LA-UR-21-27633

Approved for public release; distribution is unlimited.

Title:	Imaging Station Multi-Foil Target
Author(s):	Mignardot, David Piat
Intended for:	Report
Issued:	2021-08-02

Integrated Weapons Experiments (J) Division
P. O. Box 1663, Mail Stop P942
Los Alamos, New Mexico, 87545

J DIVISION TECHNICAL NOTE (TN) COVER SHEET

NUMBER:	TN-DARHT-21-2836			
TITLE:	Imaging Station Multi-Foil Target			
DATE:	July 26th, 2021			
AUTHOR(S):	Name	Org	Name	Org
	David Piat Mignardot	J-6		
DISTRIBUTION:	J Division Technical Note Repository			
	Name	Org	Name	Org

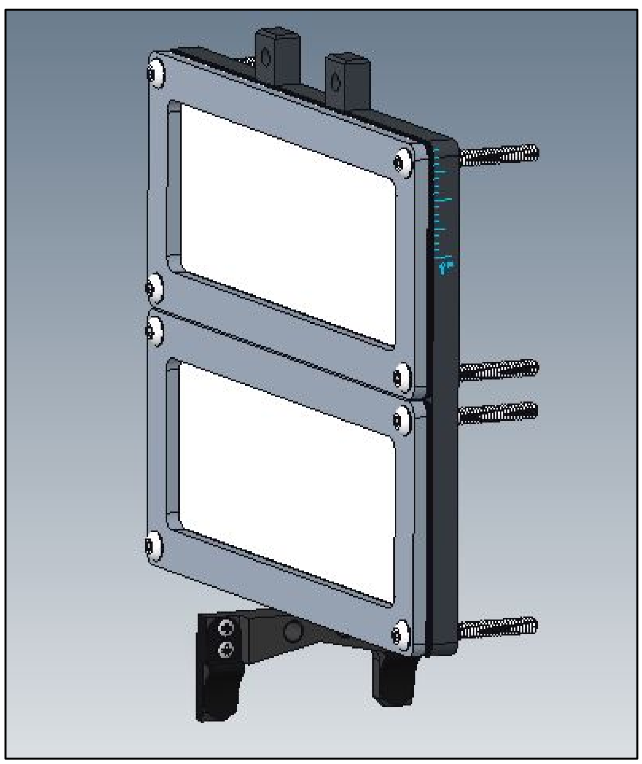
CLASSIFICATION REVIEW: ***One of the below must be selected.***	
☐ LAUR Number:	
☐ Classification Review	
☐ Unclassified : Not reviewed for Export Control	Reviewer Name:
☐ CUI: OUO - ECI ☐ CUI: OUO - AT ☐ CUI: UCNI	Date:
If document is Discretionary OUO, complete FORM-999-1037, *OUO Discretionary Determination Cover Sheet*.	
If document is CUI, ensure document is marked in accordance with P204-1, Controlled Unclassified Information.	

Imaging Station Multi-Foil Target

Technical Note

David Piat Mignardot

LA-UR-21-xxxxx
July 26th, 2021



Los Alamos
NATIONAL LABORATORY

Table of Contents

Section 1: OVERVIEW 5
Introduction 5
Purpose 5
Functionality 5
Section 2: DESIGN CONSIDERATIONS 6
Material Selection 6
Adaptive Installation 7
Adaptive Assembly 7
View Optimization 8
Calibration/focusing Aid 9
Anodization 11
Size Constraints 11
Section 3: DESIGN SUMMARIES 11
Single Window Design 11
Dual Window Design 12
Tri-Window Design 13
Section 4: INSTALLATION & OPERATION 14
Assembly & Installation Instructions 14
Maintenance Recommendations 14
Section 5: CONCLUSION 15
Section 6: WORKS CITED 16
Section 7: APPENDIX 17
Technical Requirements Document 17
Referenced Drawings & Numbers 18

List of Tables

Table 1. Target shim thickness increments. 6

List of Figures

Figure 1. 3-Axis MDC Z-Stage Linear Actuator assembly (47Y1923838)................................... 6
Figure 2. Imaging Station Target Adapter (47Y1924009)... 7
Figure 3. 1.25" button head cap screw.. 8
Figure 4. Single Window target views, 45° viewport (left A.), 16° viewport (right B.). 8
Figure 5. Dual Window target views, 45° viewport (left A.), 16° viewport (right B.).................. 9
Figure 6. Tri-Window target views, 45° viewport (left A.), 16° viewport (right B.). 9
Figure 7. FH2 calibration slide holder. Image retrieved Thorlabs... 10
Figure 8. Calibration slides with fiducials. Image retrieved from Edmund optics....................... 10
Figure 9. .375" socket head cap screw... 10
Figure 10. Etched ruler markings in contrast with anodization.. 11
Figure 11. Single Window assembly. 12
Figure 12. Dual Window assembly.. 13
Figure 13. Tri-Window assembly. 13

Section 1: OVERVIEW

Introduction

The Axis II Downstream Transport (DST) of the Dual Axis Radiographic Hydrodynamic Testing (DARHT) Facility is the final subassembly of the particle accelerator whose primary objective is to focus the 4-pulse beam as it enters the Target Region. Before the beam reaches the Target Region, it passes through two imaging stations located in the DST. At Imaging Station E (ISE) and Imaging Station C (ISC), diagnostics are conducted and experimenters study beam physics using specialized targets. Different targets are used depending on the objective of the study. The desire to conduct specific experiments has driven a need for a multi-foil target. This new design has been engineered to allow for new capabilities, and diagnostics to be studied at ISC. To accommodate new parameters, three different configurations have been conceived. Although each of the three designs differ from each other, their function and purpose remain consistent. Each target is engineered to secure a variable amount of target foils at variable spacing while Imaging Station experiments are conducted. Beam diagnostics and data from the targets are analyzed through various sized viewports on the imaging stations.

The objective of this technical note is to document the purpose and functionality of the targets. Design considerations, assembly instructions, and maintenance recommendations are also discussed. Additionally, each target and its respective advantages and disadvantages are covered in detail.

Purpose

Three multi-foil target assemblies have been designed for experimental use in the DARHT Axis II DST imaging stations. The multi-foil targets were conceptualized and designed to allow for different experiments to be conducted on a single target holder. An increased amount of diagnostic data can be collected more conveniently with the use of the multi-foil targets. These designs meet the requirement for a larger variety of targets available to be used for experimentation. The multi-foil targets were specifically designed to emulate the final focused target at the Axis II Target Region.

Functionality

Principal investigator (PI) Michael Jaworski developed a technical requirements document whose contents served as the guiding principles of the overall engineering design of the target assemblies. The technical requirements document can be found in Section 7 (appendix) of this technical note. The multi-foil targets are situated in the x-y plane of the imaging station chamber and are engineered to house multiple foils spaced variably in the direction of the beam (z-direction). This allows for different experiments to be conducted on a single target holder as the spacing can be set to emulate certain configurations of other targets. Three different assemblies exist, this includes a single, dual, and tri-window design. Section 3 of this technical note provides a detailed description of each design. All three targets offer changeable spacing via variable thickness (z-direction), interchangeable shims, and foils. The PI specified optimal shim and foil thicknesses; those increments are displayed in Table 1. Shims are situated between foils, and together the foils and shims are clamped between frame pieces to secure their position. The Axis II beam can be fired at any location on the foils within 5mm of the target edges. This is possible with use of the 3-Axis MDC Z-Stage linear actuator which provides x-y-z motion to the target. 3-axis translational capability is enormously advantageous as the beam does not have to be reoriented after each firing sequence. The 3-Axis MDC Z-Stage linear actuator is pictured below in Figure 1.

Target Shim Thickness Increments	
Variant	Size (in)
1	0.004
2	0.008
3	0.010
4	0.012
5	0.020
6	0.030

Table 1. Target shim thickness increments.

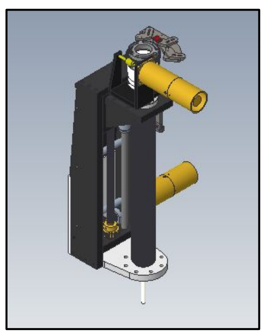


Figure 1. 3-Axis MDC Z-Stage Linear Actuator assembly (47Y1923838).

Section 2: DESIGN CONSIDERATIONS

Material Selection

The targets will be housed in ISC of the DARHT Axis II DST. This location is operated at ultra-high vacuum (UHV) (up to 10^{-8} Torr). Information from *Specification for the Manufacture of Ultra High Vacuum Components* (LANL) states that only a select few materials can be used in an UHV application. Based on the reference, aluminum alloy (AL ALY 6061-T651) and 300 Series Stainless Steel were selected for design and fabrication. Frame and clamp components were constructed from aluminum to save weight, thus minimizing load on the linear actuator. Shims were constructed from stainless steel in order to maintain rigidity at very small thicknesses. All hardware was set to be stainless steel. Foils are manufactured from Molybdenum in accordance with the design reference, but the foil material is interchangeable depending on the specifications of the experiment.

Adaptive Installation

In accordance with the technical requirements, the targets are designed to mount directly to the existing target adapter housed in ISC. The existing keyed target adapter is displayed below in Figure 2. This adaptive design allows for targets to be interchanged easily without the need to reorient and align with to beam.

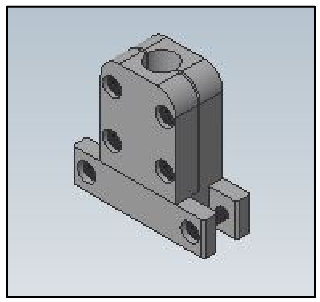


Figure 2. Imaging Station Target Adapter (47Y1924009).

