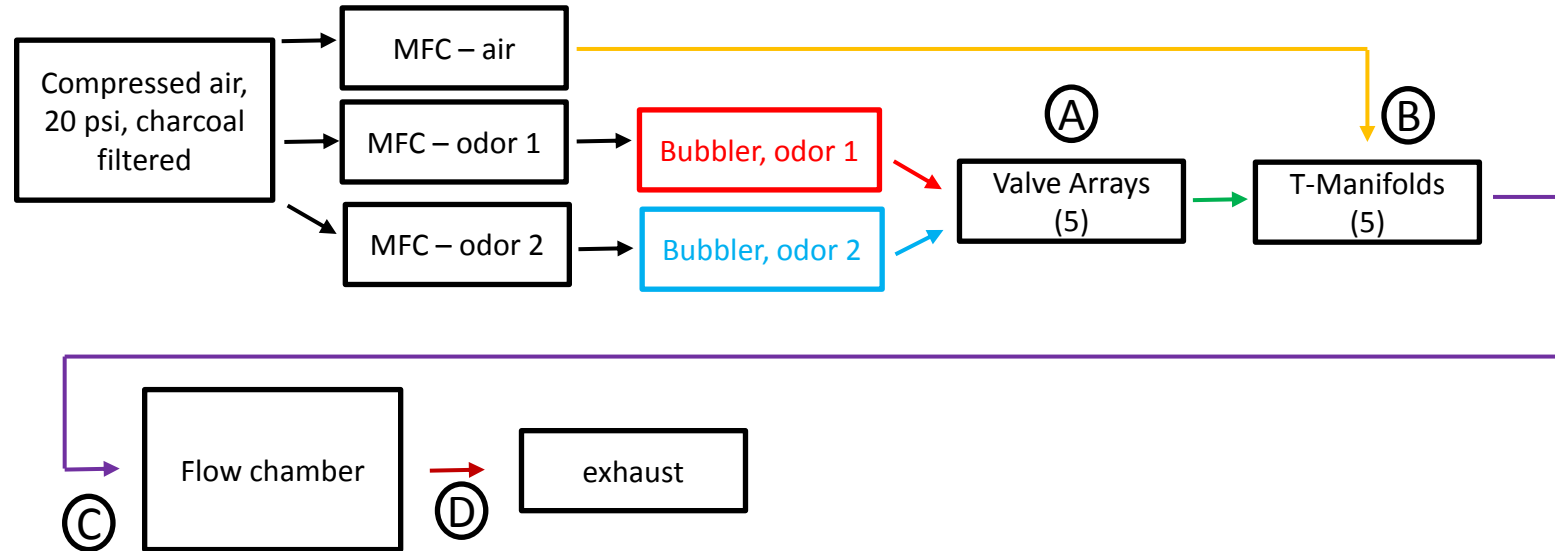


not pictured:  
tubing, fittings, and manifolds to source odor & air and connect components  
gas handling (air source, regulator, exhaust, flow meter)  
Mass Flow Controllers, bubblers  
pneumatic hinge and top plate to seal flow chamber  
electronics (valve controller, lights)  
camera, lenses, filters, channelrhodopsin stimulating light source

## LADY GAGA V2 Basic flow scheme

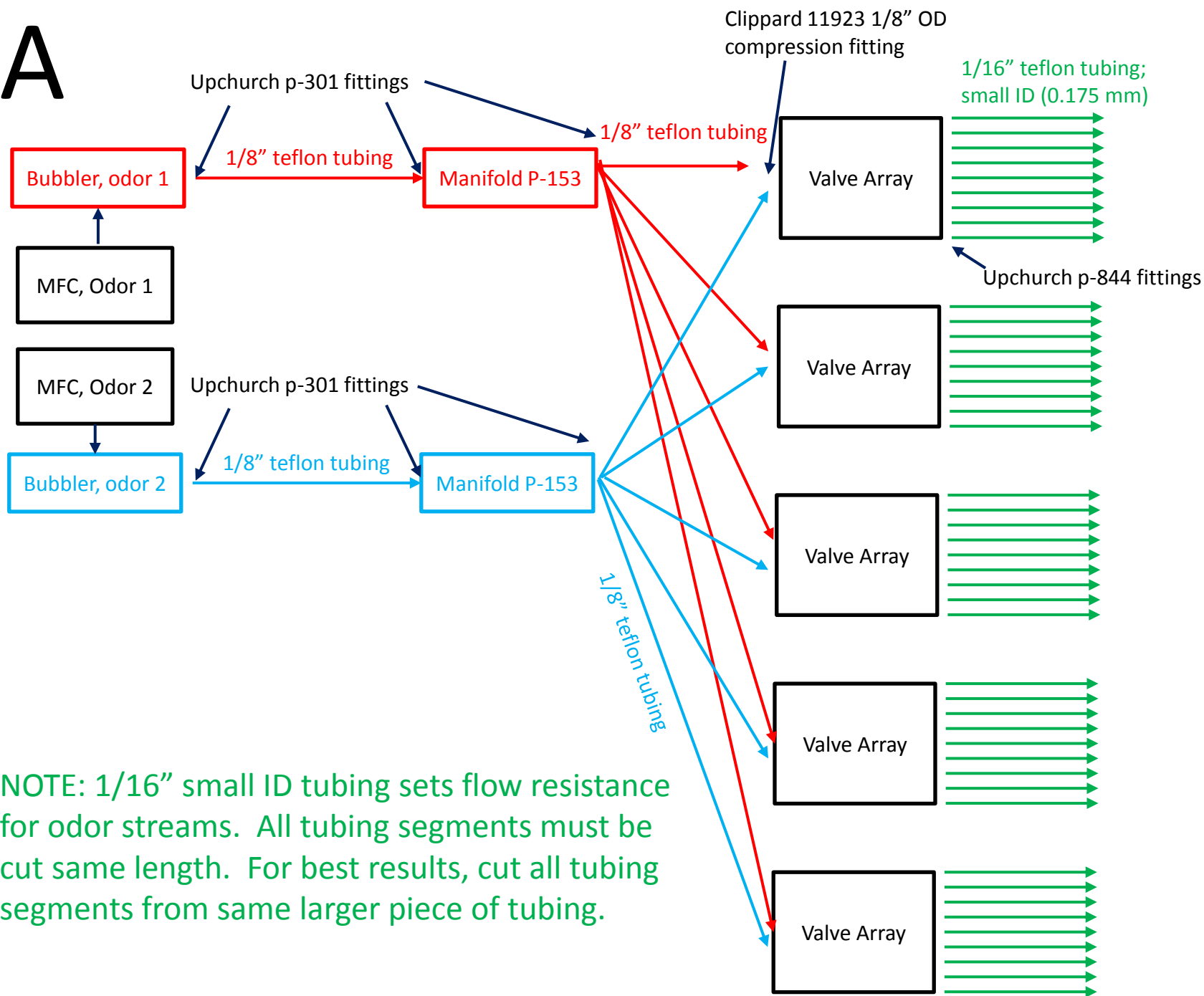
arrow indicates air flows between components in indicated direction.

Letters indicate details follow on subsequent pages.



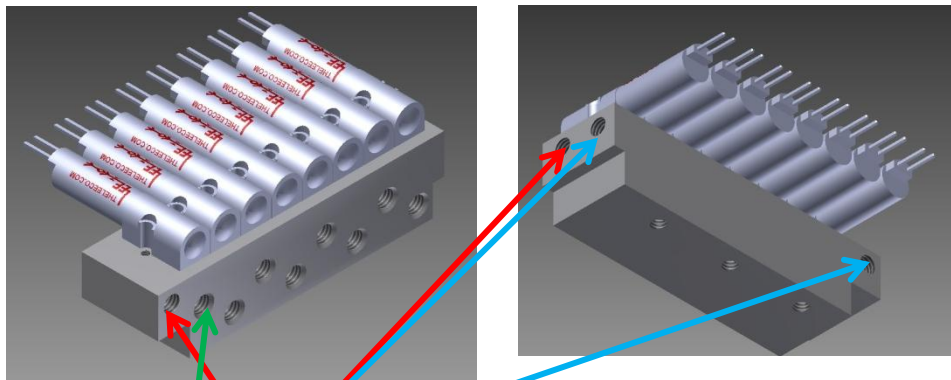
Note: all clippard fittings require that the buna-n gasket (default) be replaced by epdm

# A



# A

## Manifold with valves



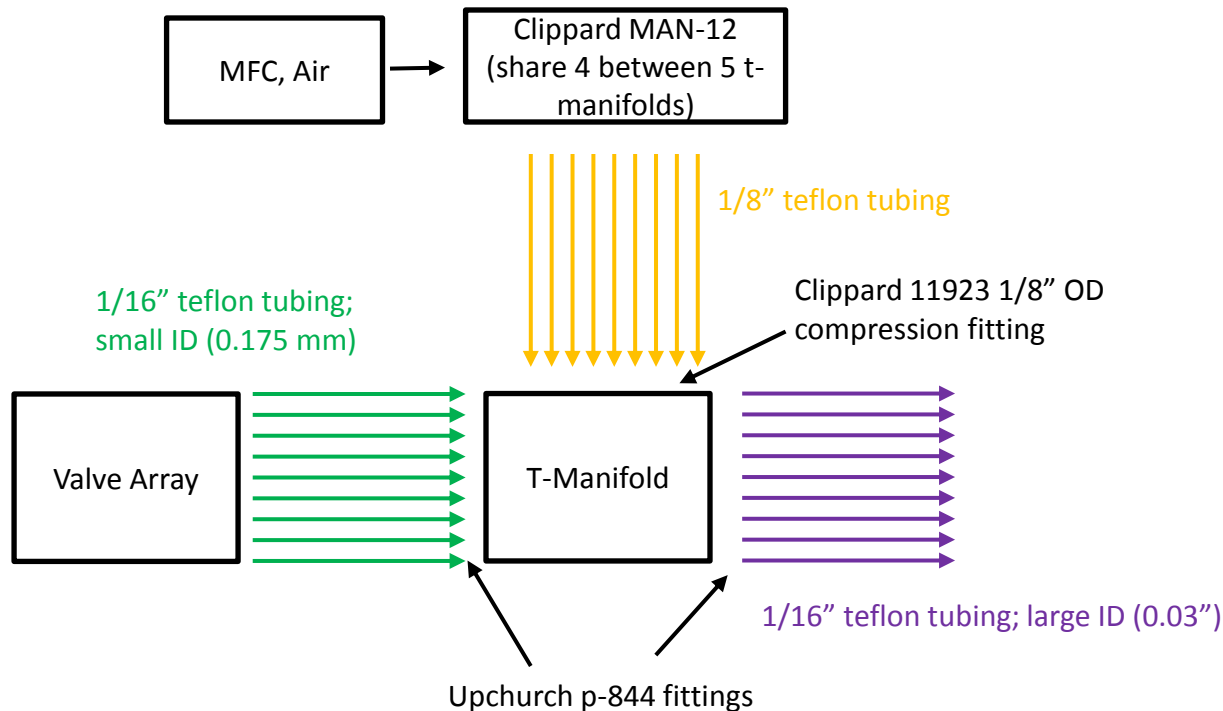
Odor 1 (NO) inlet, Odor 2 (NC) inlet: connect with clippard 10-32 to 1/8" compression fitting and 1/8" OD teflon tubing or seal with clippard 10-32 plug

Valve common (outlet), 8X: connect with upchurch 10-32 flat bottom vacutight fitting to 1/16" OD, 175 um ID

To distribute odor to 5 valve manifolds, use upchurch p-153, 6-port manifold for 1/8" OD tubing

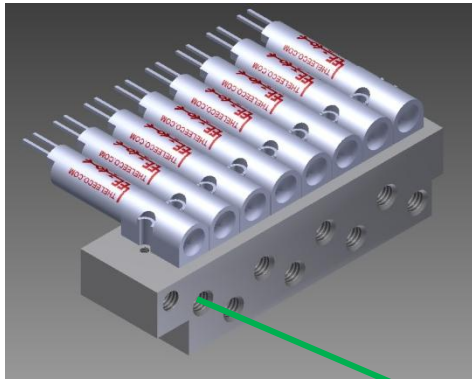
# B

# 5X



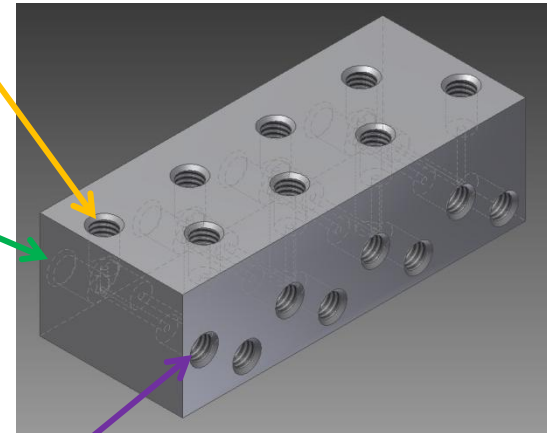
NOTE: 1/16" large ID tubing sets flow resistance for air streams. All tubing segments must be cut same length. For best results, cut all tubing segments from same larger piece of tubing.

