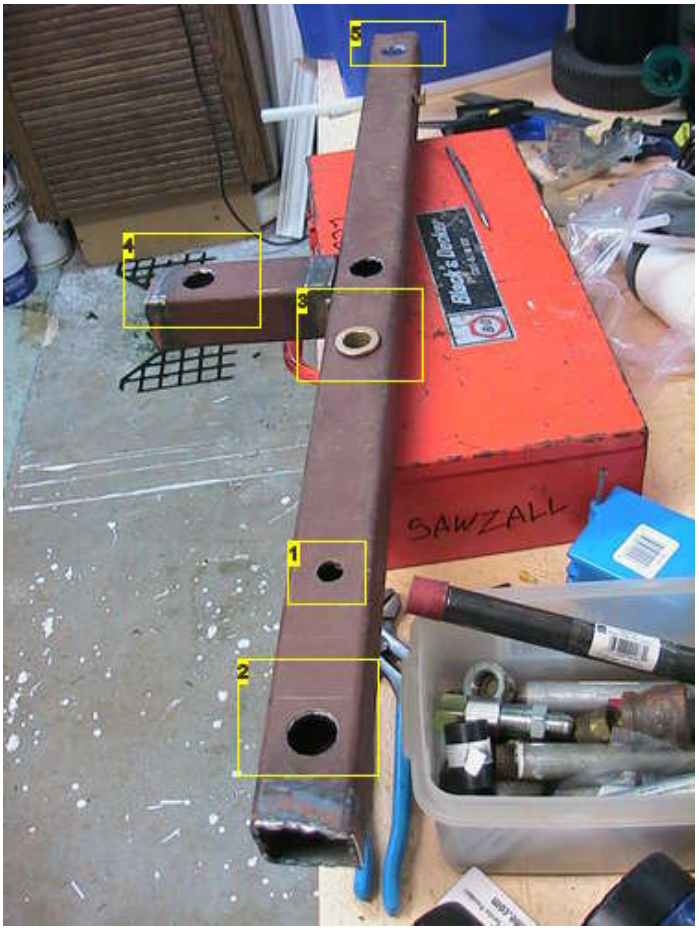


Image Notes
1. extra hole....
2. 1 inch holes in bottom and 3/8 holes in top for lag bolts into floor joist
3. pivot point with brass 3/4 bearing in 1 inch hole
4. this little arm prevents any tendency to rock when lagged to the joist
5. third joist hole

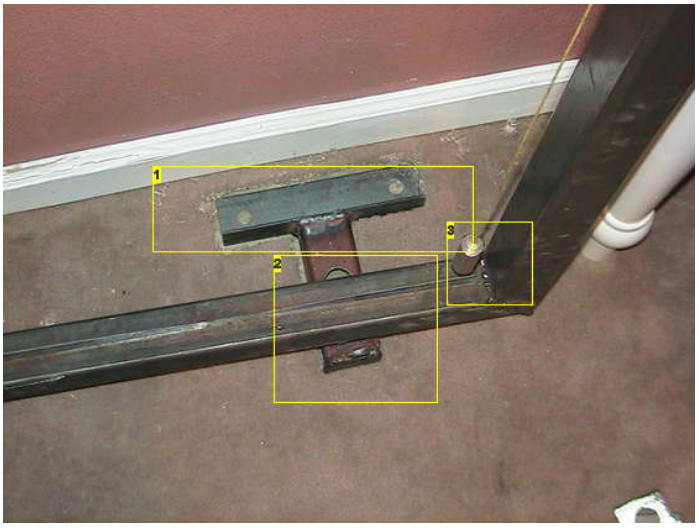


Image Notes
1. floor anchor, carpet cut away and angle iron bolted to slab
2. pivot point under here, one washer tween brass bushing and bolt. bolt cut to 2 inch long
3. plumb bob for constant check of level in both directions

