

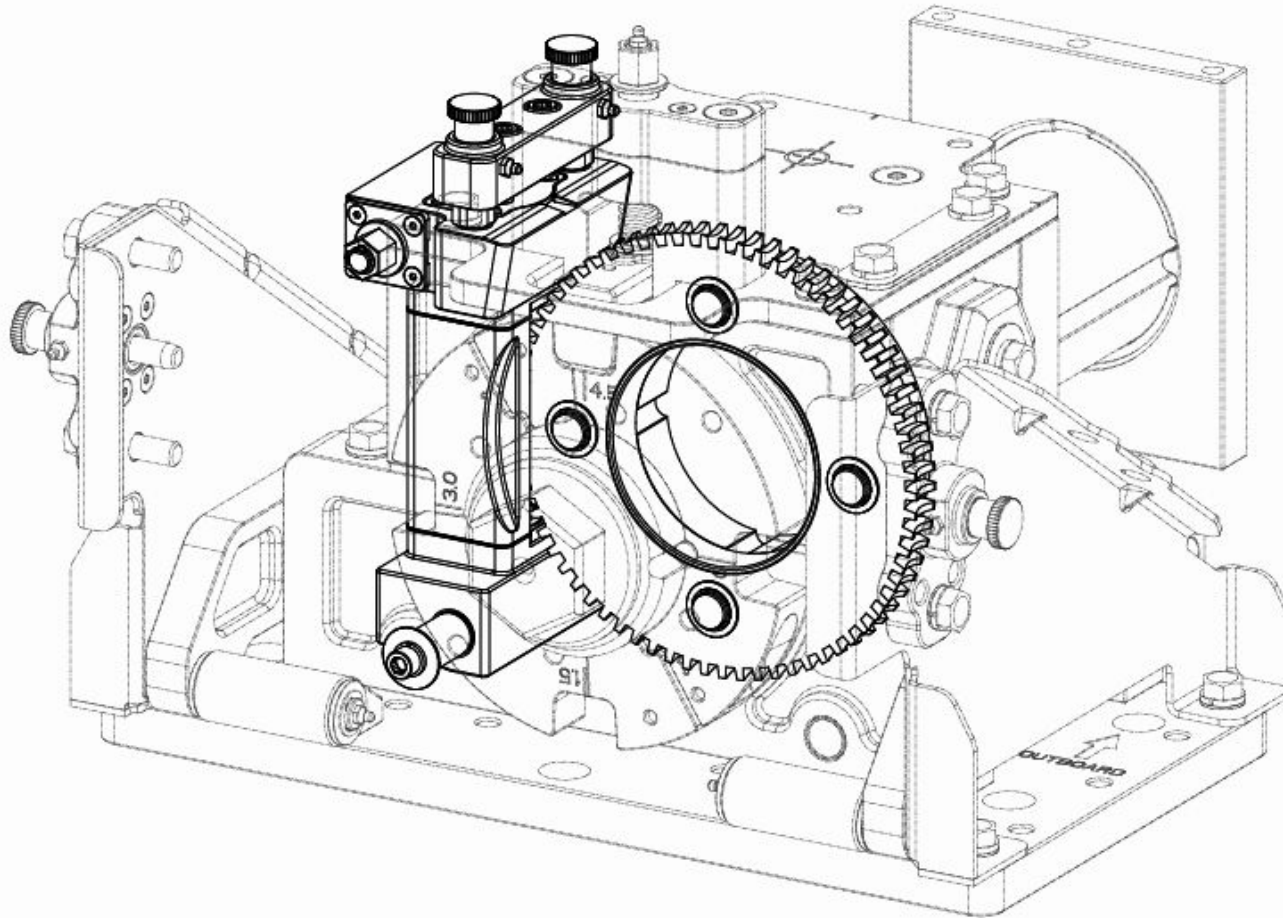
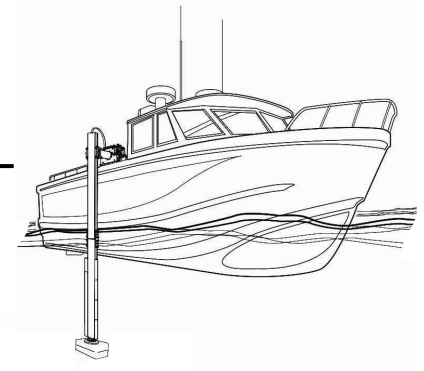


Patent #8094520

HIGHTOWER

GEAR DRIVE **USER MANUAL**

INSTALLATION & FUNCTIONALITY



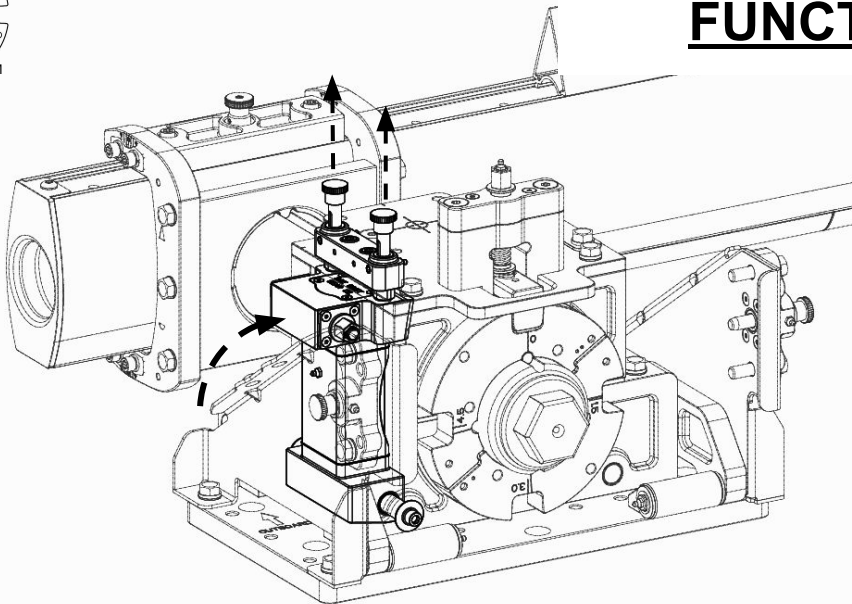
SCAN FOR VIDEO



SCAN FOR ALL
USM VIDEOS

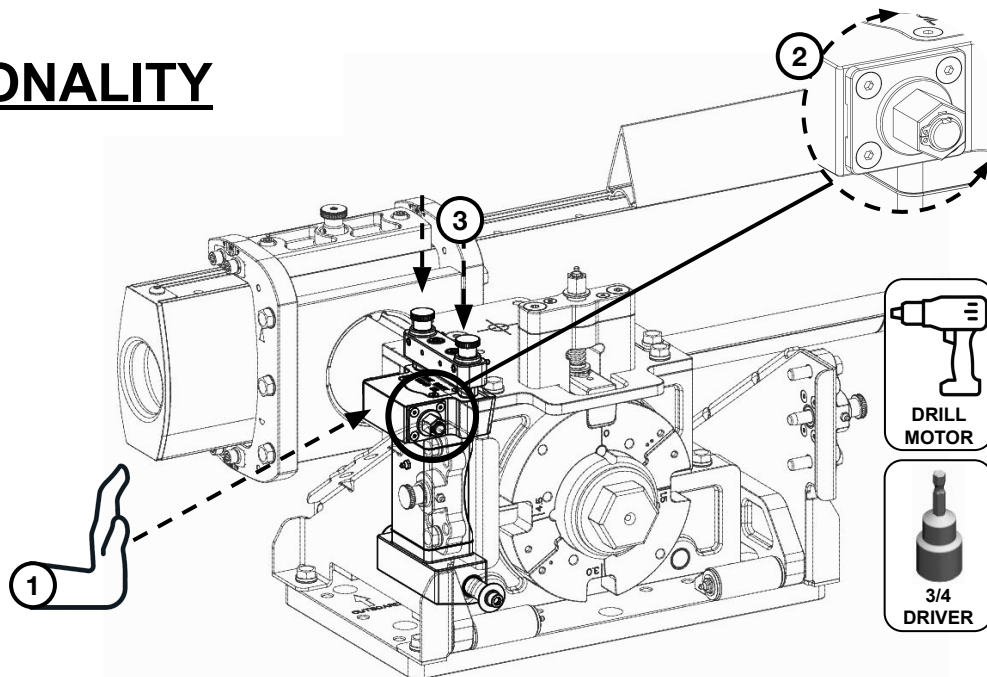


FUNCTIONALITY



ENGAGE THE GEAR DRIVE - Lift lock pins and push Gear Tower into place.

1

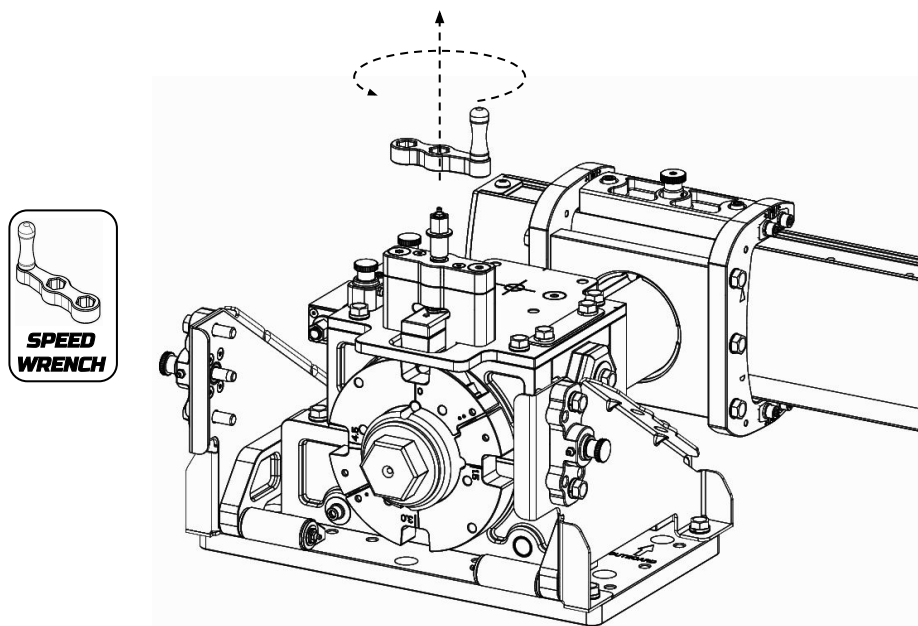


ALIGN TOWER AND RING GEAR - Rotate Drive Nut until Gear Tower pushes fully into place. Depress the Lock Pins.