Adaptive Assembly

Each target can be assembled in a multitude of ways according to the experimental procedure. The number of foils, shims, and shim thicknesses can be configured to vary the spacing between foils. The hardware length will change as the assembly configuration changes. Note this only includes the button head cap screw hardware (SCR, BTH, .138-32 UNC-2B) used to clamp all components together, as pictured in Figure 3. Depending on the configuration spacing, the appropriate hardware length should be chosen so the button head cap screws sit flush with the back of the target frames (471925684, 47Y1925695, 47Y1925696, 47Y1925701). Note this information is only a recommendation and does not prevent the assembly from functioning as long as hardware length does not exceed 1.25”. If the specified 1.25” length is exceeded, then the assembly is at risk of scraping the RF screen cutouts.

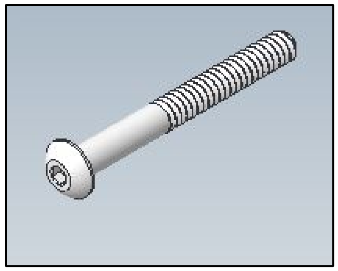


Figure 3. 1.25” button head cap screw.

View Optimization

One of the most important considerations specified on the technical requirements document was to design the targets such that the field of view (FOV) through each viewport on the imaging stations provides acceptable visuals in areas between foils. In order to accomplish this, the shims were designed to be low profile, fixed only at the top and bottom of each viewing window. This allows for unobstructed views in line with the sides and front of the target. Cones of light were modeled using *Creo Parametric 4.0* to simulate FOV through the viewports. In order to verify that adequate views were achievable, the cones were positioned at the center axis of the viewports to simulate the visual capability of a camera. In Figures 4-6, the cones of light are displayed onto the multi-foil targets. All cones of light are represented in transparent yellow. The centerline of the view is denoted by a darker yellow tube. The cones are modeled with a half angle of 3.4°. In all images, the multi-foil target is positioned in the center of the ISC chamber.

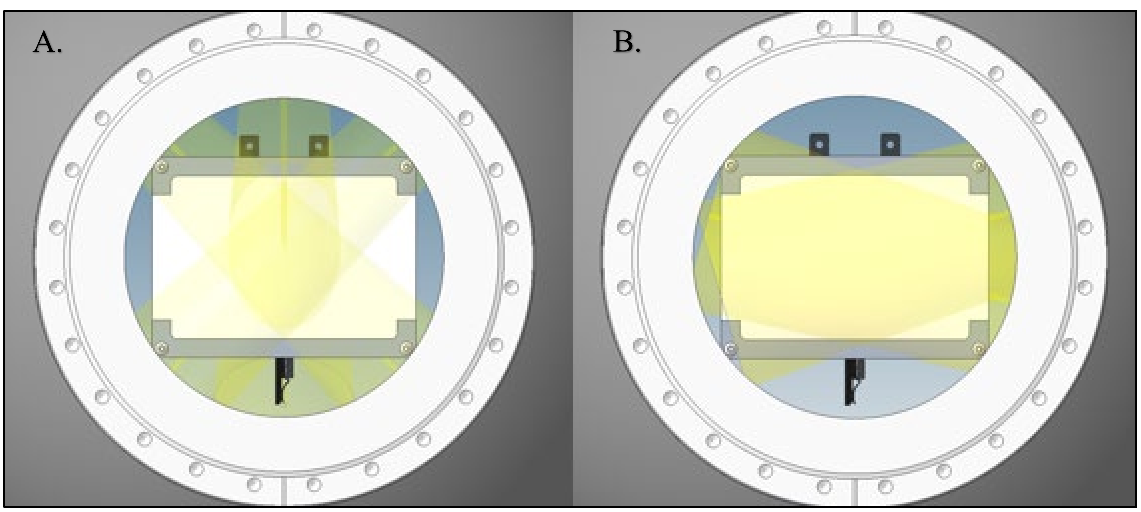


Figure 4. Single Window target views, 45° viewport (left A.), 16° viewport (right B.).

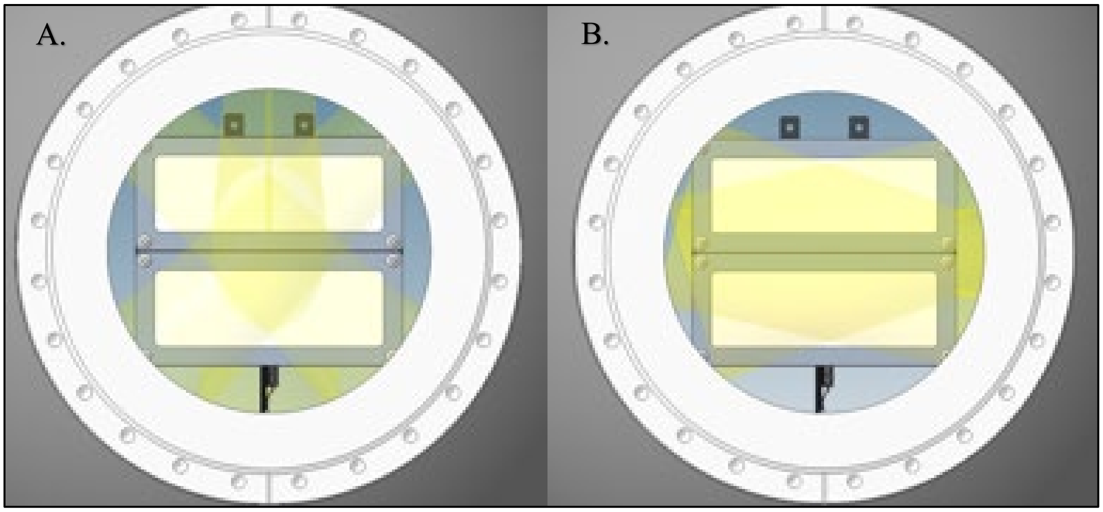


Figure 5. Dual Window target views, 45° viewport (left A.), 16° viewport (right B.).

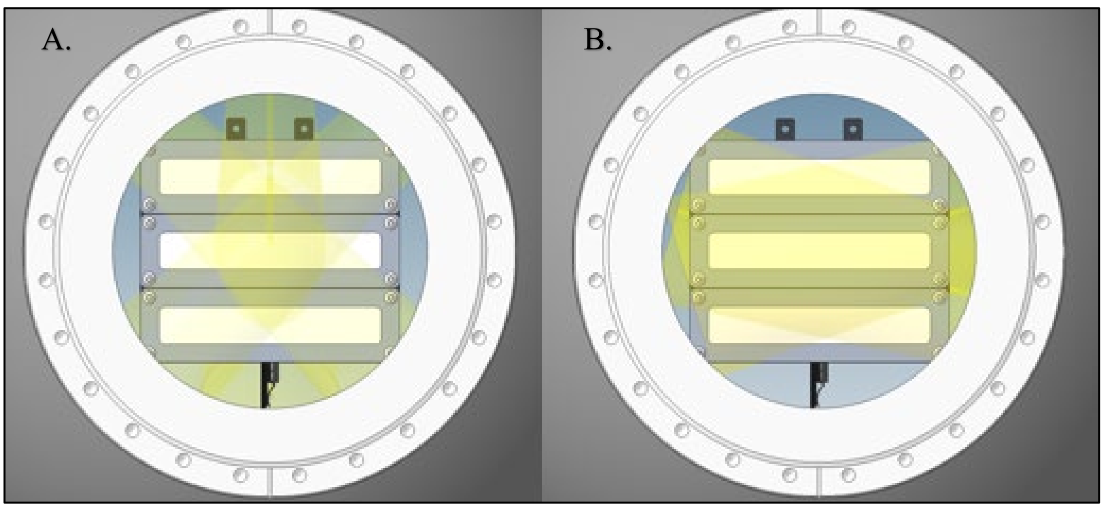


Figure 6. Tri-Window target views, 45° viewport (left A.), 16° viewport (right B.).

Calibration/focusing Aid

Each target is designed to be compatible with a calibration/focusing aid. A number 8 (.164-32 UNC-2B) tapped hole exists at the bottom of each frame component (471925684, 47Y1925695, 47Y1925696, 47Y1925701) for mounting a calibration slide holder (Thorlabs FH2). Figure 7 displays the calibration slide holder. Camera calibration and focus can be achieved using fiducials shown in Figure 8. Hardware used to fix the calibration slide holder should not exceed a length of .375", otherwise such hardware would protrude into the experimental area. This applies only to the socket head screw hardware (SCR, SCH, .164-32 UNC-2B) shown in Figure 9. The RF screen cutout at the top of the ISC chamber is 2.25" in width, therefore calibration slides should not exceed a length of 2.00". Calibration slides should not exceed a height of 1.00" otherwise the slides are at risk of contacting the RF screen at the bottom of ISC chamber when the target is fully extended. When using the calibration slides on the dual and tri-window designs, slides needs to be reduced to a height of .750" to prevent contact. If the targets are not fully extended, this risk is avoided. Etched ruler marks are engraved after anodization on the sides of each target frame component (471925684, 47Y1925695, 47Y1925696, 47Y1925701). The etched ruler marks provide additional calibration and focusing aid.

Figure 7. FH2 calibration slide holder. Image retrieved Thorlabs.

Figure 8. Calibration slides with fiducials. Image retrieved from Edmund optics.

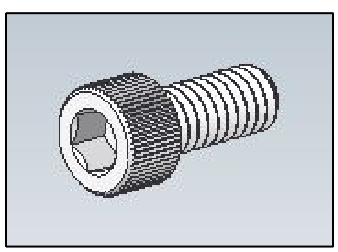


Figure 9. .375" socket head cap screw.

Anodization

Each frame component (471925684, 47Y1925695, 47Y1925696, 47Y1925701) is anodized in accordance with MIL-A-8625F Type II, Class II: black. The anodization enhances visual capability by creating a contrast between frame components and the etched markings that are machined onto the parts post anodization. Figure 10 displays the anodization in contrast with the etched ruler markings.

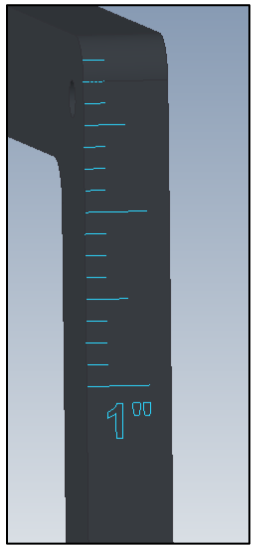


Figure 10. Etched ruler markings in contrast with anodization.