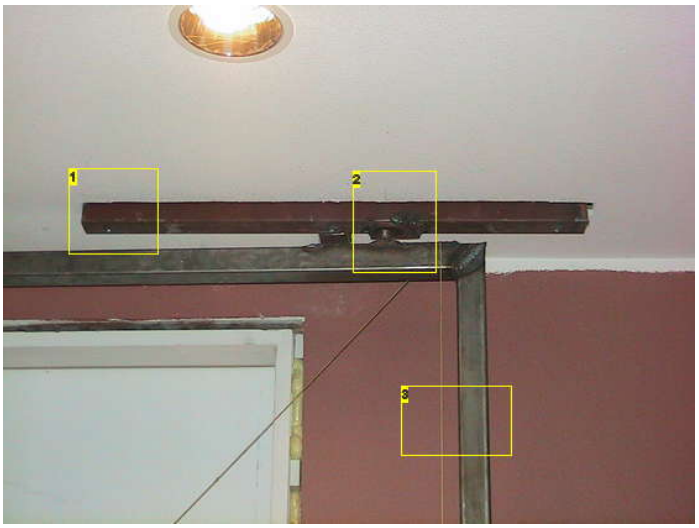


Image Notes

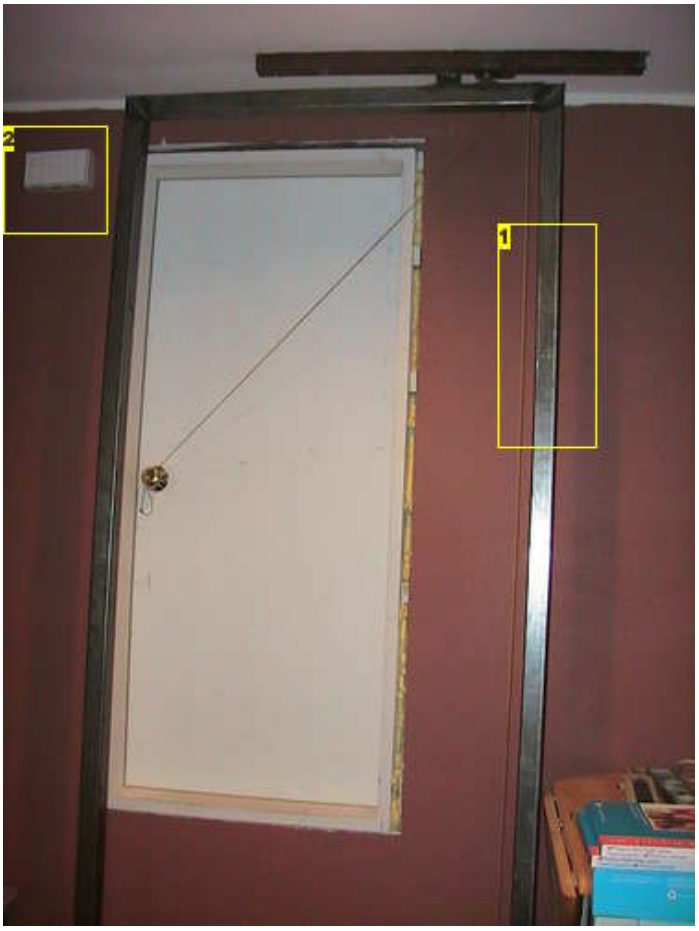
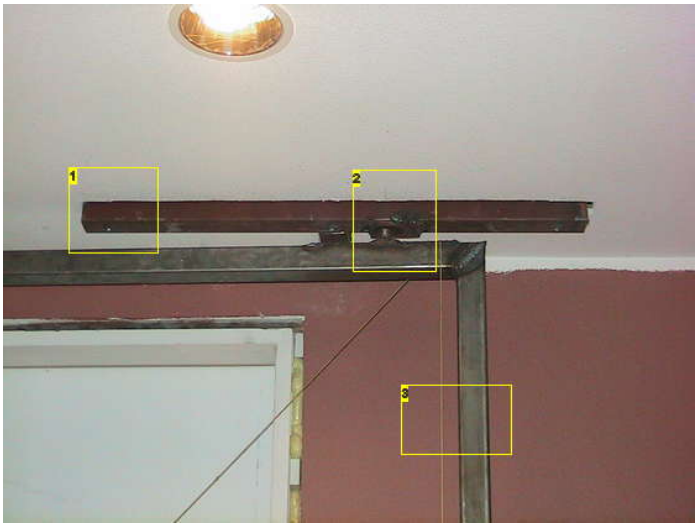