2

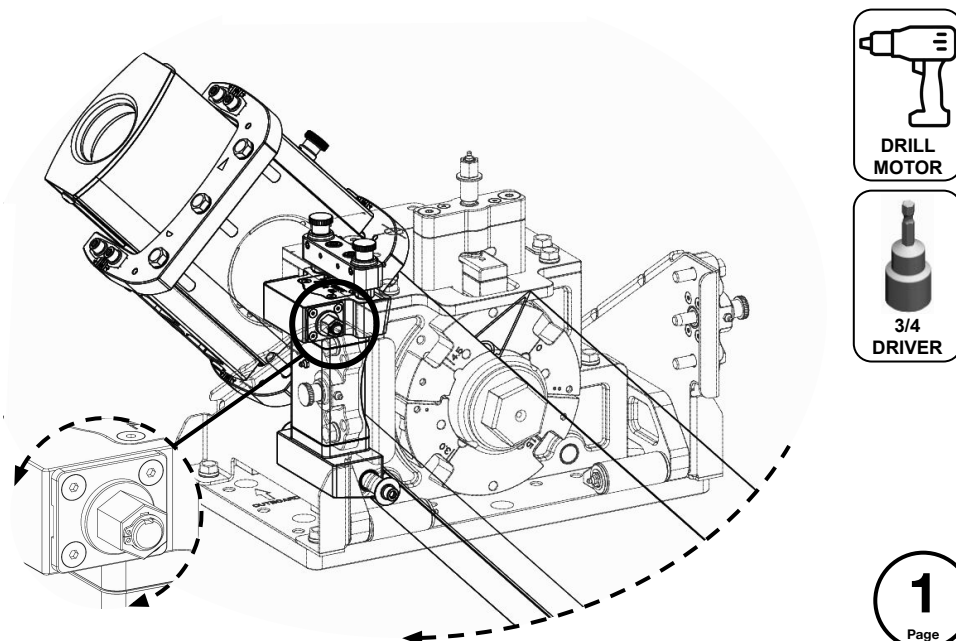
DISENGAGE SHEAR BLOCK - Before actuating the Gear Drive lift the Shear Block using the Speed Wrench.

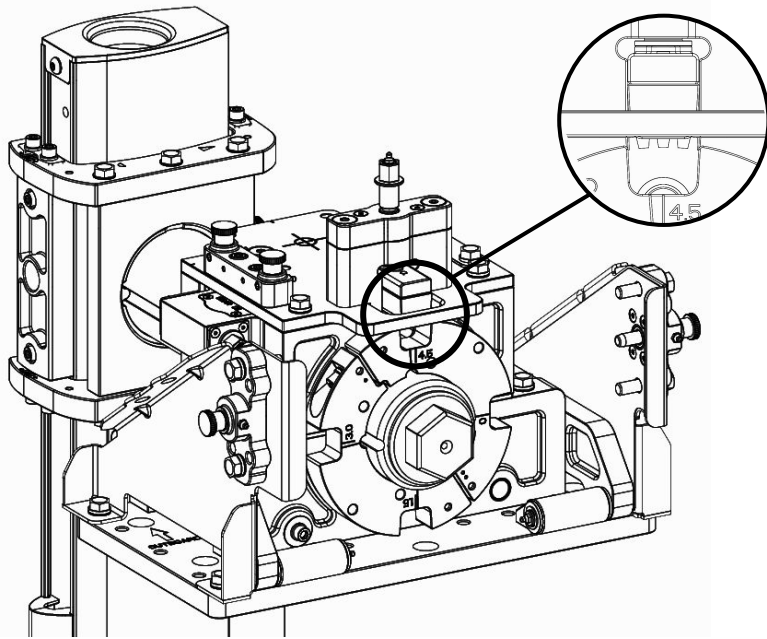
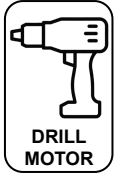
3



DEPLOY Z-POLE - With the Shear Block disengaged use a drill motor to turn the drive nut.

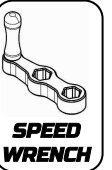
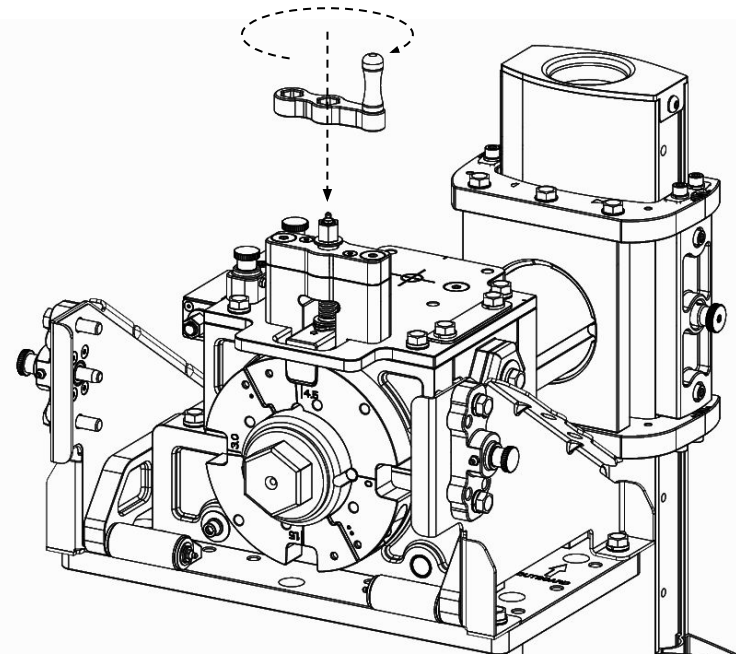
4





ALIGN NOTCH RINGS - Align Notch Rings with notch in Top Block.

5

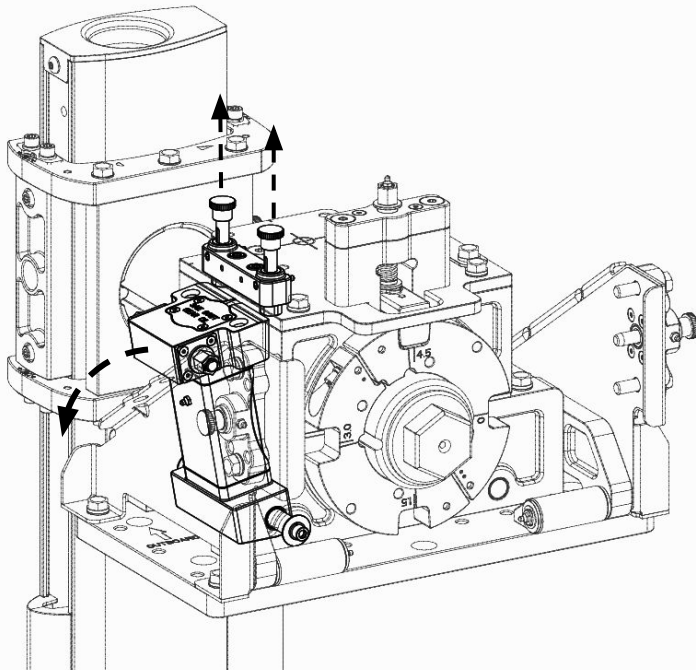


ENGAGE SHEAR BLOCK - Using the Speed Wrench, engage the Shear Block.

6

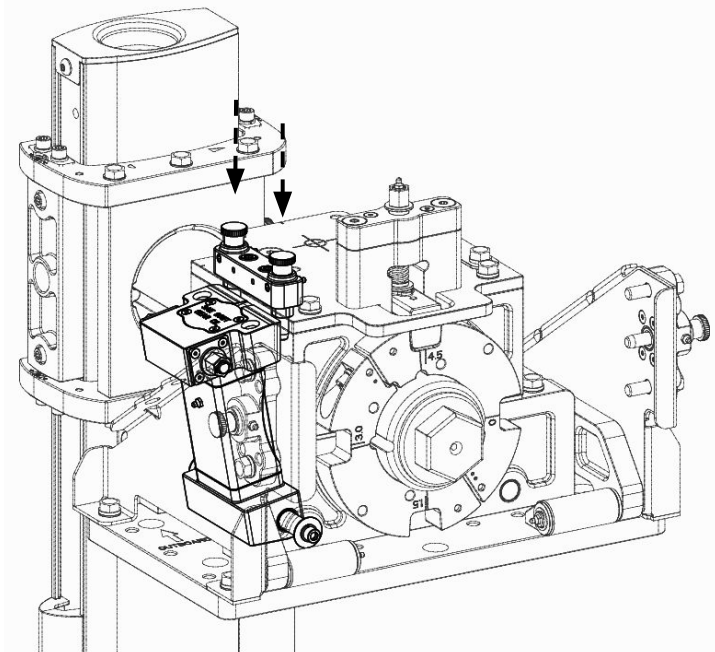
DISENGAGE GEAR DRIVE- With Shear Block Engaged, you may disengage the Gear Drive. **NEVER** Survey with the Gear Drive Engaged.

7



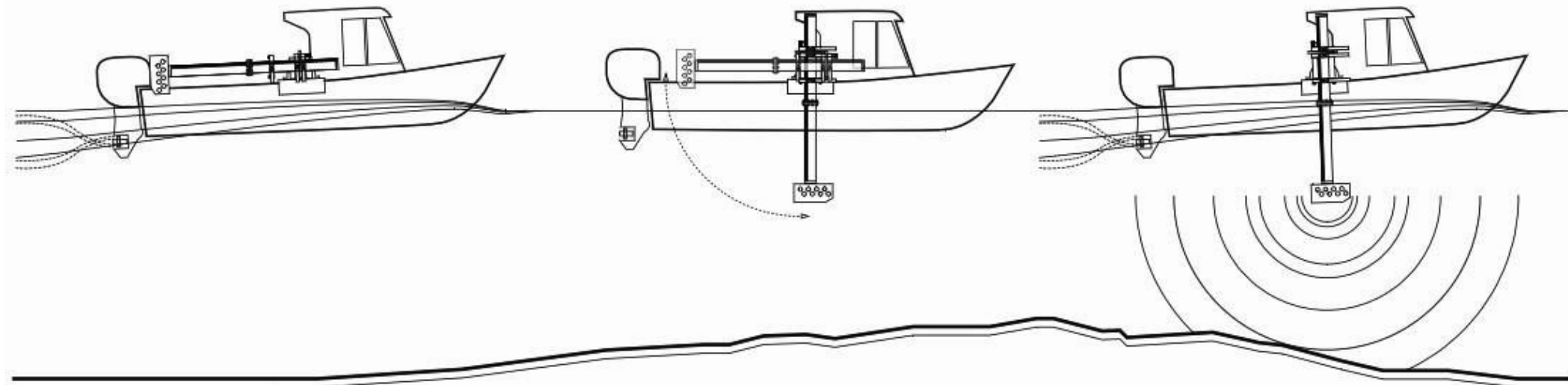
8

LOCKOUT GEAR DRIVE - Depress the Lock Pins to lock out the Gear Drive.





