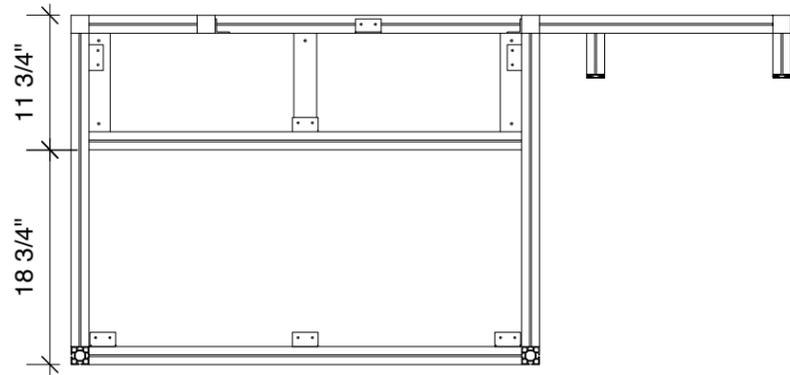


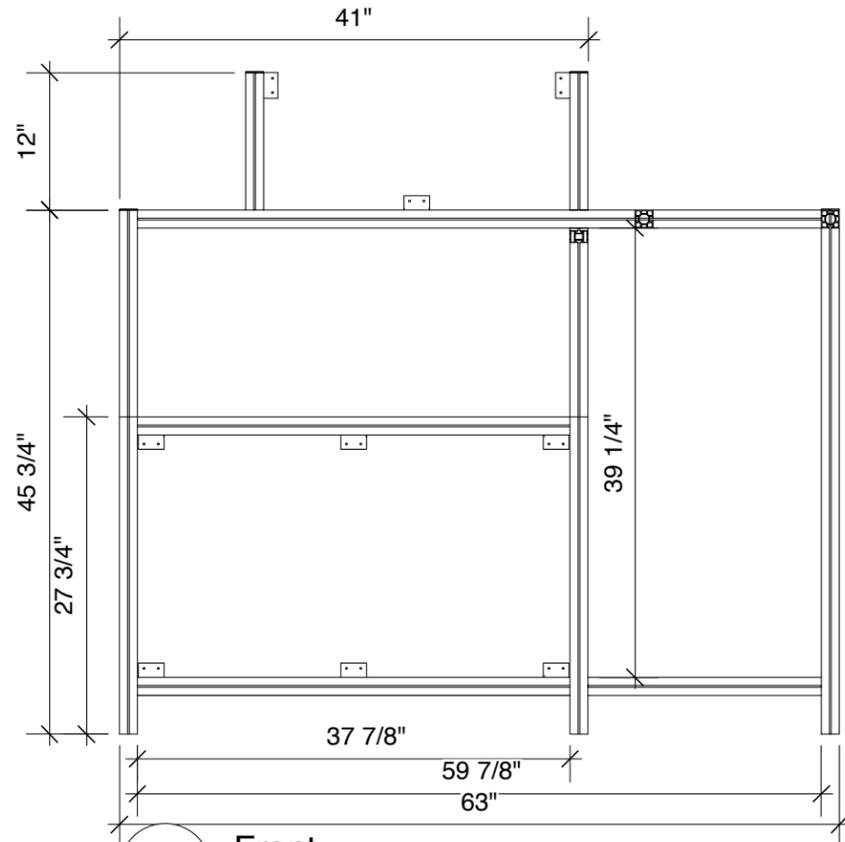

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 120 W KELLOGG, ST. PAUL, MN 55102
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DRAWING TITLE: Bump and Roll Overview			
COMPONENT TITLE: Bump and Roll		DRAWN BY: MDA	DATE DRAWN: 04/20/2009
REVISED BY:	DATE REVISED:	REVISION DESCRIPTION:	SCALE: as noted
EXHIBIT TITLE: NISE Network Exhibits			SHEET #: 1 of 1





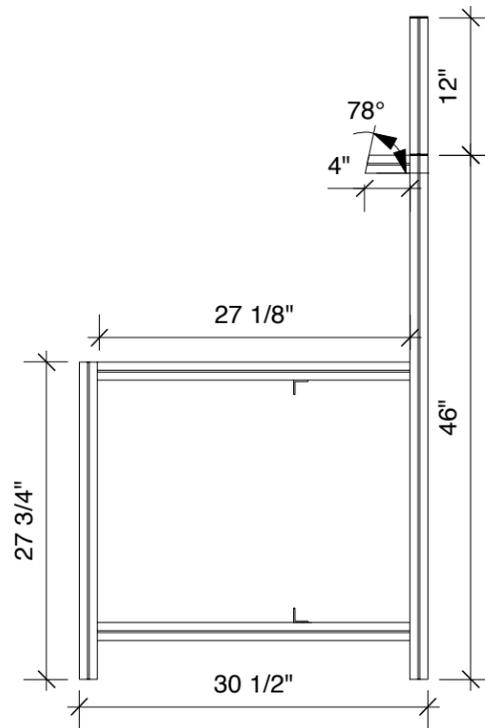
1 Top
Scale: 3/4" = 1'-0"



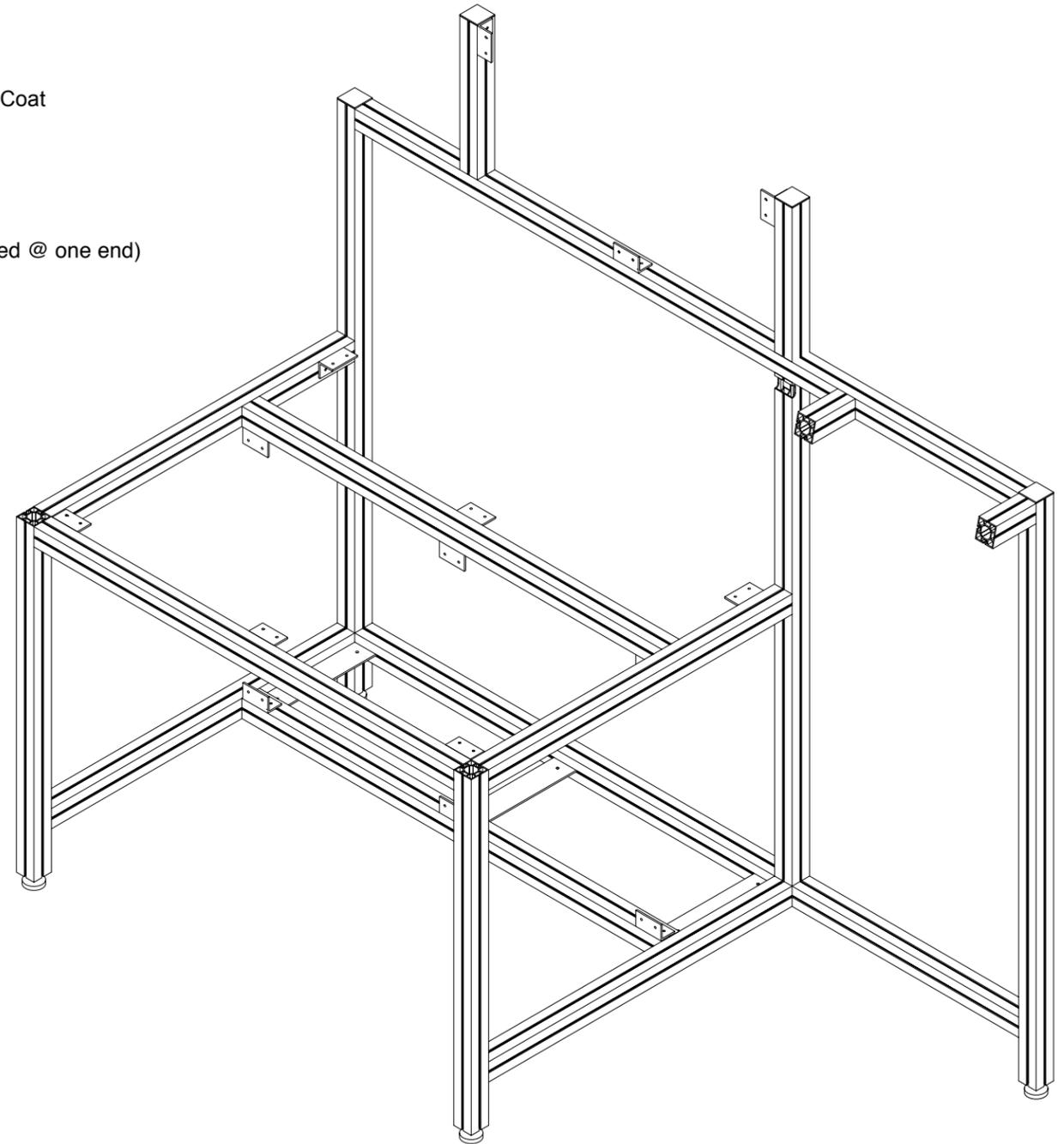
2 Front
Scale: 3/4" = 1'-0"

All members are Octanorm M1000.
Tiger Drylac RAL 09/10126 Glossy White Powder Coat

- 2@1520 both ends drilled w/ locks
- 2@1162
- 1@996 both ends drilled w/ locks
- 3@961 both ends drilled w/ locks
- 2@703
- 4@690 both ends drilled w/ locks(1 has locks turned @ one end)
- 2@305 1 end drilled w/ lock
- 2@100 1 end drilled w/ locks\



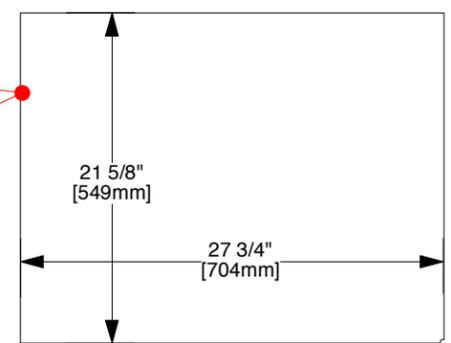
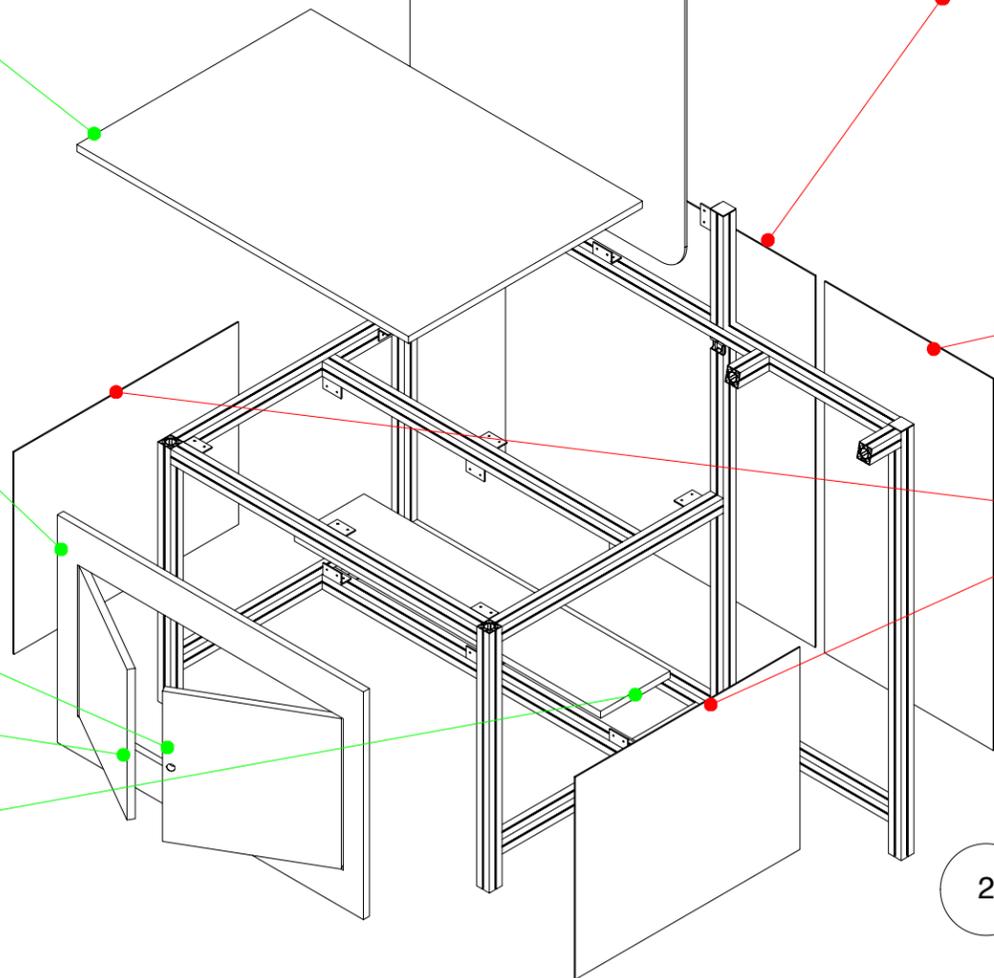
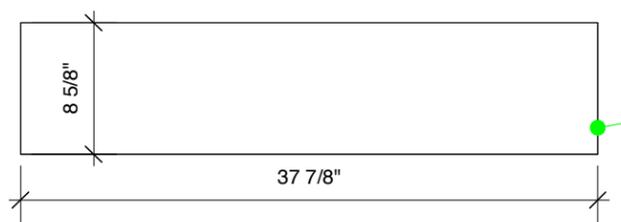
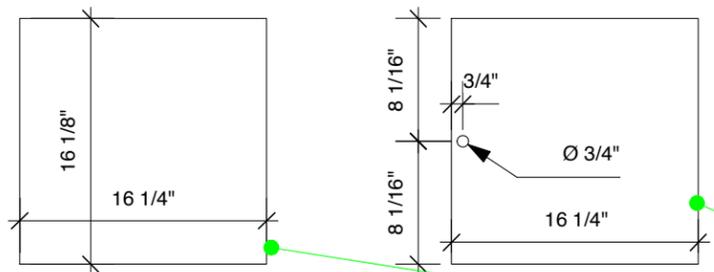
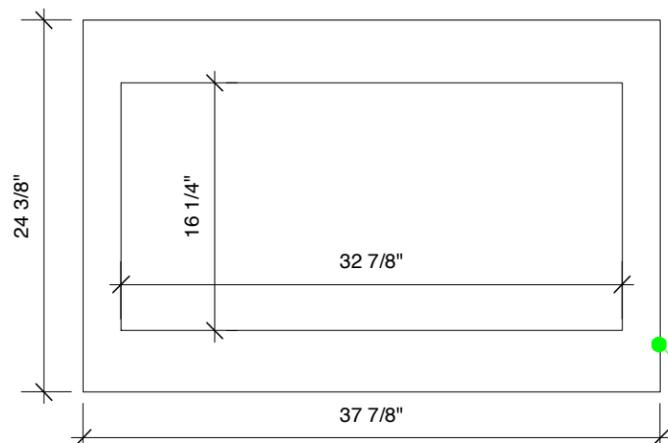
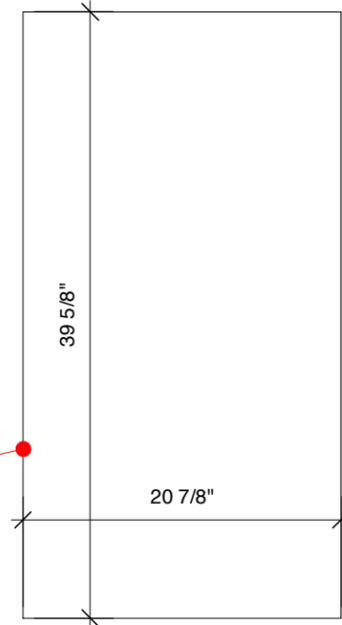
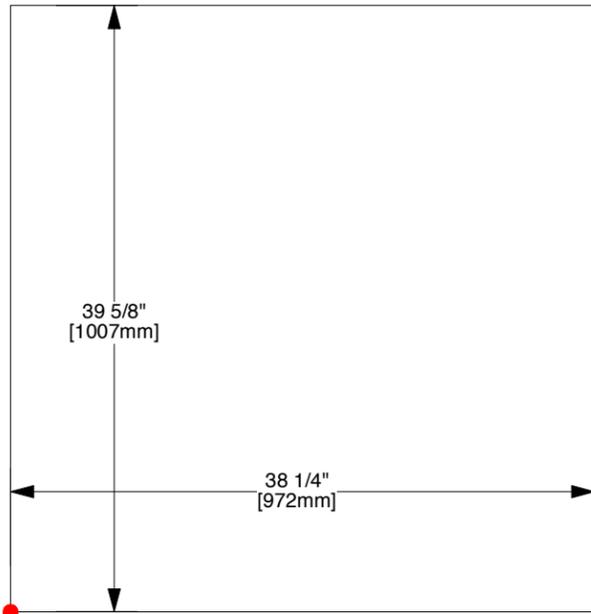
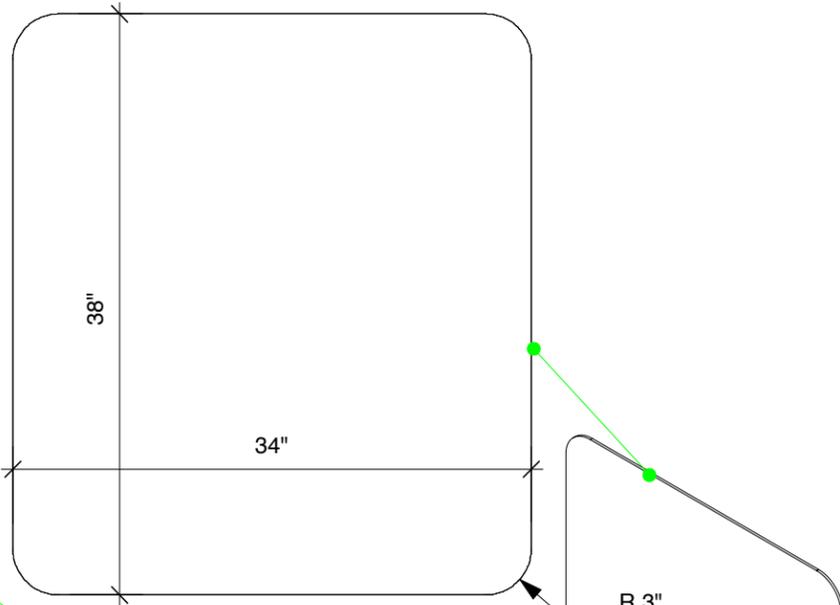
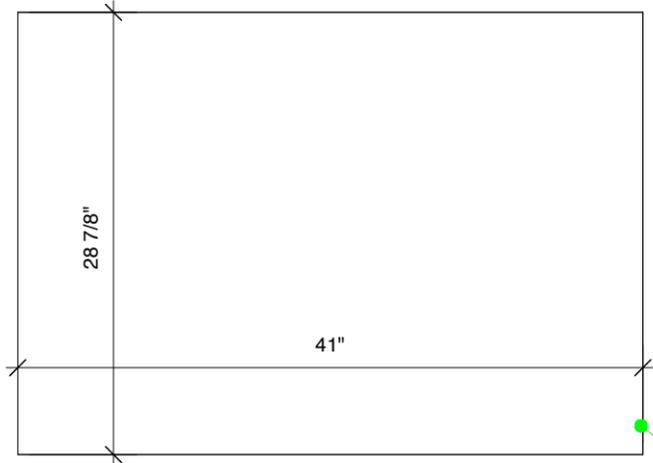
3 Right Side
Scale: 3/4" = 1'-0"