# B



**Air inlet 8x.** Connect with 10-32 clippard compression fittings to 1/8" OD teflon tubing.

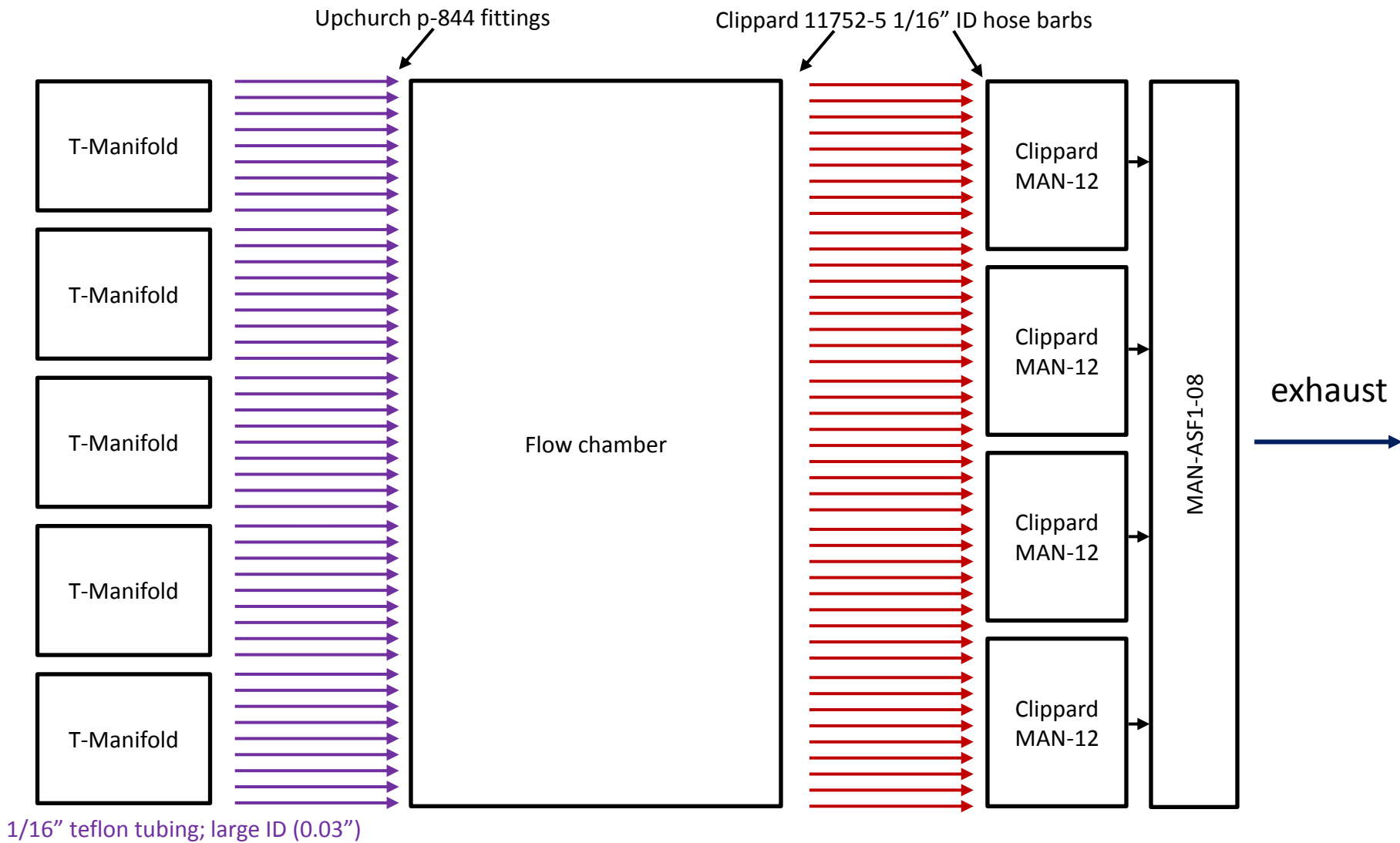
**Odor flows** from valve manifold to t-manifold through 1/16" OD 175 um ID teflon tubing (connect at both ends with 10-32 vacutight fittings) (8x)



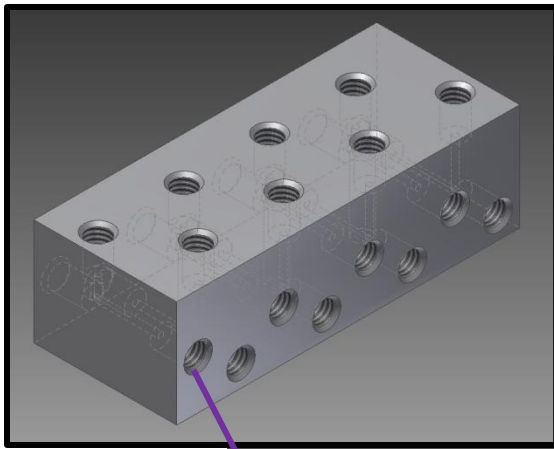
T-manifold

**Combined air and odor outlet, 8x.** Connect with 10-32 vacutight fittings and 1/16" OD, 0.03" ID teflon tubing.

Notes: to combine multiple valve arrays, use t-manifolds in series, connected with 1/16" OD 0.03" ID tubing. Air inlet should be last connection.  
To distribute air to each inlet, use clippard MAN-12 and NPT tees.

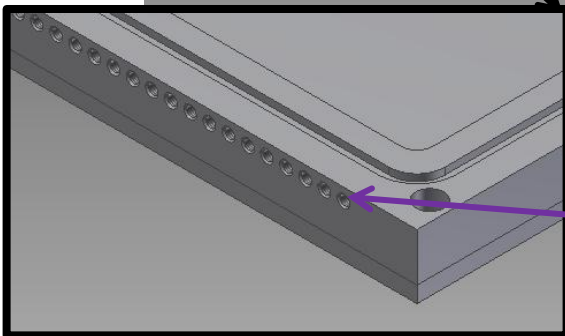
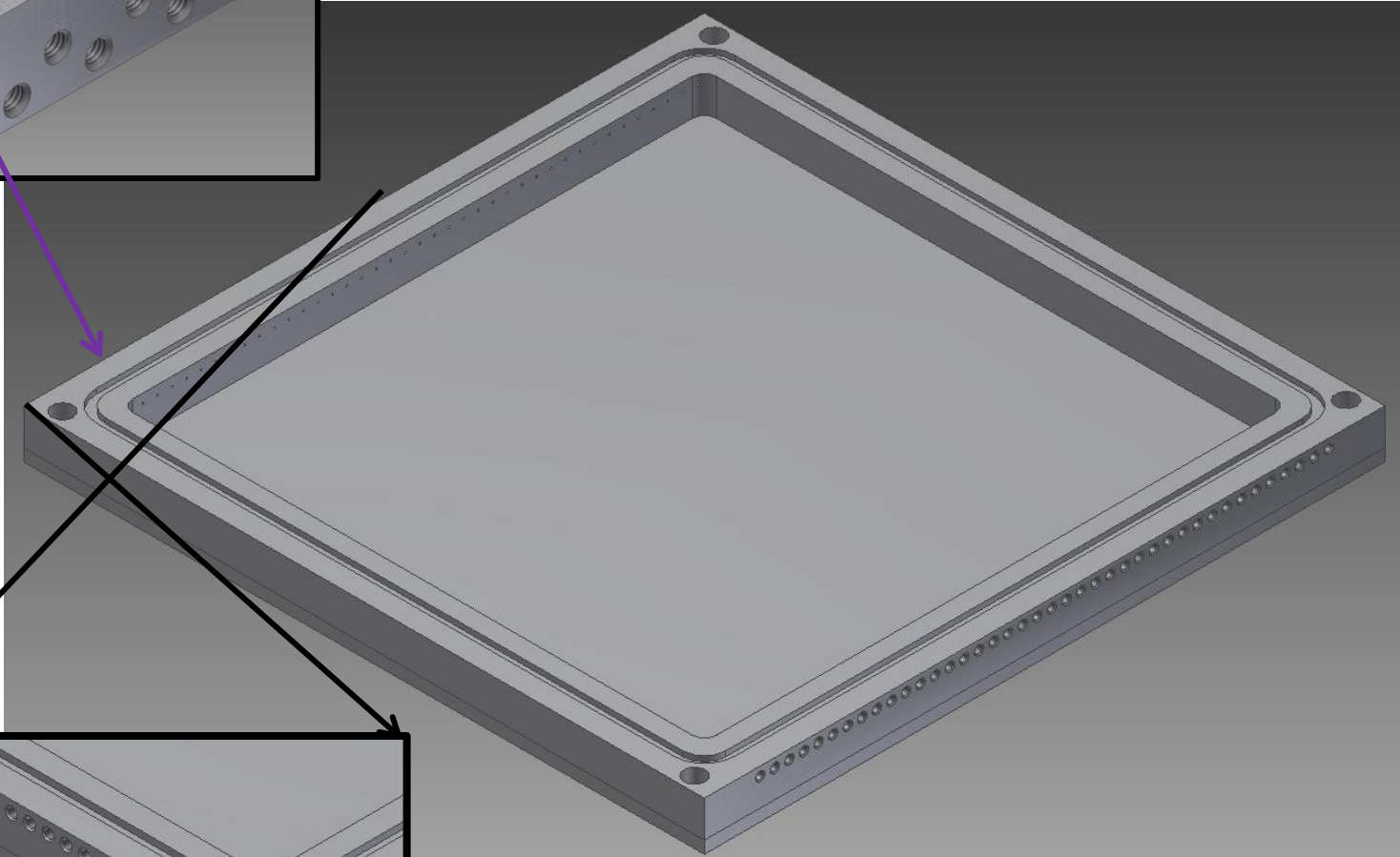


C,D



Odorized air flows from t-manifold to flow chamber through 1/16" OD 0.03" ID teflon tubing (connect with 10-32 vacutight fittings, both ends)

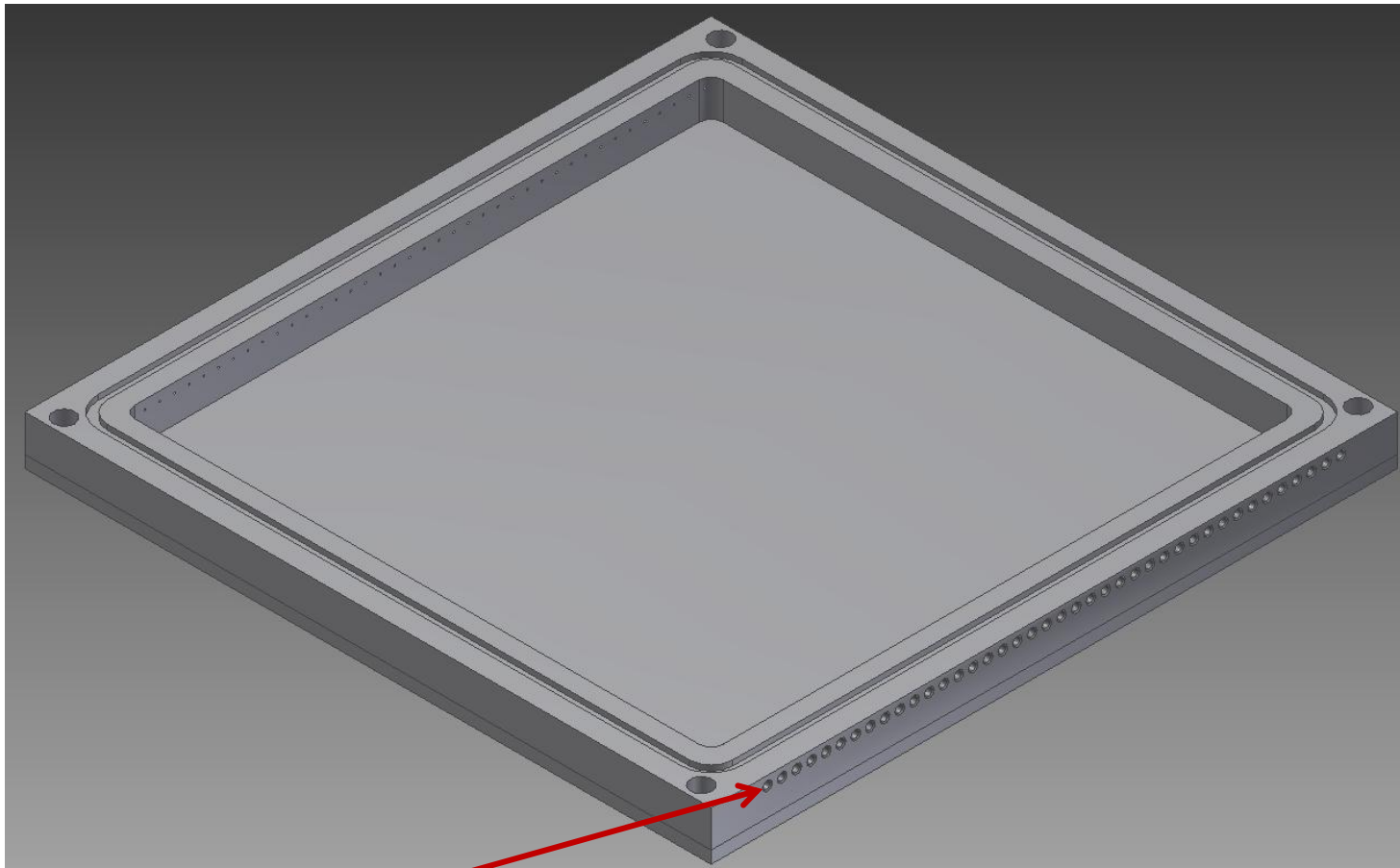
C



Connect with 10-32 vacutight fittings (40 places)