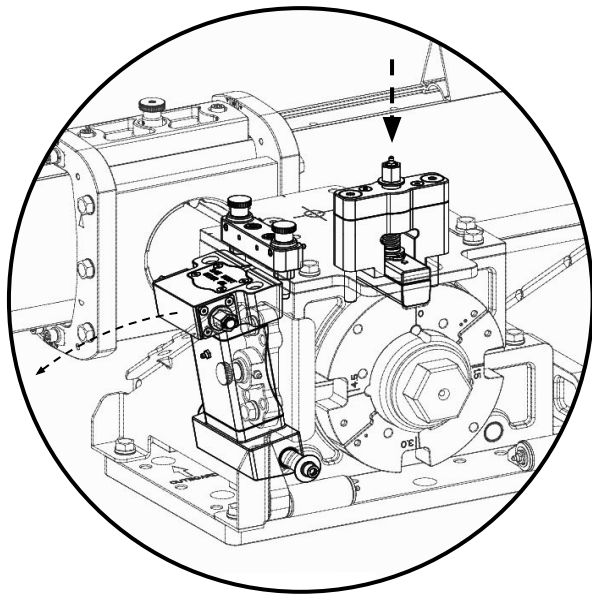
OPERATIONAL OVERVIEW



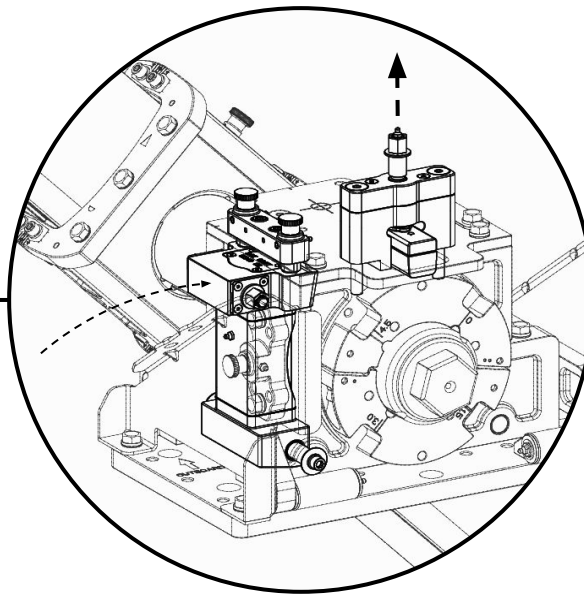
TRANSIT

OPERATE

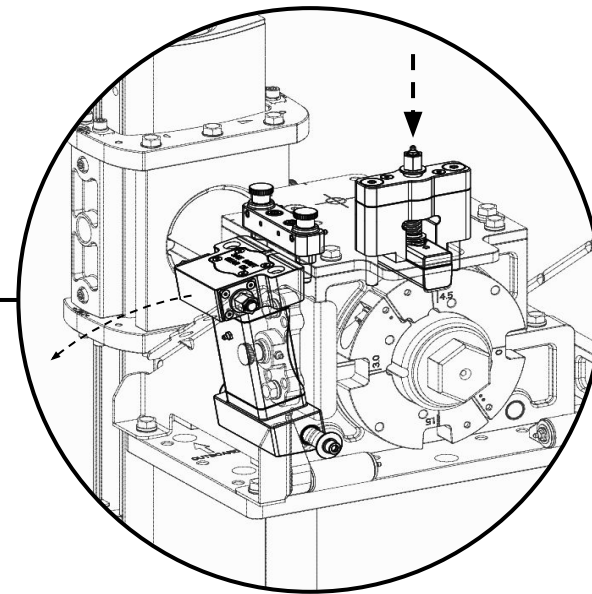
SURVEY



**Gear Drive disengaged
Shear Block engaged**



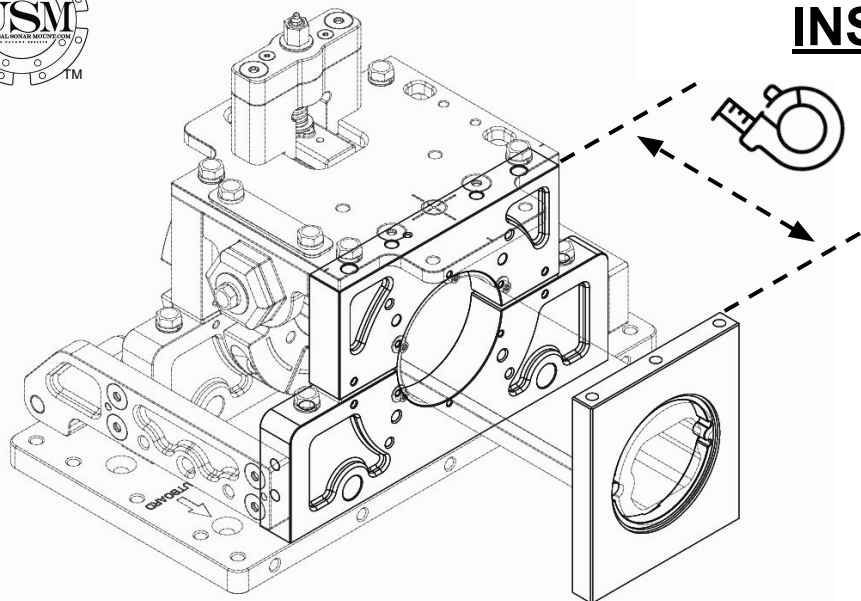
**Gear Drive engaged
Shear Block disengaged**



**Gear Drive disengaged
Shear Block engaged**

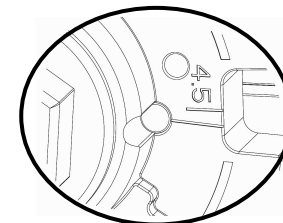
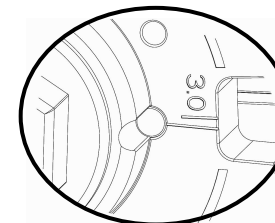
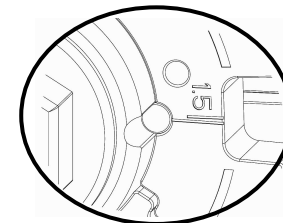
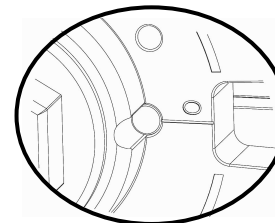
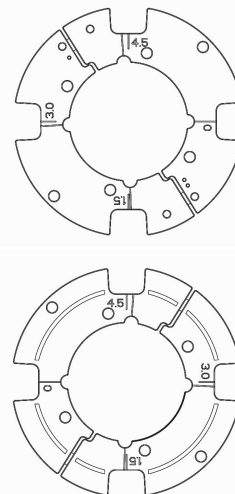


INSTALLATION



RECORD WIDTH MEASUREMENT - Measure the distance between the inside faces of X-Pole and the mount body. Reset to this measurement after installing **GEAR DRIVE**.

9

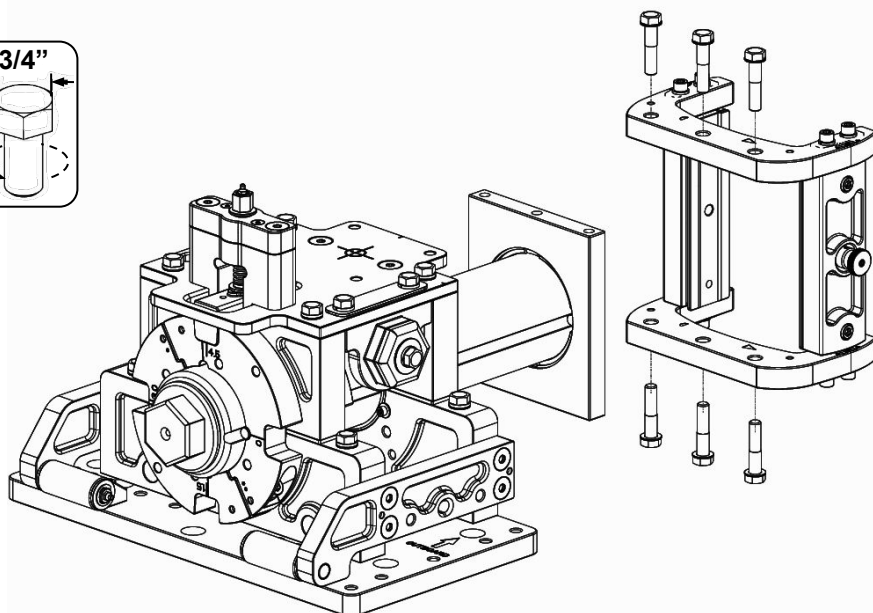
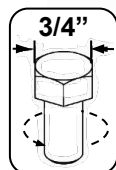


RECORD NOTCH RING PITCH SETTING - Make a note of the pitch setting on the Notch Rings. Reset to the recorded position during reassembly.

10

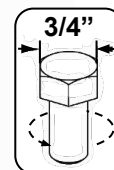
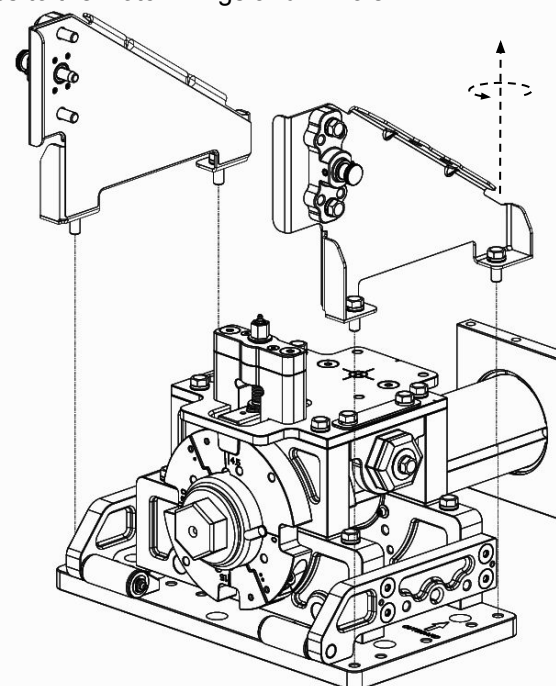
REMOVE Z-POLE - If necessary remove Z-Pole and C-Clamps in order to separate X-Pole from mount.