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DRAWING TITLE: Octanorm Frame			
COMPONENT TITLE: Table Frame		DRAWN BY: MDA	DATE DRAWN: 7/01/2009
REVISED BY:	DATE REVISED:	REVISION DESCRIPTION:	SCALE: as noted
EXHIBIT TITLE: NISE Network Exhibits			SHEET #: 1 of 3



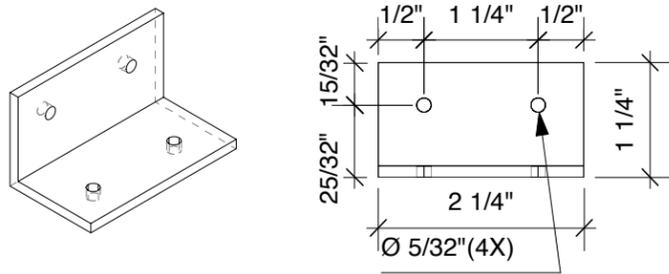


1 Plywood Parts
 Scale: 1" = 1'-0"
 3/4" Plywood
 Formica Gloss White Laminate on all public surfaces.

2 Acrylic Panels
 Scale: 1" = 1'-0"
 Plexiglass W2447 White

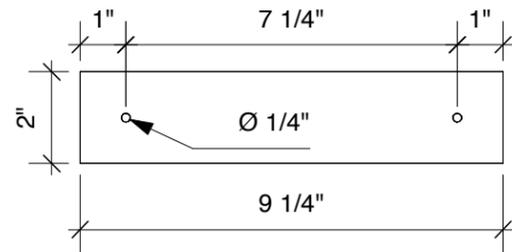
 120 W KELLOGG, ST. PAUL, MN 55102 ©2008 THE SCIENCE MUSEUM OF MINNESOTA		DRAWING TITLE: Casework Details	
COMPONENT TITLE: Table Frame		DRAWN BY: MDA	DATE DRAWN: 9/29/09
REVISED BY:	DATE REVISED:	REVISION DESCRIPTION:	
EXHIBIT TITLE: NISE Network Exhibits		SCALE: as noted	
		SHEET #: 2 of 3	