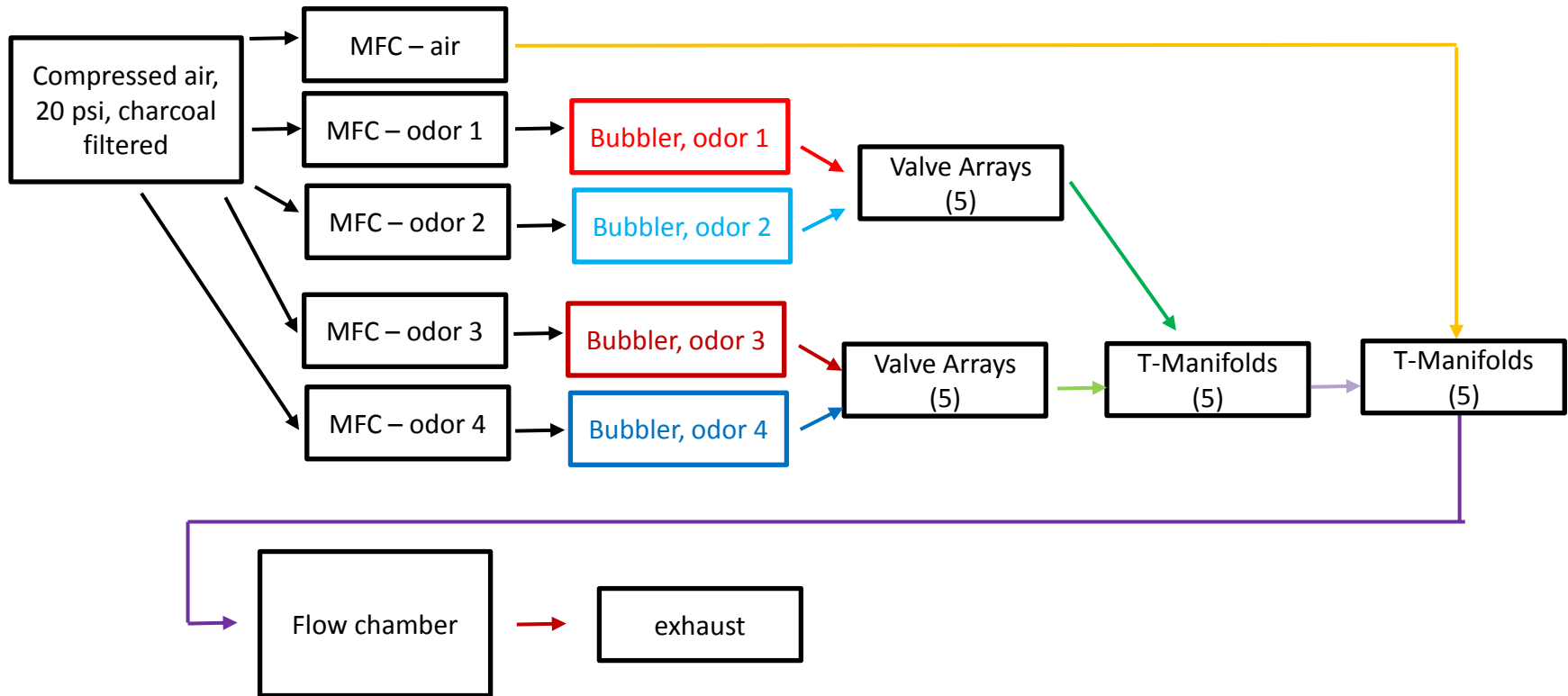


D



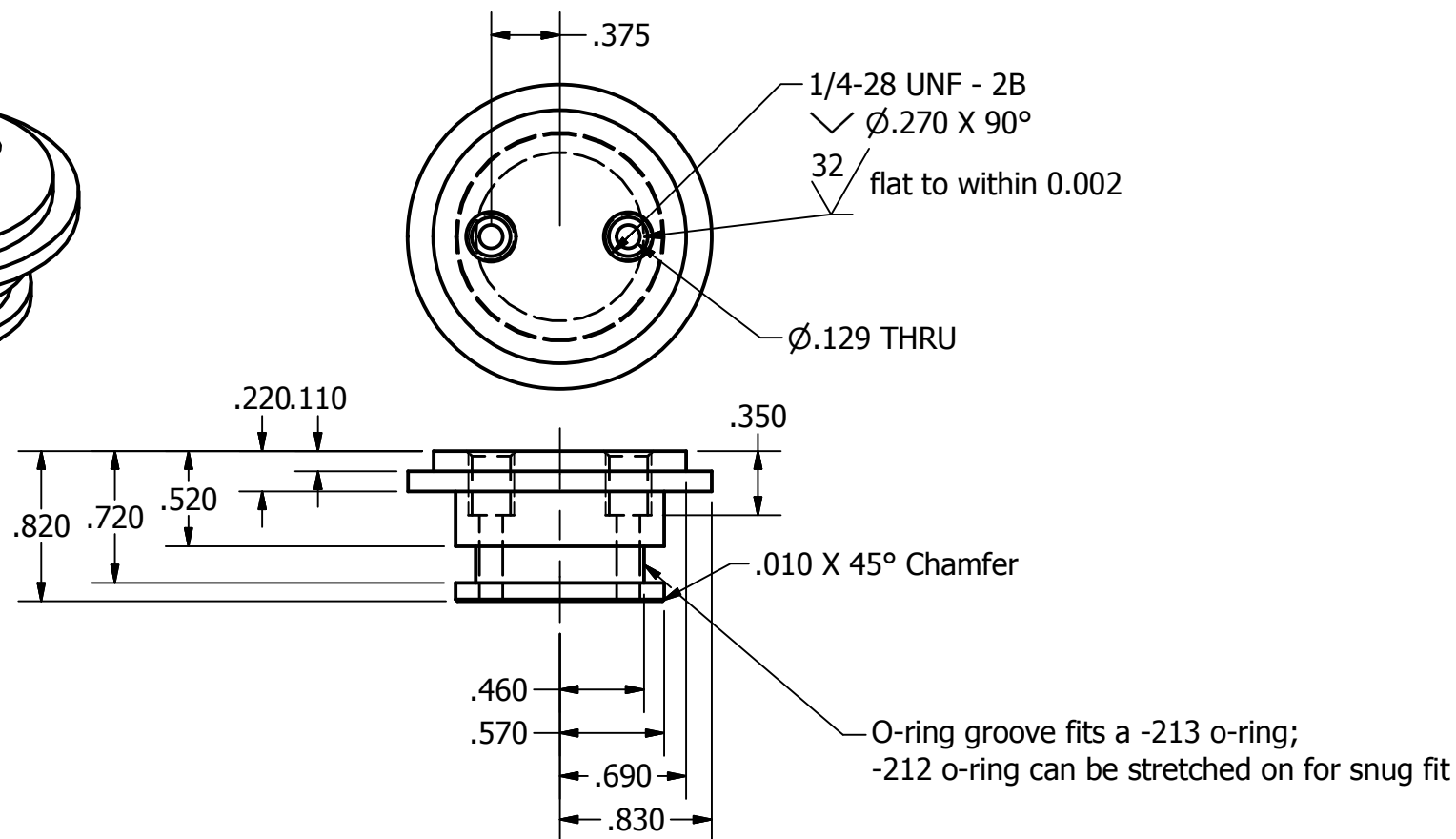
**Flow chamber outlet:** connect with clippard 10-32 to 1/16" ID hose barbs to 1/8" OD, 1/16" ID fep lined tygon tubing (40 x). Connect other end to clippard MAN-12 using clippard barbs. Connect all MAN-12s to MAN-ASF1-08 (use NPT plugs to fill empty connections). connect MAN-ASF1-08 to tubing (this is the outlet, which should run through a flow meter and then into whatever venting system you decide to use)

## Alternate connection scheme for multiple independent valve arrays



2

1



B

B

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A

A

DRAWN Marc Gershow	3/19/2012	LADY GAGA V. 2 (Marc Gershow, Samuel Lab, Harvard)		
CHECKED				
QA		TITLE		
MFG				
APPROVED		GL45 bottle - 1/428 flat bottom adapter		
		SIZE A	DWG NO GL45 - 1/4 28	REV
		SCALE	SHEET 1 OF 1	

2

1

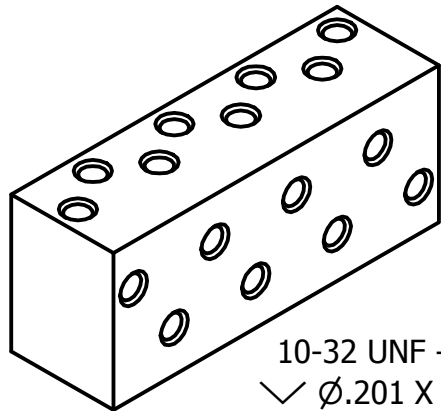


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1

2

1

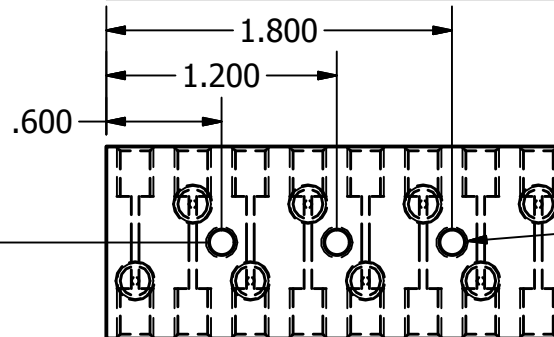
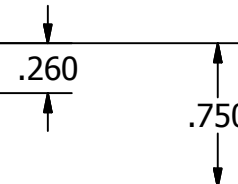
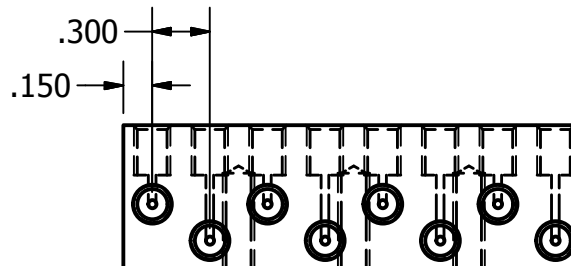
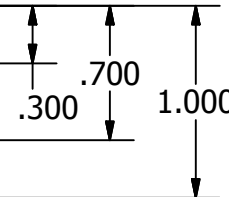
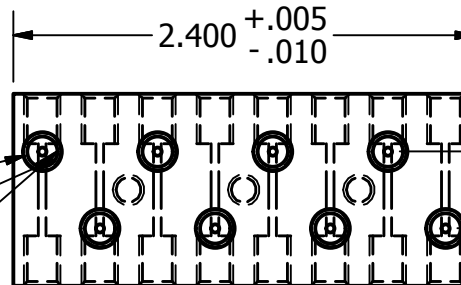