Image Notes
1. plum bob string.
2. doorbell, i removed and moved this.



1. screwed into three joist and twice in center joist
2. pivot point. i split a tiny piece - about 3/8 inch - of nylon tubing and slipped it on exposed bolt. this keeps the bearing from slipping down
3. pretty level...

step 4: add the wood

Into the installed frame I built the first shelf box for the swinging shelf and verified clearance. In my design I made the swinging shelf 2 inch shallower than the other shelves to allow clearance behind it for the arc when it swung. (If I did this again I would bring all the shelves out from the wall, making all full depth. Then I built the two side shelves and installed trim all around. I used a credit card for gaps between trim and crown to allow clearance.

The 4.5 inch trim left and right of the shelf-door, the right side is fixed to the fixed shelf, the left side moves with the door.I had to bevel notches in the trim on the right because the horizontal trim dives under it as the door opens. I also had to slightly round the horizontal pieces to slip underneath smoothly.

I am not the best woodworker, and the materials (mdf and particle board) are less than optimum, and the walls are crooked, but the results were great. Nobody would ever see the finished wall and think "Hey I wonder if that is a door?"

all in all i have about $350 in the project.

Image Notes
1. lots of sharpies
2. 7/16 plywood on center moving shelf. side shelf boxes were built tight to wall.
3. save everything.... a bunch of kvm cables... soon to live on the new shelf
4. this outlet is going to be in the middle of a shelf box. I cut a hole for it. it now powers my printer.

Image Notes
1. hits steel to keep door from closing too far

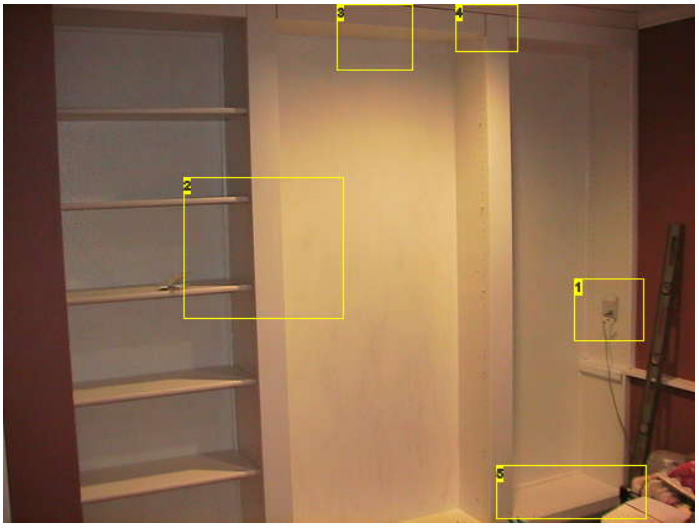


Image Notes
1. had to cut out for outlet
2. 4.5 inch trim hides clearance gap between shelf boxes
3. 3.5 inch mdf across top - 1 credit card thickness below crown molding. crown was placed slightly inset from outside edge of top trim.
4. special gap on following picture
5. 2.5 inch mdf across bottom. this clears the floor by about 3 inches, i put 2.2 inch trim board 2 inch back so from viewing angle looks like trim in toe kick area.