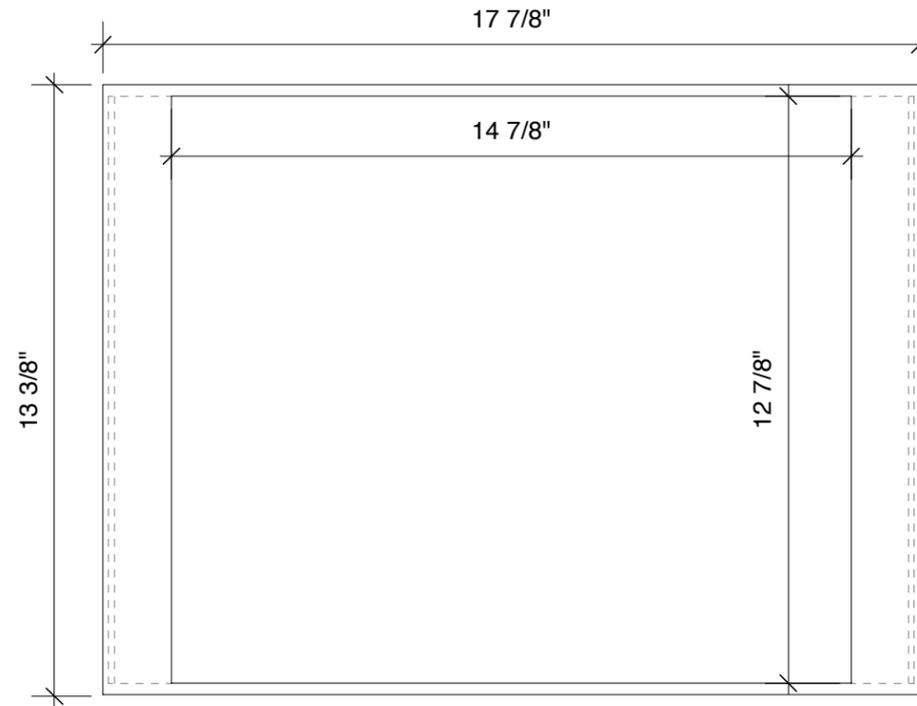
MATERIAL: .125 ALUMINUM ANGLE

1 Panel Cleats
Scale: Half Actual Size
Make 14

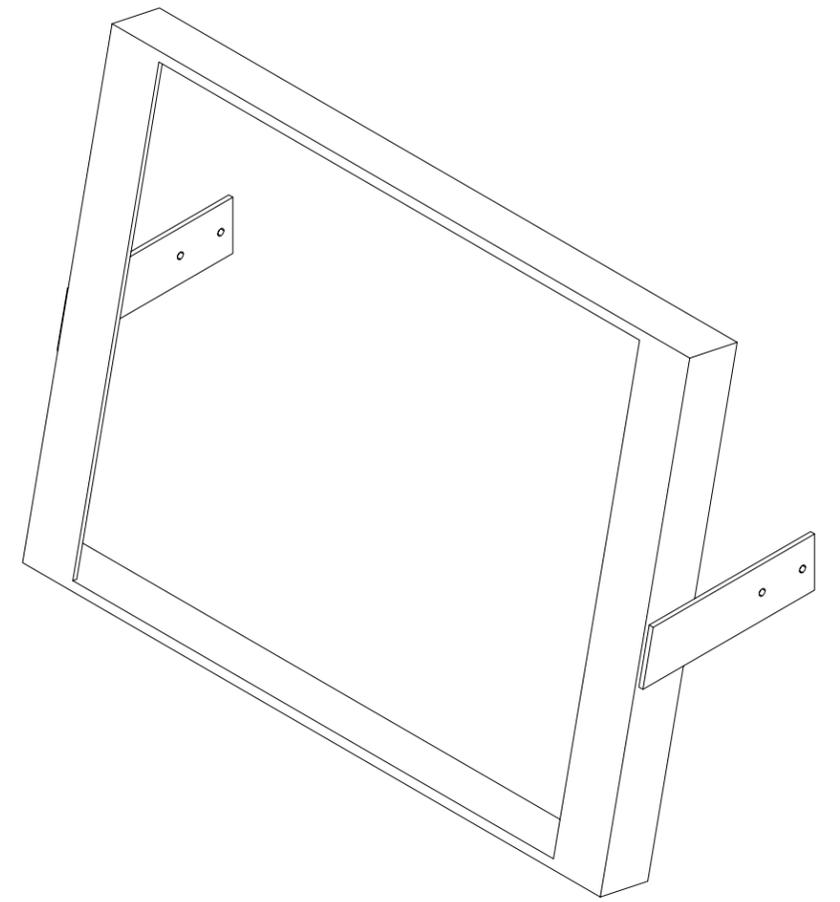


MATERIAL: .125 ALUMINUM

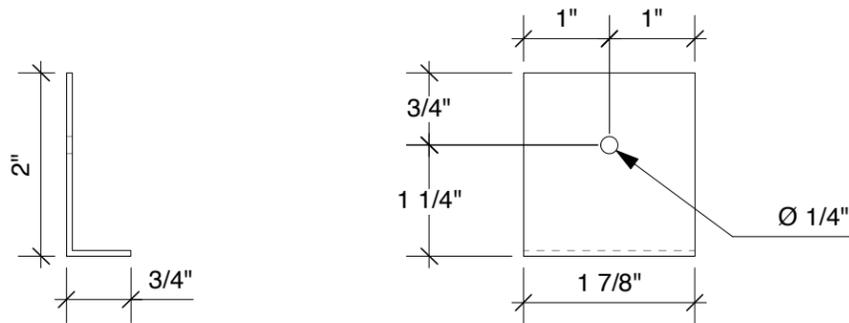
2 Shelf Cleat
Scale: 3" = 1'-0"
Make 3



6 Monitor Frame - Front
Scale: 3" = 1'-0"
Verify dimensions against Monitors

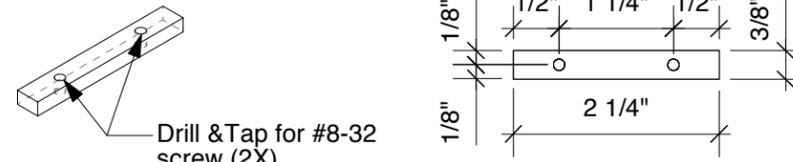


7 Monitor Frame - Isometric
Scale: 3" = 1'-0"
MATERIAL: STEEL



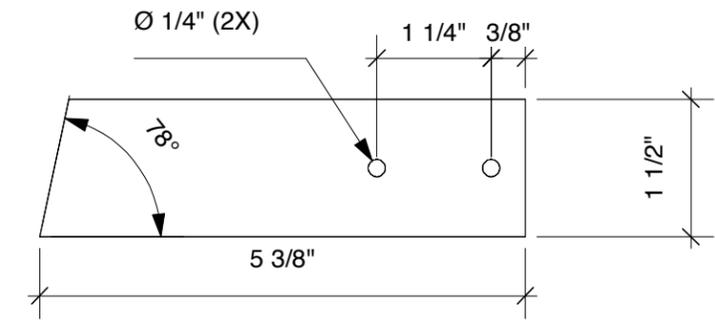
MATERIAL: 1/16" ALUMINUM

3 Cable Chase - Horizontal
Scale: Half Actual Size

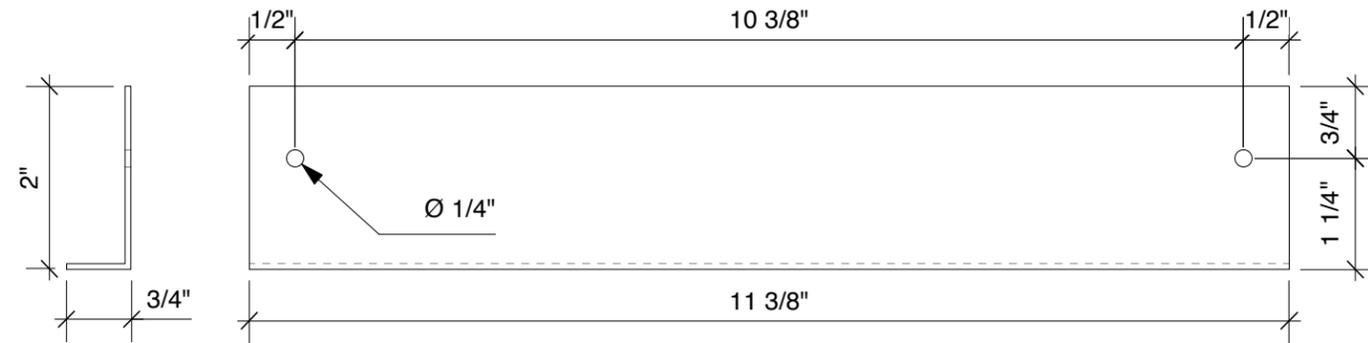


Drill & Tap for #8-32 screw (2X)
MATERIAL: 3/16" ALUMINUM OR MILD STEEL

5 Bolt Plate
Scale: Half Actual Size
Make 16



8 Monitor Flange
Scale: Half Actual Size
Make 2



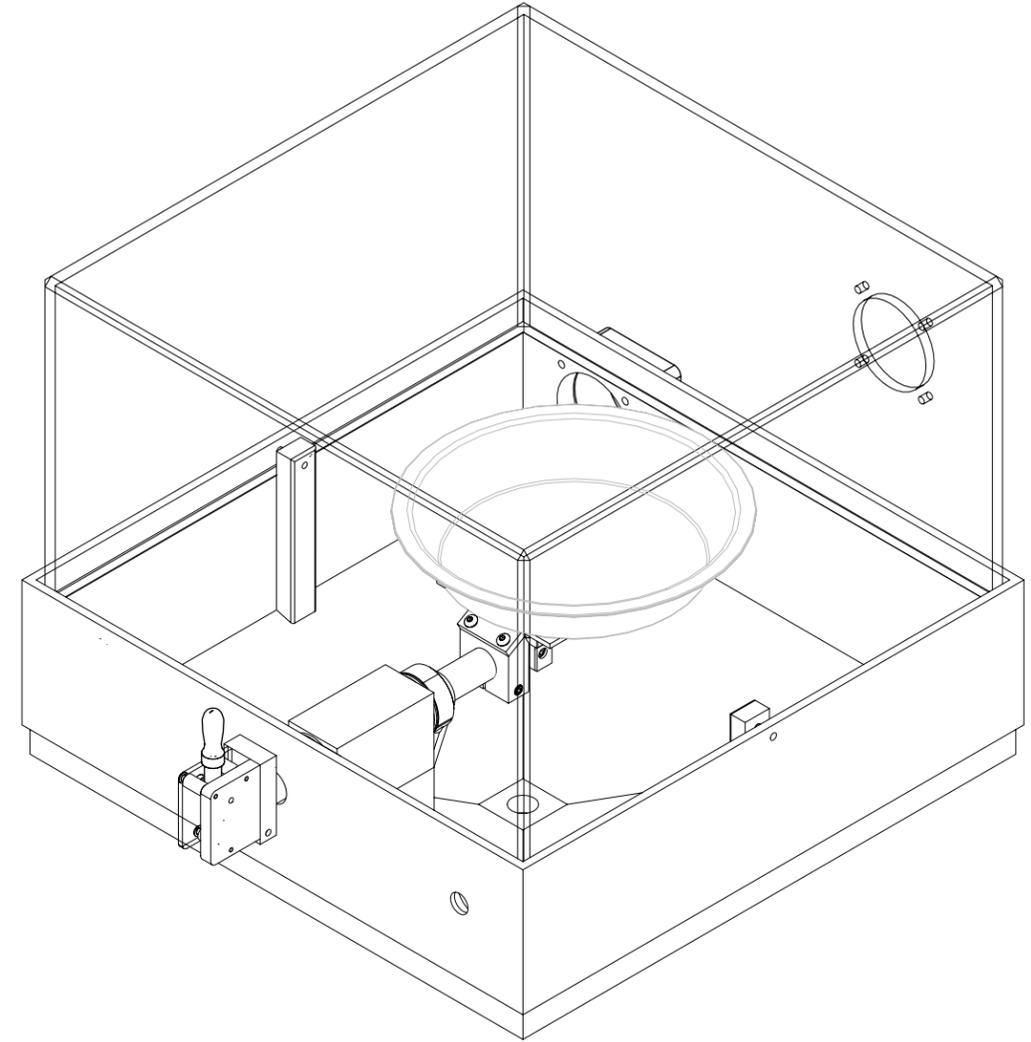
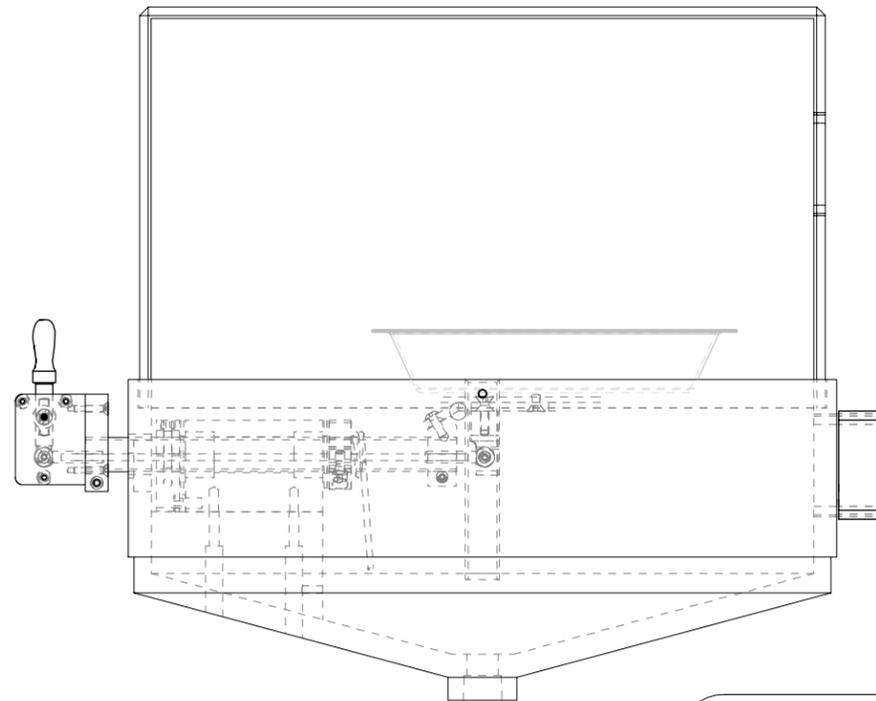
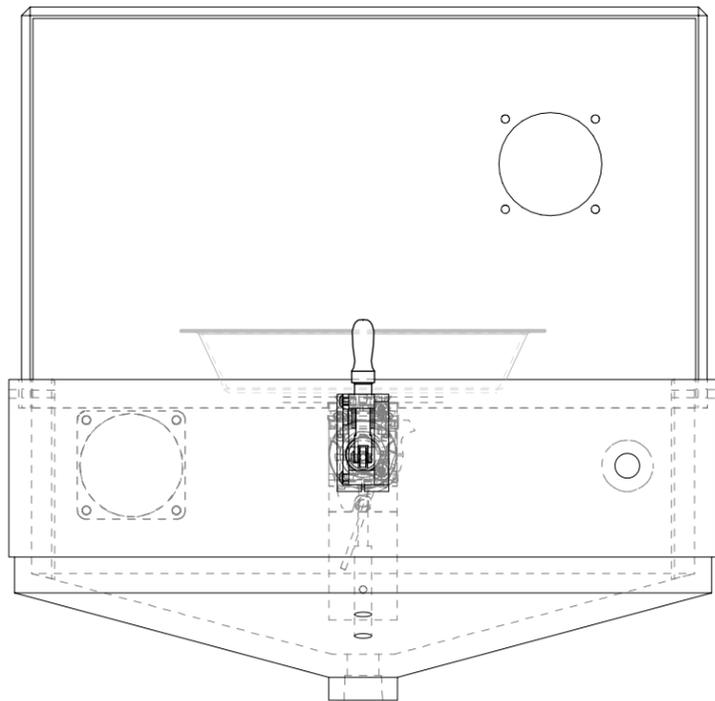
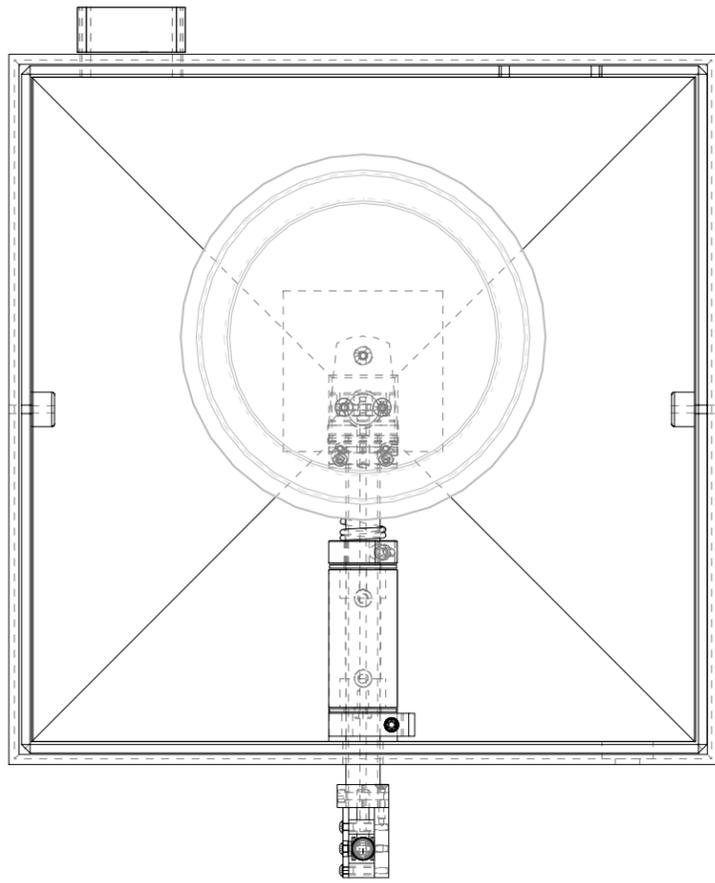
MATERIAL: 1/16" ALUMINUM

4 Cable Chase - Vertical
Scale: Half Actual Size

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DRAWING TITLE: Details			
COMPONENT TITLE: Table Frame		DRAWN BY: MDA	DATE DRAWN: 9/29/09
REVISED BY:	DATE REVISED:	REVISION DESCRIPTION:	SCALE: as noted
EXHIBIT TITLE: NISE Network Exhibits			SHEET #: 3 of 3

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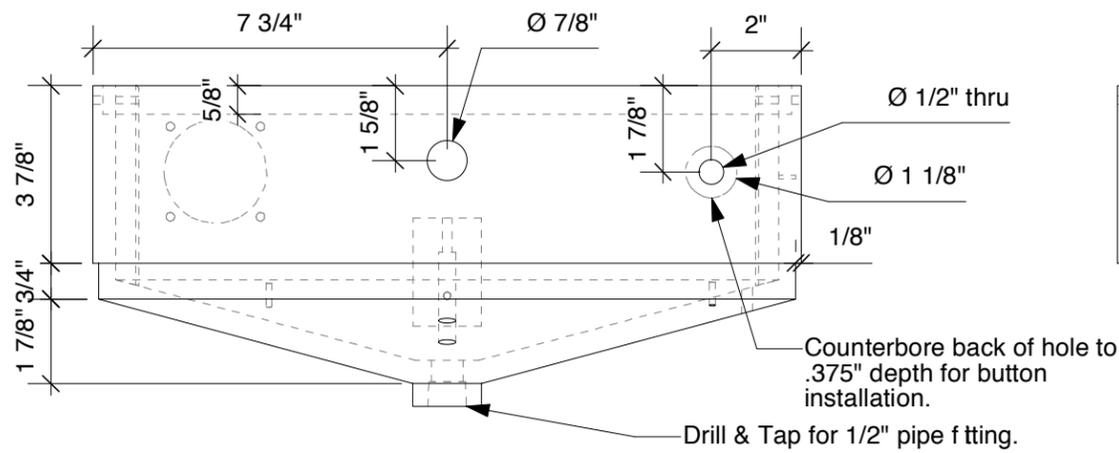


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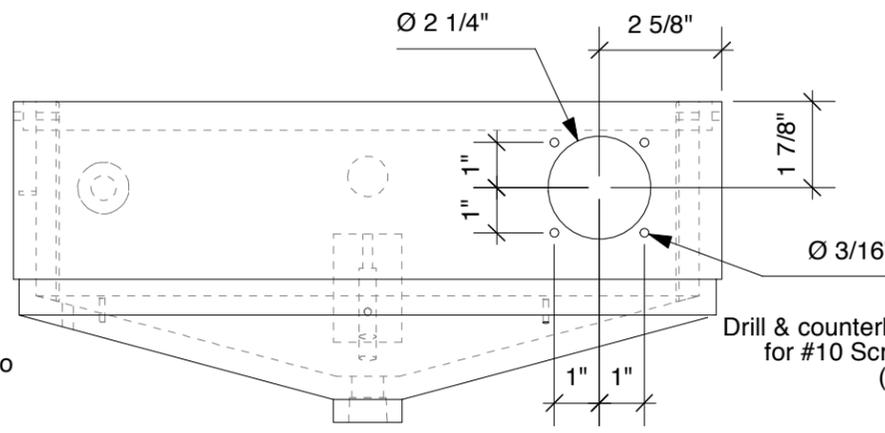
DRAWING TITLE: Overview			
COMPONENT TITLE: Bump and Roll Gimbal Encl.		DRAWN BY: MDA	DATE DRAWN: 9/29/09
REVISED BY:	DATE REVISED:	REVISION DESCRIPTION:	SCALE:
EXHIBIT TITLE: NISE Network Exhibits			SHEET #: 1 of 4



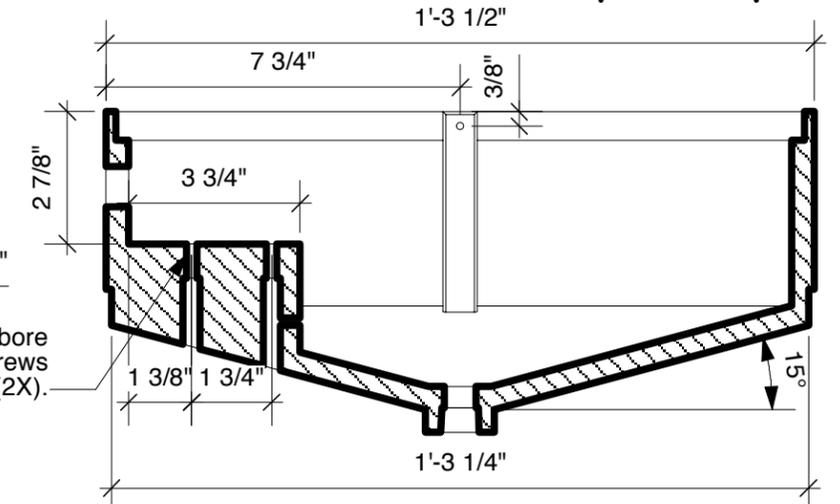
REVISION HISTORY			
REV	DESCRIPTION	DATE	APPROVED
1	Moved Fan, Added 1/8" rabbet around perimeter.	7/20/09	MDA
2	Added holes for wires & tube.	9/29/09	MDA



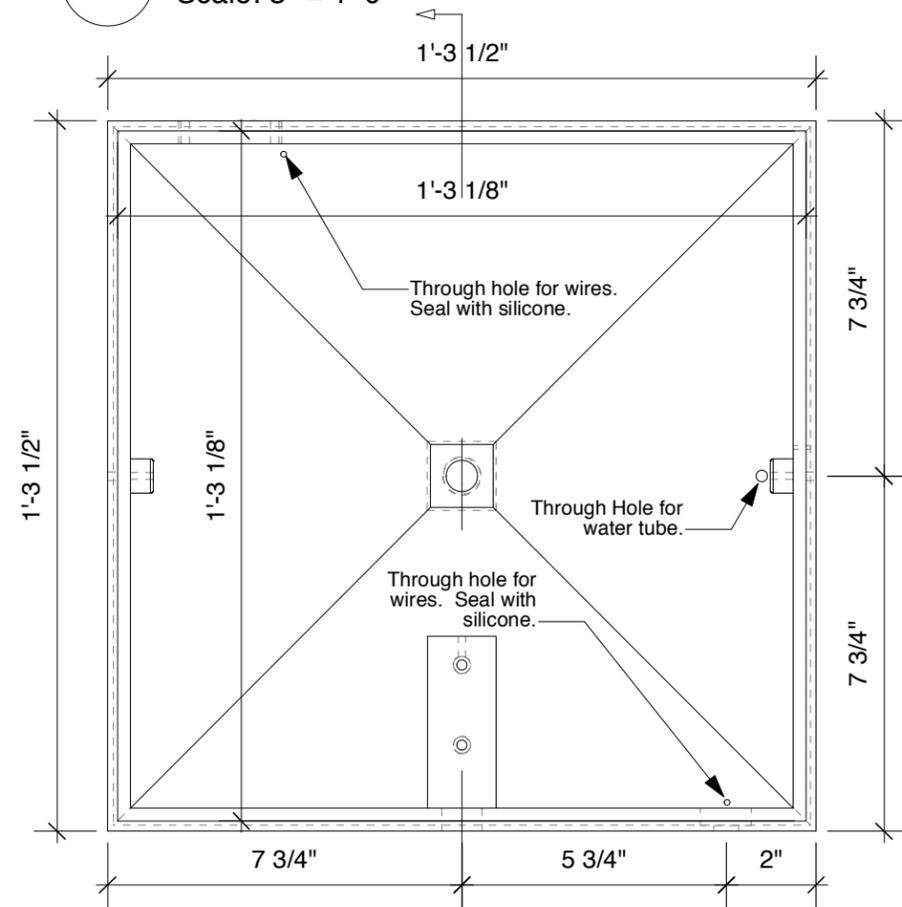
2 Front View
Scale: 3" = 1'-0"



4 Back View
Scale: 3" = 1'-0"

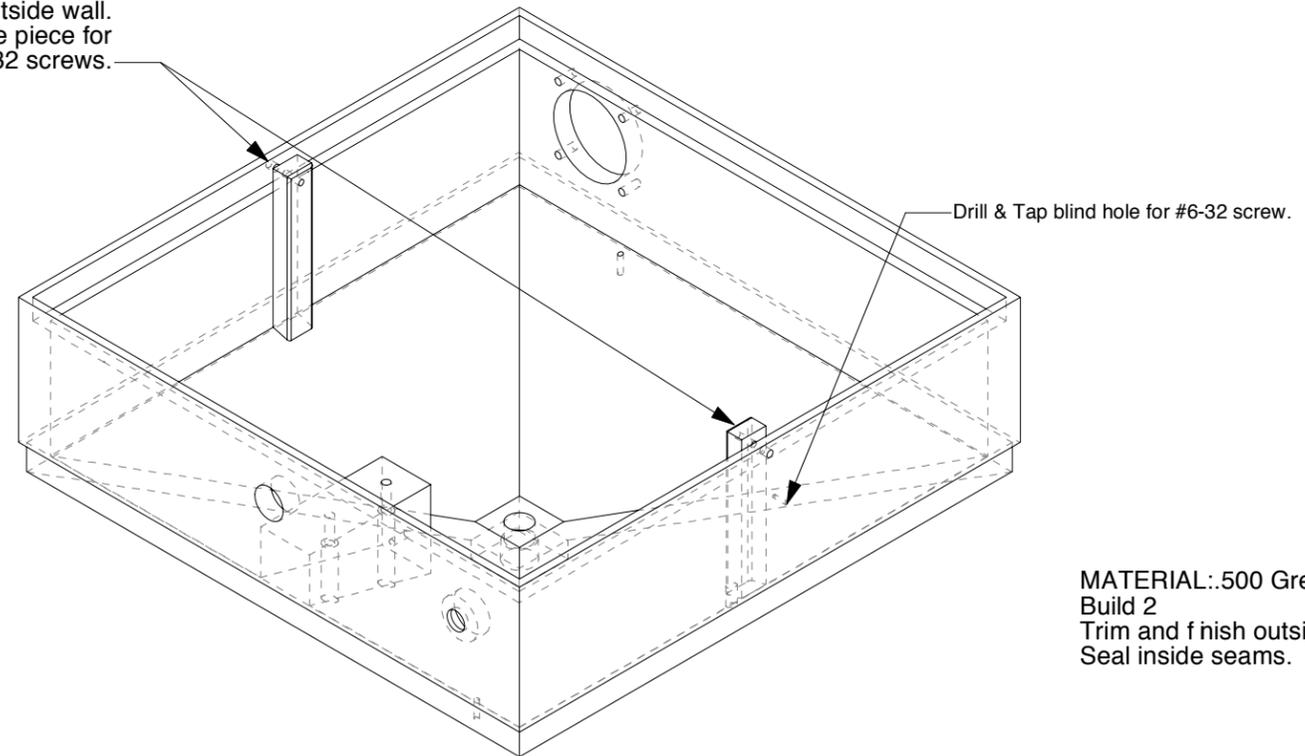


3 Section A
Scale: 3" = 1'-0"



1 Top View
Scale: 3" = 1'-0"

Drill thru outside wall.
Drill & Tap inside piece for #8-32 screws.