10-32 UNF - 2B

✓ Ø.201 X 90°

32

Flat to within 0.002  
0.26" deep 24 places

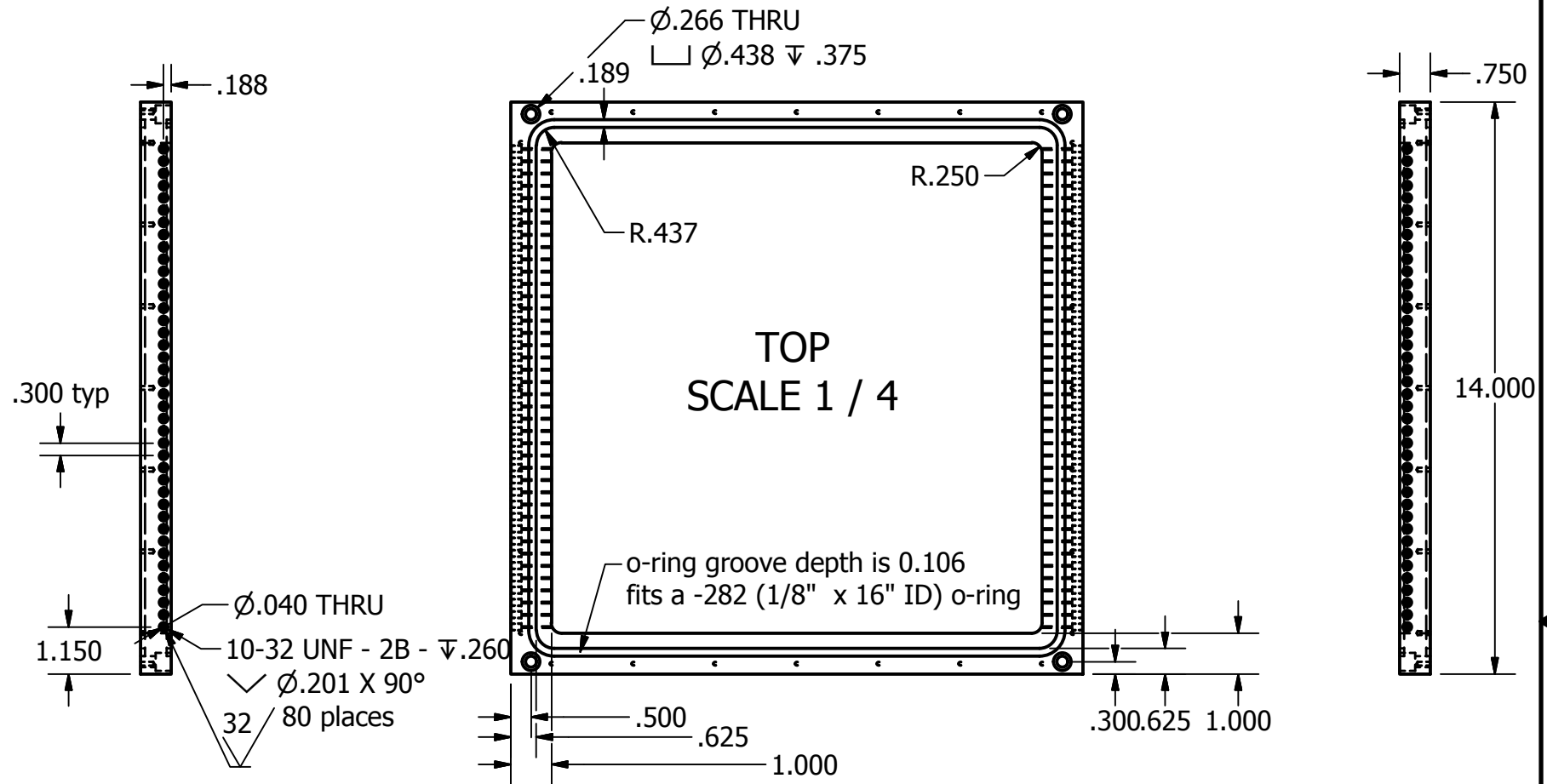


8-32 UNC - 2B 0.5" depth 3 places

DRAWN Marc Gershow	3/19/2012	LADY GAGA V. 2 (Marc Gershow, Samuel Lab, Harvard)		
CHECKED		TITLE		
QA		T-Manifold		
MFG		SIZE A		
APPROVED		DWG NO t-manifold		
		REV 00		
		SCALE 1:1		
		SHEET 1 OF 1		

2

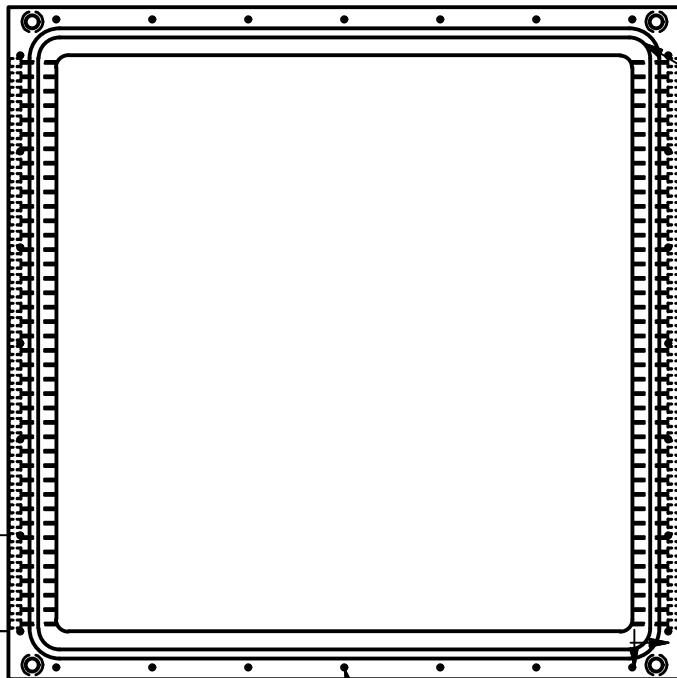
1



DRAWN Marc Gershow	3/19/2012	LADY GAGA V. 2 (Marc Gershow, Samuel Lab, Harvard)			A
CHECKED					
QA					
MFG					
APPROVED					
		TITLE			
		Flow Chamber Walls			
		SIZE A		DWG NO FlowChamberWalls	REV 00
		SCALE		SHEET 1 OF 2	

2

1



O-ring groove on bottom surface has same dimensions as o-ring groove on top

Bottom  
SCALE 1 / 4

2.000 typ

1.000

2.000 typ

.250

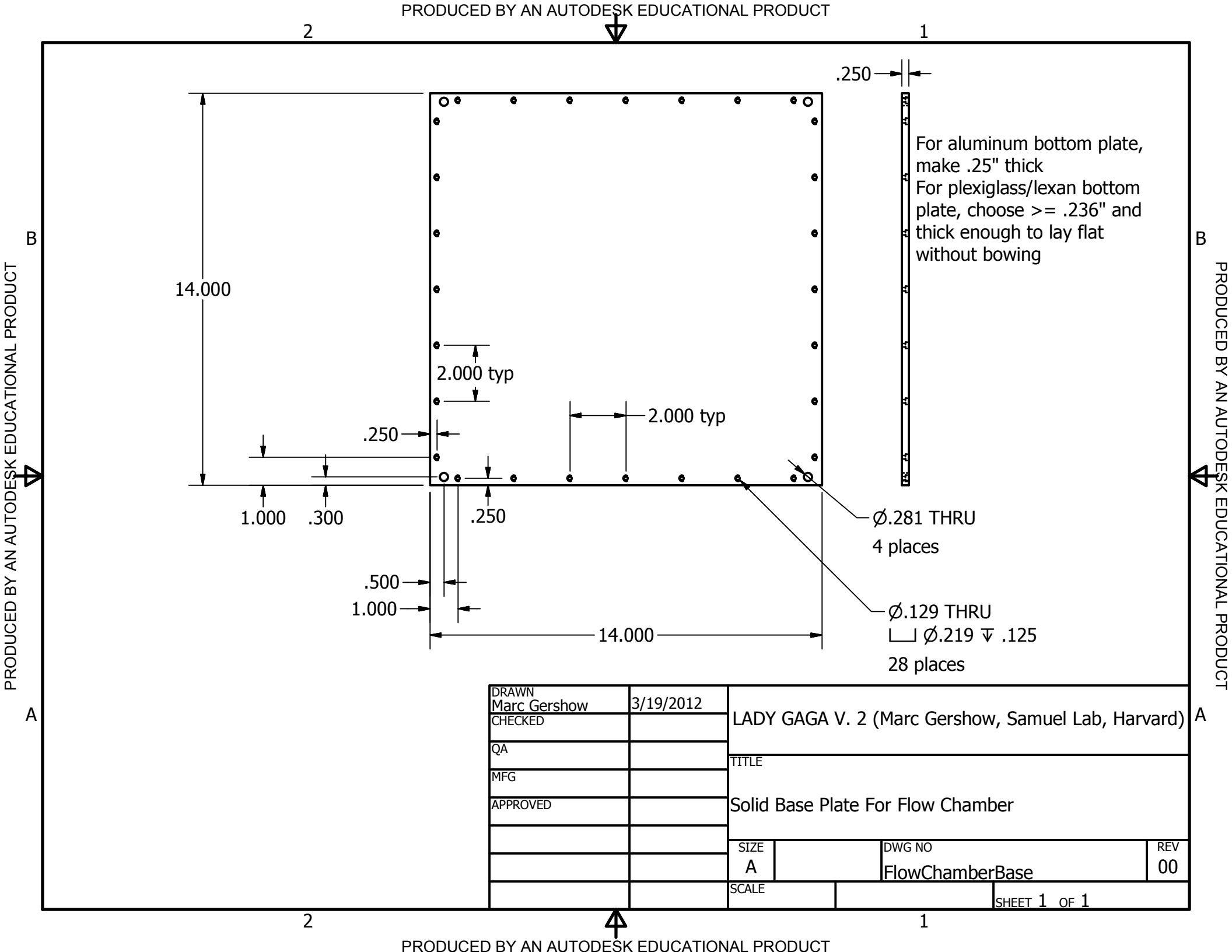
.250

4-40 UNC - 2B- $\nabla$ .313  
28 places

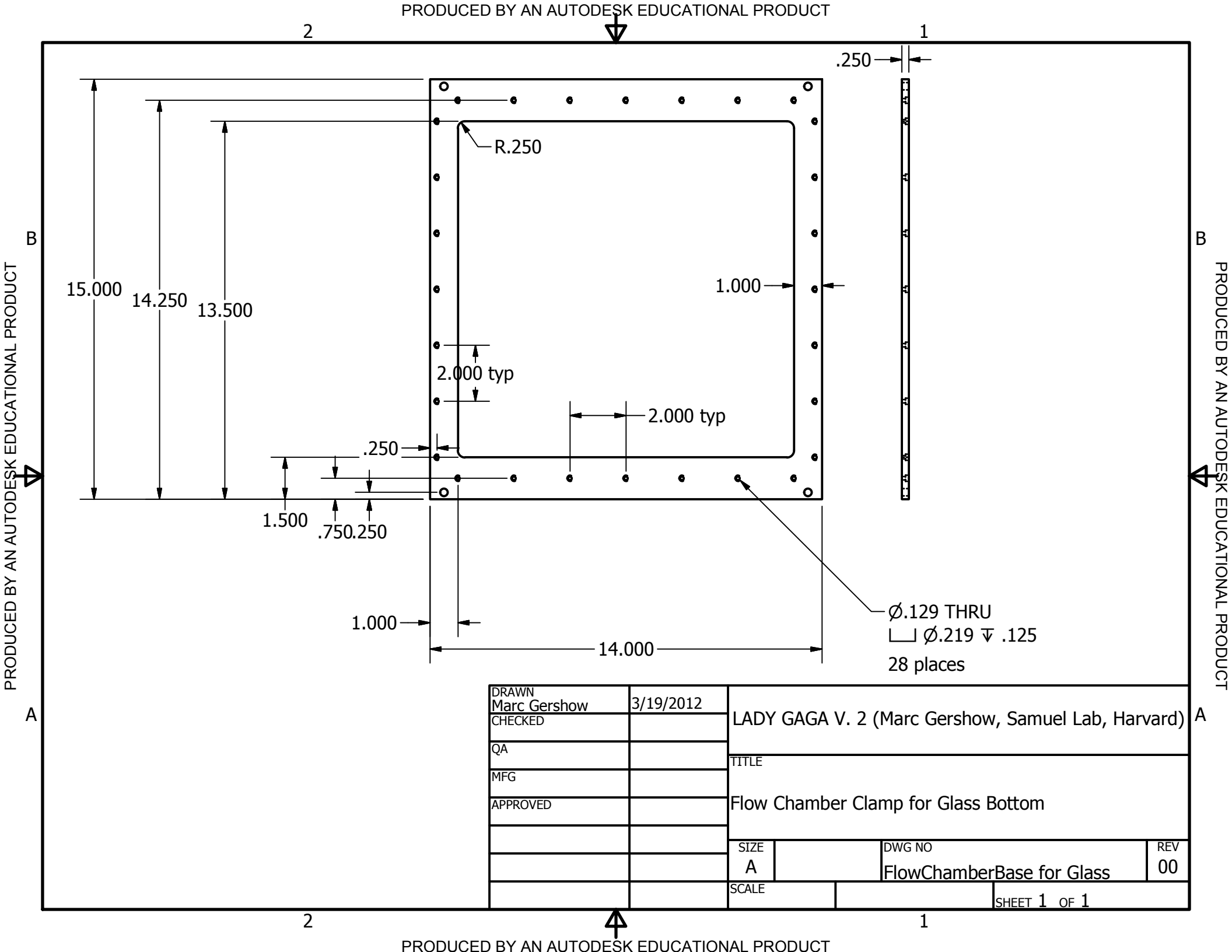
DRAWN Marc Gershow	3/19/2012	LADY GAGA V. 2 (Marc Gershow, Samuel Lab, Harvard)		
CHECKED				
QA		Flow Chamber Walls		
MFG				
APPROVED		Flow Chamber Walls		
		SIZE A	DWG NO FlowChamberWalls	REV 00
		SCALE	SHEET 2 OF 2	