Image Notes
1. 4.5 inch trim on this side attached to door. on other side attached to neighboring shelf box
2. 3.5 inch trim - one credit card distance below crown molding crown molding set 1/8 inch in from outside edge of trim

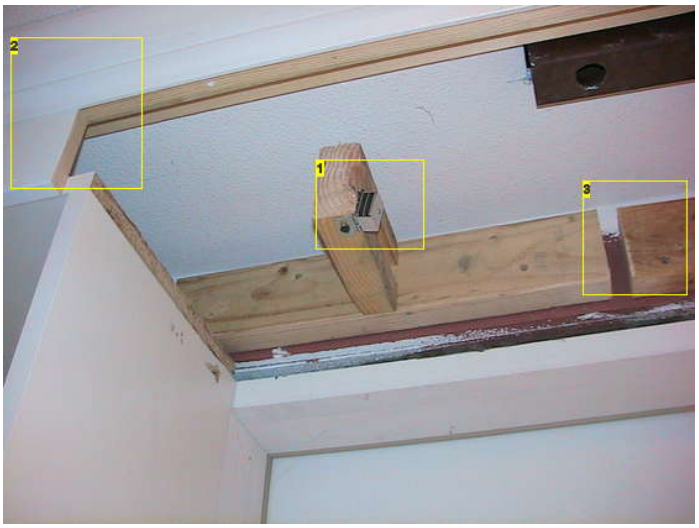


Image Notes
1. added a magnet to hold door so it doesn't float open, it is that smooth
2. here you can see how crown is set slightly back from top trim to hide the small gap - sort of
3. the other end of this board keeps the door from opening too far - stops it at 90 degrees.

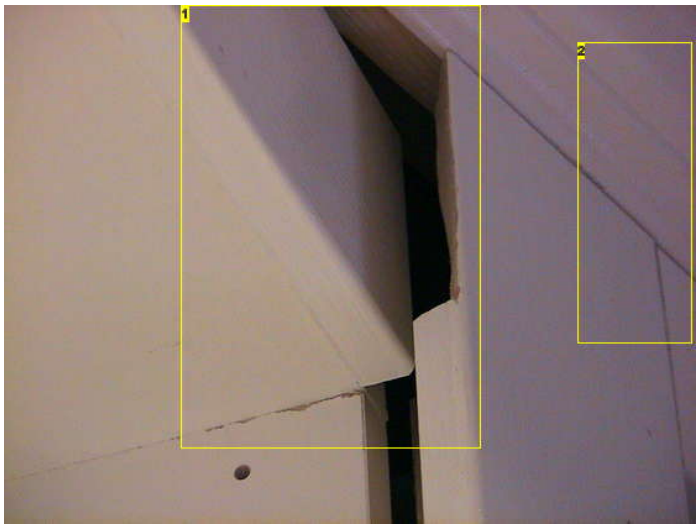


Image Notes
1. top trim had to have place to dive under the vertical 4.5inch trim.
2. crown 1 credit card above top trim pieces

Image Notes
1. finished product - now they are full of books, and computer parts, and nifty stuff i must save...

step 5: Videos

Just posted some videos --

open the door

close the door

thanks for all the feedback!

Image Notes
1. finished product - now they are full of books, and computer parts, and nifty stuff i must save...

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adw3345 says: Mar 11, 2009. 7:12 PM REPLY

I really like your bookshelves - I would like to build one just like yours! I have a perfect room for bookshelves except there is an open space on one wall to go to the basement, so this project is a great idea!

Just two questions!

1) I see the width of your frame is 48" from your plans (if I am not mistaken). I would like to make mine 53" wide and 88" tall. Do you think the frame using the same steel stock you used would be fine in this size? I worry I am making something too big, it will be packed with books - probably the very same types you have stacked on yours.

2) I understand that the pivot is just a 3/4 inch bolt going into a 3/4 inch bearing, which is more or less just a cup. Is that all it is? Did you put in any grease or need to do anything to the bolt to prevent grinding when you cut it to 2 inches?

Thanks a lot for any advice, I'm not very good with metalworking (having a welder friend of mine do the frame for me), so I appreciate your descriptions!