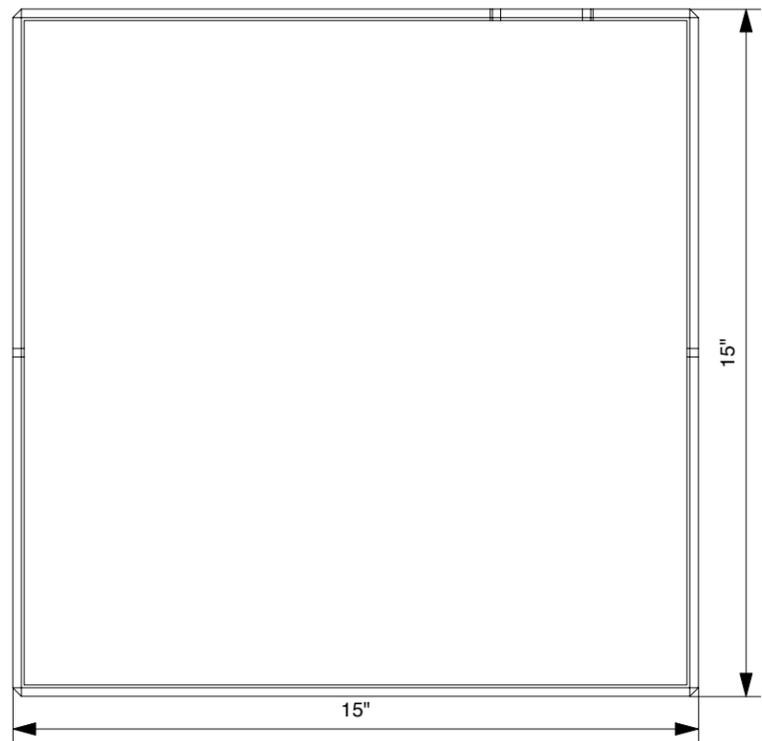


MATERIAL: 500 Grey PVC
Build 2
Trim and finish outside welds.
Seal inside seams.

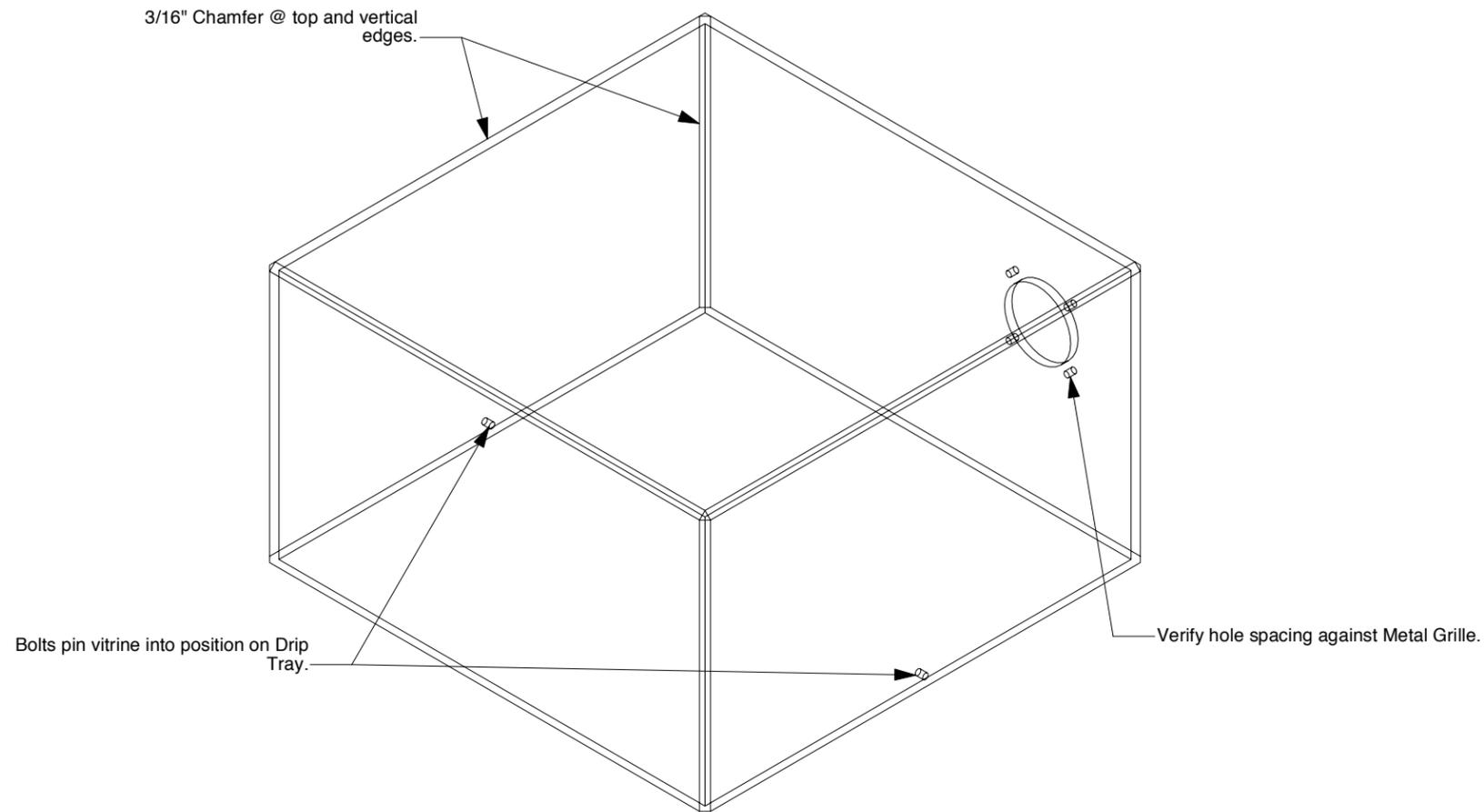


DRAWING TITLE: PVC Drain Pan			
COMPONENT TITLE: Bump and Roll Encl.		DRAWN BY: MDA	DATE DRAWN: 04/20/2009
REVISED BY: MDA	DATE REVISED: 9/29/09	REVISION DESCRIPTION:	
EXHIBIT TITLE: NISE Network Exhibits			SCALE: as noted
			SHEET #: 2 of 4

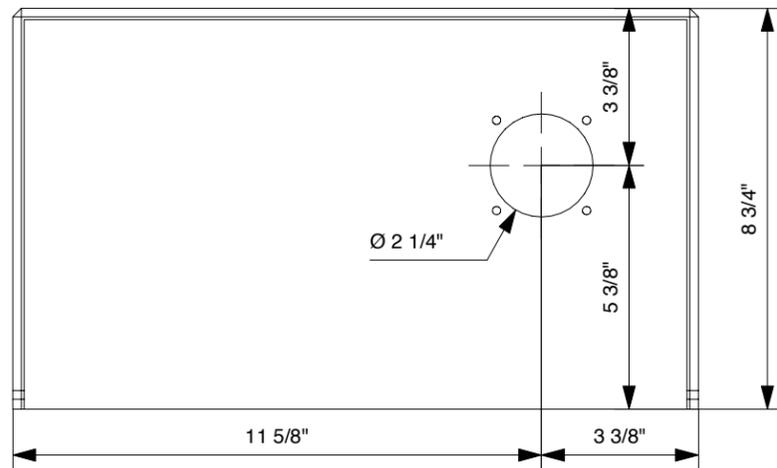




1 Top View
Scale: 3" = 1'-0"



3 Vitrine Isometric View
Scale: 3" = 1'-0" MATERIAL: .25" CLEAR ACRYLIC

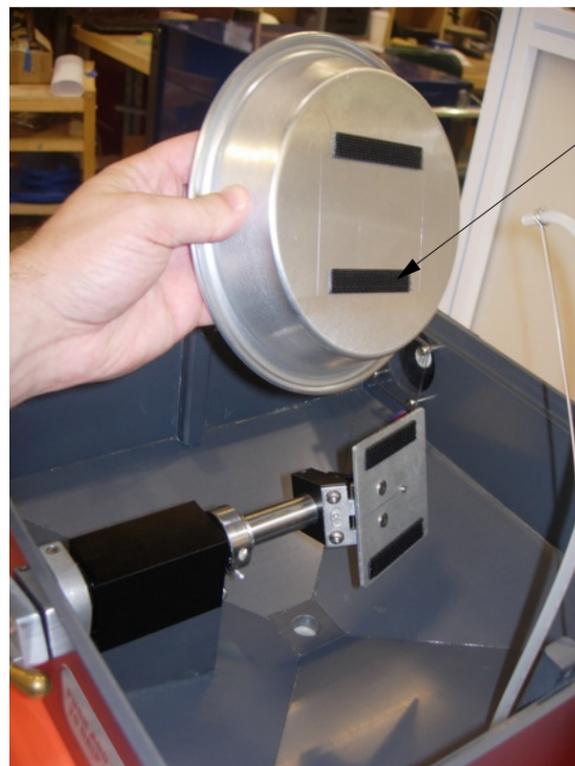


2 Vitrine Front View
Scale: 3" = 1'-0"

 <p>120 W KELLOGG, ST. PAUL, MN 55102 ©2008 THE SCIENCE MUSEUM OF MINNESOTA</p>	DRAWING TITLE: Vitrine Details		DRAWN BY: MDA	DATE DRAWN: 04/20/2009
	COMPONENT TITLE: Bump and Roll Gimbal Encl.		REVISOR:	SCALE: as noted
	REVISED BY:	DATE REVISED:	REVISION DESCRIPTION:	SHEET #: 3 of 4
	EXHIBIT TITLE: NISE Network Exhibits			



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Pans secured with Self-Lock Mushroom-Head Fastener (McMaster-Carr #96055K21)

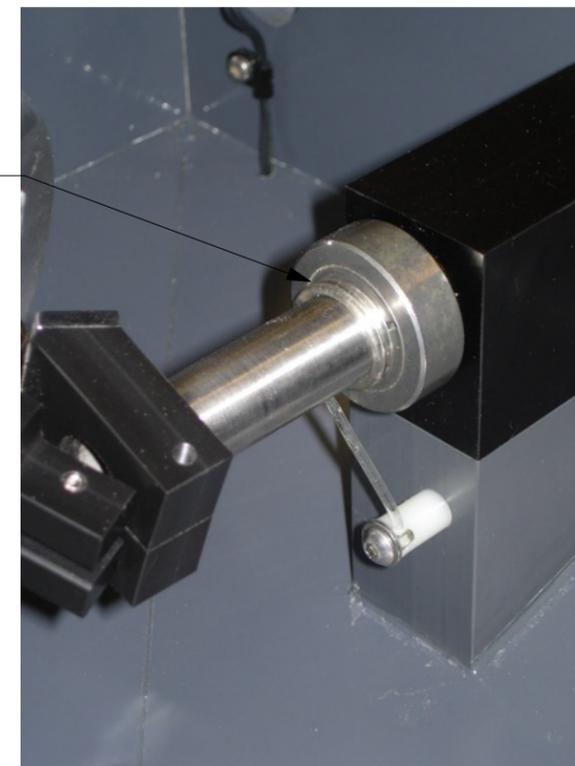
DC Equipment Cooling Fan 2.36" SQ X 1" Depth, 12 CFM, 12 VDC (McMaster-Carr #1939K58)



13.6 mm Harsh Environment Push-Button Switch Round Button with 19.7" Length Wire Leads (McMaster-Carr #6915K24)

Return "Spring" 3/32" Polyurethane Round Belting (McMaster-Carr #59725K801) One end clamped in slot of Shaft Collar, other end secured with bolt and stand-off to Drain Pan.

Steel Fan Guard for 2.36" (60 mm) Fan (McMaster-Carr #19155K93)



8" Aluminum Pie Pan coated by Isurtec, St Paul, MN. Dark spots have been masked to leave some parts of the pan bare.



Tube support made from 1/16" Stainless wire. Secured to side of Drain Pan with #6-32 SS screw.



5" 430 SS Wall cover. (McMaster-Carr #2043K23) Secured to pan with Self-Lock Mushroom-Head Fastener (McMaster-Carr #96055K21)

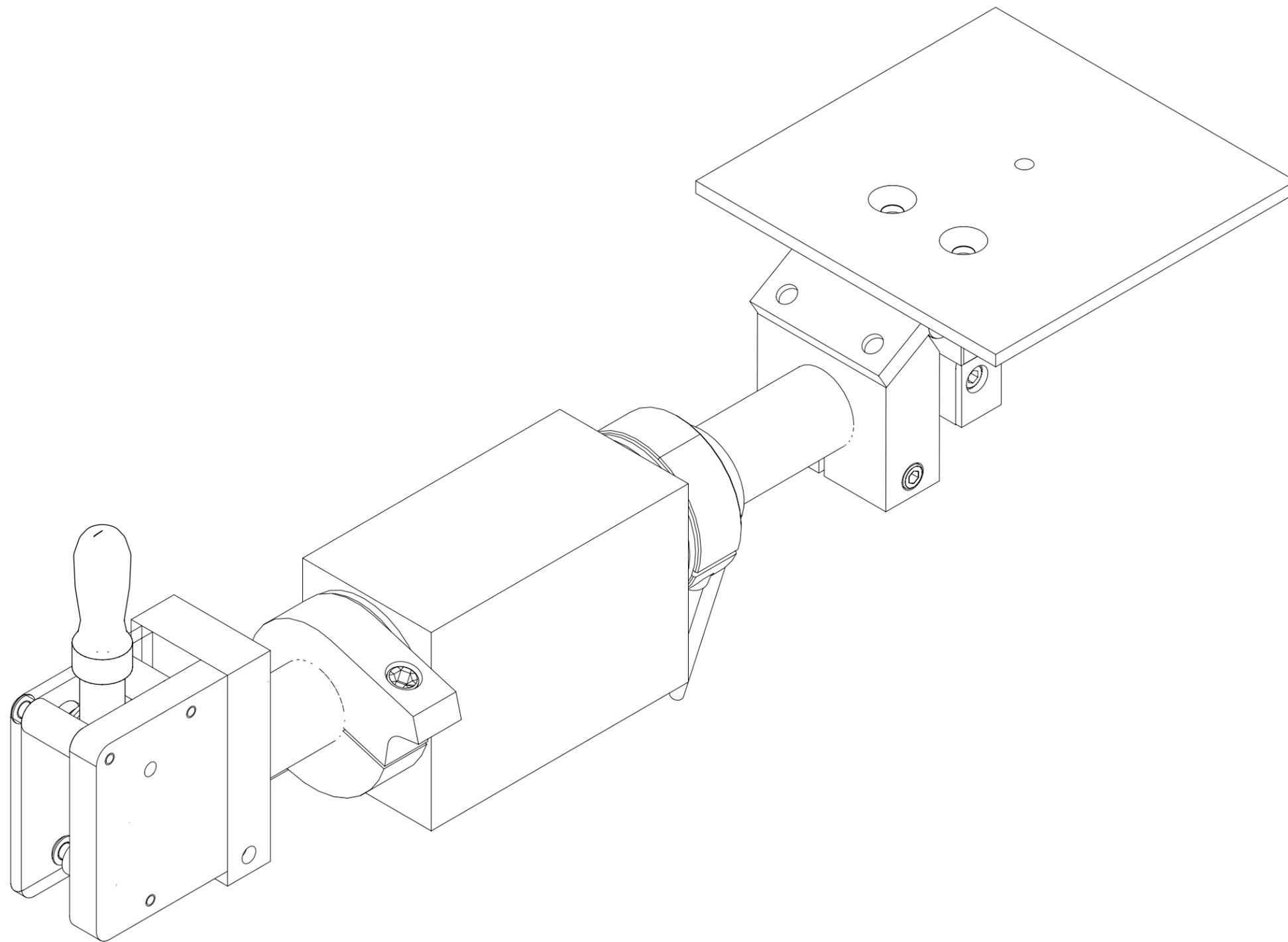
.25" x .125" Rare Earth Magnets press-fit into .5" plastic balls to secure Cabbage leaf to plate.