2

1







2

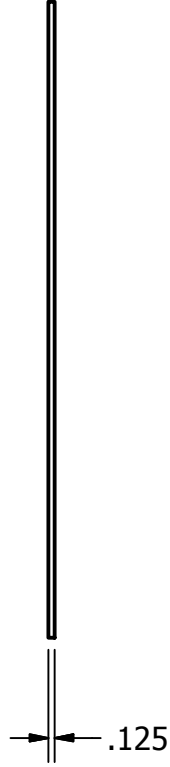
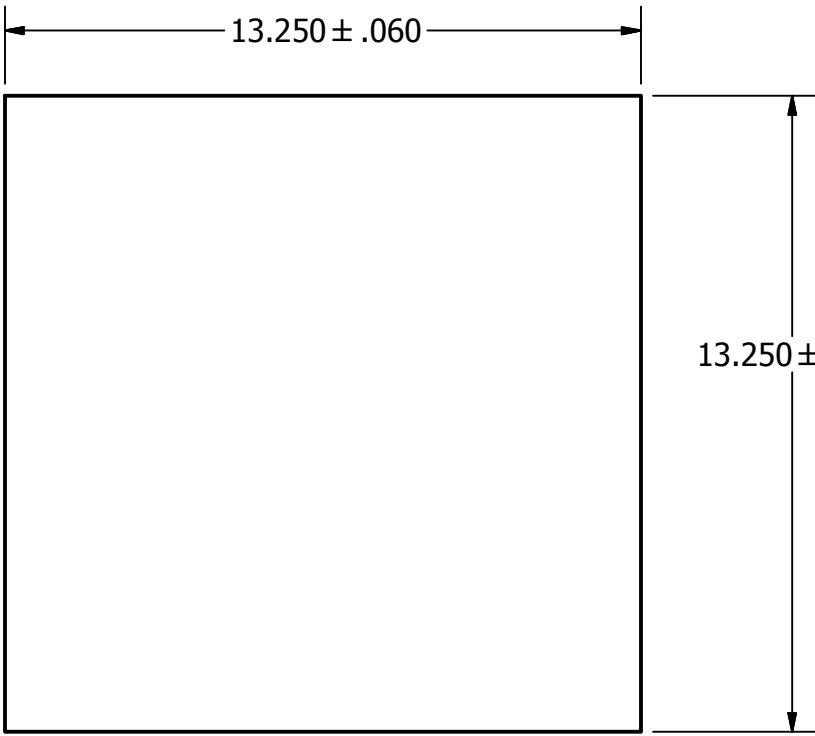
1

B

B

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A

A

DRAWN Marc Gershow	3/19/2012	LADY GAGA V2 (Marc Gershow, Samuel Lab, Harvard)		
CHECKED				
QA		TITLE Bottom Glass Plate		
MFG				
APPROVED		SIZE A		
		DWG NO Bottom Glass Plate	REV 00	
		SCALE	SHEET 1 OF 1	

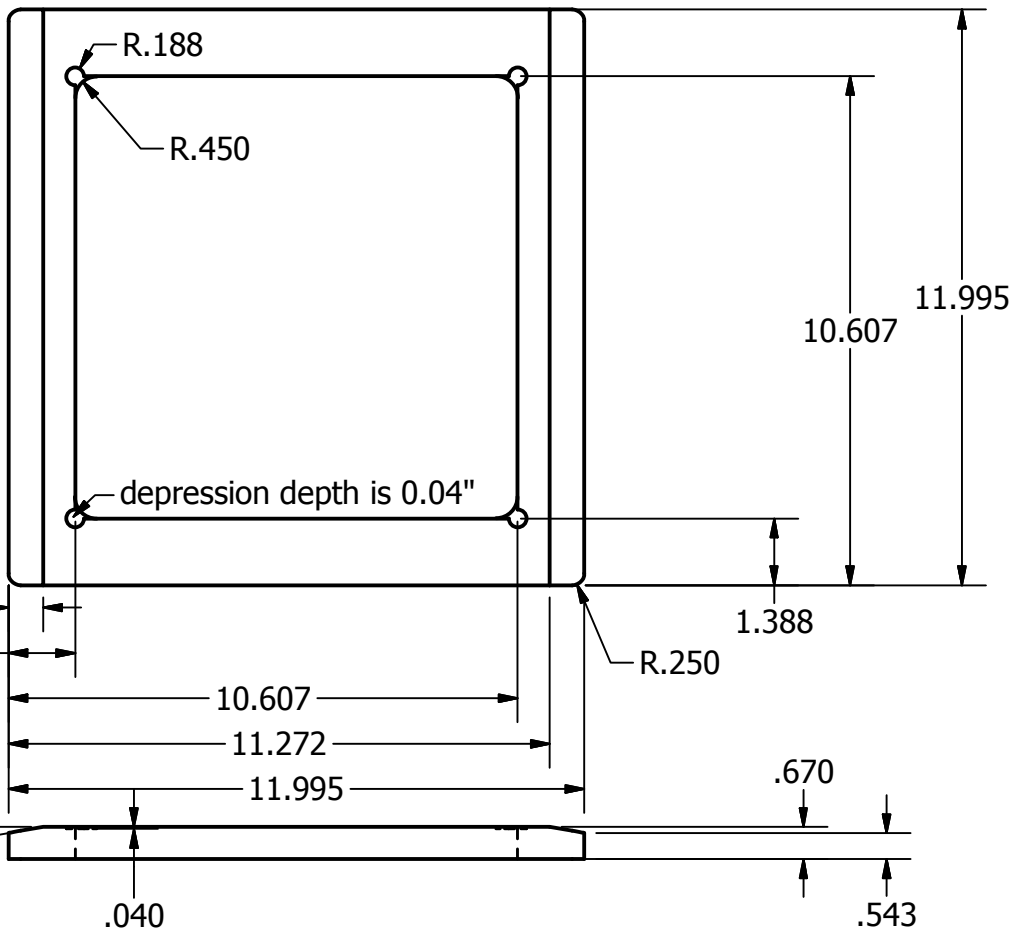
2

1



2

1

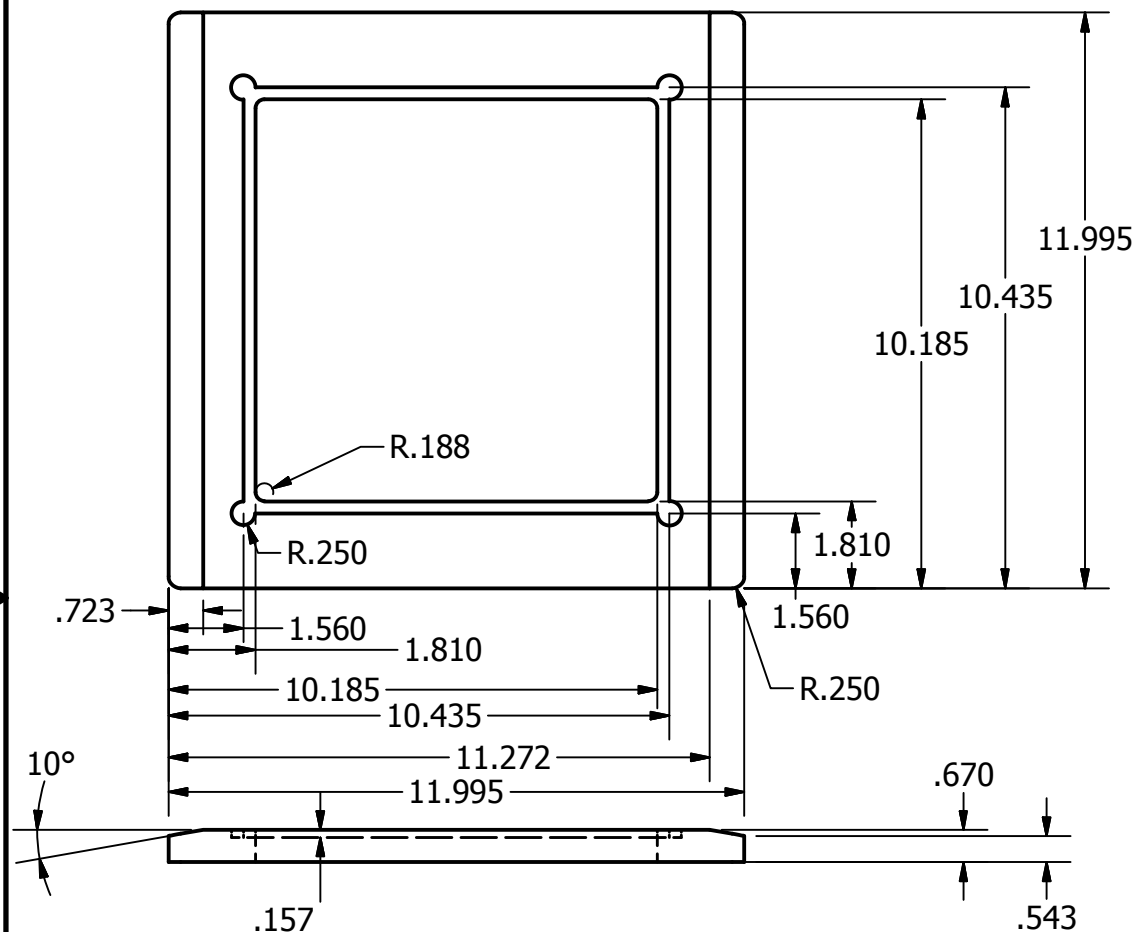


Insert should slip fit into flow chamber  
BD Biodish-XL should slip fit into center  
of insert  
Insert height should match top edge of  
BD Biodish-XL when both are placed on  
same flat surface

DRAWN Marc Gershow	3/19/2012	LADY GAGA V. 2 (Marc Gershow, Samuel Lab, Harvard)		
CHECKED				
QA		Insert to hold BD Biodish XL		
MFG				
APPROVED		FlowChamberInsert_BiodishXL		
		SIZE A	DWG NO FlowChamberInsert_BiodishXL	REV 00
		SCALE	SHEET 1 OF 1	

2

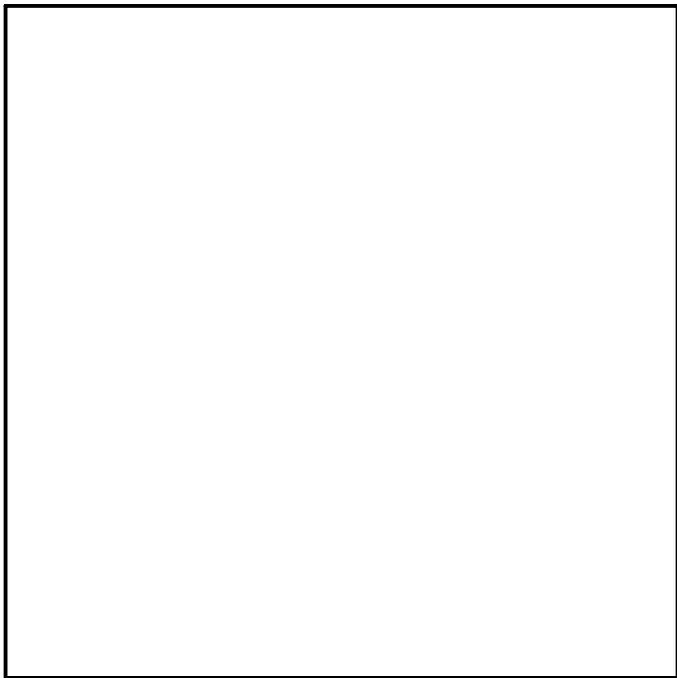
1



DRAWN Marc Gershow	3/19/2012	LADY GAGA V. 2 (Marc Gershow, Samuel Lab, Harvard)		
CHECKED				
QA		TITLE		
MFG				
APPROVED		Insert to hold agar plate		
		SIZE A	DWG NO FlowChamberInsert_Plate	REV 00
		SCALE	SHEET 1 OF 1	