Thanks again for a wonderful project!

-Derrick

kenbob says: Mar 12, 2009. 9:51 PM REPLY

@adw3345,
Thanks much for the kind words. As to the width, I do not think the extra 7 inches would make any difference. I used 1/8" steel box, so it is very strong. If you are worried you could go with thicker or wider box steel.
All the force on the bolt is lateral, the weight is actually sitting on the shoulder of the bolt. (the bearing is a tube) I placed 2 large washers and a drop of oil on the bottom pivot point. A cross section drawing would probably have been helpful.

There is one picture that shows that i added a piece of 1/4" plate under the bolt to avoid any chance of having it dent the box tubing. the lateral force on the bold is also mitigated by the placement of the pivot away from the edge of the shelf (given evenly loaded shelves). I filled my shelves with text books just to make the "door" as heavy as i could. It easily handles the weight and the extra inertia gives it a nice feel.

tacamaral says: Mar 8, 2009. 11:15 AM REPLY

Wow! Loved it! The videos show how smooth it is. :)

1thadeaus1 says: Feb 17, 2009. 7:49 PM **REPLY**

i would love to do something like this.! good inst!

Greenehouse says: Mar 22, 2008. 10:04 AM **REPLY**

I am looking for a secret "latch" to open/close this type of hidden door. There are some nice electromagnet types but they are expensive and need power. Any ideas on a "chinese puzzle" type of thing where you move a a couple of things and it opens? I don't want the classic horror movie things like move a book, lever or statute. Just thinking...

inquisitive says: Jan 19, 2009. 8:56 PM **REPLY**

Hey don't turn your nose up at the classic horror movie moment :) So many possibilities.

wperry1 says: Jan 15, 2009. 8:32 AM **REPLY**

You could try something like these

http://www.safety1st.com/product/detail.asp?ID=208

I use them to keep my 2 year old out of the knife drawer and some cabinets in my kitchen. They are relatively cheap and easy to install with no externally visible latch mechanism.

kenbob says: Jan 15, 2009. 1:17 PM **REPLY**

Those are exactly the idea I was contemplating with the magnetic release. I have some really strong ceramic magnets that would do the trick. Of course, locking the door hasn't been a priority for me as it only hides a storage area with holiday decorations, scrap lumber, left over tile, and other "treasures".

kenbob says: Mar 22, 2008. 12:54 PM **REPLY**

My favorite idea i have heard is a small latch that is released by a magnet... you put a really strong magnet inside something (book, paper weight, etc) then unlatch the door by moving this magnet to the right spot on the shelf where it releases the latch behind the door.
The other fun idea is an internet unlock page, tied to a web server inside the secret door. You have to go to a web site and type the password to unlock the door.

James (pseudo-geek) says: Apr 21, 2008. 10:52 PM **REPLY**

thats very creative.

billiereilly says: Apr 22, 2008. 8:34 PM **REPLY**

This is a grand project. I have a question about a similar, smaller hidden door bookcase. We want our bookcase, which will be built into our hallway, to swing out so we can use the space to the left inside. What we need are some sort of armature that will permit the unit to come forward before swinging to the right. Ideas please?

Thanks

Billie Reilly

Yoda12999 says: Jan 15, 2009. 6:52 PM **REPLY**

You could do a L shaped hinge. It may take up a little more room but it would work.

fireblast_1212 says: Jan 15, 2009. 1:23 PM **REPLY**

kenbob. You look like my teacher.