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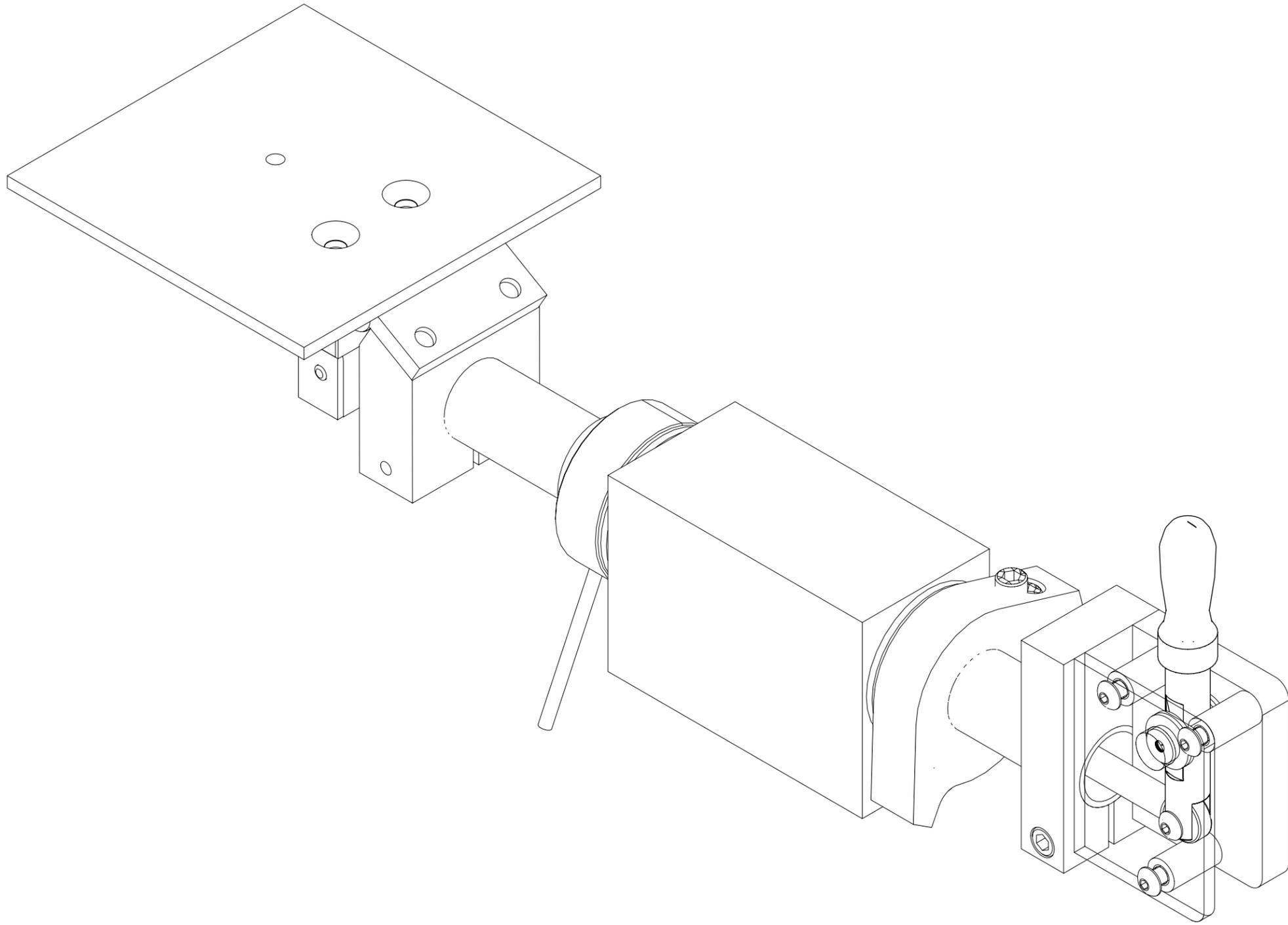
DRAWING TITLE: Detail Photos			
COMPONENT TITLE: Bump and Roll Gimbal Encl.		DRAWN BY: MDA	DATE DRAWN: 9/29/09
REVISED BY:	DATE REVISED:	REVISION DESCRIPTION:	SCALE:
EXHIBIT TITLE: NISE Network Exhibits			SHEET #: 4 of 4





 <p>120 W KELLOGG, ST. PAUL, MN 55102 ©2008 THE SCIENCE MUSEUM OF MINNESOTA</p>	DRAWING TITLE: Right Isometric			DRAWN BY: MDA	DATE DRAWN: 04/20/2009
	COMPONENT TITLE: Bump and Roll - Gimbal		REVISOR:		SCALE: FULL
	REVISED BY:	DATE REVISED:	REVISION DESCRIPTION:		SHEET #: 1 of 10
	EXHIBIT TITLE: NISE Network Exhibits				

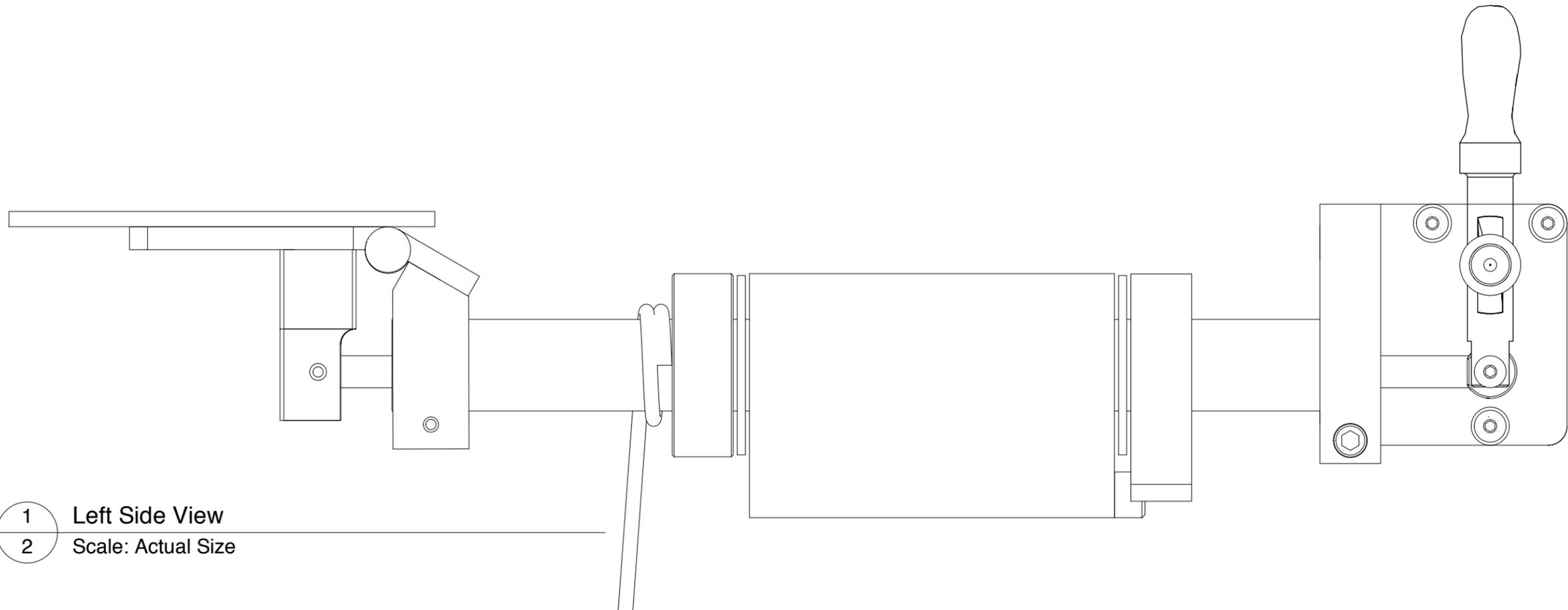




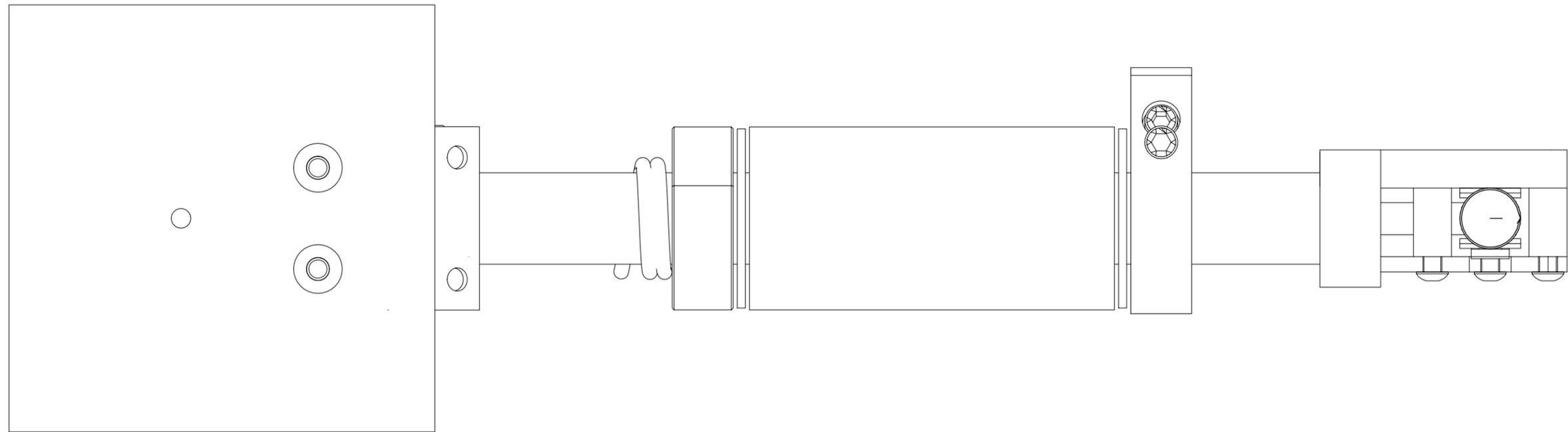
 <p>120 W KELLOGG, ST. PAUL, MN 55102 ©2008 THE SCIENCE MUSEUM OF MINNESOTA</p>	DRAWING TITLE: Left Isometric			DRAWN BY: MDA	DATE DRAWN: 04/20/2009
	COMPONENT TITLE: Bump and Roll - Gimbal		REVISIONS:		SCALE: FULL
	REVISED BY:	DATE REVISED:	REVISION DESCRIPTION:		SHEET #: 2 of 10
	EXHIBIT TITLE: NISE Network Exhibits				



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1 Left Side View
2 Scale: Actual Size

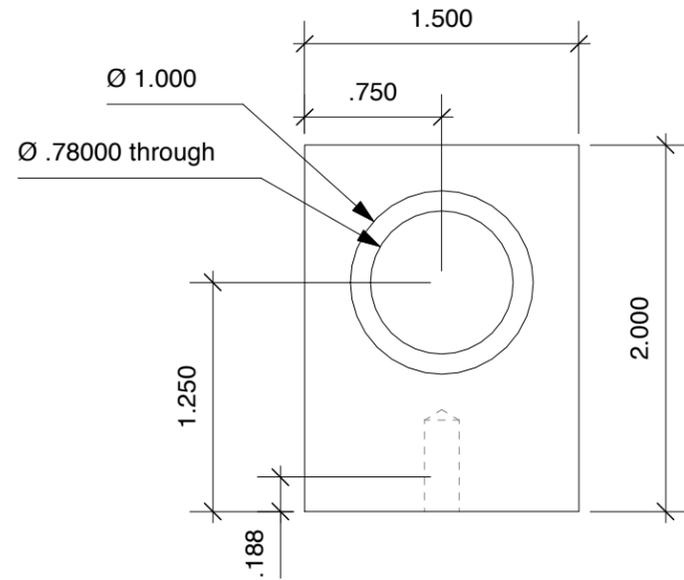


2 Top View
2 Scale: Actual Size

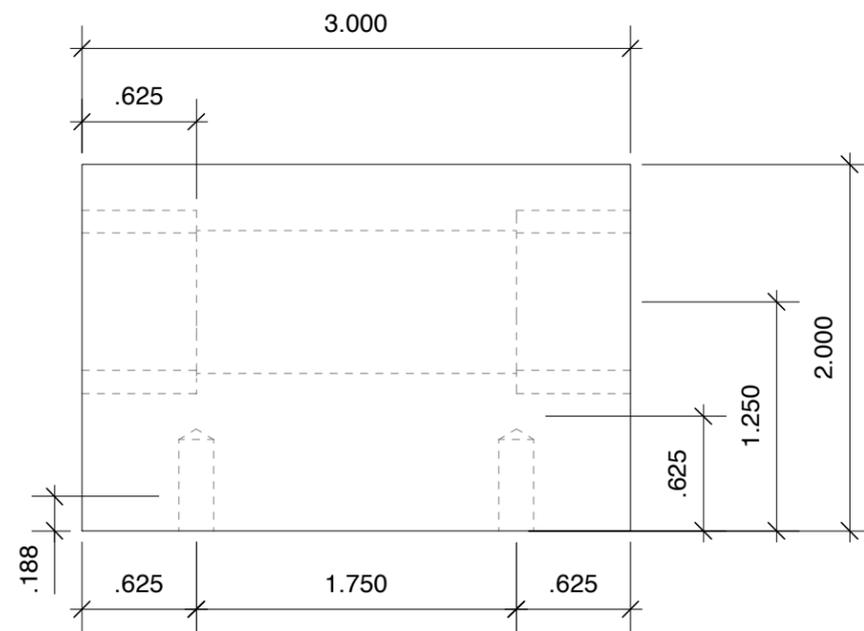
 <p>120 W KELLOGG, ST. PAUL, MN 55102 ©2008 THE SCIENCE MUSEUM OF MINNESOTA</p>	DRAWING TITLE: Top and Side Views			DRAWN BY: MDA	DATE DRAWN: 04/20/2009
	COMPONENT TITLE: Bump and Roll - Gimbal		REVISION DESCRIPTION:		
	REVISED BY:	DATE REVISED:	REVISION DESCRIPTION:	SHEET #: 3 of 10	
	EXHIBIT TITLE: NISE Network Exhibits				



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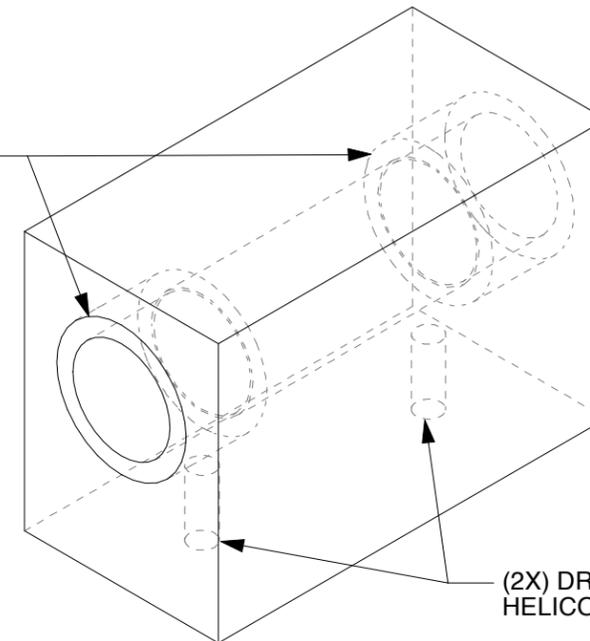


1 Bearing Block - Front
3 Scale: Actual Size



2 Bearing Block - Right Side
3 Scale: Actual Size

(2X) BRONZE BUSHING
.750 ID x 1.000 OD x .625



(2X) DRILL & TAP FOR 10-24
HELICOIL

MATERIAL: BLACK DELRIN (ACETAL)

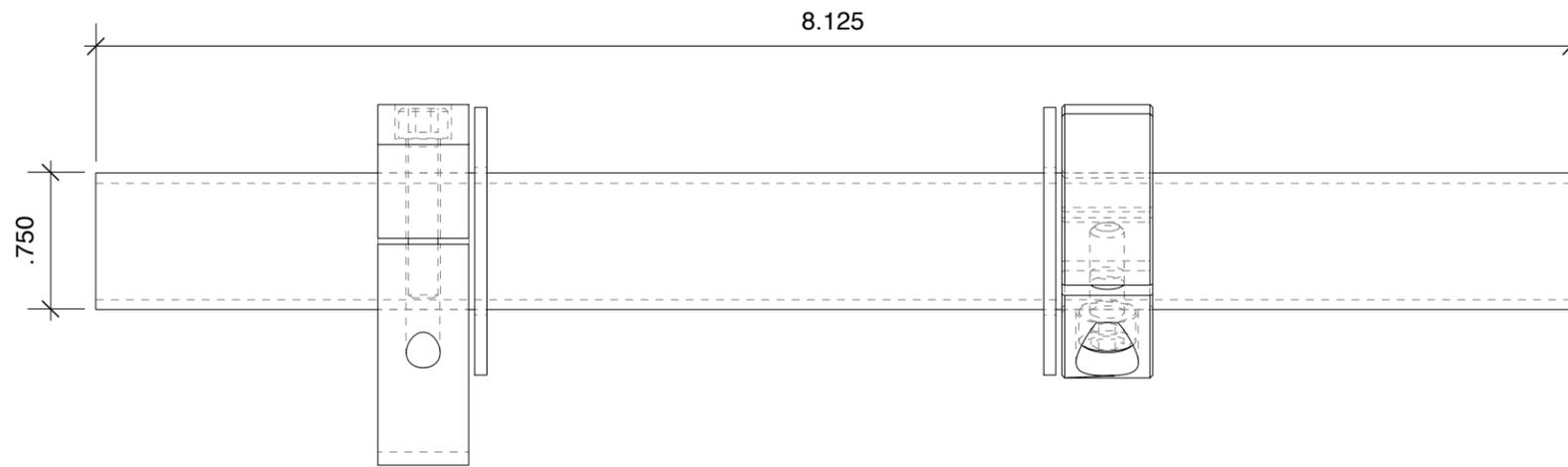
3 Bearing Block - Isometric
3 Scale: Actual Size