Size Constraints

The overall dimensions of the target assemblies were determined by several factors: RF screen cutouts, imaging station chamber dimensions, and the existing keyed target adapter (47Y1924009). Overall length, height, and thickness were chosen based on the RF screen cutout dimensions. Adapter key dimensions were dictated by the existing keyed target adapter (47Y1924009).

Section 3: DESIGN SUMMARIES

Single Window Design

The single window target design features one large window for experimentation. The primary advantages of the single window are the large foil view and surface area. The lack of centralized cross members between the frame components (47Y1925695, 47Y1925696), allows for a large unobstructed view and experimentation area. Another advantage is the ease of assembly with less foils and shims needed when compared to the dual and tri-window designs. The tradeoff is that only a single set of foils can be used. The other tradeoff is the need for foil tensioning as the foils are larger in size. The experimentation area for the single window design is approximately $14.625 in^2$.

In the single window design, a 2-piece frame was engineered to accommodate the need for foil tensioning. The two-piece frame is joined via coupling nuts and the target foils. Similar to a turnbuckle design, left and right hand threaded studs which are press fit into both frame pieces, are joined together via a left to right hand thread coupling nut (Mcmaster Carr 97372A102). As the coupling nut is tightened or loosened, the frame components are pulled together and pushed away thus stretching and tensioning the foils. Foil material rigidity was discussed with the PI, and slight tensioning in one direction was concluded to be sufficient.

Frame thickness is larger on the single window design to accommodate for the dimensions of the left to right hand coupling nut. The thicker frame allows for more space between the coupling nut and foil targets. This additional space is necessary for adjustment of the coupling nuts.

Vent thru holes are included in the design to prevent virtual vacuum leaks where the studs are press fit. The assembled single window design is pictured below in Figure 11.

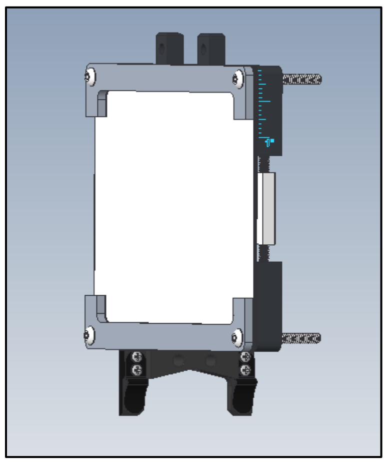


Figure 11. Single Window assembly.

Dual Window Design

The dual window design features two window openings for experimentation. This design maintains fairly large foil and viewable areas while having the ability to house two independent sets of foils. The advantage exists in the different foil configurations. This allows for the analysis and comparison of two different materials, or different foil spacing configurations without the need for target changes. The tradeoffs for these advantages include increased view obstruction from the hardware posts, and increased amounts of shims needed for assembly. The dual window design incorporates advantages from both the single and tri-window designs while mitigating disadvantages. The experimentation area for the dual window design is approximately $13.5 in^2$, which is an 8% decrease from the single window design. The dual window assembly is pictured below in Figure 12.

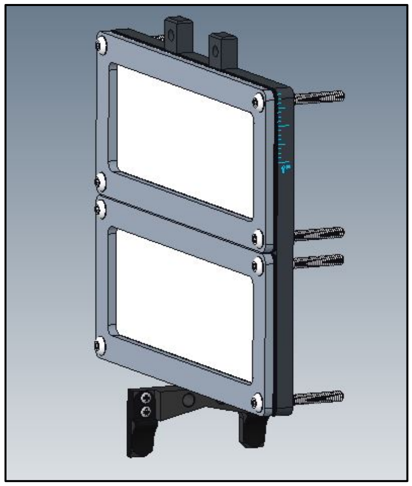


Figure 12. Dual Window assembly.

Tri-Window Design

The tri-window design features three window openings for experimentation. This assembly has the ability to house three independent sets of foils. The advantage exists in the different foil configurations. This allows for analysis and comparison of three different materials, or different foil spacing configurations without the need for target changes. The tradeoffs for these advantages include increased view obstruction from the hardware posts and an increased amount of shims needed for assembly. Another tradeoff is the decreased experimentation area. The experimentation area for the tri-window design is approximately $10.125 in^2$, which is a 30% decrease from the single window design and a 25% decrease from the dual window design. The tri-window assembly is pictured below in Figure 13.

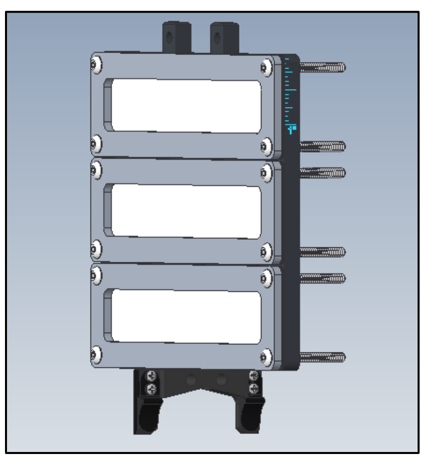


Figure 13. Tri-Window assembly.

Section 4: INSTALLATION & OPERATION

Assembly & Installation Instructions

The assembly of the single window target requires special instruction. Prior to assembling the shims, foils, and clamps, the two frame pieces should be fastened together via the left to right hand thread coupling nut. Turn the coupling nut completely until the two frame pieces are as close together as possible. Once this step has been accomplished the shims, foils, and clamps can be assembled per the following instructions stated in the next paragraph. After every component has been assembled, tension can be applied to the foils by turning the coupling nuts in the direction that increases the distance between the frame pieces. Be cautious to not over tension potentially damaging the foils.

All multi-foil target designs are assembled and installed in a similar manner, therefore, the following instructions can be used for the single, dual, and tri-window designs. It is advisable to wear gloves in order to keep undesirable oils off the foils as well as to protect hands from possible sharp edges. Lay the frame piece on a flat surface and stack shims and foils on top of each other according to the desired configuration. The number of foils and shims as well as the thickness of shims shall be specified by the experiment design. Stack the clamp components on top once all of the foils and shims have been put into place. Once all components are in place and aligned, secure the specified length cap screw hardware (SCR, BTH, .138-32 UNC-2B) through each screw hole and tighten using a 5/64" (or appropriate) hex drive allen key. Once all components are fastened together, the assembly can be inserted into the imaging station chamber and fixed to the existing target holder with the appropriate hardware, tools, and procedure.

The calibration slide holder is installed by being positioned on the bottom surface of the frame component and securing it with the socket head screw hardware (SCR, SCH, .164-32 UNC-2B). Orientation of the calibration slide holder can vary depending on where it will be viewed from (E.g. parallel or perpendicular with the frame component). This screw should be tightened with a 9/64" (or appropriate) hex drive allen key.

Maintenance Recommendations

All screws and threads are small on the multi-foil target designs. Foils and shims can be very thin on the multi-foil target designs. Caution should be taken when assembling and disassembling each component to prevent damage to the threads, foils, and shims. Do not over tighten the screws as they only need to be snug.

Section 5: CONCLUSION

Three different designs for a multi-foil target were engineered in accordance with the requirements specified by the PI. Each design offers varying parameters to accommodate different foil configurations for the desired experiments. The multi-foil targets are to be housed in the DARHT Axis II ISC. The single window design offers the most experimental area with the least configuration variability, while the tri-window design offers the least experimental area and the most configuration variability. The dual window design is a median of the other two designs.

Section 6: WORKS CITED

1. Lieblich, J. H. (2008). *Drawing Requirements Manual* (11th ed.). Englewood, CO: Global Engineering Documents.

2. *McMaster-Carr*. (2021). McMaster-Carr. https://www.mcmaster.com/

3. *Optical Imaging: Laser Optics: Edmund Optics*. Edmund Optics Worldwide. (n.d.). https://www.edmundoptics.com/.

4. *Thorlabs, Inc.* - Your Source for Fiber Optics, Laser Diodes, Optical Instrumentation and Polarization Measurement & Control. (n.d.). Retrieved from https://www.thorlabs.com/

5. *United States Military*. (2003). MIL-A-8625F Military Specification Anodic Coatings for Aluminum and Aluminum Alloys.

6. *University of California Los Alamos National Laboratory.* Specification for the Manufacture of Ultra High Vacuum Components. Specification No. P12-89Y-238650-01

Section 7: APPENDIX

Technical Requirements Document

Multi-pulse Science Station Target

Technical Requirements Document

Michael Jaworski

Goal: enable multiple shots on an experiment without steering the beam in the XY plane (accelerator coordinates).

Mechanical Requirements

1. Interface with existing, keyed, target holder on ISC and ISE providing absolute rotation reference
2. Capable of mounting multiple foils
    a. Foils space from 0.004" to the full mounting distance
    b. Mounting shall not exclude variable spacing between foils
    c. Foils shall maintain separation distance (foil-to-foil) across the entire area
    d. Total mounting distance between foils shall extend up to 1.25" in the z direction
    e. Holder shall be capable of mounting foil thicknesses from 0.004" up to 0.040"
    f. Foil materials can include carbon through tungsten (the design reference shall be molybdenum at 0.010")
3. When translating in the XY plane, the foil position should remain at the same z position
4. Number of experiments on a single target shall be maximized with minimum spacing of 5mm
5. Clear views through the space between foils shall not be occluded as per the following
    a. Diagnostic views are referenced to the nominal experiment center (i.e. beam incidence point)
    b. Views in the X-Y plane include the X-axis (0 degrees) and 45 degrees in the XY-plane.
    c. Views in the Y-Z plane enter at 45 degrees above and below the axis on front and back of the target
    d. Views along these coordinates shall not have obstructions such that a cone of light can reach the nominal centerpoint of the sample. The cone shall have a half-angle of at least 3.4 degrees.