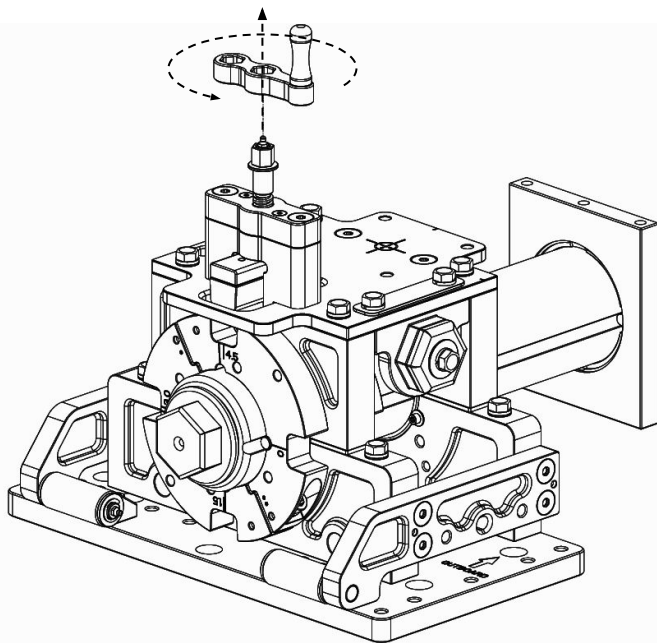
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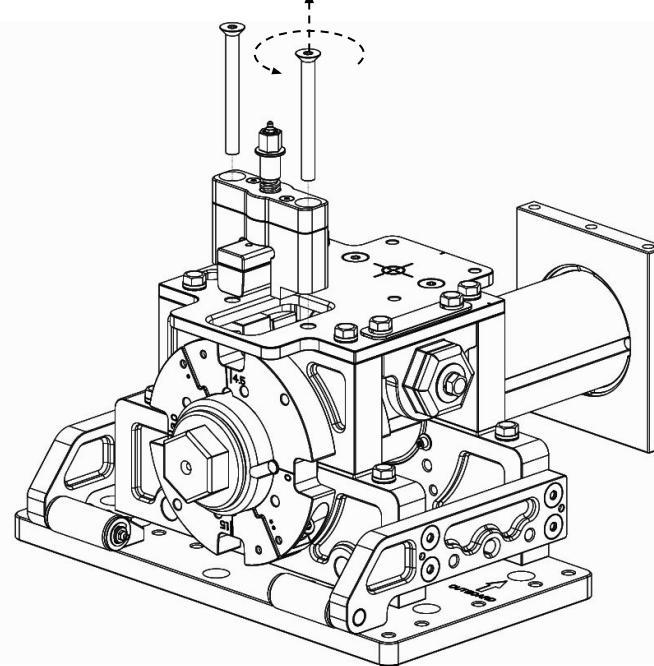
REMOVE HINGE BRACKETS - If your Hightower came equipped with the **HINGE** option, remove the Hinge Brackets for clear access to the Notch Rings and X-Pole.

12



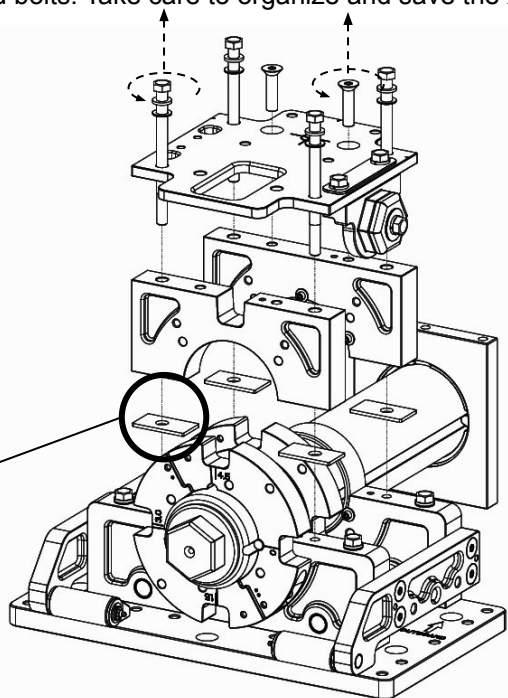


13 **DISENGAGE SHEAR BLOCK** - Using the Speed-Wrench loosen the lead-screw on top of the Shear Block Tower. Ensure the Shear Block is fully disengaged from the Notch Rings.

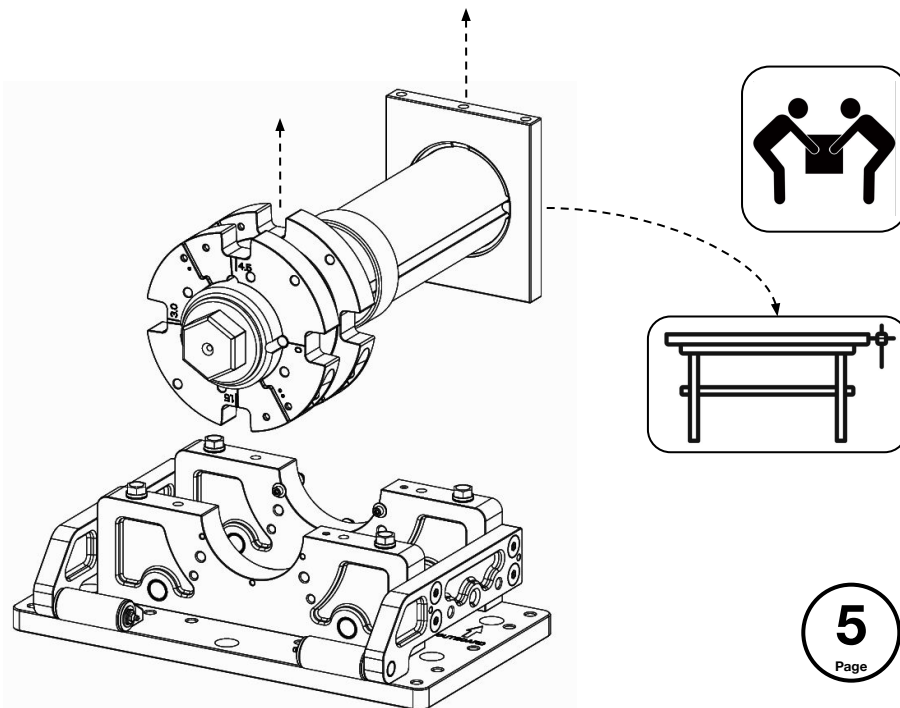


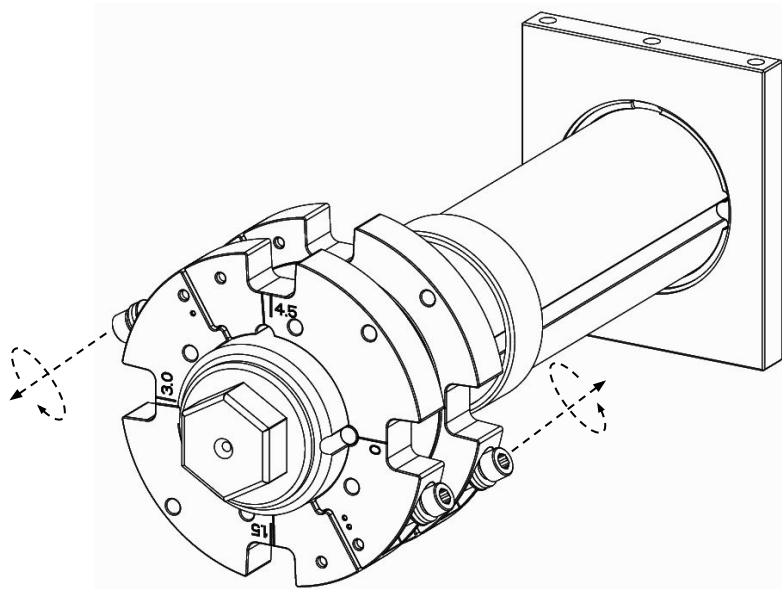
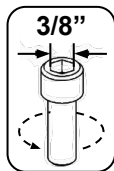
14 **REMOVE TOWER FROM MOUNT** - Using a 5/16" Allen Wrench, remove two 1/2-13 x 5.0" flat-head bolts. Lift the Shear Block Tower from the USM.

15 **REMOVE TOP PLATE** - Using a 3/4" Wrench and a 5/16" Allen Wrench, remove four 1/2-13 x 6.5" hex-head bolts and two 1/2-13 x 2.0" flat-head bolts. Take care to organize and save the X-Pole Shims.



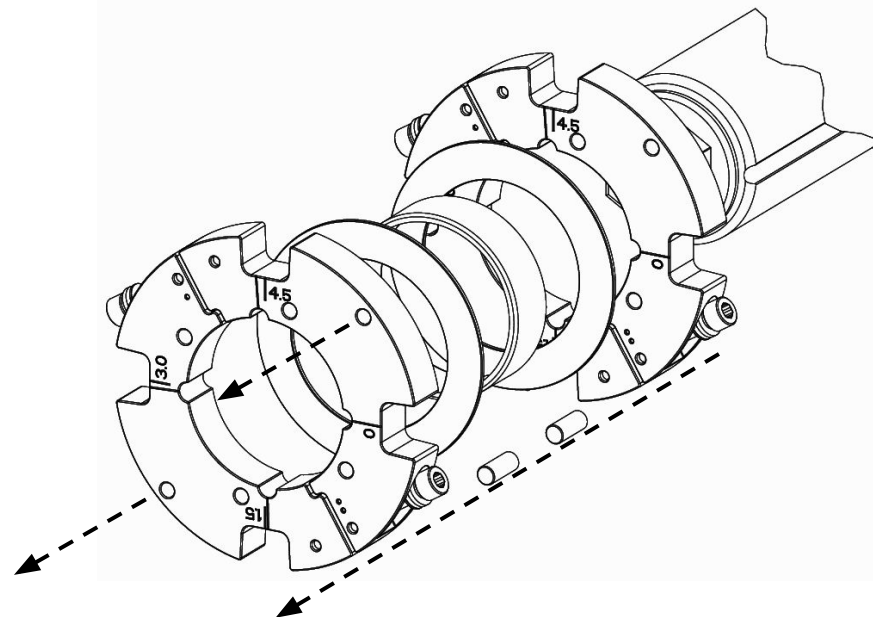
16 **REMOVE X-POLE** - Lift X-Pole Assembly from Mount-Base and place on an appropriate work surface.





LOOSEN NOTCH RINGS - Using a $\frac{3}{8}$ Allen Wrench loosen the Notch Rings so that they may slide easily off of the X-Pole.

17

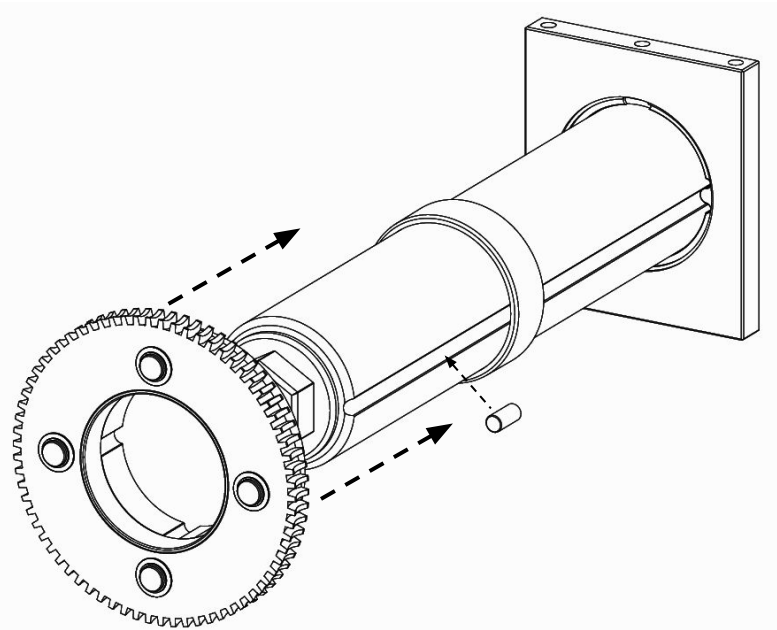


REMOVE NOTCH RINGS - Remove Notch Rings, one Bushing, and Thrust Washer and set aside.