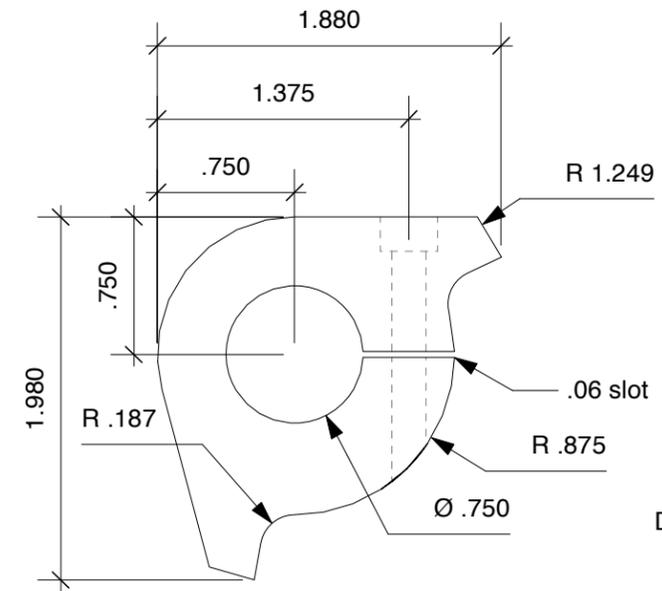
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DRAWING TITLE: Bearing Block			
COMPONENT TITLE: Bump and Roll - Gimbal		DRAWN BY: MDA	DATE DRAWN: 04/20/2009
REVISED BY:	DATE REVISED:	REVISION DESCRIPTION:	SCALE: FULL
EXHIBIT TITLE: NISE Network Exhibits			SHEET #: 4 of 10

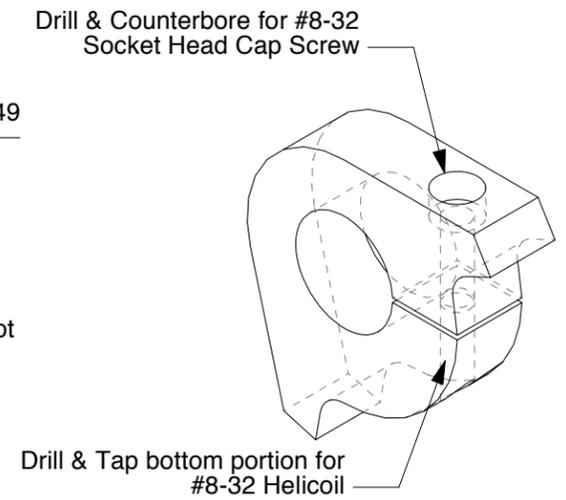




1 Tubular Shaft - Right Side
3 Scale: Actual Size



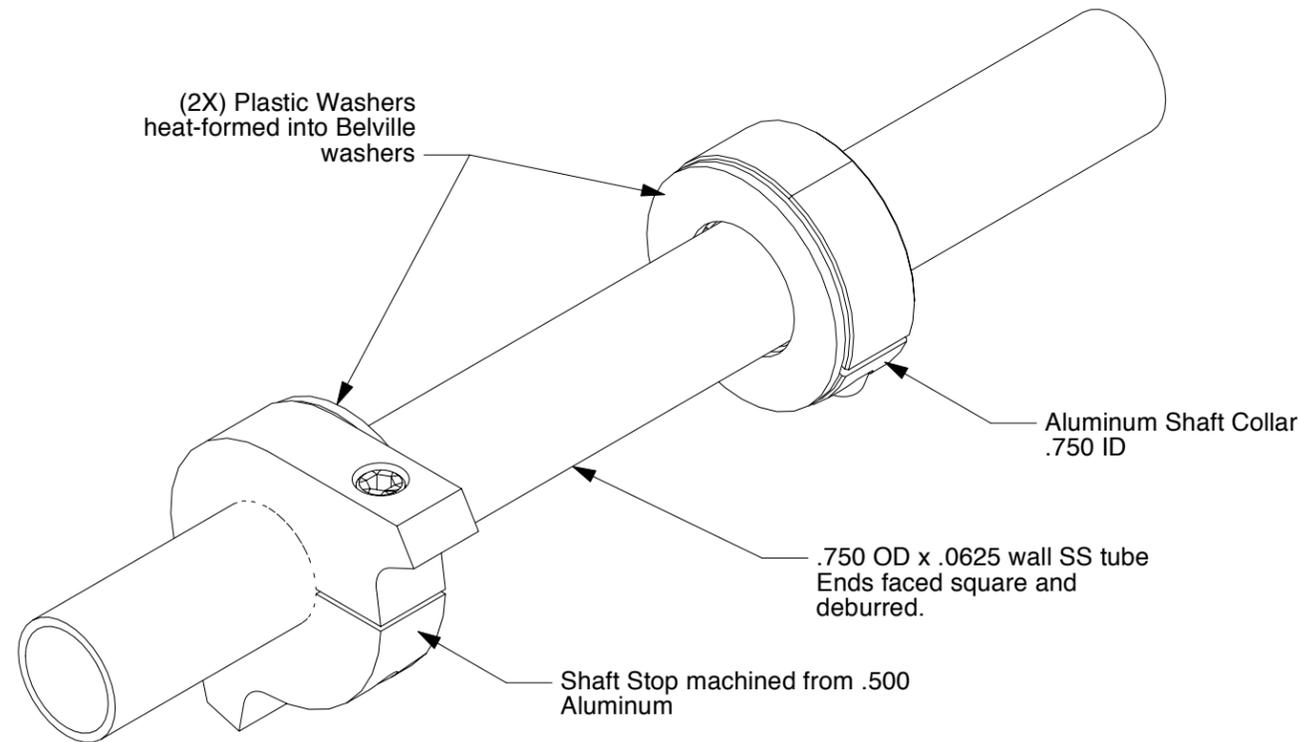
FRONT VIEW @ SHAFT STOP



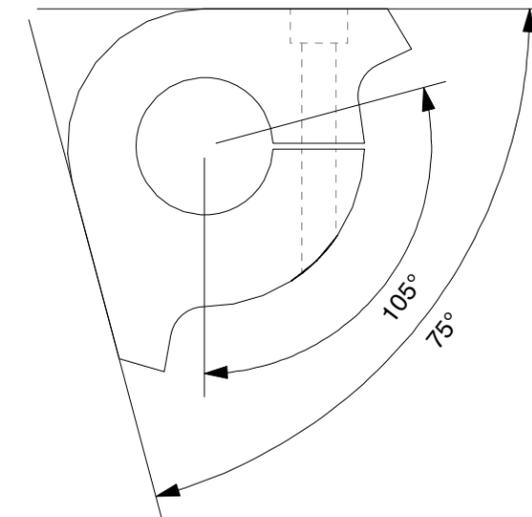
Drill & Counterbore for #8-32
Socket Head Cap Screw

Drill & Tap bottom portion for
#8-32 Helicoil

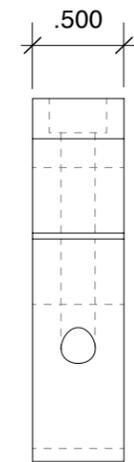
MATERIAL: 6061-T6 ALUMINUM



2 Tubular Shaft - Isometric
5 Scale: Actual Size



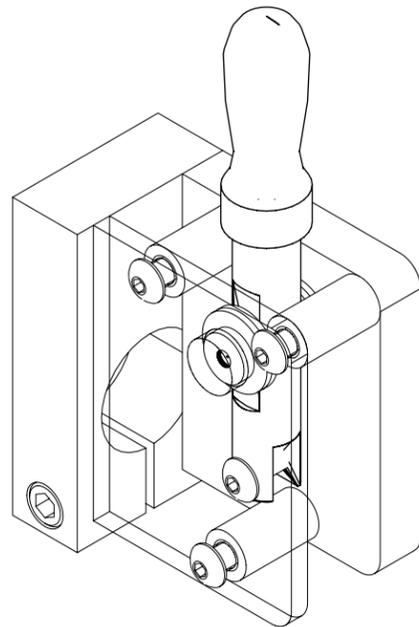
FRONT VIEW @ SHAFT STOP



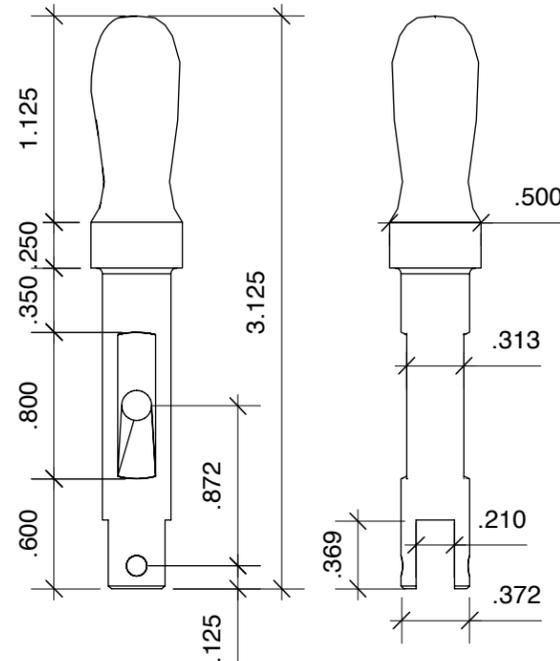
RIGHT VIEW @ SHAFT STOP

3 Shaft Stop Details
5 Scale: Actual Size

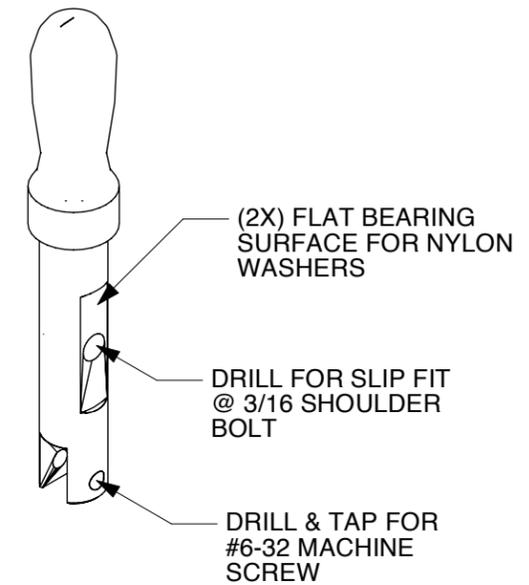
 <p>120 W KELLOGG, ST. PAUL, MN 55102 ©2008 THE SCIENCE MUSEUM OF MINNESOTA</p>	DRAWING TITLE: Tubular Shaft and Stop			DRAWN BY: MDA	DATE DRAWN: 04/20/2009
	COMPONENT TITLE: Bump and Roll - Gimbal		SCALE: FULL		
	REVISED BY:	DATE REVISED:	REVISION DESCRIPTION:	SHEET #:	
	EXHIBIT TITLE: NISE Network Exhibits			5 of 10	
				 <p>NANOSCALE INFORMAL SCIENCE EDUCATION</p>	



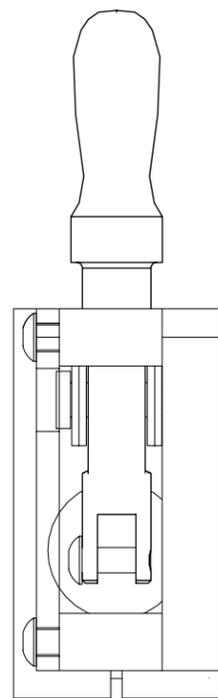
1 Joystick Assy. Left Isometric
6 Scale: Actual Size



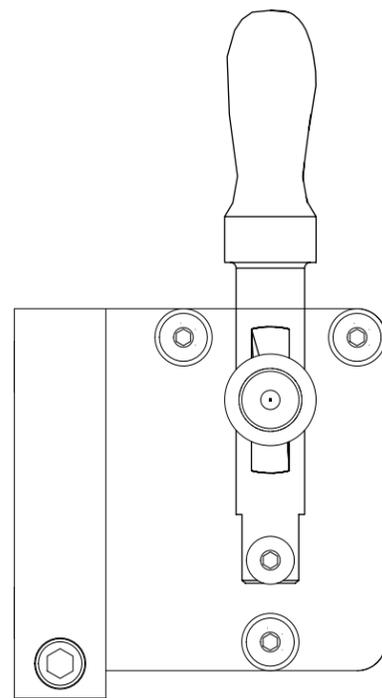
4 Joystick Details
6 Scale: Actual Size



MATERIAL: BRASS ROD



2 Joystick Assy. Front
6 Scale: Actual Size

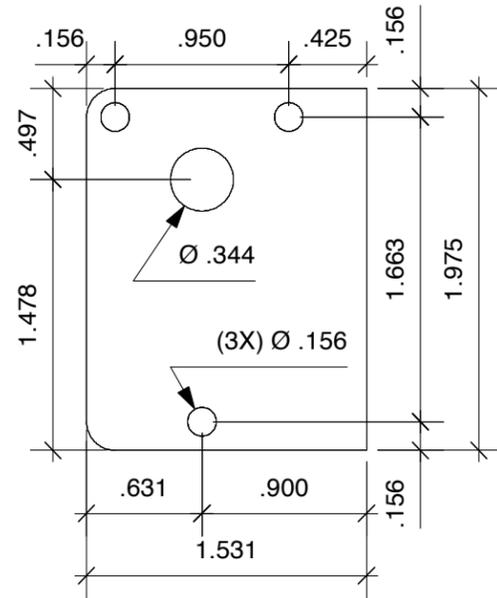


3 Joystick Assy. Left Side
6 Scale: Actual Size

 <p>120 W KELLOGG, ST. PAUL, MN 55102 ©2008 THE SCIENCE MUSEUM OF MINNESOTA</p>	DRAWING TITLE: Joystick Assembly		DRAWN BY: MDA	DATE DRAWN: 04/20/2009
	COMPONENT TITLE: Bump and Roll - Gimbal			
	REVISED BY:	DATE REVISED:	REVISION DESCRIPTION:	SHEET #:
	EXHIBIT TITLE: NISE Network Exhibits			6 of 10

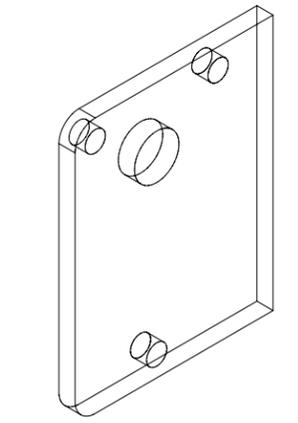


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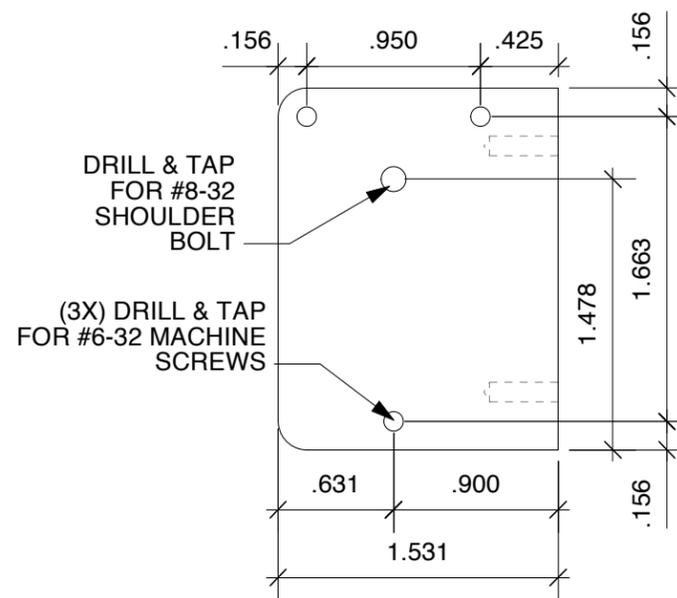


RIGHT SIDE VIEW
@ JOYSTICK COVER

1 Joystick Cover Details
7 Scale: Actual Size

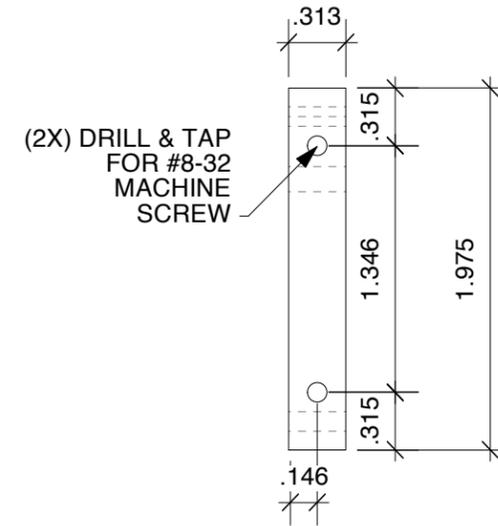


MATERIAL: .125 LEXAN

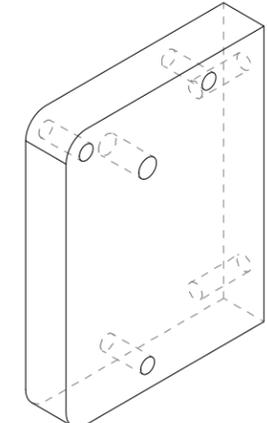


RIGHT SIDE VIEW
@ JOYSTICK MOUNT PLATE

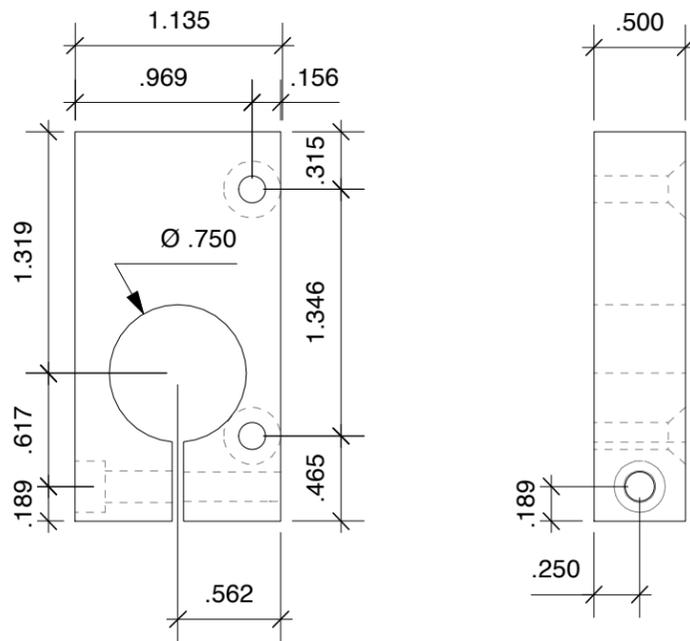
3 Joystick Mount Plate Details
7 Scale: Actual Size