Electrical Requirements

1. Mounting of foils shall permit electrical continuity with the target holder
2. Mount shall provide good electrical conductivity (<50 ohms) to the vacuum chamber walls.

Visual Marks

1. Ruler marks shall be included along the side of the target holder
2. Frame of the target holder shall be anodized or otherwise treated so as to enable high-contrast of the etched marks
3. A focusing aid shall be included that can be moved to the chamber center and will also include ruler marks

Referenced Drawings & Numbers

Drawing Number	Drawing Title	Type
47Y1923838	Imaging Station Z-Stage Assembly	Assembly
47Y1924009	Imaging Station Target Adapter Assembly	Assembly
47Y1925684	Dual Window Target Frame	Part
47Y1925695	Single Window Target upper Frame	Part
47Y1925696	Single Window Target lower Frame	Part
47Y1925701	Tri-Window Target Frame	Part

REVISIONS								
ZONE	REV	DESCRIPTION	DATE	CLASS REVIEW	CHANGED	CHECKED	ENGINEER	RELEASED
	A	ORIGINAL ISSUE	13-Jul-21	-	-	-	-	-

NOTES: (UNLESS OTHERWISE SPECIFIED)

104. ABBREVIATIONS IN ACCORDANCE WITH ASME Y14.38-1999.

200. DIMENSIONING AND TOLERANCING IN ACCORDANCE WITH ASME Y14.5M-2009.

500. THOROUGHLY CLEAN PARTS TO REMOVE ALL OIL, GREASE, DIRT, CHIPS, ETC.

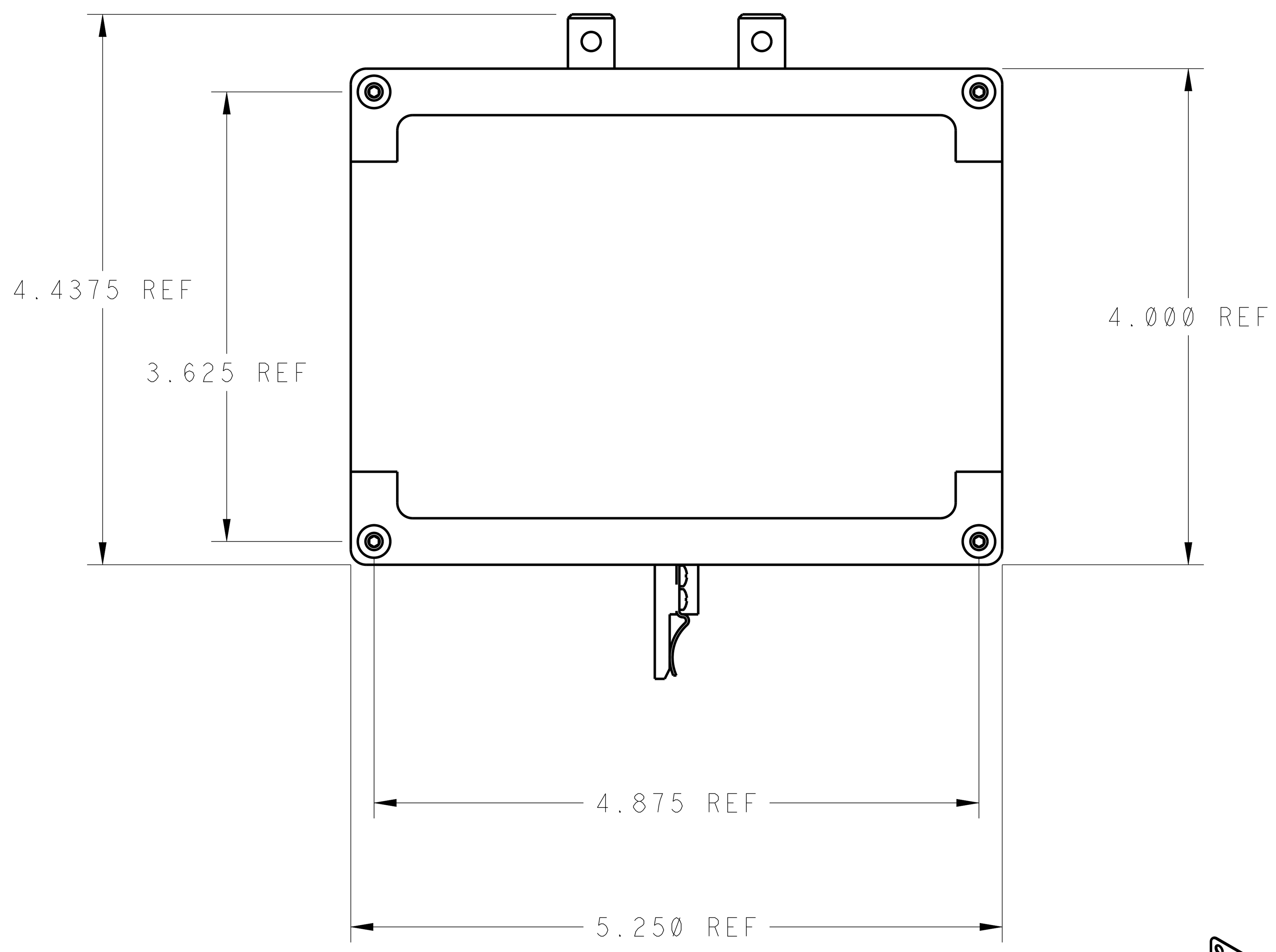
900. ITEMS LISTED WITHOUT MGT LEVEL DESIGNATION ARE MGT LEVEL 4.

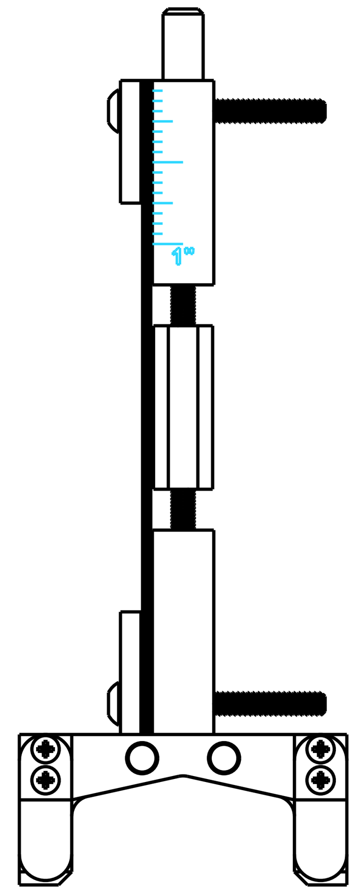
901. LENGTH OF CAP SCREW HARWARE WILL VARY DEPENDING ON CONFIGURATION.

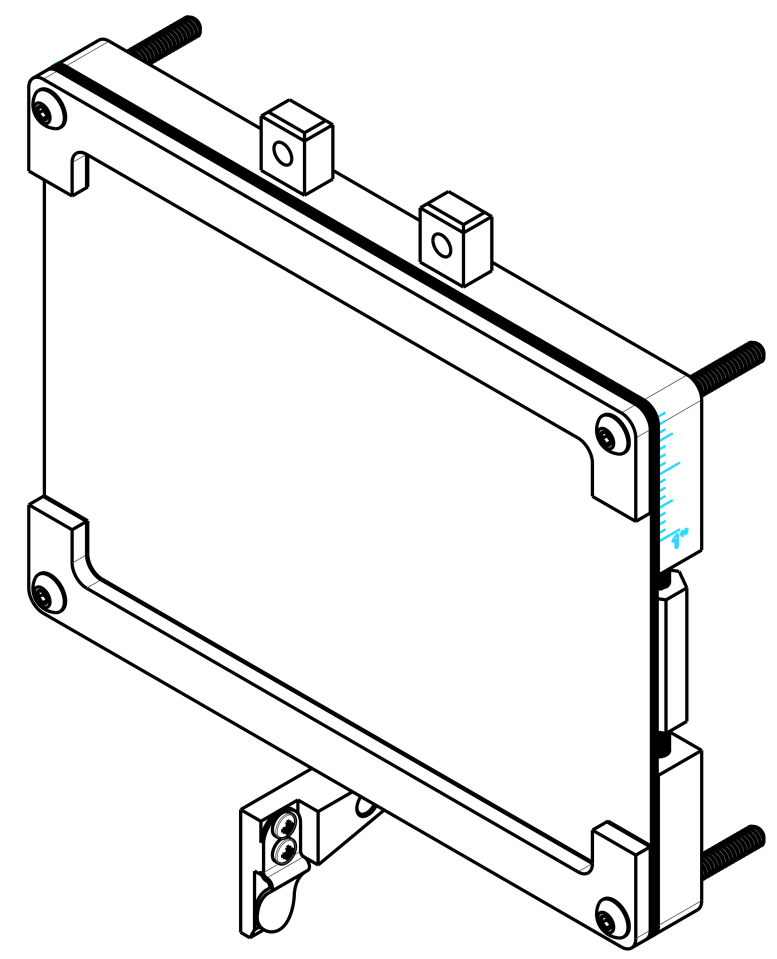
902. NUMBER OF FOILS/SHIMS WILL VARY DEPENDING ON CONFIGURATION.