18

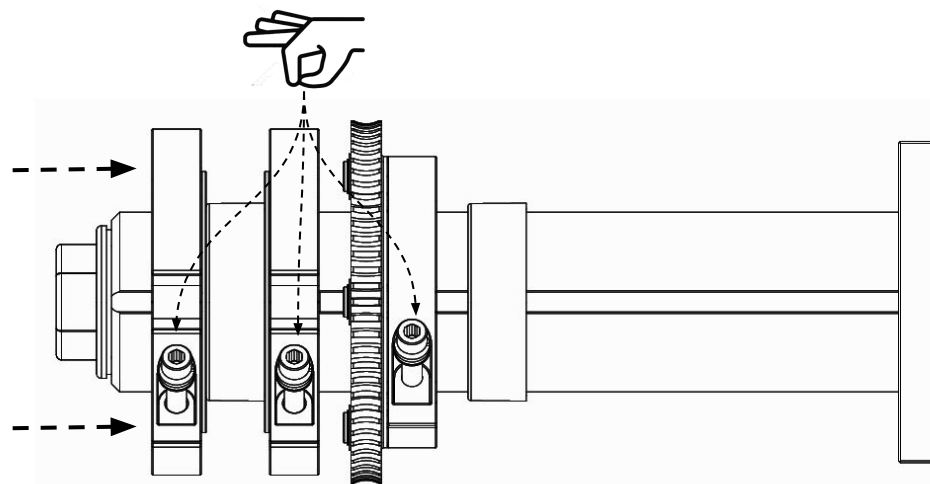
INSTALL GEAR ASSEMBLY - Slide Gear assembly onto X-Pole. Note, install one Bushing before sliding gear onto X-Pole.

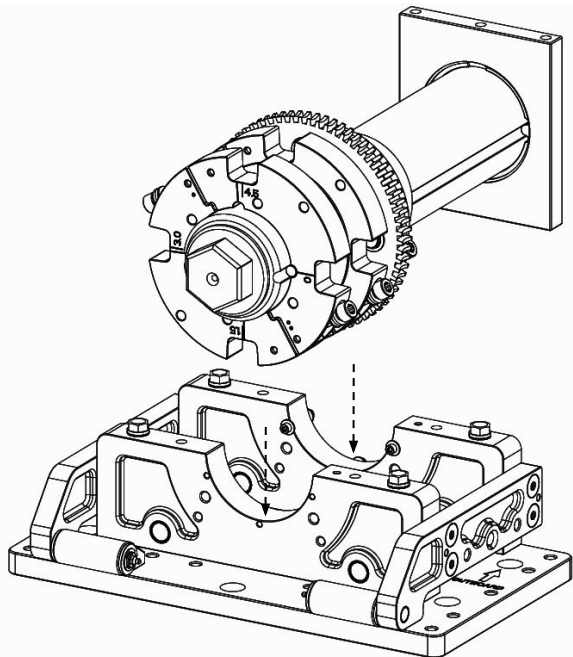
19



REPLACE COMPONENTS - Replace Notch Rings, Thrust Washers and second Bushing. Leave bolts loose.

20

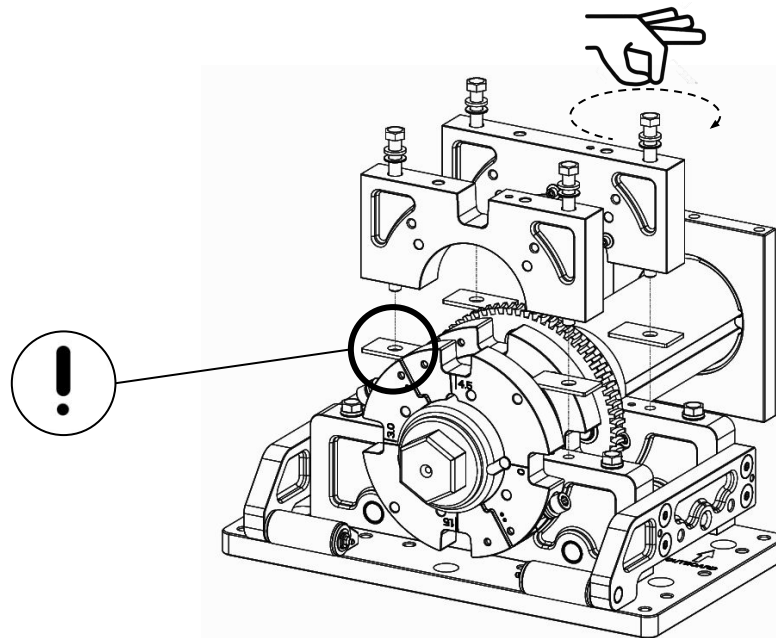




REPLACE X-POLE - Lift X-Pole and place onto Mount-Base.

21

22

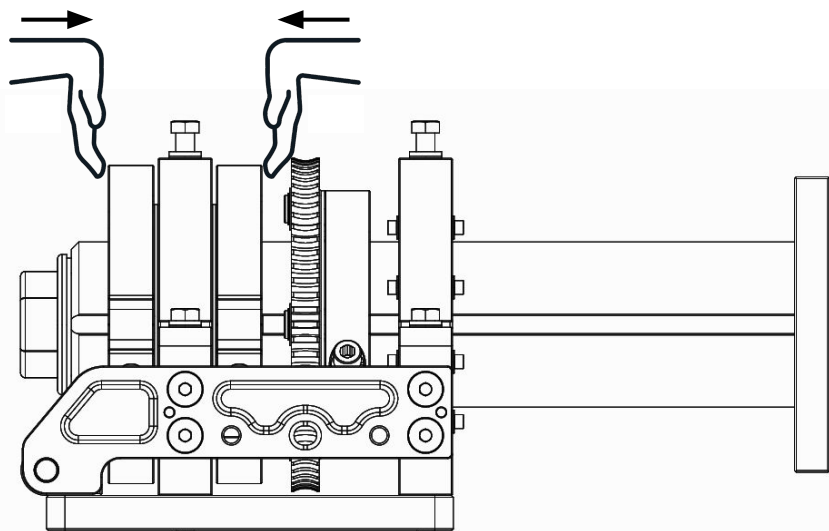


REPLACE TOP BLOCKS - Replace the two Top Blocks and four 1/2-13 x 6.5" hex-head bolts and tighten by hand. Replace the X-Pole Shims in the order they were removed.

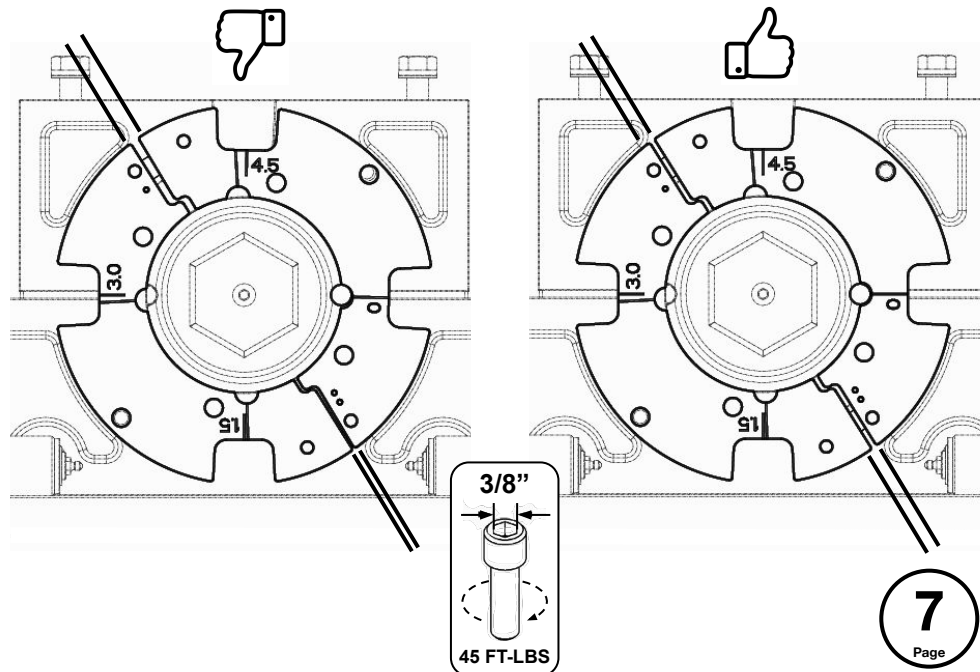
COMPRESS RINGS - Ensure the Notch Rings are tight against the plastic Thrust Washer.

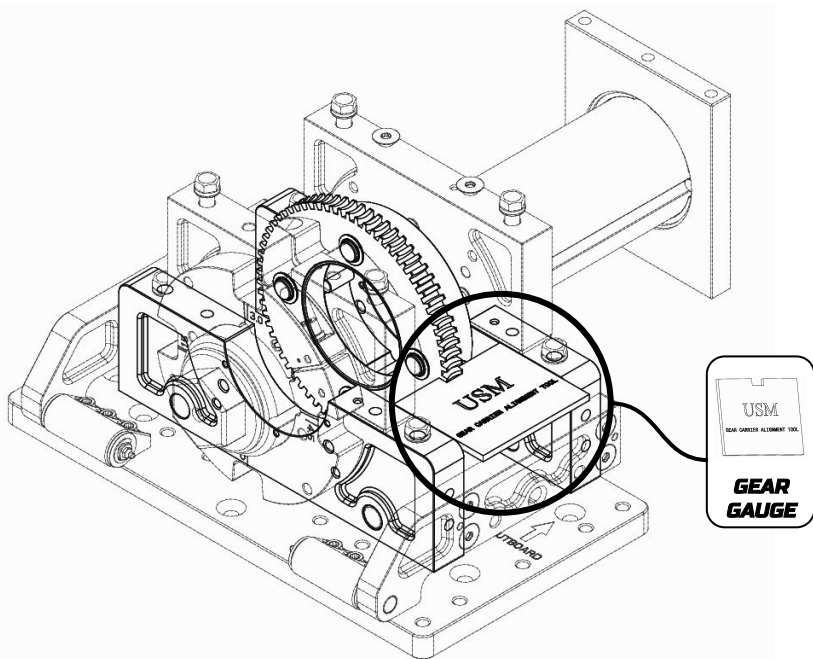
23

24



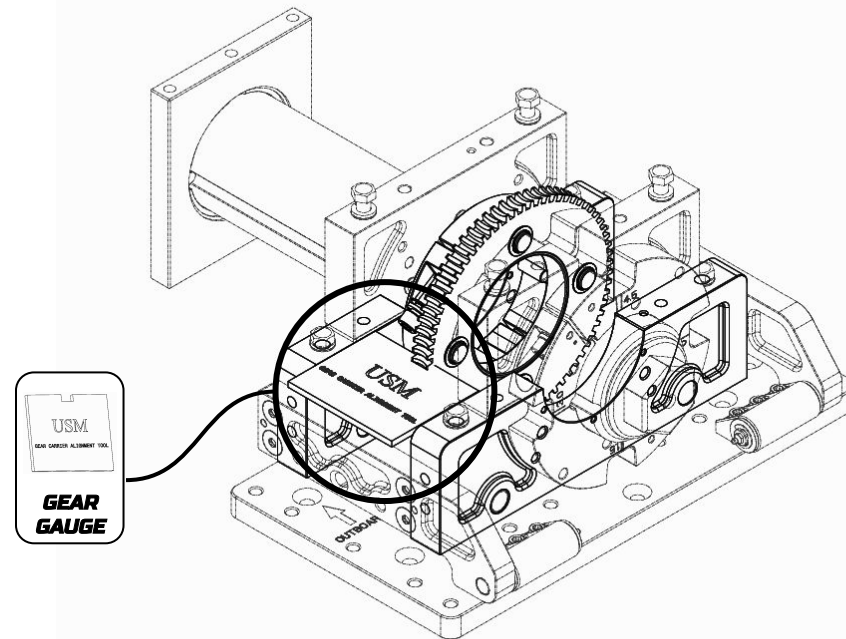
TIGHTEN NOTCH RINGS - Using a 3/8 Allen Wrench tighten the Notch Rings. Be sure to maintain an even gap on each side.