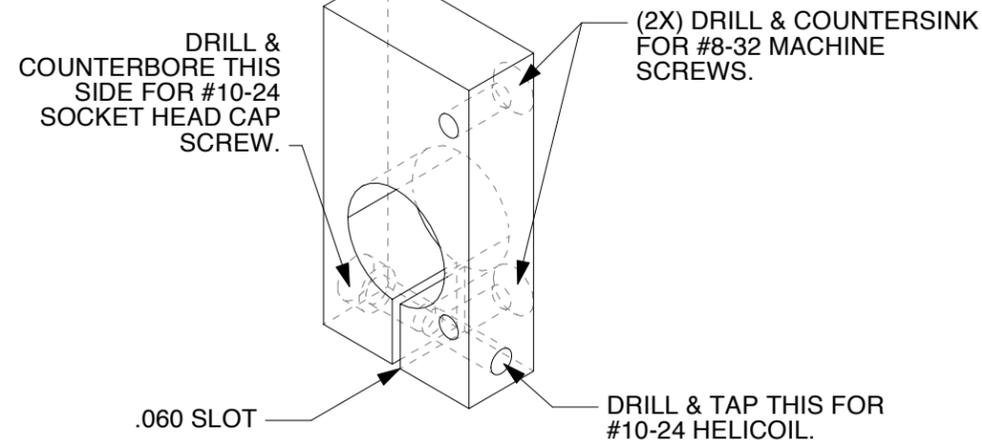
BACK VIEW
@ JOYSTICK MOUNT PLATE



MATERIAL: 6061-T6 ALUMINUM



2 Shaft Receiver Details
7 Scale: Actual Size

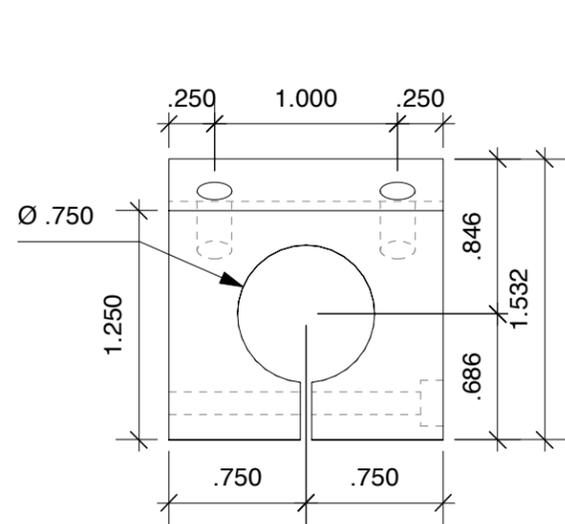


MATERIAL: 6061-T6 ALUMINUM

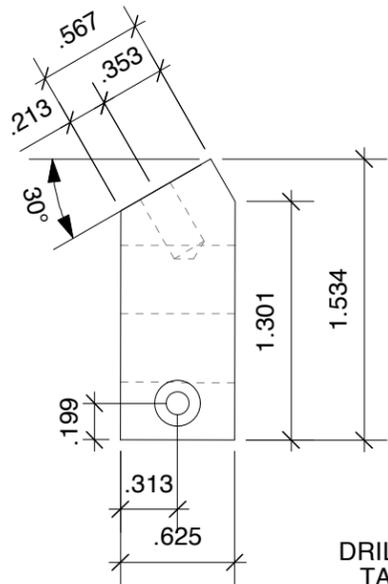
120 W KELLOGG, ST. PAUL, MN 55102
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DRAWING TITLE: Joystick Assembly Parts			
COMPONENT TITLE: Bump and Roll - Gimbal	DRAWN BY: MDA	DATE DRAWN: 04/20/2009	
REVISED BY:	DATE REVISED:	REVISION DESCRIPTION:	SCALE: FULL
EXHIBIT TITLE: NISE Network Exhibits			SHEET #: 7 of 10

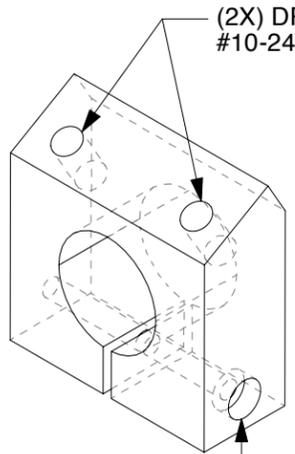




FRONT VIEW @ TILT BLOCK



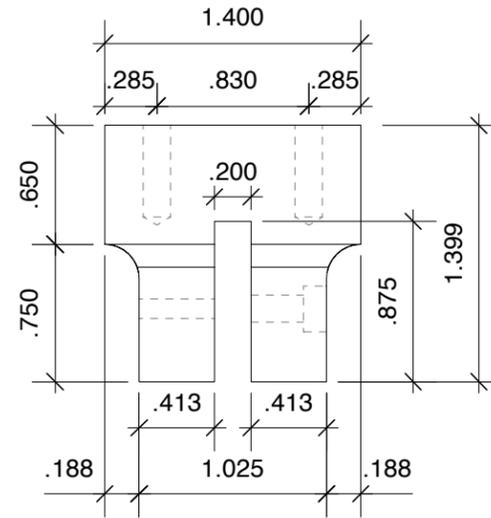
RIGHT VIEW @ TILT BLOCK



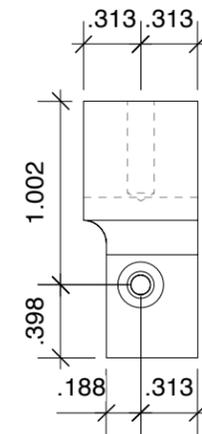
(2X) DRILL & TAP FOR #10-24 MACHINE SCREWS.

DRILL, COUNTERBORE, & TAP FOR #6-32 SOCKET HEAD CAP SCREW.

MATERIAL: BLACK DELRIN (ACETAL)

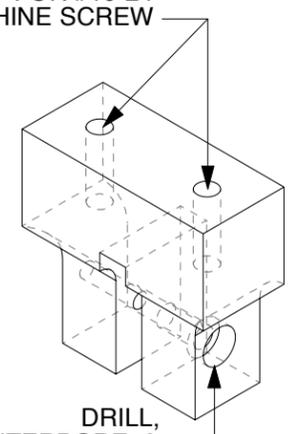


FRONT VIEW @ PIVOT ARM



RIGHT VIEW @ PIVOT ARM

(2X) DRILL 7 TAP FOR #10-24 MACHINE SCREW

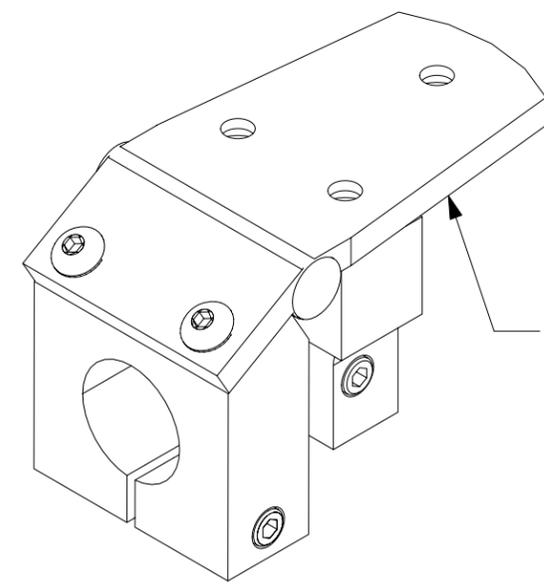
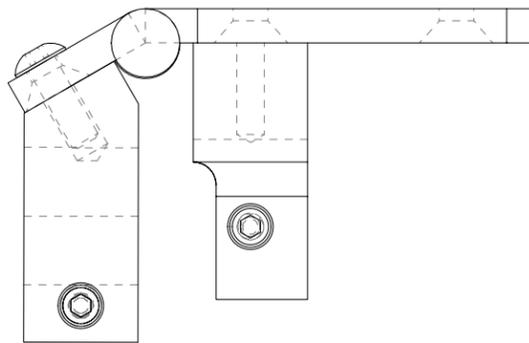
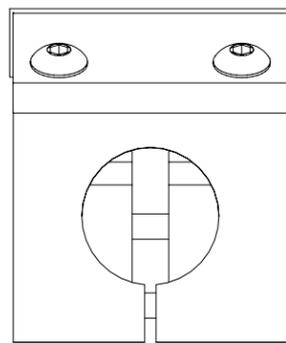


DRILL, COUNTERBORE, & TAP FOR #6-32 SOCKET HEAD CAP SCREW.

MATERIAL: BLACK DELRIN (ACETAL)

1 Tilt Block Detail
8 Scale: Actual Size

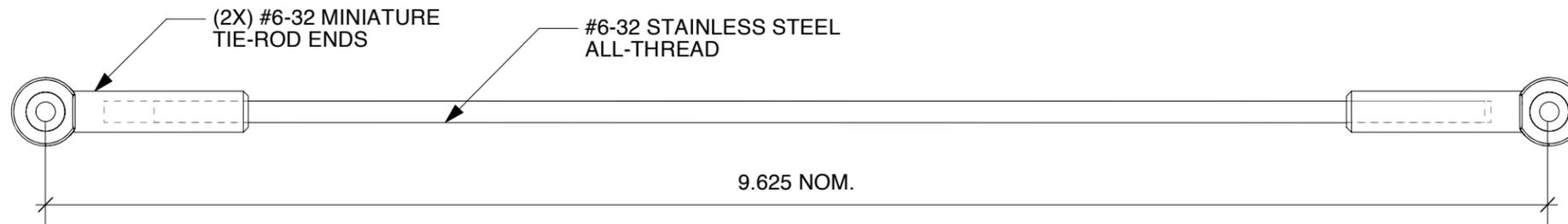
2 Pivot Arm Detail
8 Scale: Actual Size



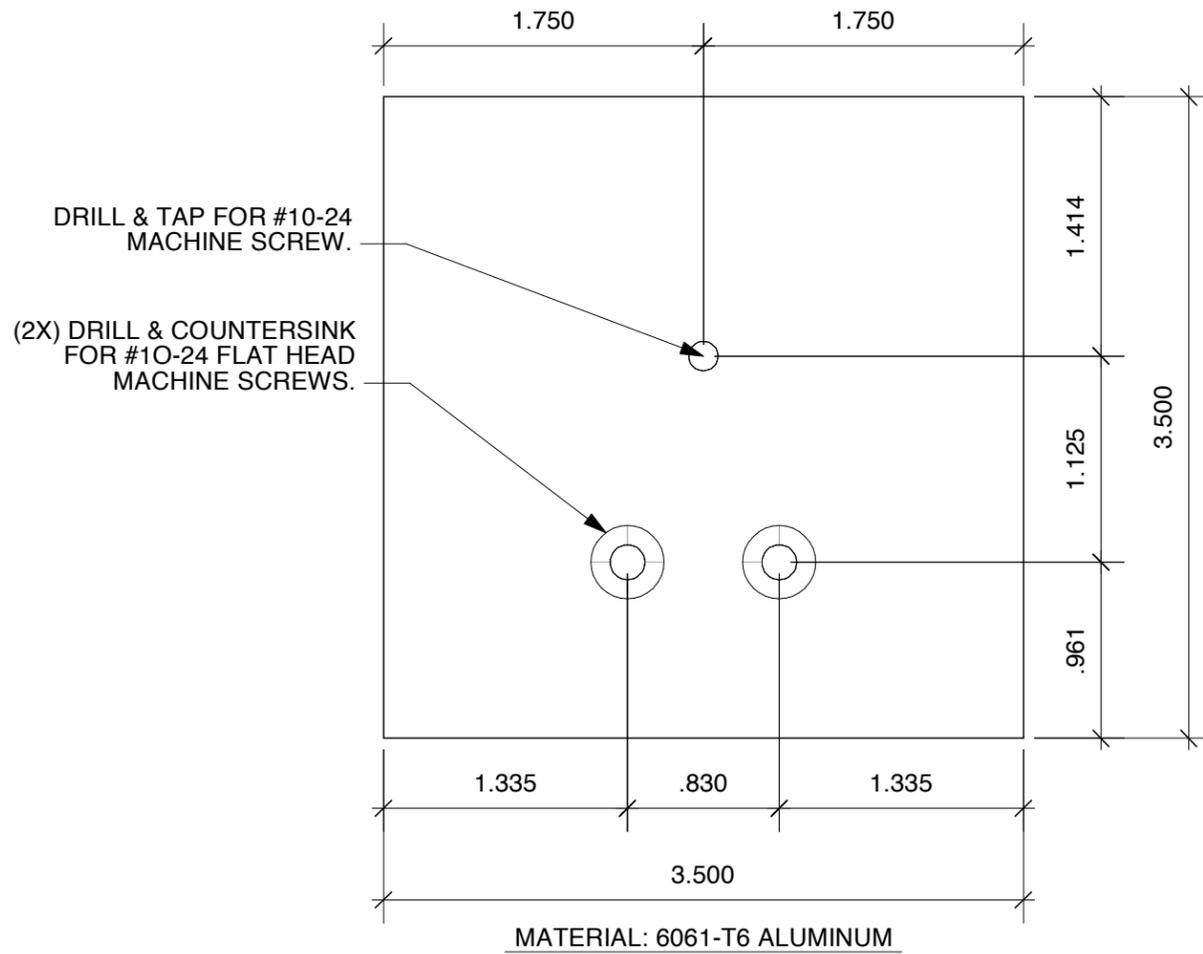
McMaster Part #11175A12
316 SS Surface-Mount Hinge
with Holes Polished Fnsh,
Nonremoveable Pin, 1-1/2" H,
2-7/8" W

3 Tilt Mechanism
8 Scale: Actual Size

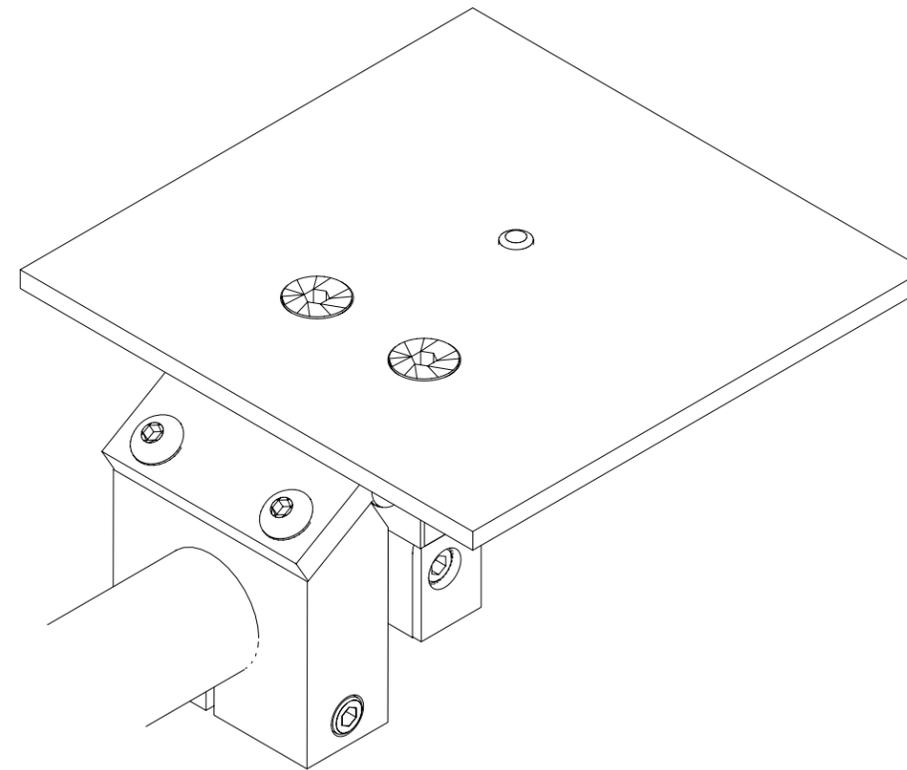
 <p>120 W KELLOGG, ST. PAUL, MN 55102 ©2008 THE SCIENCE MUSEUM OF MINNESOTA</p>	DRAWING TITLE: Tilt Mechanism Parts			 <p>NANOSCALE INFORMAL SCIENCE EDUCATION</p>	
	COMPONENT TITLE: Bump and Roll - Gimbal		DRAWN BY: MDA		DATE DRAWN: 04/20/2009
	REVISED BY:	DATE REVISED:	REVISION DESCRIPTION:		SCALE: full
	EXHIBIT TITLE: NISE Network Exhibits				SHEET #: 8 of 10