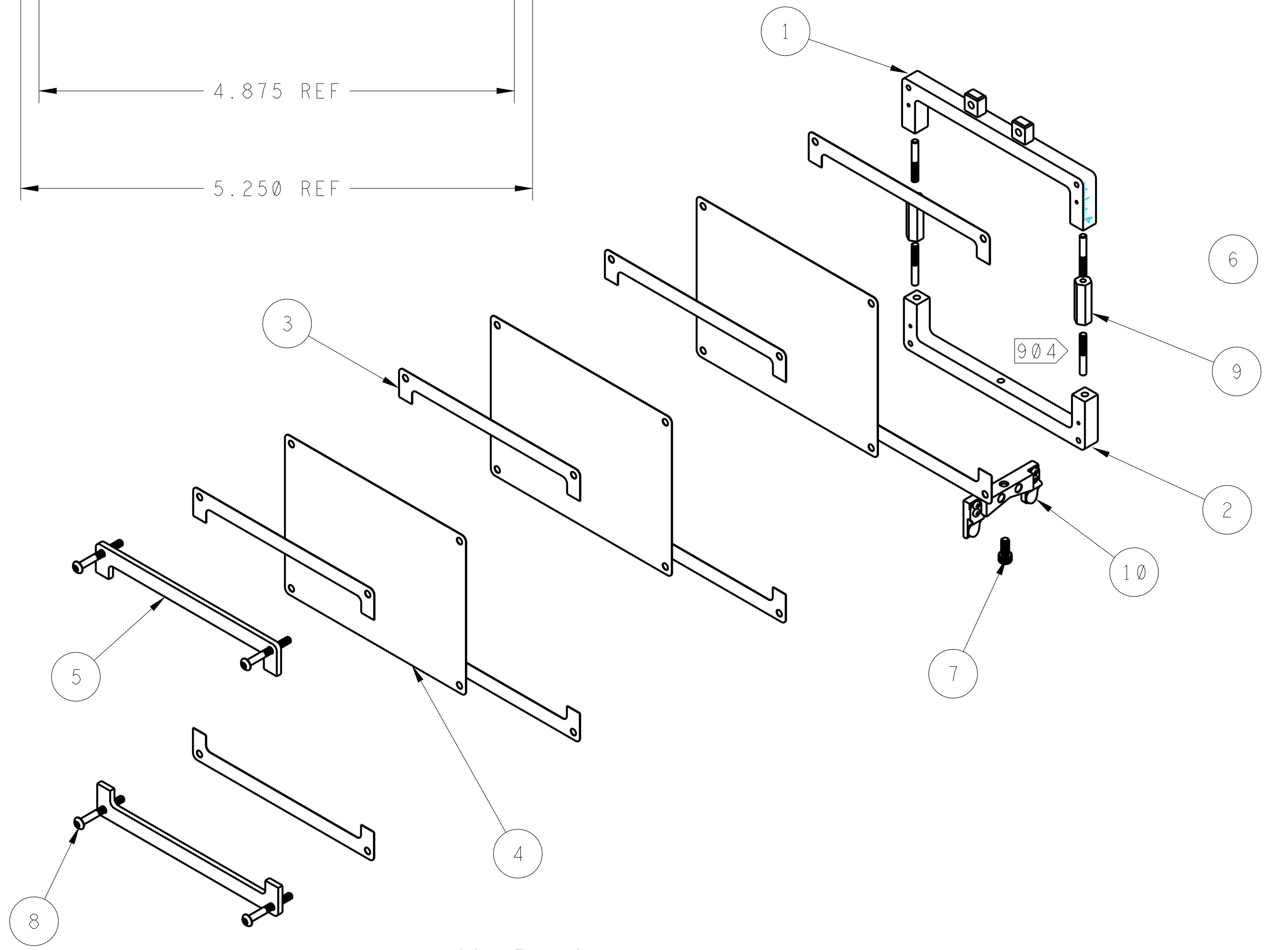
903. PRESS FIT STUDS (ITEMS 8 & 10) INTO FRAME PIECES (1 & 2)

904. APPROXIMATE WEIGHT: .84 LBS.









SCALE 1/2

QTY REQD	CAGE CODE	MGT LEVEL	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION	ITEM NO
1	0LW43	4	THORLABS FH2	CALIBRATION SLIDE HOLDER		11
2		4	47Y1925708	LEFT HAND THREAD STUD	SS 18-8	10
2	0E328	4	MCMASTER CARR 97372A102	RH LH FEMALE HEX ADPT X 1.0 LG	SS 304 (18-8)	9
2		4	47Y1925709	RIGHT HAND THREAD STUD	SS 18-8	8
4		4	MCMASTER CARR 98164A444	SCR, BTH, .138-32 UNC-2B X 1.25 LG	SS 316	7
1		4	MCMASTER CARR 92196A192	SCR, SCH, .164-32 UNC-2B X .375 LG	SS 304 (18-8)	6
2		4	47Y1925699	TARGET CLAMP	AL ALY 6061-T651	5
3		4	47Y1925698	TARGET FOIL	MOLYBDENUM	4
8		4	47Y1925697	TARGET SHIM	SS 304	3
1		4	47Y1925696	TARGET LOWER FRAME	AL ALY 6061-T651	2
1		4	47Y1925695	TARGET UPPER FRAME	AL ALY 6061-T651	1

PARTS LIST/BILL OF MATERIAL

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES.
TOLERANCES ARE:
DECIMALS
.X = ±.1
.XX = ±.03
.XXX = ±.010
ANGLES = ±.5°
SURFACE FINISH 125 μin.
DO NOT SCALE DRAWING

CLASSIFICATION REVIEW	CLASSIFICATION
CLASSIFIER: TACCETTI M.	TITLE: UNCLASSIFIED
CLASSIFIER TITLE: R@D SCIENTIST	PART: UNCLASSIFIED
MANAGEMENT LEVEL 4	DRAWING: UNCLASSIFIED

ENGLISH

THIRD ANGLE PROJECTION

NEXT ASSEMBLY	USED ON
--	--
--	--

APPLICATION

CAD SYSTEM & VERSION	CREO 4.0
CAD DRAWING NAME	47Y1925700
CAD MODEL NAME	47Y1925700
CAD MODEL TYPE	ASSEM
CAD MODEL PDM LINK REVISION	A.1
DRAWING PDM LINK VERSION	A.1

APPROVALS			
	NAME	GROUP	DATE
ORIGINATED	JAWORSKI M.	J-6	13-Jul-21
MODELED & DRAWN	MIGNARDOT D.	J-6	APPROVALS ON FILE
CHECKED	ORTIZ G.	J-6	
ENGINEERING	MIGNARDOT D.	J-6	
RELEASED	WEAVER T.	J-DO	
FILE PATH			

Los Alamos NATIONAL LABORATORY EST. 1943
J-DIVISION INTEGRATED WEAPONS EXPERIMENTS

PROJECT: DARHT AXIS II DS TRANSPORT

TITLE: IMAGING STATION SINGLE WINDOW MULTI-PULSE TARGET ASSEMBLY

SIZE	CAGE CODE	DWG NO. & CAD FILENAME	REV.
D	88516	47Y1925700	A

SCALE 1/1 DRAWING STATUS WIP SHEET 1 OF 1

REVISIONS								
ZONE	REV	DESCRIPTION	DATE	CLASS REVIEW	CHANGED	CHECKED	ENGINEER	RELEASED
	A	ORIGINAL ISSUE	13-Jul-21	-	-	-	-	-

NOTES: (UNLESS OTHERWISE SPECIFIED)

104. ABBREVIATIONS IN ACCORDANCE WITH ASME Y14.38-1999.

200. DIMENSIONING AND TOLERANCING IN ACCORDANCE WITH ASME Y14.5M-2009.

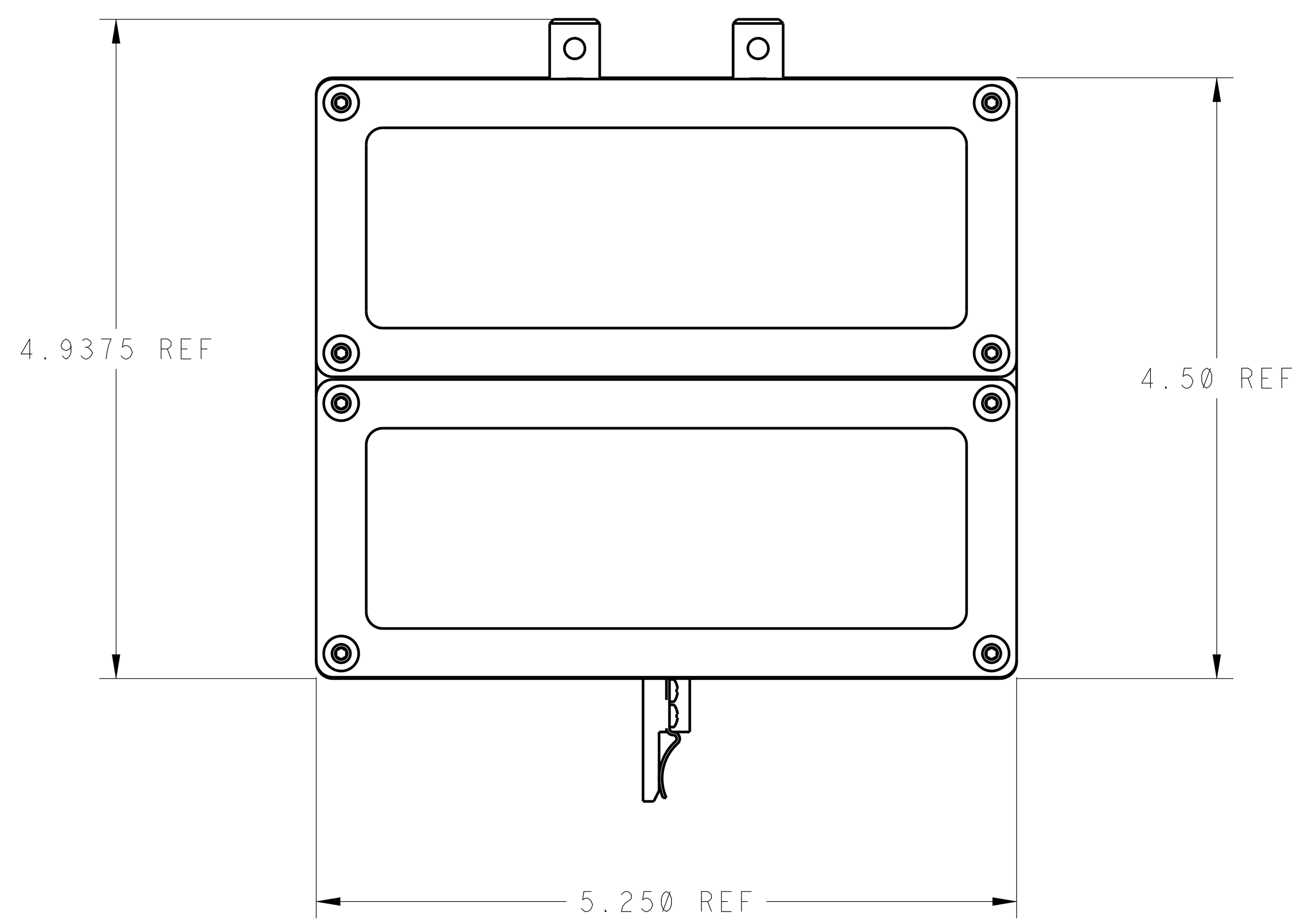
500. THOROUGHLY CLEAN PARTS TO REMOVE ALL OIL, GREASE, DIRT, CHIPS, ETC.