2

1



14.00 <sup>+.00</sup>  
<sub>-.25</sub>

14.00 <sup>+.00</sup>  
<sub>-.25</sub>



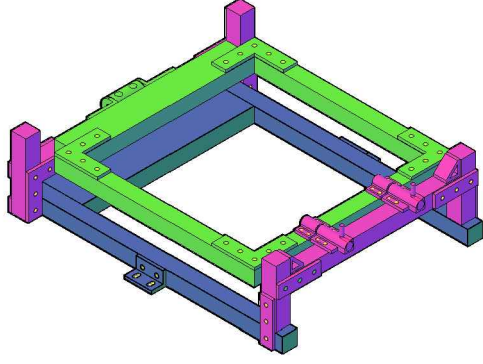
.125

DRAWN Marc Gershow	3/19/2012	LADY GAGA V. 2 (Marc Gershow, Samuel Lab, Harvard)			
CHECKED					
QA		TITLE			
MFG					
APPROVED		Glass Plate for Top of Flow Chamber			
		SIZE A		DWG NO Top Glass Plate	REV 00
		SCALE		SHEET 1 OF 1	

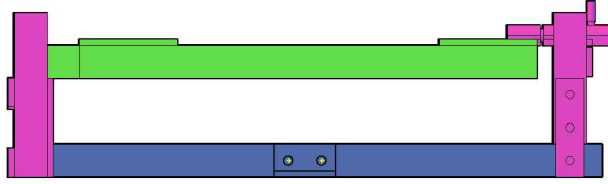
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1

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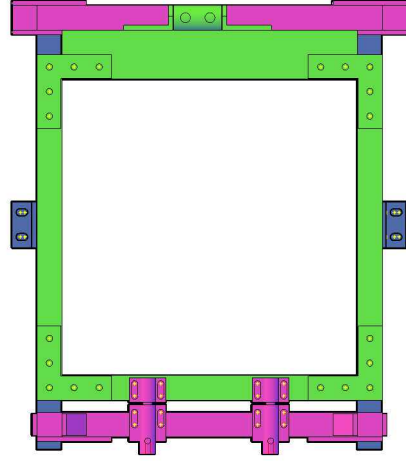
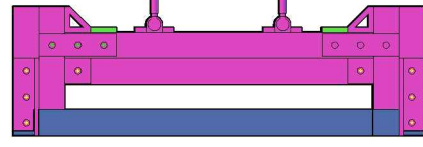


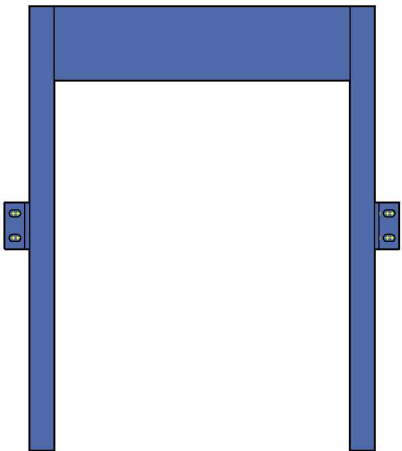
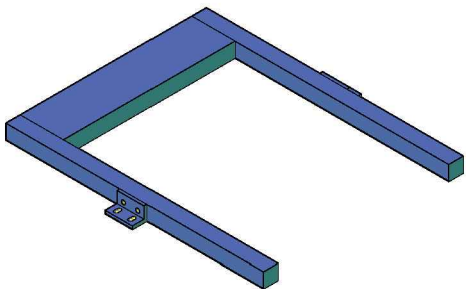
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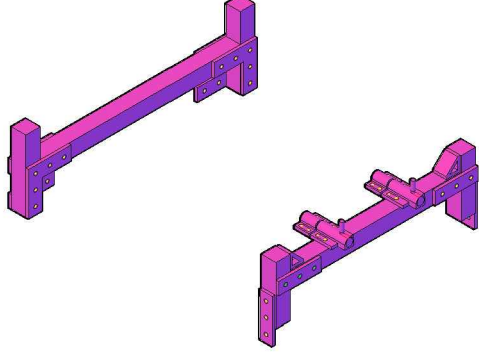
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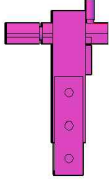
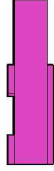




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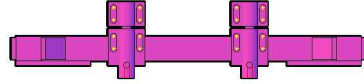
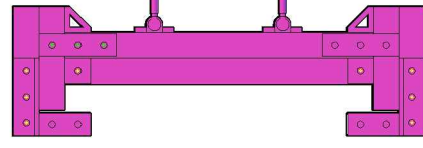


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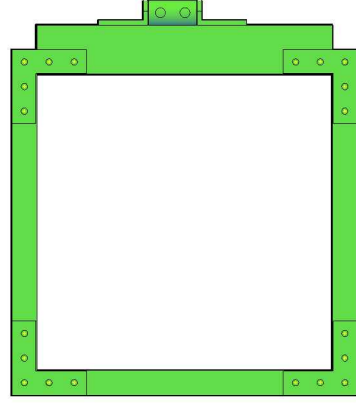
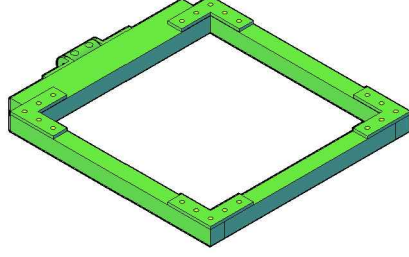
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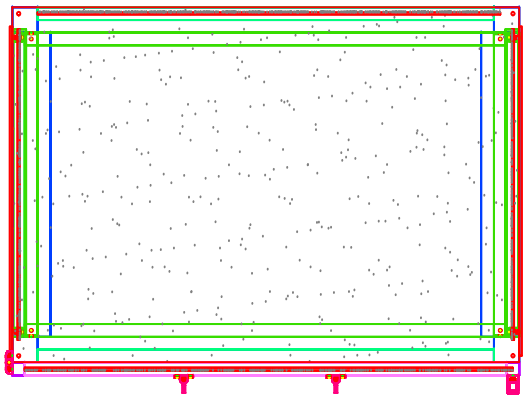
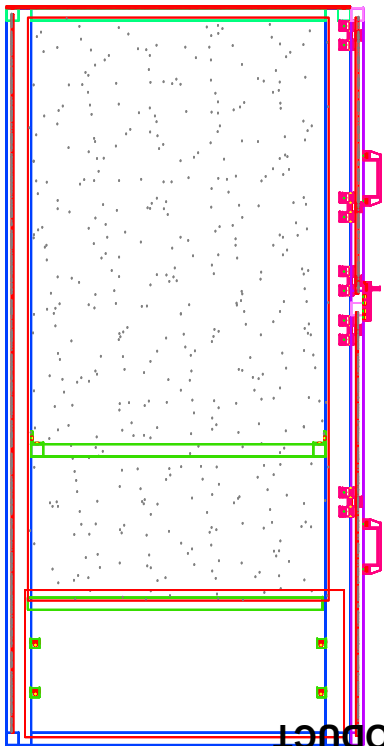
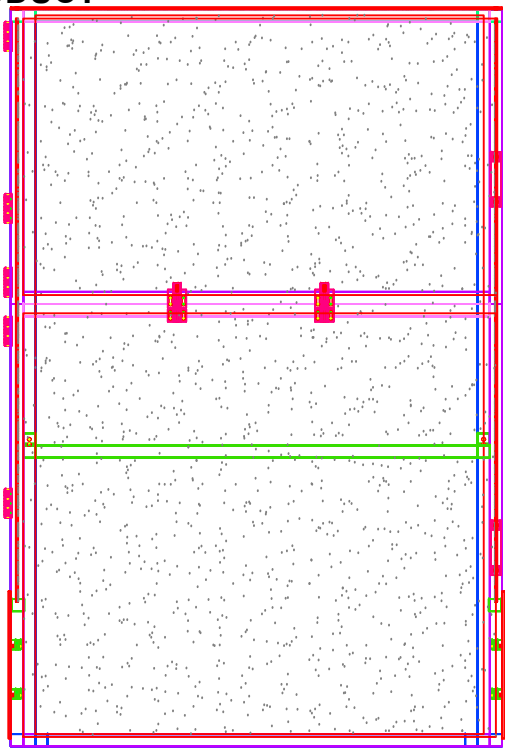
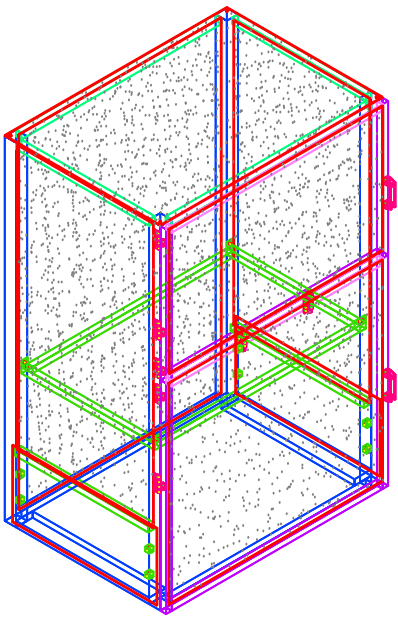


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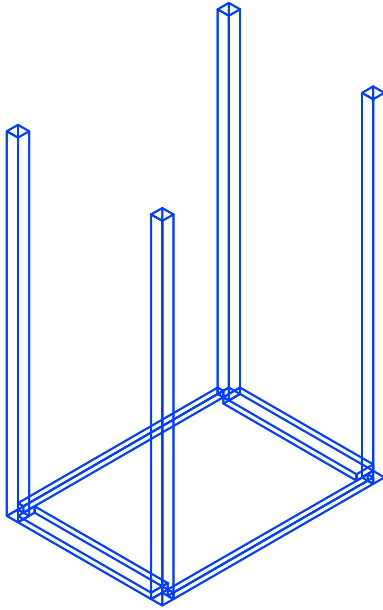


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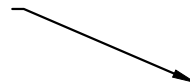


assembly instructions for lady gaga enclosure  
(is it really that much worse than IKEA?)  
Letters indicate line on BOM

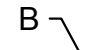
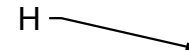
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Anchor fastener goes on bottom of box



Place a 1/4-20 double economy t-nut in top middle t-slot before assembling (both sides)