1 Threaded Rod and Ends
9 Scale: Actual Size

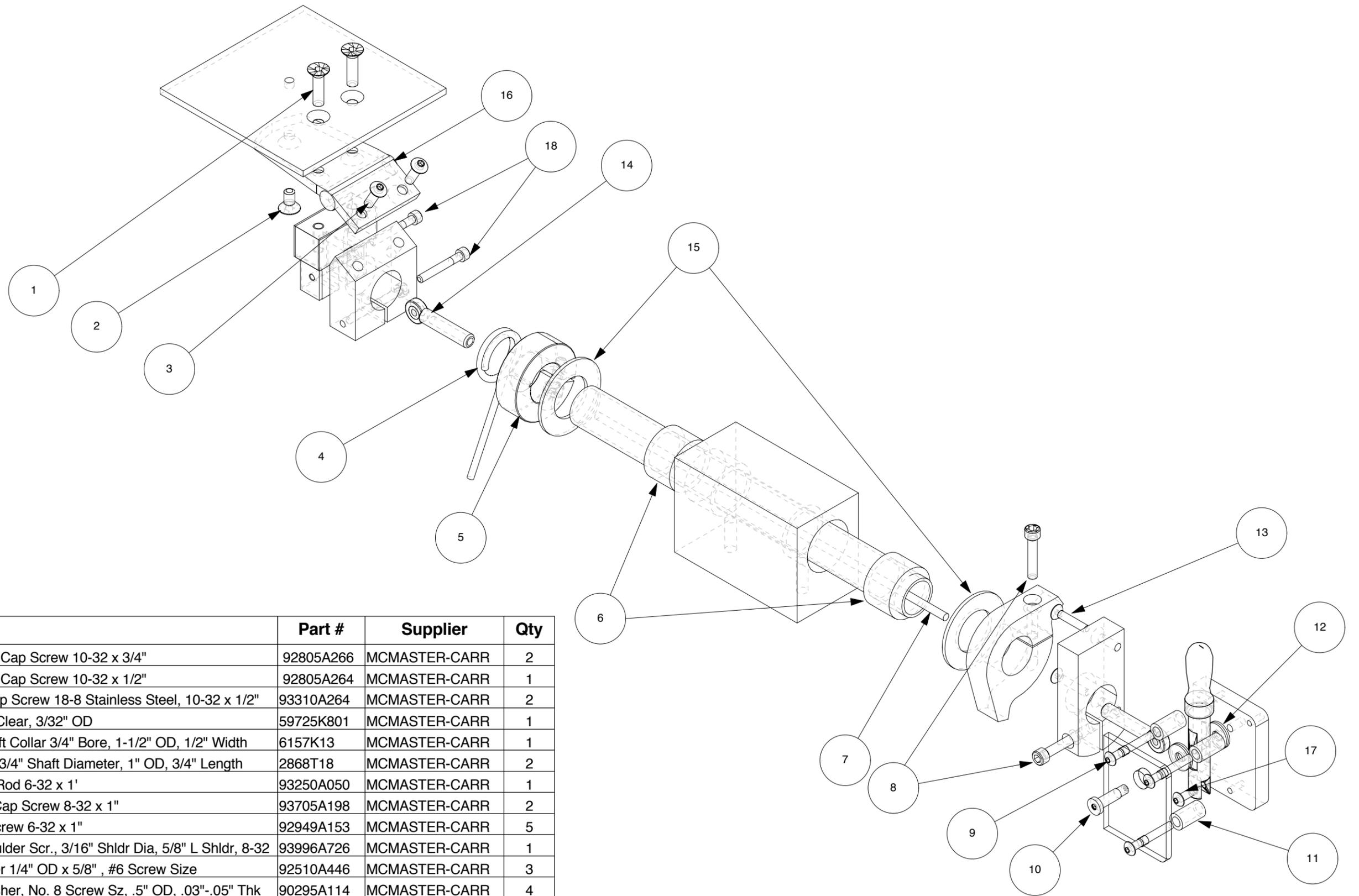


2 Pie Pan Platform
9 Scale: Actual Size



3 Isometric
9 Scale: Actual Size

 <p>120 W KELLOGG, ST. PAUL, MN 55102 ©2008 THE SCIENCE MUSEUM OF MINNESOTA</p>	DRAWING TITLE: Pie Pan Platform and Threaded Rod			
	COMPONENT TITLE: Bump and Roll - Gimbal	DRAWN BY: MDA	DATE DRAWN: 04/20/2009	
	REVISED BY:	DATE REVISED:	REVISION DESCRIPTION:	SCALE: FULL
	EXHIBIT TITLE: NISE Network Exhibits			SHEET #: 9 OF 10



Item #	Description	Part #	Supplier	Qty
1	18-8 SS Self-Lock Flat Head Socket Cap Screw 10-32 x 3/4"	92805A266	MCMaster-CARR	2
2	18-8 SS Self-Lock Flat Head Socket Cap Screw 10-32 x 1/2"	92805A264	MCMaster-CARR	1
3	Self-Locking Button Head Socket Cap Screw 18-8 Stainless Steel, 10-32 x 1/2"	93310A264	MCMaster-CARR	2
4	Urethane Solid Core Round Belting Clear, 3/32" OD	59725K801	MCMaster-CARR	1
5	One-Piece Aluminum Clamp-on Shaft Collar 3/4" Bore, 1-1/2" OD, 1/2" Width	6157K13	MCMaster-CARR	1
6	SAE 863 Bronze Sleeve Bearing for 3/4" Shaft Diameter, 1" OD, 3/4" Length	2868T18	MCMaster-CARR	2
7	Type 316 Stainless Steel Threaded Rod 6-32 x 1'	93250A050	MCMaster-CARR	1
8	Self-Locking 18-8 SS Socket Head Cap Screw 8-32 x 1"	93705A198	MCMaster-CARR	2
9	18-8 SS Button Head Socket Cap Screw 6-32 x 1"	92949A153	MCMaster-CARR	5
10	Self-Locking 18-8 SS Precision Shoulder Scr., 3/16" Shldr Dia, 5/8" L Shldr, 8-32	93996A726	MCMaster-CARR	1
11	Aluminum Unthreaded Round Spacer 1/4" OD x 5/8" , #6 Screw Size	92510A446	MCMaster-CARR	3
12	Nylon 6/6 General Purpose Flat Washer, No. 8 Screw Sz, .5" OD, .03"-.05" Thk	90295A114	MCMaster-CARR	4
13	18-8 SS Self-Lock Flat Head Socket Cap Screw 8-32 x 3/4"	92805A197	MCMaster-CARR	2
14	Miniature Tie-Rod End for #6-32		HOBBY /SHOP	2
15	Nylon 6/6 General Purpose Flat Washer, 3/4" Screw Sz, 2" OD, .09"-.11" Thk	90295a201	MCMaster-CARR	2
16	316 SS Surface-Mount Hinge, Nonremoveable Pin, 1-1/2" H, 2-7/8" W	11175A12	MCMaster-CARR	1
17	Self-Locking Button Head Socket Cap Screw 18-8 Stainless Steel, 6-32 x 3/8"	93310A146	MCMaster-CARR	1
18	Self-Locking 18-8 SS Socket Head Cap Screw 6-32 x 1"	93705A154	MCMaster-CARR	2



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DRAWING TITLE: **Parts Diagram**

COMPONENT TITLE: **Bump and Roll - Gimbal**

REVISIONS:

REVISED BY: MDA	DATE REVISED: 9/29/09	REVISION DESCRIPTION:
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EXHIBIT TITLE: **NISE Network Exhibits**

DRAWN BY: MDA

DATE DRAWN: 5/28/2009

SCALE: none

SHEET #: 10 of 10



NISE network™
NANOSCALE
INFORMAL
SCIENCE
EDUCATION



AC power into cabinet

Entire electrical system protected by GFCI

Outlets for AV. GFCI protected.

12V Sealed Lead Acid Battery for fan power. The fans run constantly to discourage mold in the vitrines.

1Amp fuse

12 V sealed lead acid battery

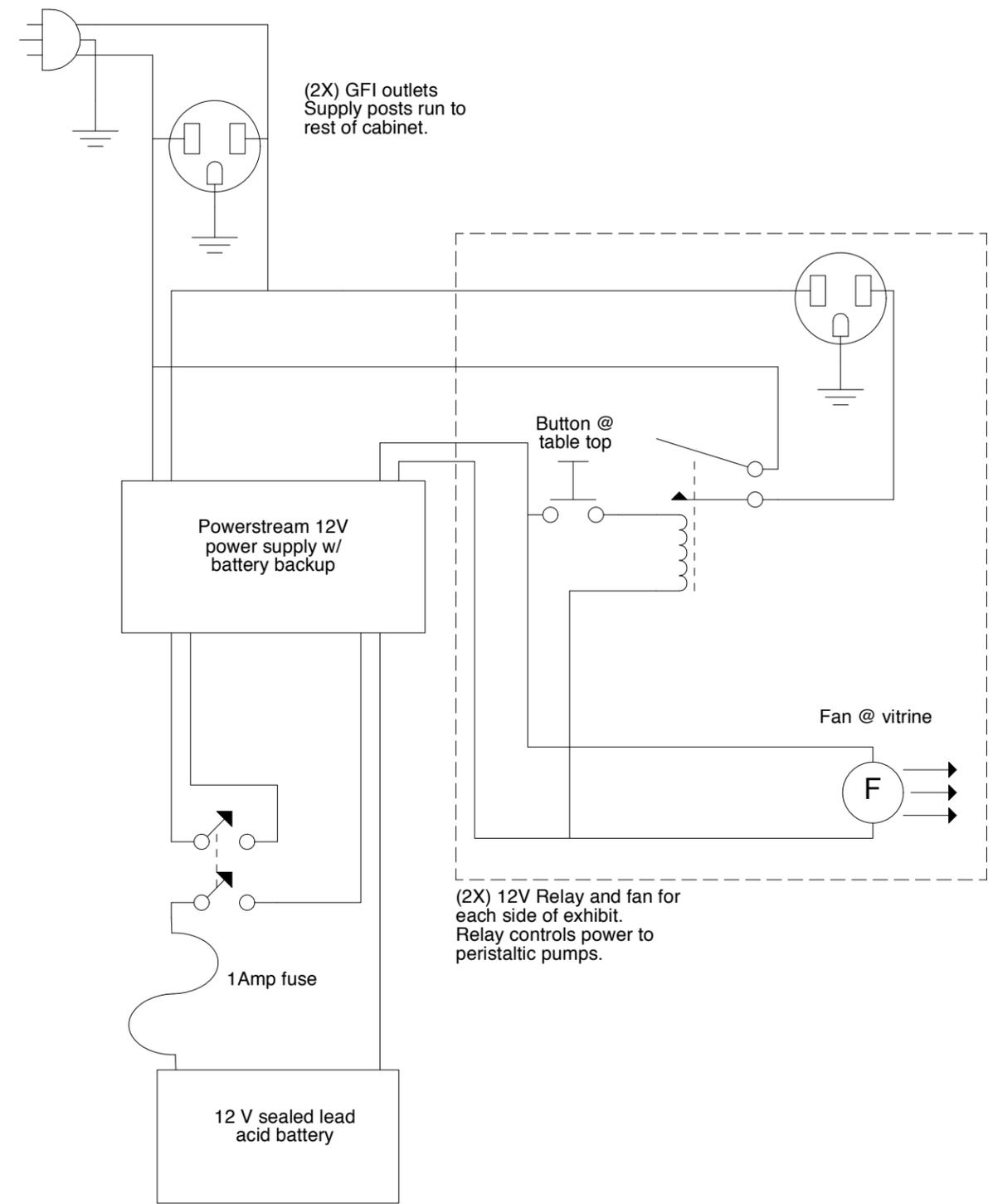
AC power out to peristaltic pumps.

12v relays for peristaltic pumps. Each relay has an onboard fuse.

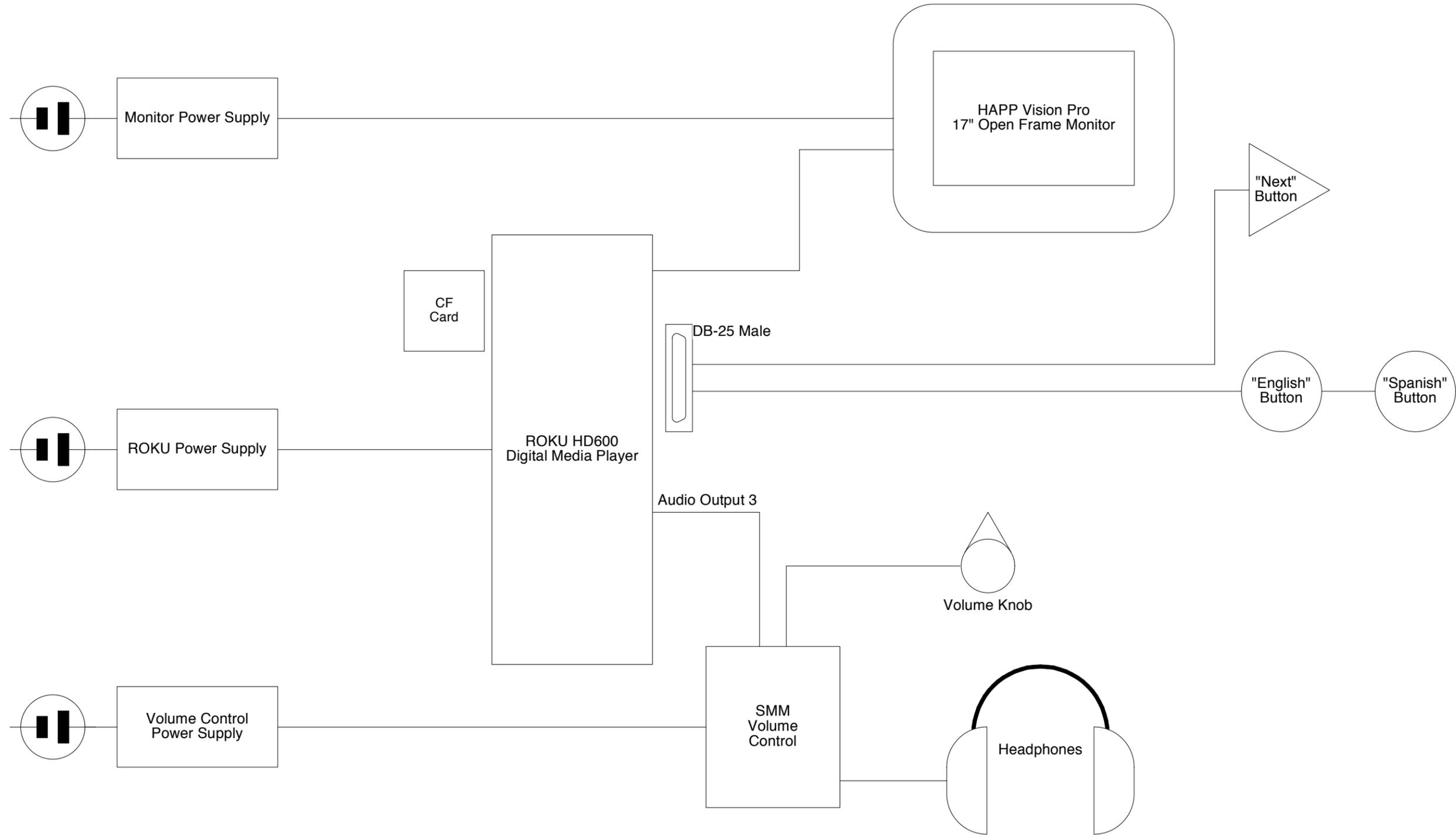
1A Fuse block for Battery

Powerstream Power supply provides 12VDC for fans and relays as well as charging the battery.

DPST toggle disconnects Battery and turns power supply off.



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	COMPONENT TITLE: Bump and Roll		DRAWN BY: MDA		DATE DRAWN: 04/20/2009
	REVISED BY:	DATE REVISED:	REVISION DESCRIPTION:		
	EXHIBIT TITLE: NISE Network Exhibits				SCALE: as noted
					SHEET #: 1 of 2



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	COMPONENT TITLE:		REVISION DESCRIPTION:			
	REVISED BY:	DATE REVISED:	SCALE: NA			
	EXHIBIT TITLE: NISE Network Exhibits				SHEET #:	
						 <p>NISE network NANOSCALE INFORMAL SCIENCE EDUCATION</p>