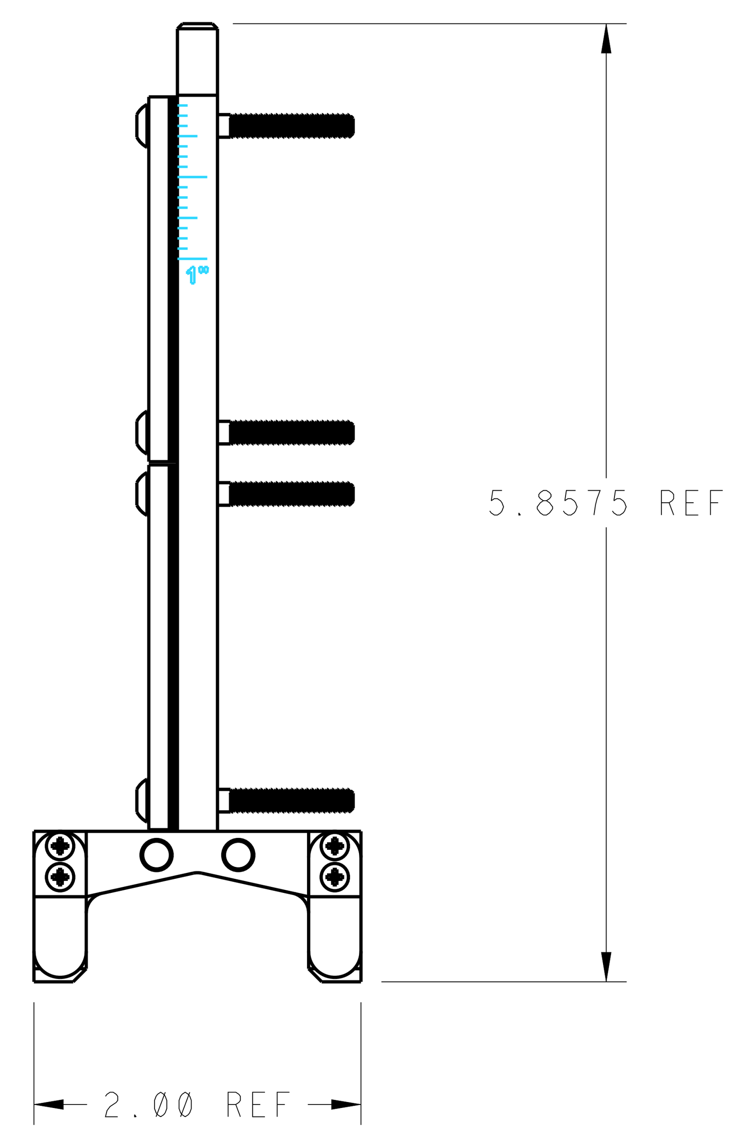
900. ITEMS LISTED WITHOUT MGT LEVEL DESIGNATION ARE MGT LEVEL 4.

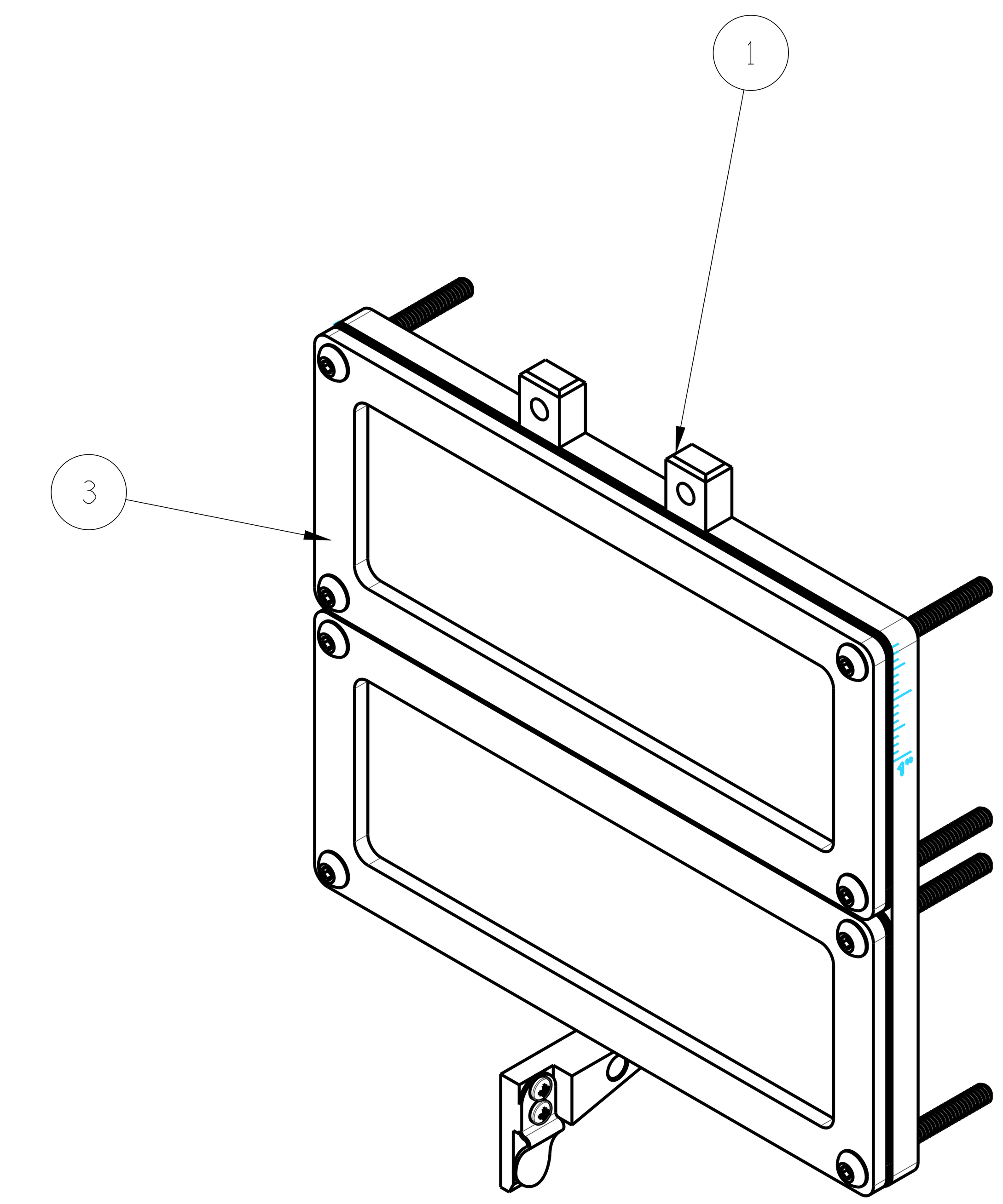
901. LENGTH OF CAP SCREW HARWARE WILL VARY DEPENDING ON CONFIGURATION.

902. NUMBER OF FOILS/SHIMS WILL VARY DEPENDING ON CONFIGURATION.

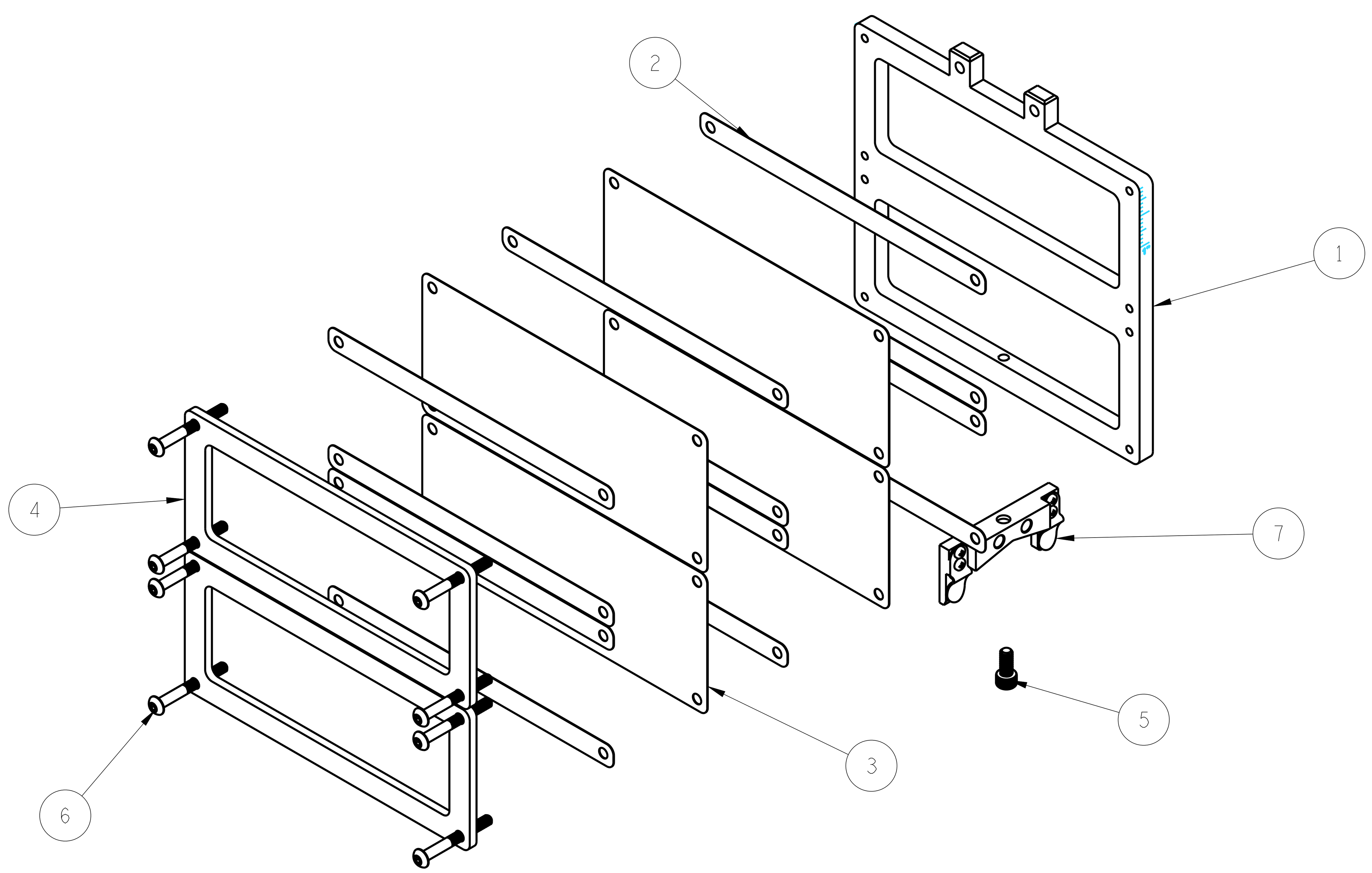
903. APPROXIMATE WEIGHT: .87 LBS.