JEEPBOY52 says: Jan 15, 2009. 9:10 AM **REPLY**

What a great job. This leaves me looking for a place in my home for one. Have you thought about putting a locking mechanism on it? There is nothing like pulling a book off the shelf then opening the secret door.

supremedragonx says: Jan 14, 2009. 1:24 PM **REPLY**

Awesome

led_scorched says: Jan 14, 2009. 10:29 AM **REPLY**

Very cool. Nice job :)

A.C.E. says: Jan 12, 2009. 3:37 PM **REPLY**

great idea definately vote. this would be a great idea for a safe room. just take out the second door and make a mount that you can slide a 4 inch thick steel bar through and you wont be able to open it.

clarissa_ann says: Jan 12, 2009. 12:33 PM **REPLY**

I see that a lot of people are picking apart your project. I personally thing that you did a great job. I wish I had one. Kudos.

moneyover says: May 19, 2007. 9:03 PM **REPLY**

this looks nice, but when people opening the door,what will happen to he things on the Bookshelf?

Katzsta says: May 16, 2008. 8:17 AM **REPLY**

If you want to go to a bit more effort, you could build the shelves so they have a slight slant towards the back, then the books or whatever would have that added tiny bit of gravitational stability to keep them in. It's more work, but cheaper than buying big magnets or other fluff stuff to hold them in. Also, if you didn't have a lot of books, you could make "fake" books by removing the pages (recycle them into scrapbooks or card art by tearing edges, distress with sandpaper and tea bag stain), fill the now empty book with a cardboard box or cardboard pieces, weight them a bit at the bottom with any type of recycled junque and place on shelf. That way you would fill up the shelf, but not risk the potential knockout punch of a heavy book falling on your head or foot.

kenbob says: May 17, 2008. 8:20 AM **REPLY**

The tipping risk is at both ends of the swing - sudden stop at open or close - so no perfect way to slope the shelf. In reality the "door" is now loaded with heavy text books, so all combined (frame, shelving, stuff) it is has a mass of about 100Kilos - this provides enough inertia to avoid any quick moves. the biggest risk is someone "slamming" it shut. adding a gas cartridge to the system would be a good feature as there is almost no friction in the pivot. This would blunt the momentum from an overly aggressive closer.

heyjeffbray says: Aug 29, 2008. 1:21 PM **REPLY**

The slant on the shelf combined with the wall behind it would actually prevent both directions of movement. A sudden stop after opening would project the books outwards, a force that is cancelled in part because of the angle of the shelf. A sudden stop after closing would push the book towards inwards, being cancelled by the force back from the wall.

photozz says: Jan 12, 2009. 11:47 AM **REPLY**

You could also just use a pneumatic arm on the door to soften the open/close movement. Something like a non-pressurised oil shock absorber for a car.

EngineerWannaBe says: Feb 16, 2008. 10:45 AM **REPLY**

I think that's an important consideration, especially if you're looking to make a "safe room". Make sure that whatever's on the shelves doesn't migrate and look "out of place". Example: books neatly organized, except for all the books on the door. If bad guy sees that, it may look out of place, and alert them. But 2-sided tape would keep vases & stuff in place to prevent that.

trackstar0420 says: Dec 27, 2008. 11:27 PM **REPLY**

i also think that anything taped down may also look out of place to bad guys

skidude28 says: Jan 3, 2009. 9:00 PM **REPLY**

Yes, but 2-sided tape as EngineerWannaBe mentioned would go under the book/object, and there it would be hidden.

trackstar0420 says: Jan 4, 2009. 11:10 AM **REPLY**

I understand that, and if only a few larger items or books were taped down, in order to keep everything else in place makes sense, but having everything taped down(and someone tries to pick it up) would be as much a give a way as disheveled books.

kenbob says: May 20, 2007. 10:08 AM **REPLY**

The weight keeps the movements pretty slow on the open(video). so far nothing has been tipped out. The potential problem is at both ends.. the hard stops - a perfect design would include something to decelerate the stops like gas cartridges. this could also provide an auto open on release of the future hidden latch... hmmmm. have to think about this.

chabuhi says: Jul 12, 2007. 1:33 PM **REPLY**

If you were to only put books on the shelves (or on the shelves that hold books, what about some sort of stiff-bristled brush spacers to hold the books in place? Wouldn't be able to secure books of any random width, but ought to work for a majority. And you could afix the contraption to the back of the shelf (and keep it low) in order to conceal it somewhat. I'm trying to think of where I've seen that type of holder before -- will post back if I find a link.