ALIGN GEAR, RIGHT SIDE - Use Gear Gauge to set the position of the Ring Gear on the right side of the USM.

25

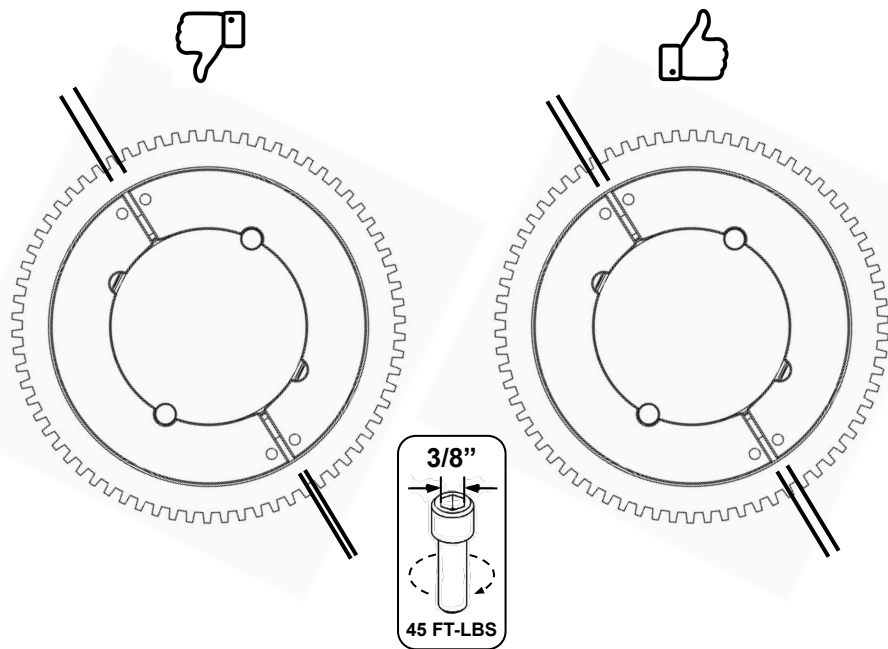


ALIGN GEAR, LEFT SIDE - Use Gear Gauge to set the position of the Ring Gear on the left side of the USM.

26

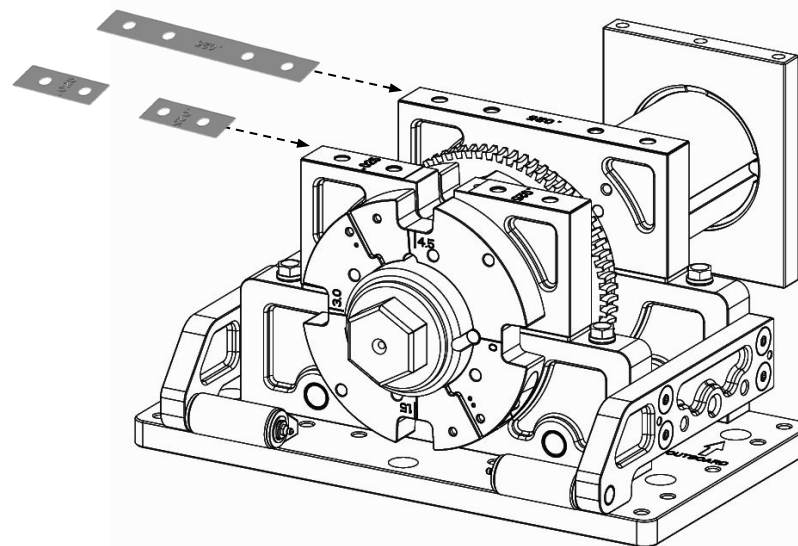
TIGHTEN GEAR CARRIER - Using a $\frac{3}{8}$ Allen Wrench tighten Gear Carrier. Be sure to maintain an *even* gap on each side, in the same way as on step 26.

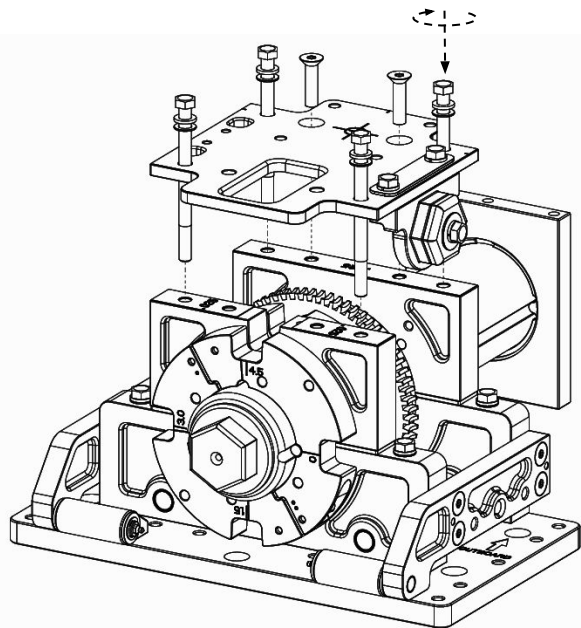
27



PLACE SHIMS - Set Gear Drive Shims in place on top of Top Blocks.

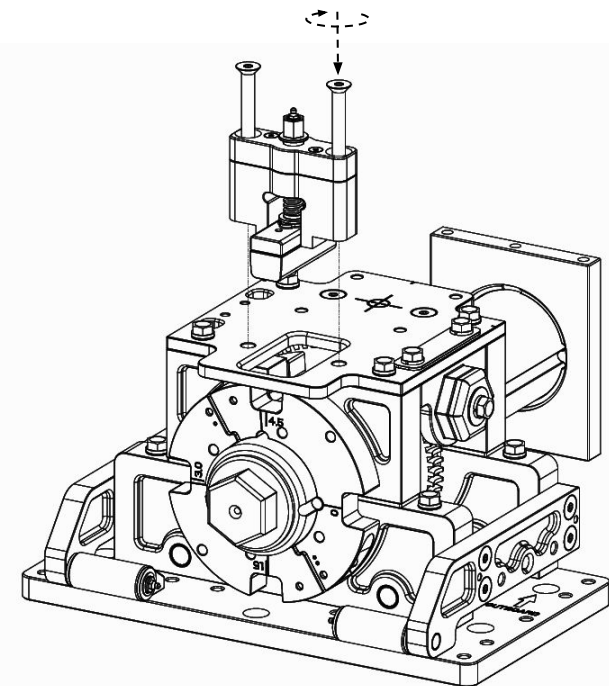
28





INSTALL TOP PLATE - Install Top Plate and torque hardware.

29

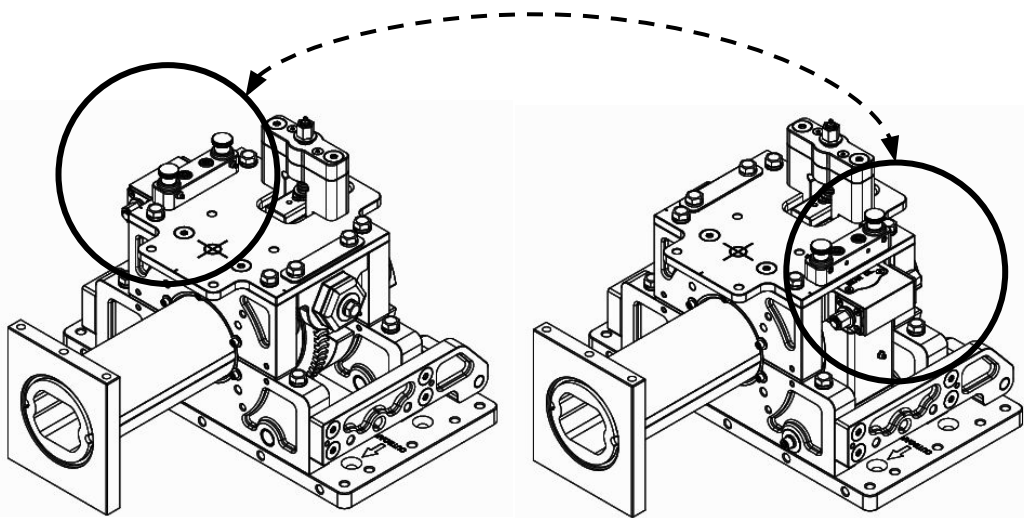


INSTALL SHEAR TOWER - Replace Shear Tower and torque hardware

30

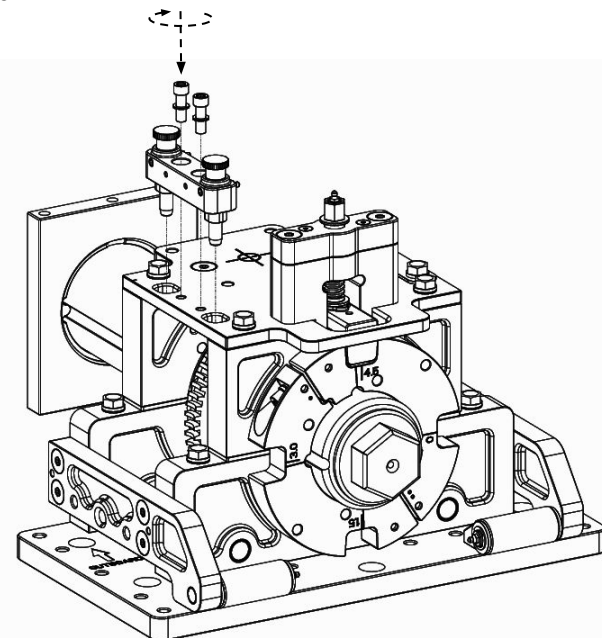
SELECT GEAR DRIVE POSITION - The Gear Tower can be mounted onto either side of the USM. Install the Gear Tower onto the most appropriate side of the USM