SCALE 1/1



SCALE 3/4

1	ØLW43	4	THORLABS FH2	CALIBRATION SLIDE HOLDER		7
8		4		SCR, BTH, .138-32 UNC-2B X 1.25 LG	SS 316	6
1		4		SCR, SCH, .164-32 UNC-2B X .375 LG	SS 304 (18-8)	5
2		4	47Y1925687	TARGET CLAMP	AL ALY 6Ø61-T651	4
4		4	47Y1925686	TARGET FOIL	MOLYBDENUM	3
12		4	47Y1925685	TARGET SHIM	SS 3Ø4	2
1		4	47Y1925684	TARGET FRAME	AL ALY 6Ø61-T651	1
QTY REQD	CAGE CODE	MGT LEVEL	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION	ITEM NO

PARTS LIST/BILL OF MATERIAL

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES.
TOLERANCES ARE:
DECIMALS
.X = ±.1
.XX = ±.Ø3
.XXX = ±.Ø1Ø
ANGLES = ±.5°
SURFACE FINISH 125 µin.
DO NOT SCALE DRAWING

CLASSIFICATION REVIEW	CLASSIFICATION
CLASSIFIER: TACCETTI M.	TITLE: UNCLASSIFIED
CLASSIFIER TITLE: R&D SCIENTIST	PART: UNCLASSIFIED
MANAGEMENT LEVEL 4	DRAWING: UNCLASSIFIED

ENGLISH

THIRD ANGLE PROJECTION

--	--
--	--
NEXT ASSEMBLY	USED ON

APPLICATION

CAD SYSTEM & VERSION	CREO 4.Ø
CAD DRAWING NAME	47Y1925688
CAD MODEL NAME	47Y1925688
CAD MODEL TYPE	ASSEM
CAD MODEL PDM LINK REVISION	A.1
DRAWING PDM LINK VERSION	A.1

APPROVALS

	NAME	GROUP	DATE
ORIGINATED	JAWORSKI M.	J-6	13-Jul-21
MODELED & DRAWN	MIGNARDOT D.	J-6	APPROVALS ON FILE
CHECKED	ORTIZ G.	J-6	
ENGINEERING	MIGNARDOT D.	J-6	
RELEASED	WEAVER T.	J-DO	

FILE PATH

Los Alamos NATIONAL LABORATORY EST. 1943

J-DIVISION INTEGRATED WEAPONS EXPERIMENTS

PROJECT: DARHT AXIS II DS TRANSPORT

TITLE: IMAGING STATION DUAL WINDOW MULTI-PULSE TARGET ASSEMBLY

SIZE	CAGE CODE	DWG NO. & CAD FILENAME	REV.
D	88516	47Y1925688	A
SCALE 1/1		DRAWING STATUS WIP	SHEET 1 OF 1

REVISIONS								
ZONE	REV	DESCRIPTION	DATE	CLASS REVIEW	CHANGED	CHECKED	ENGINEER	RELEASED
	A	ORIGINAL ISSUE	21-Jul-21	-	-	-	-	-

NOTES: (UNLESS OTHERWISE SPECIFIED)

104. ABBREVIATIONS IN ACCORDANCE WITH ASME Y14.38-1999.

200. DIMENSIONING AND TOLERANCING IN ACCORDANCE WITH ASME Y14.5M-2009.

500. THOROUGHLY CLEAN PARTS TO REMOVE ALL OIL, GREASE, DIRT, CHIPS, ETC.

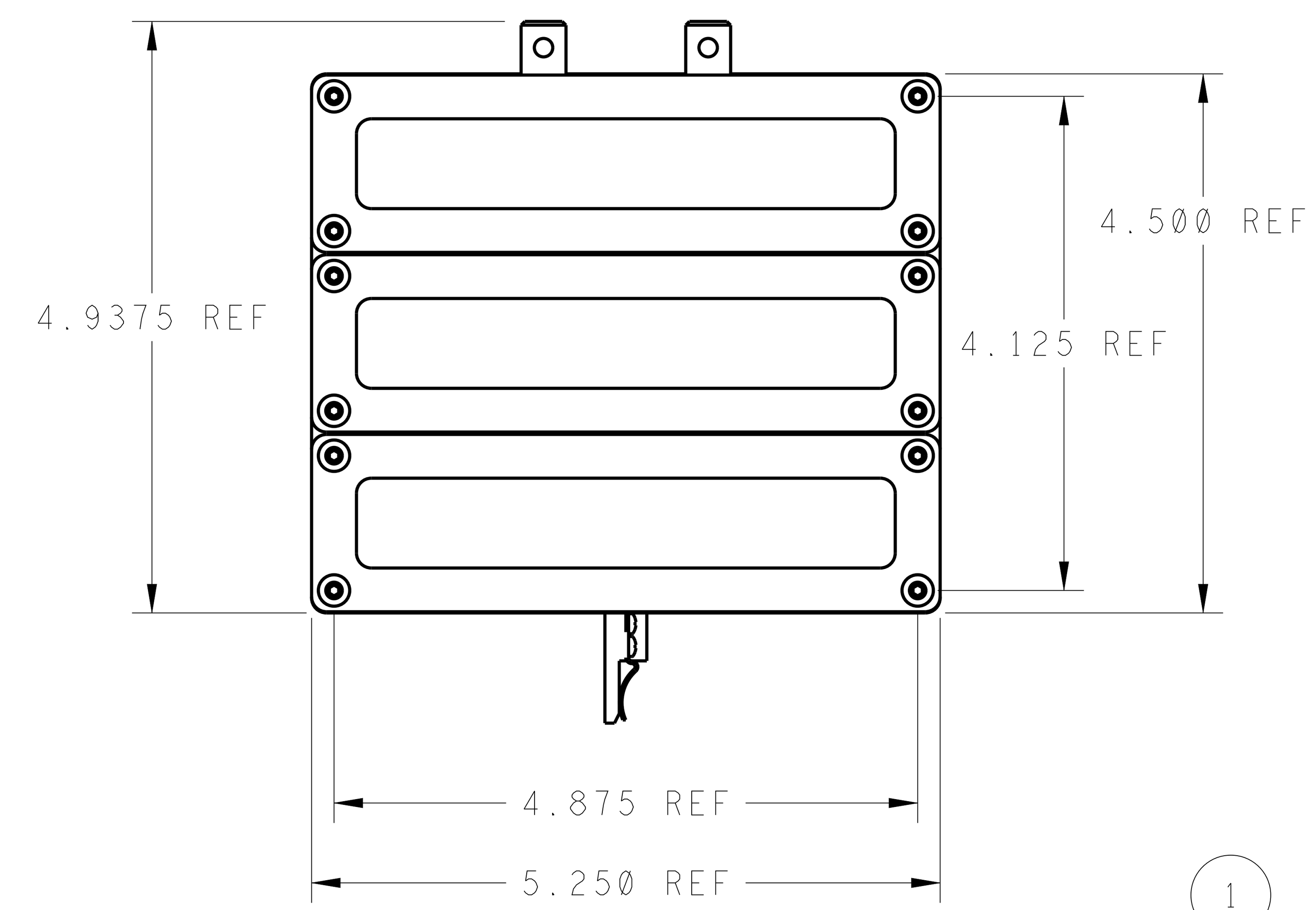
900. ITEMS LISTED WITHOUT MGT LEVEL DESIGNATION ARE MGT LEVEL 4.