cabrlamo says: Jan 3, 2009. 6:20 AM **REPLY**
Fabulous instructable. My husband and I are wanting to build a sliding bookcase to hide a door. Any ideas on a rail? We would have casters on the bottom to help with the weight of the bookcase. We have searched the internet and have no idea what would work. The results look great!

photozz says: Jan 12, 2009. 11:46 AM **REPLY**
I would think a couple of heavy duty drawer slides could do it. mount them between the wall and the bookcase so it can slide sideways.

kenbob says: Jan 3, 2009. 8:33 AM **REPLY**
thanks much. I have seen sliding barn door hardware that would take the weight, but the trick would be how to make blend in to the wall. I would love to see what you come up with.

darcythomas says: Jul 12, 2007. 8:01 PM **REPLY**
Walls are **never** square. I think that nature abhors a square.

James (pseudo-geek) says: Dec 6, 2007. 10:05 PM **REPLY**
Agreed. If someone finds a non-man-made square that exists, please tell me about it.

deth2all says: Apr 18, 2008. 11:44 PM **REPLY**
perfect diamond crystal?

James (pseudo-geek) says: Apr 21, 2008. 10:50 PM **REPLY**
hmm not quite, that would be kind of a square but 2 of the opposing corners are closer together than the others.

Fitzy2211 says: Aug 9, 2008. 8:26 AM **REPLY**
Pyrite crystals are squares

llamafur says: Jan 9, 2009. 1:37 PM **REPLY**
Salt, its always a perfect square because its molecular structure is a square.
Just so ya know.

James (pseudo-geek) says: Aug 11, 2008. 8:53 PM **REPLY**
SIGH.

ok here is my, new stable argument.

GOD DID NOT MAKE A SINGLE THING THAT IS VISIBLE TO THE NAKED EYE SQUARE.

photozz says: Jan 12, 2009. 11:44 AM **REPLY**
I'm an atheist.
:)

I can generate a square wave.. does that count?

Fitzy2211 says: Aug 12, 2008. 1:57 AM **REPLY**
http://z.about.com/d/geology/1/0/Z/A/1/pyritextals.jpg

go to this link has a nice comparison. these are smaller than nrmal.

cwid says: Dec 25, 2007. 4:17 PM **REPLY**
ahahaha I think I just found a non man made square.... and his name is "James (pseudo-geek)" HAHHA sorry I saw the chance and I just had to..

ravebot says: Jan 12, 2009. 5:50 AM **REPLY**
awww man a just spilled my soda laughing so hard

ghostrider2 says: Apr 18, 2008. 9:08 PM **REPLY**

technically, he is man made.

teamcoltra says: Jan 11, 2009. 6:48 AM **REPLY**

:) And woman made too...

darcythomas says: Apr 20, 2009. 11:49 PM **REPLY**

Mostly woman made (by mass) :P

inkstainedheart says: Aug 30, 2008. 12:34 PM **REPLY**

AWESOME instructable. I've been looking for a simpler way to build a secret door, and this is by far easier to understand. Thanks for putting it up!

kwscholar says: Aug 28, 2008. 1:18 PM **REPLY**

I dislike advertising any name brand items but there is an annoying infomercial that advertises an extra strong putty that might work for non-book items on your shelves. Great idea and great instructable btw!

tellner says: May 14, 2008. 7:00 AM **REPLY**

frankman, I really appreciate your expertise, but do you have to say "Visit us on the web at blahblahblah.com or blahblahblarg.com for retail customers" in every post? This is a site for the diyer, not just a marketing opportunity for you. A little less advertising and a little more discussion of the instructable being presented would be very helpful.

tellner says: May 14, 2008. 7:01 AM **REPLY**

For instance, what do you think of his frame and pivot scheme? Is it overkill? Is it sturdy enough? Is it better than high-strength hinges?

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