31

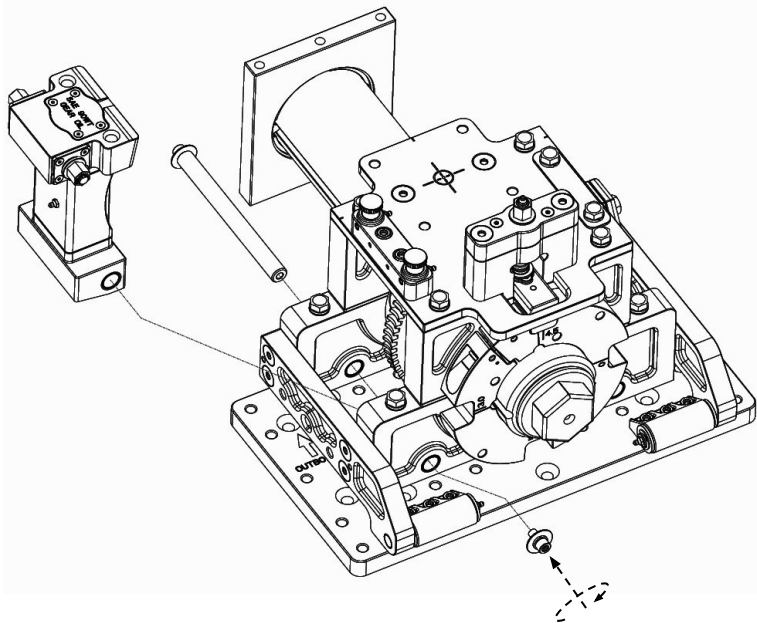


INSTALL LOCK TOWER - Install Lock Tower using a 5/16" Allen wrench

32

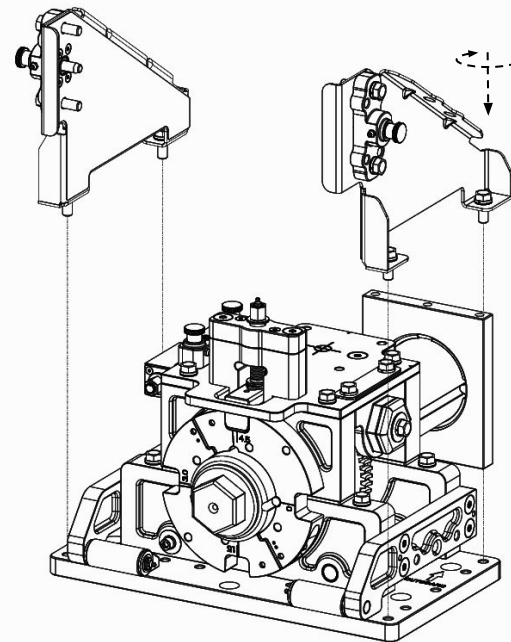


5/16"
35 FT-LBS



INSTALL GEAR TOWER - Install the Gear Tower on the selected side of the USM.

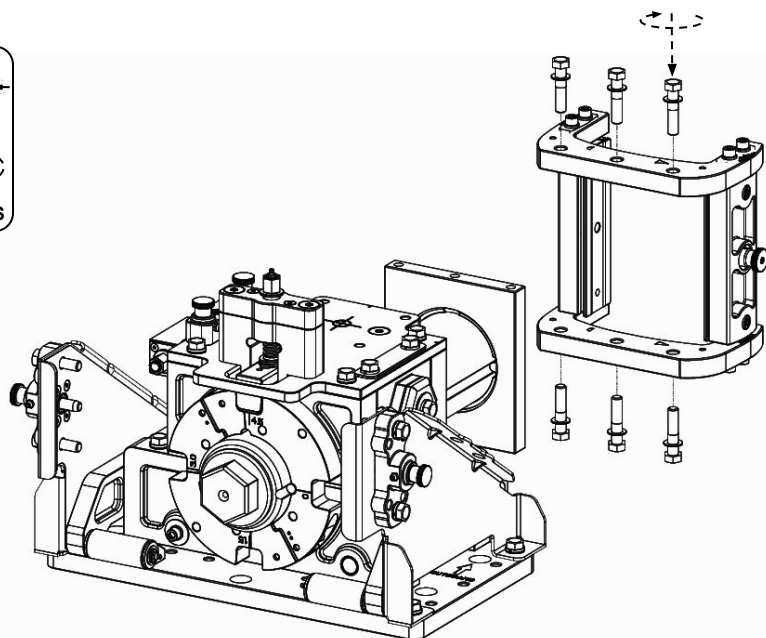
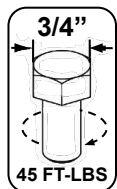
33



INSTALL HINGE BRACKETS - If applicable, reinstall Hinge Brackets.

34

INSTALL Z-POLE - Install Z-Pole.



35

36

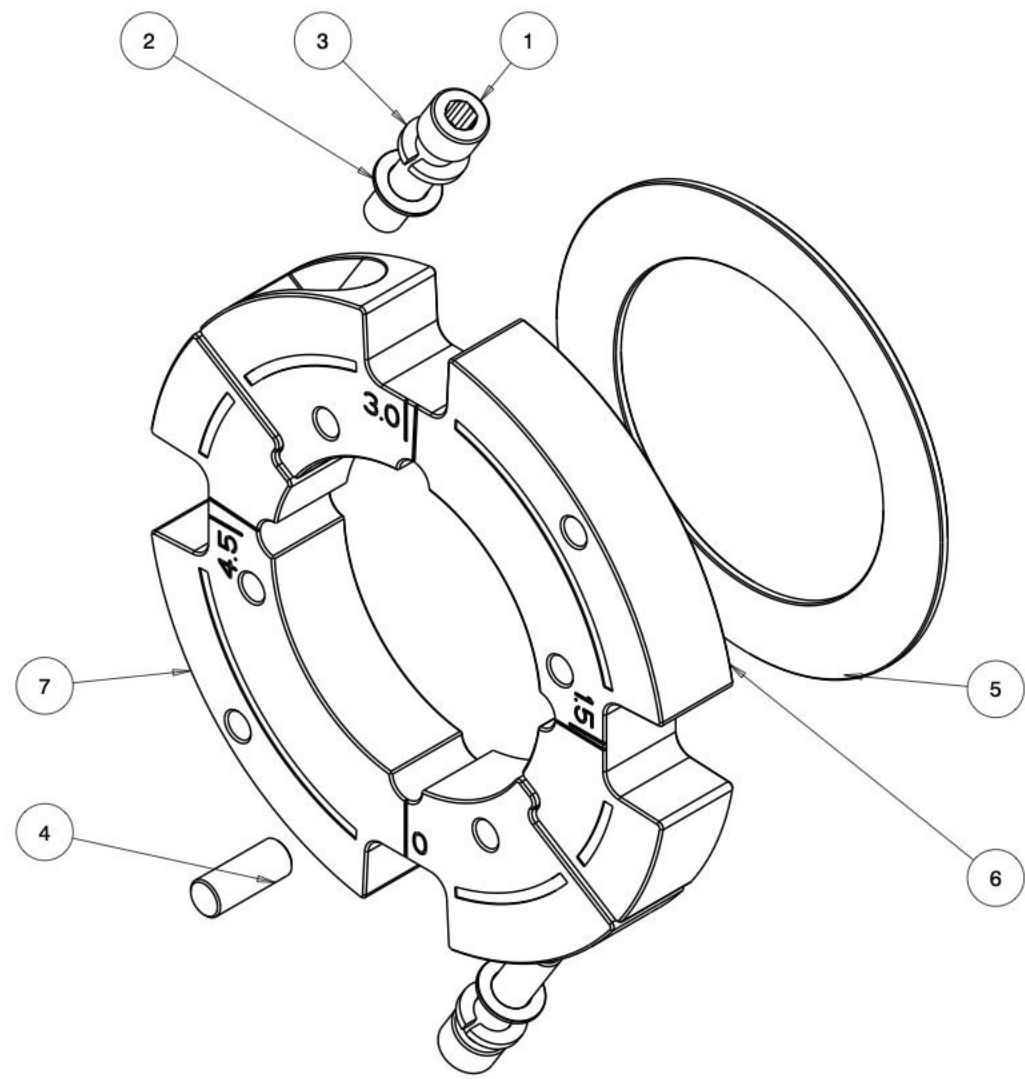
GENERAL MAINTENANCE - Ensure all stainless hardware always coated with a marine grade anti-seize product. Always wash and dry the USM after each use. After the unit is dry apply a silicone spray or lubricant that does not make plastic swell.

AVAILABLE FROM USM FOR MOUNT SERVICE AND MAINTENANCE

- AQUA-SHIELD GREASE
- T-9 BOESHIELD
- CMD EXTREME PRESSURE #3 GREASE
- BOLT AND SPARES KITS



REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
--	1	INITIAL RELEASE	02022-JAN-19	MZ



ITEM NO.	QTY	PART NO.	DRAWING TITLE OR DESCRIPTION	MANUFACTURER	MFG PART NO.
7	1	500-001-1440-02	NOTCH RING, 0 AND 4.5 DEGREES, HT	FAB	---
6	1	500-001-1440-01	NOTCH RING, 1.5 AND 3.0 DEGREE, HT	FAB	---
5	1	500-001-1005	THRUST WASHER, X POLE, HT	FAB	---
4	1	90-400-500-1250-20	DOWEL PIN, .500 ID X 1.250 L 18-8	MCMASTER	90145A714
3	2	90-310-510-870-120-20	WASHER, SPLIT LOCK .510 ID X .87 X .120TK, SST	MCMASTER	92146A033
2	2	90-300-515-875-060-20	WASHER, .515 ID X .875 OD X .060 18-8	MCMASTER	98017A210
1	2	90-100-500C-2000-20	SCREW, 1/2-13 X 2 SCH, SST 18-8	MCMASTER	92196A720

TOLERANCES ARE:		PRO/E REPORTED PARAMETERS	DESIGNER
.X +/-	0.1	N/A	G STAPLES
.XX +/-	0.01	4.719	G STAPLES
.XXX +/-	0.001	N/A	G STAPLES
ANGLES +/-	0.5	N/A	---

UNIVERSAL SONAR MOUNT			
ASSEMBLY, NOTCH RING, 4.5" POLE W/ NOTCH			
SIZE	CUSTOMER DRAWING/PART NO.	REV	
C	---	1	
DRAWING/PART NO.		540-001-9440	
SCALE	0.875	SHEET 1 OF 2	