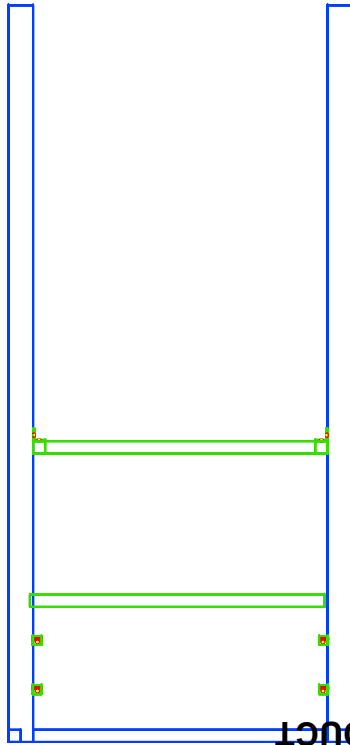
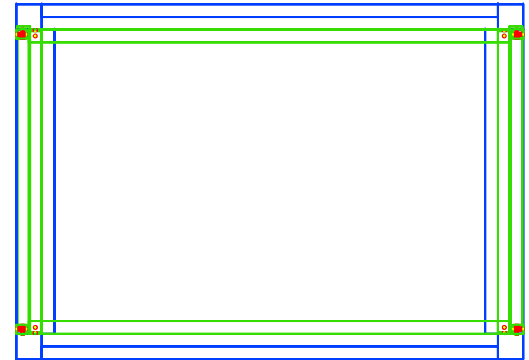
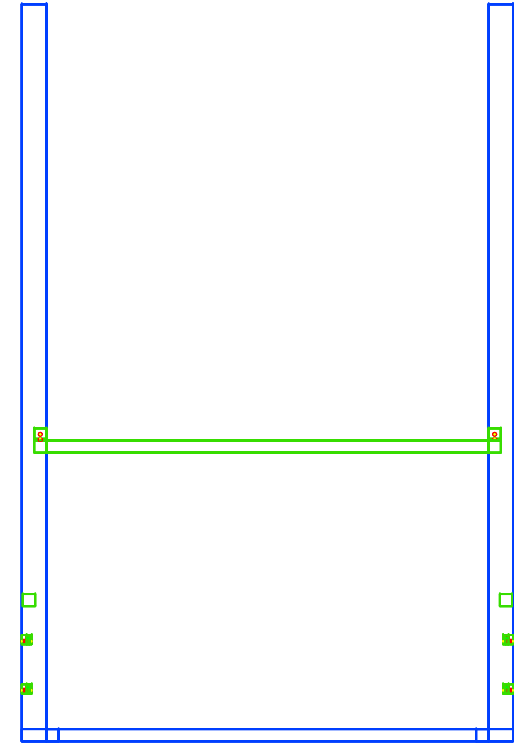
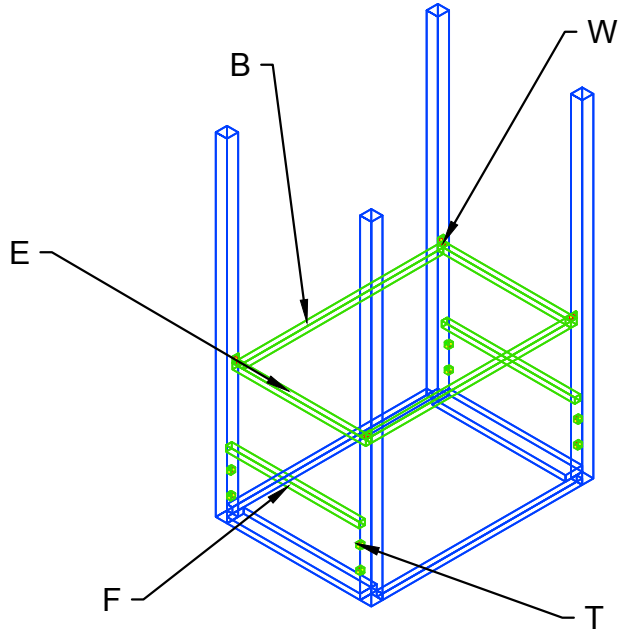
connect side posts (2x2x60) to bottoms (1x3x24 and 1x1x36). All parts should line up on the outside of the box. Make sure anchor fasteners face down.

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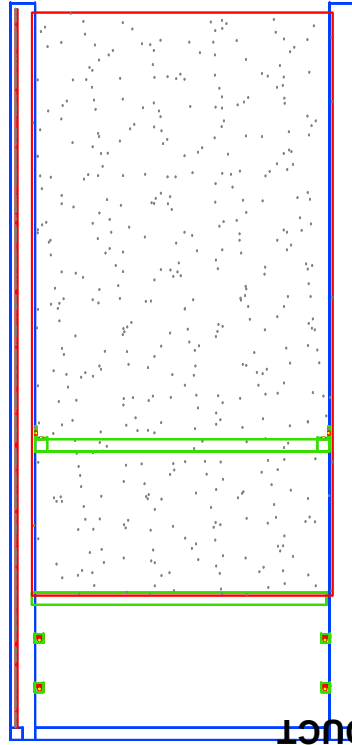
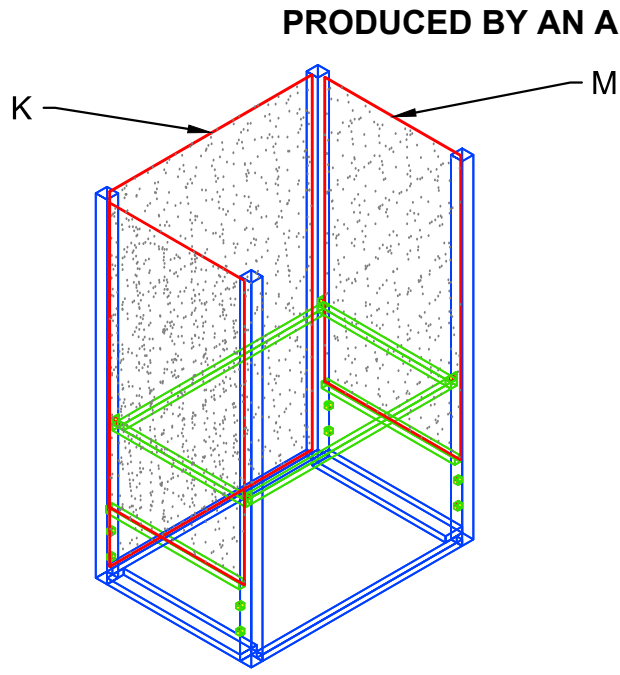
insert panel mount blocks and panel divider (1x1x24 with anchor fasteners at either end) into outer t-slots. Insert accessory support frame into inner t-slots.

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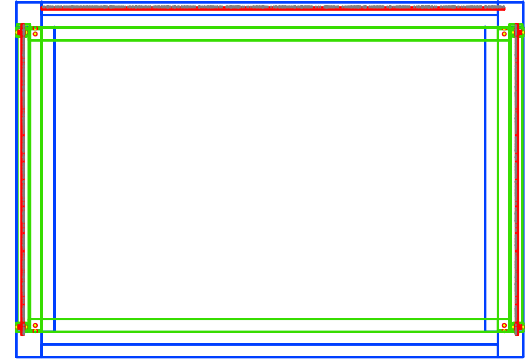
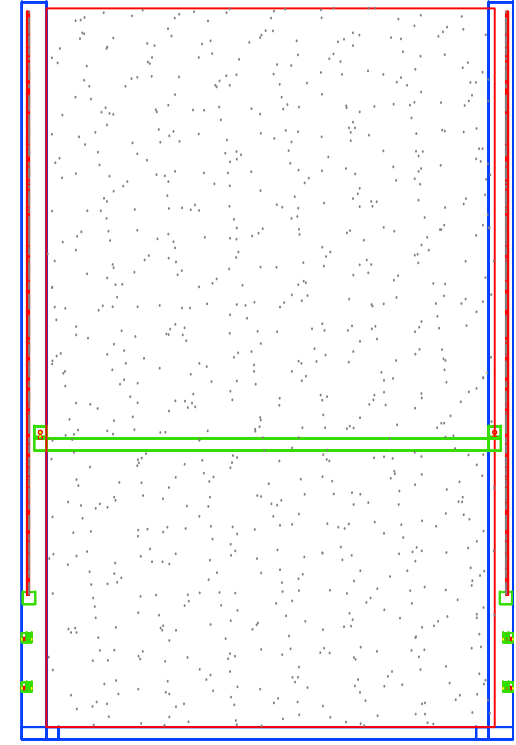
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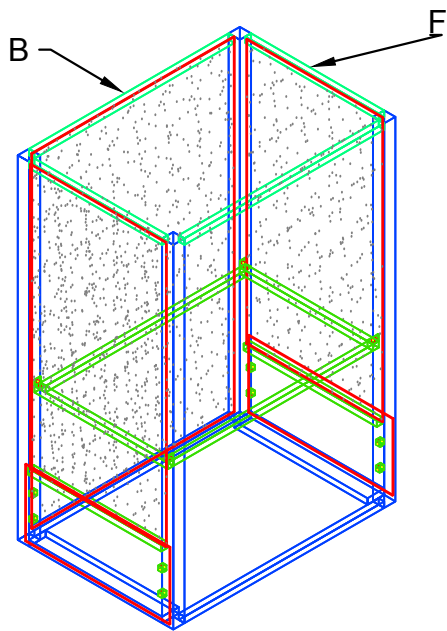


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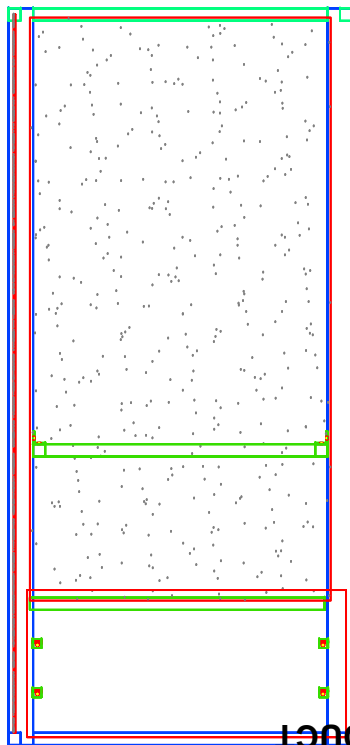
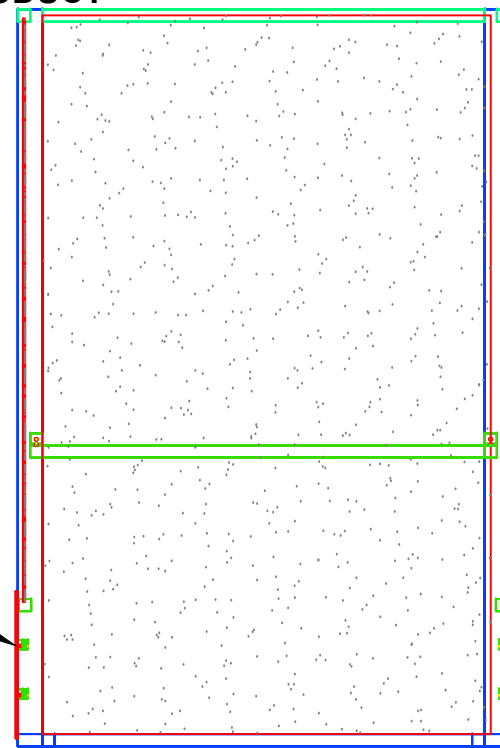
insert panels into t-slots. back panel is 36.5x58.5. side panels are 24.5 x 47.5. face textured surface in.



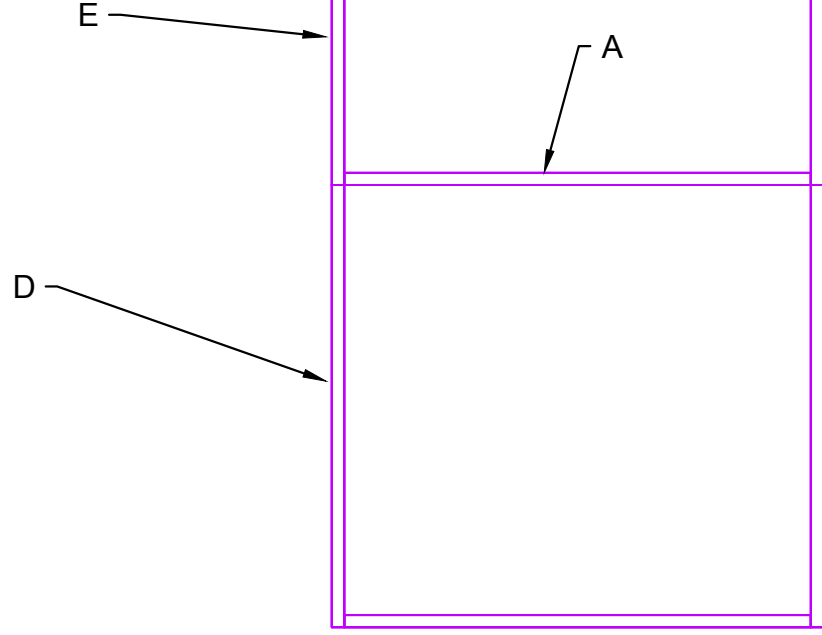
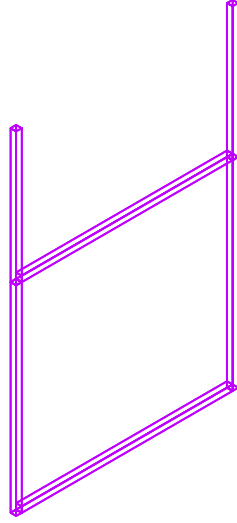
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J

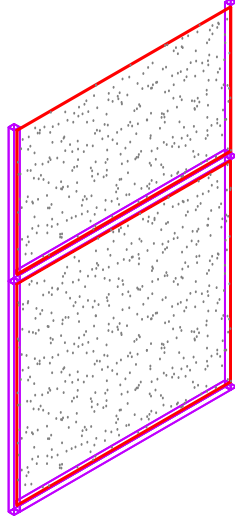


Place extrusion on top of frame to secure panels. Anchor fasteners should face up. Use 2 1x1x24 extrusions and 2 1x1x36 extrusions with anchor fasteners in both sides. Attach feedthrough panels to panel mount blocks.