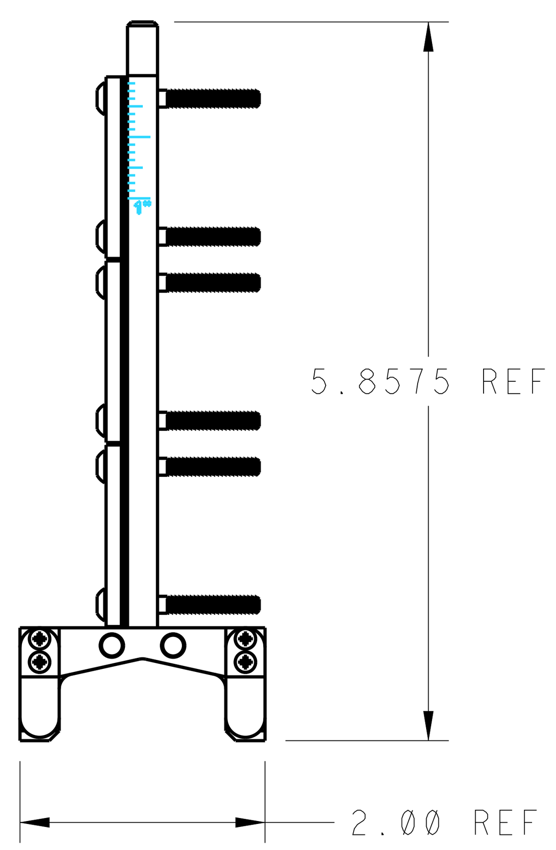
901. LENGTH OF CAP SCREW HARWARE WILL VARY DEPENDING ON CONFIGURATION

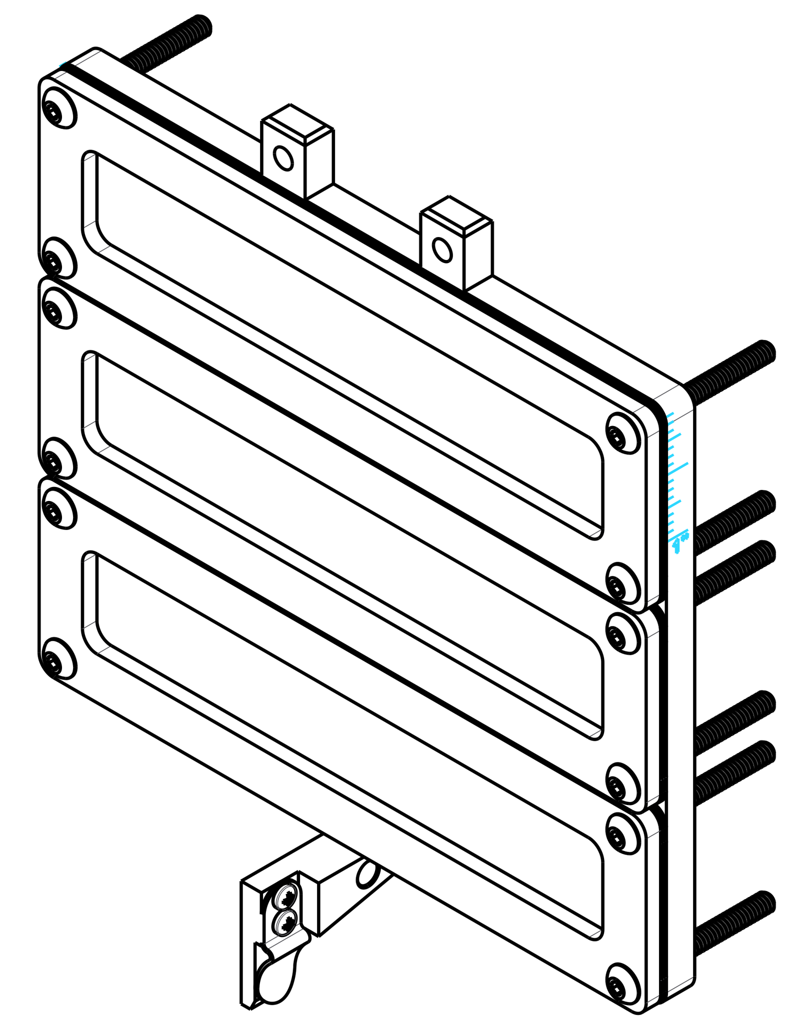
902. NUMBER OF FOILS/SHIMS WILL VARY DEPENDING ON CONFIGURATION

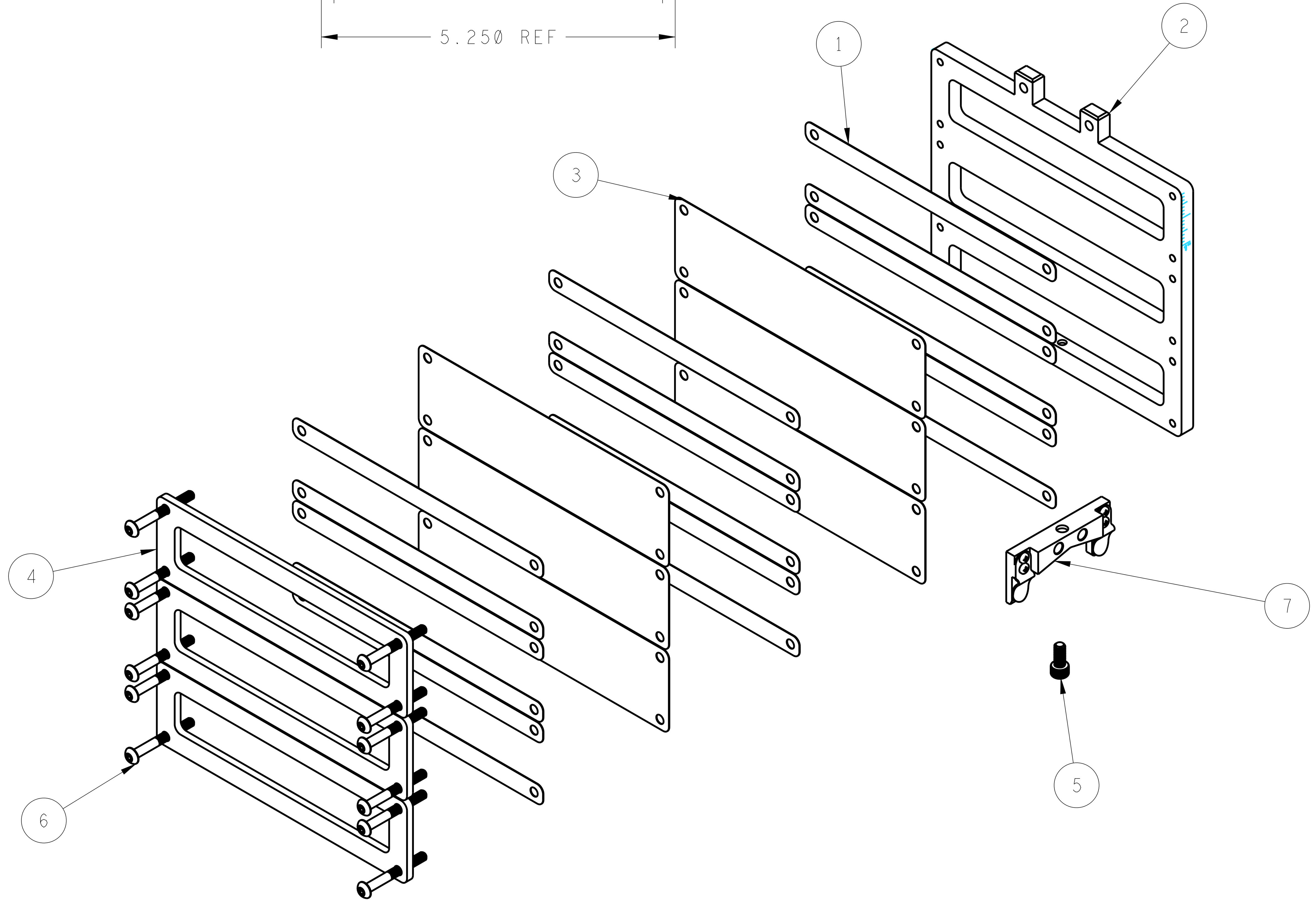
903. APPROXIMATE WEIGHT: 1.04 LBS.

SCALE 3/4









SCALE 3/4

QTY REQD	CAGE CODE	MGT LEVEL	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION	ITEM NO
1	ØLW43	4	THORLABS FH2	CALIBRATION SLIDE HOLDER		7
12		4		SCR, BTH, .138-32 UNC-2B X 1.25 LG	SS 316	6
1		4		SCR, SCH, .164-32 UNC-2B X .375 LG	SS 304 (18-8)	5
3		4	47Y1925703	TARGET CLAMP	AL ALY 6061-T651	4
6		4	47Y1925702	TARGET FOIL	MOLYBDENUM	3
1		4	47Y1925701	TARGET FRAME	AL ALY 6061-T651	2
18		4	47Y1925685	TARGET SHIM	SS 304	1

PARTS LIST/BILL OF MATERIAL

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES.
TOLERANCES ARE:
DECIMALS
.X = ±.1
.XX = ±.03
.XXX = ±.010
ANGLES = ±.5°
SURFACE FINISH 125 µin.
DO NOT SCALE DRAWING

CLASSIFICATION REVIEW	CLASSIFICATION
CLASSIFIER: TACCETTI M.	TITLE: UNCLASSIFIED
CLASSIFIER TITLE: R&D SCIENTIST	PART: UNCLASSIFIED
MANAGEMENT LEVEL 4	DRAWING: UNCLASSIFIED

ENGLISH

THIRD ANGLE PROJECTION

NEXT ASSEMBLY	USED ON
--	--
--	--

APPLICATION

CAD SYSTEM & VERSION	CREO 4.0
CAD DRAWING NAME	47Y1925704
CAD MODEL NAME	47Y1925704
CAD MODEL TYPE	ASSEM
CAD MODEL PDM LINK REVISION	A.1
DRAWING PDM LINK VERSION	A.1

APPROVALS

	NAME	GROUP	DATE
ORIGINATED	JAWORSKI M.	J-6	21-Jul-21
MODELED & DRAWN	MIGNARDOT D.	J-6	APPROVALS ON FILE
CHECKED	ORTIZ G.	J-6	
ENGINEERING	MIGNARDOT D.	J-6	
RELEASED	WEAVER T.	J-DO	

FILE PATH

Los Alamos NATIONAL LABORATORY EST. 1943
J-DIVISION INTEGRATED WEAPONS EXPERIMENTS

PROJECT: DARHT AXIS II DS TRANSPORT

TITLE: IMAGING STATION TRI-WINDOW MULTI-PULSE TARGET ASSEMBLY

SIZE	CAGE CODE	DWG NO. & CAD FILENAME	REV.
D	88516	47Y1925704	A

SCALE 1/1 | DRAWING STATUS WIP | SHEET 1 OF 1