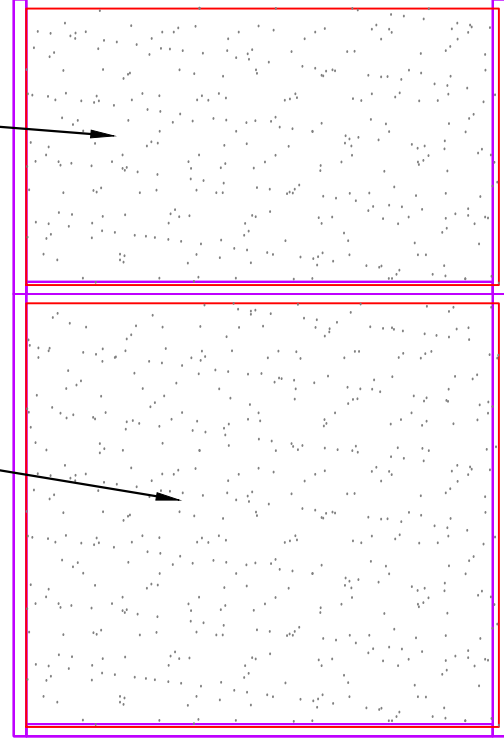
assemble doors. Although drawn together here, doors are separate and are not screwed together. Start by assembling sides (1x1x24 x 2 pieces top; 1x1x36 x 2 pieces bottom) and bottoms (1x1x38 with anchor fasteners in either end). Face anchor fasteners down.





O

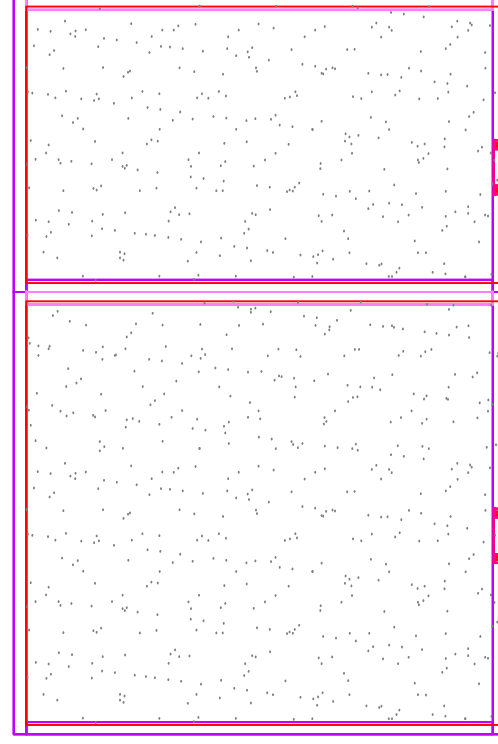
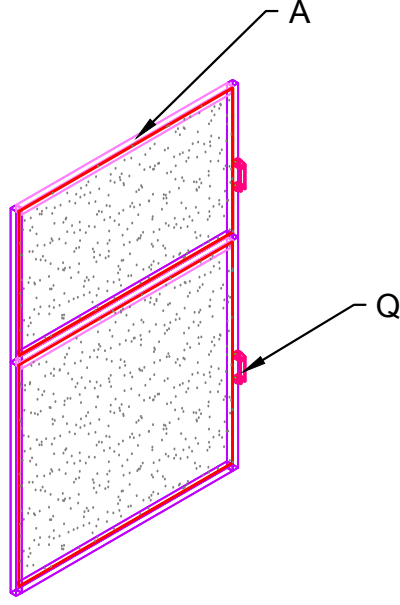
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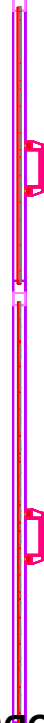
insert panels (38.5 x 22.5 top; 38.5x34.5 bottom) into doors.

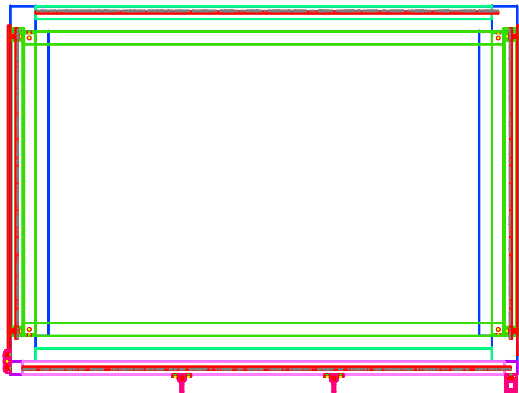
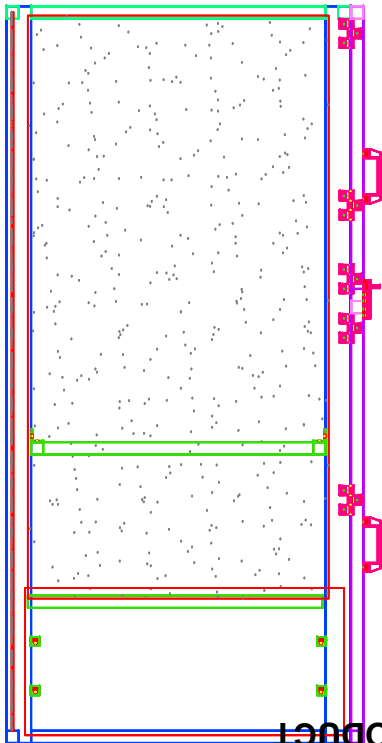
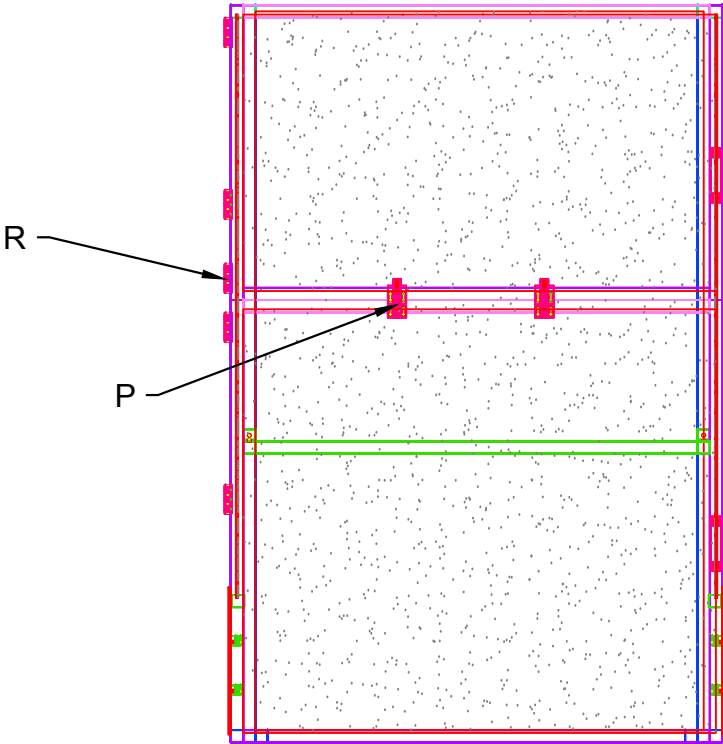
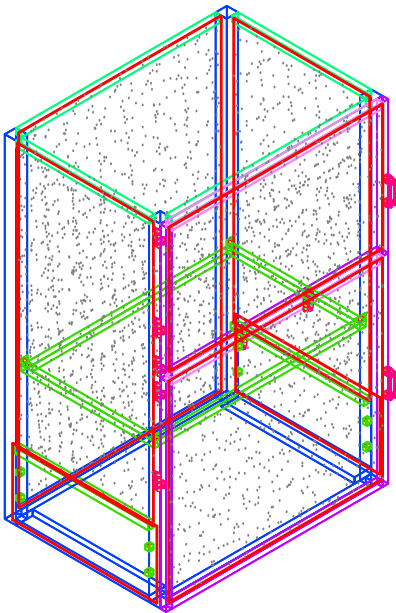






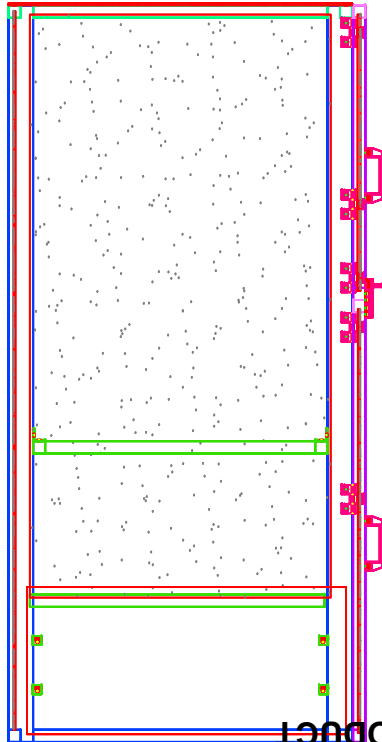
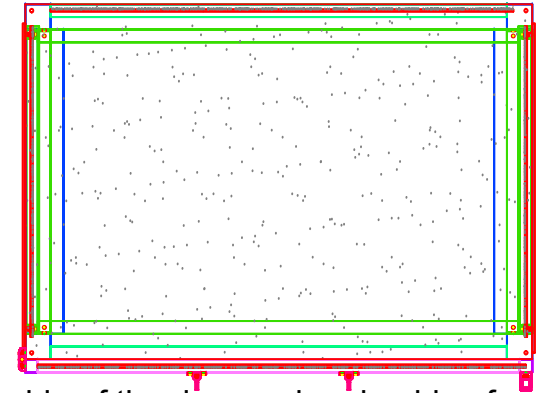
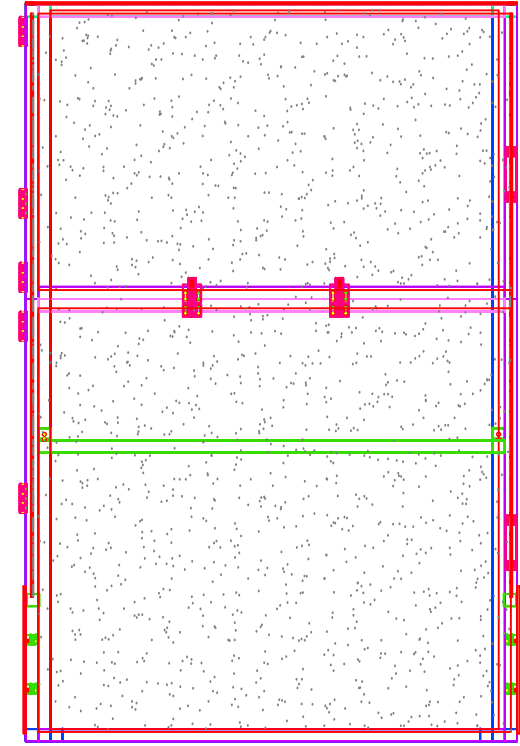
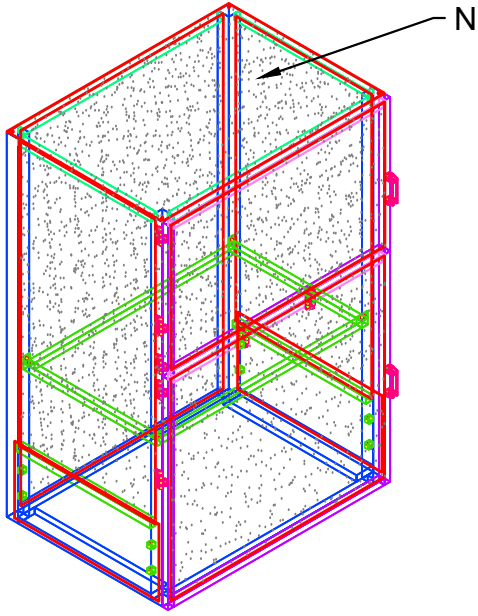
add top extrusion to secure panel (1x1x38  
with anchor fasteners both sides). anchor  
fasteners face up





mount doors to box using hinges. doors should sit on top of one another. when you are satisfied with door placement, connect them with deadbolt latch

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gasket the panels (using panel gasket strip) inside of the door and underside of exterior feedthrough panels (using  $\frac{1}{16}$ " adhesive gasket from mcmaster). install draw latches (mcmaster carr) using 8-32 t-nuts (you may have to drill out clearance on latch slightly). screw on the top with  $\frac{1}{4}$ -20 screws. Have a beer! You're done

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extra hardware (really just to confuse you, but also possibly useful). Extra extrusion to construct interior scaffolding; tubing supports; extra l-brackets. 4 hole plates to attach breadboard to frame. Also included an assortment of extra t-nuts and some tools.