CUSTOMER DRAWING/PART NO. ---
 DRAWING/PART NO. 540-001-9440
 REV 1
 SHEET 1

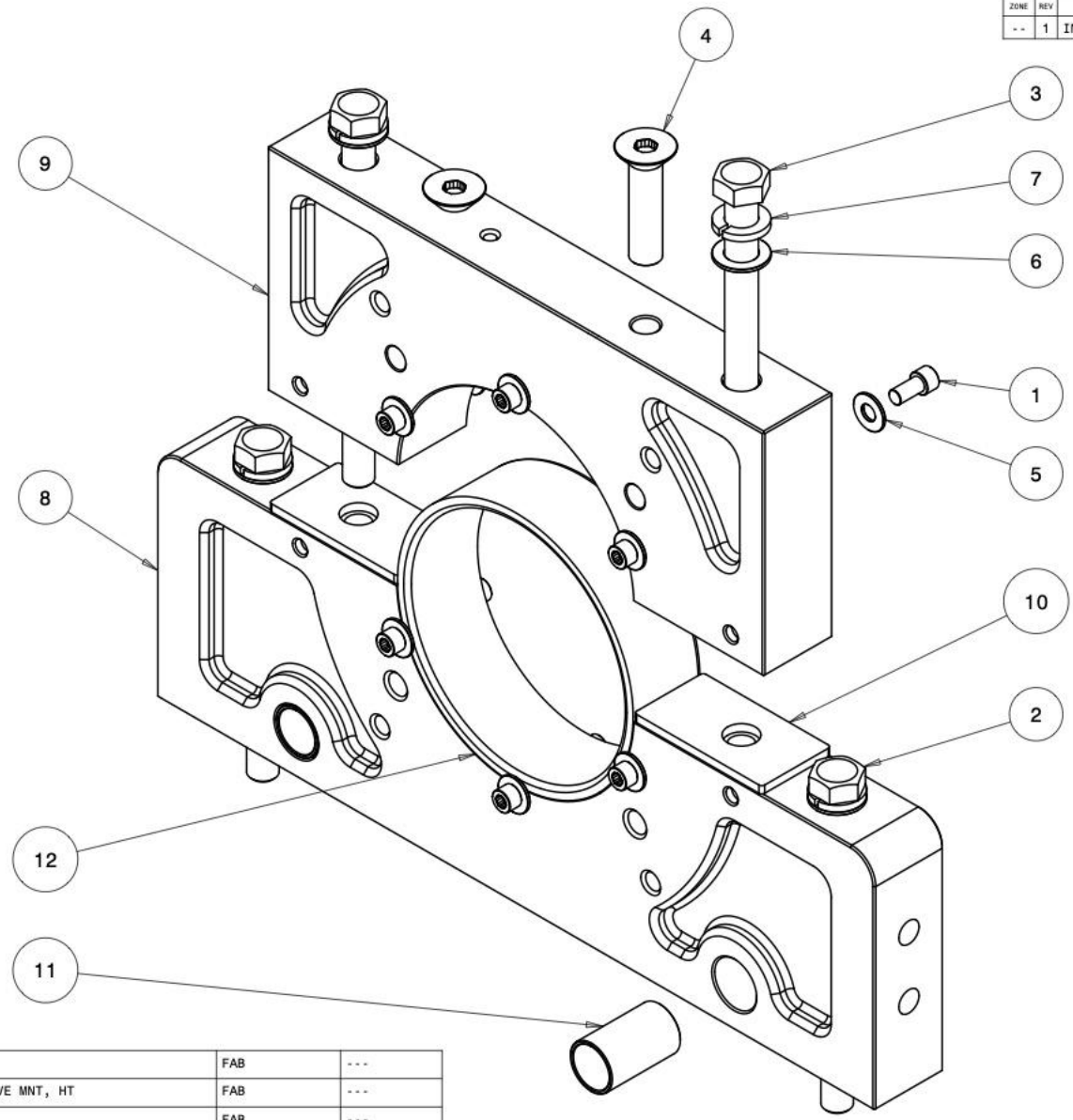
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2

1

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
--	1	INITIAL RELEASE	02022-JAN-19	MZ



ITEM NO.	QTY REQD.	PART OR IDENTIFYING NO.	DRAWING TITLE OR DESCRIPTION	MANUFACTURER	MFG PART NO.
12	1	500-1003-IM	BUSHING, MAIN SHAFT, HT	FAB	---
11	2	500-001-1008	PIVOT BUSHING, GEAR DRIVE MNT, HT	FAB	---
10	2	500-001-1004	SHIM, MAIN CLAMP, HT	FAB	---
9	1	500-001-1003-02	TOP BLOCK, HT	FAB	---
8	1	500-001-1002	BOTTOM BLOCK, HT	FAB	---
7	4	90-310-510-870-120-20	WASHER, SPLIT LOCK .510 ID X .87 X .120TK, SST	MCMASTER	92146A033
6	4	90-300-515-875-060-20	WASHER, .515 ID X .875 OD X .060 THICK, SST	MCMASTER	98017A210
5	12	90-300-281-625-050-20	WASHER, .281 X .625 OD X .050 THICK, SST	MCMASTER	92141A029
4	2	90-110-500C-2000-20	SCREW, 1/2-13 UNC X 2.0 FHC 18-8	MCMASTER	92210A720
3	2	90-104-500C-6500-20	HEX BOLT, 1/2-13 X 6.50 SST 18-8	MCMASTER	92198A754
2	2	90-104-500C-5750-20	HEX BOLT, 1/2-13 X 5.75 SST 18-8	MCMASTER	92314A413
1	12	90-100-250C-500-20	SCREW, 1/4-20 X .50 SHC 18-8	MCMASTER	92196A537

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES.	CREO REPORTED PARAMETERS	DESIGNER	
		ENGINEER	G STAPLES
TOLERANCES ARE:	CREO MATERIAL	G STAPLES	02021-JAN-28
.X +/- 0.1	CREO MASS	DRAFTER	G STAPLES
.XX +/- 0.01	13.867	CHECKED	---
.XXX +/- 0.001	CREO VOLUME	---	02021-MMJ-DD
ANGLES +/- 0.5	131.415	INTERPRET DIMENSIONS PER ASME Y14.5M 1994 (R2004)	CREO DRAWING FILE NAME: 540-001-9100-02
		DO NOT SCALE DRAWING	

UNIVERSAL SONAR MOUNT			
ASSEMBLY, BLOCK, OUTER, HT			
SIZE	CUSTOMER DRAWING/PART NO.	REV	
C	---	1	
DRAWING/PART NO.		540-001-9100-02	
SCALE	0.750	SHEET 1 OF 2	

CUSTOMER DRAWING/PART NO. ---
 DRAWING/PART NO. 540-001-9100-02
 REV 1 SHEET 1

4

3

2

1

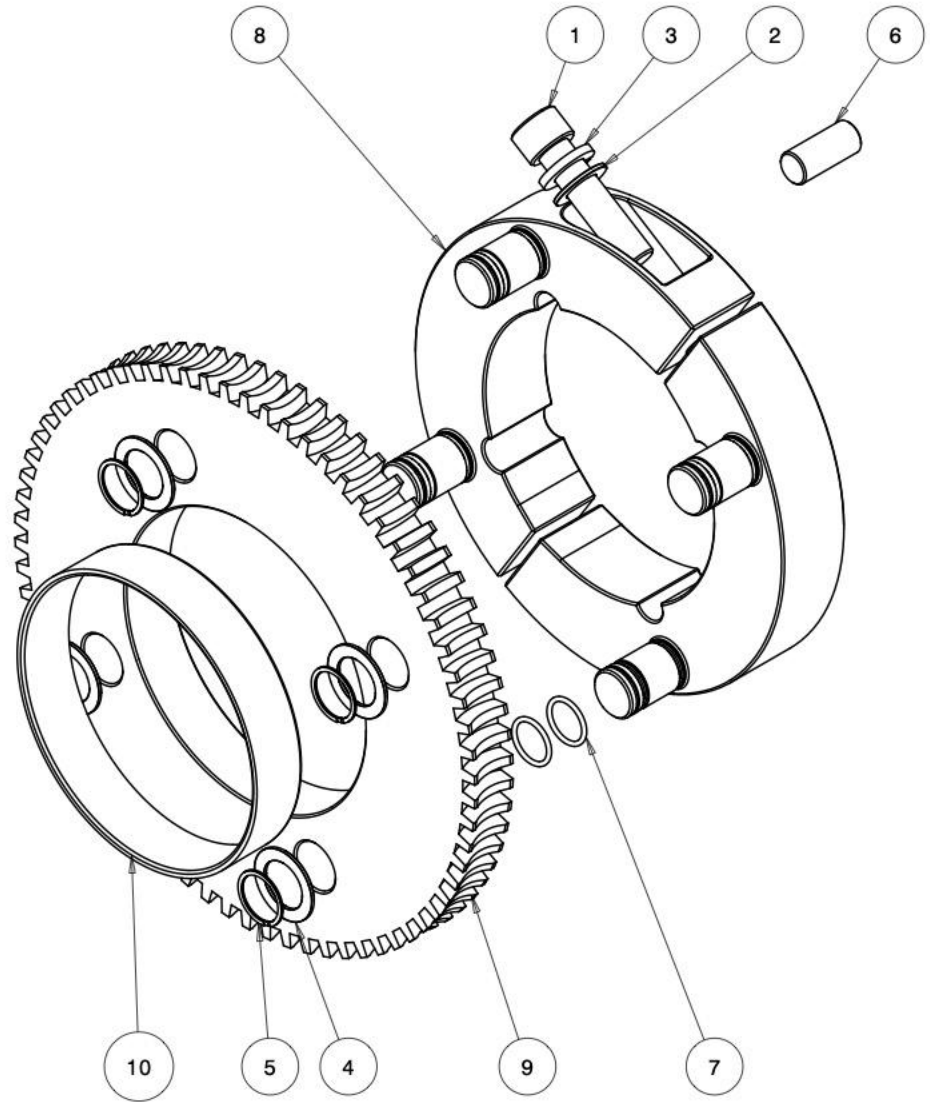
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3

2

1

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
--	1	INITIAL RELEASE	2022-FEB-02	MZ



ITEM NO.	QTY	PART NO.	DRAWING TITLE OR DESCRIPTION	MANUFACTURER	MFG PART NO.
10	1	500-1004-LM	USM, BUSHING, LOCK RING	FAB	---
9	1	500-001-1032	WORM GEAR, R-L GEAR BOX	FAB	---
8	2	500-001-1030	GEAR MOUNT, CLAMP RING, HT	FAB	---
7	8	90-500-016-0614-0070-80	ORING, 5/8 X 3/4 X 1/16 DASH 016, BUNA-N	MCMMASTER	9452K6
6	1	90-400-500-1125-20	DOWEL PIN, .500 ID X 1.125 L 18-8	MCMMASTER	90145A947
5	4	90-357-719-036-20	EXTERNAL SPRIAL RETAINER, .750" SHAFT, SST	MCMMASTER	93513A130
4	4	90-320-750-1125-048-20	SHIM, .750 ID X 1.125 OD X .048 THK, SST	MCMMASTER	98126A700
3	2	90-310-510-870-120-20	WASHER, SPLIT LOCK .510 ID X .87 X .120TK, SST	MCMMASTER	92146A033
2	2	90-300-515-875-060-20	WASHER, .515 ID X .875 OD X .060 18-8	MCMMASTER	98017A210
1	2	90-100-500C-2000-20	SCREW, 1/2-13 X 2 SCH, SST 18-8	MCMMASTER	92196A720

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES.		PRO/E REPORTED PARAMETERS	DESIGNER
TOLERANCES ARE:		PRO/E MATERIAL	G STAPLES
.X +/- 0.1		N/A	ENGINEER
.XX +/- 0.01		PRO/E MASS	G STAPLES
.XXX +/- 0.001		13.107	DRAFTER
ANGLES +/- 0.5		PRO/E VOLUME	G STAPLES
		N/A	CHECKED

INTERPRET DIMENSIONS PER ASME Y14.5M 1994 (R2004)		PRO/E DRAWING FILE NAME:	02019-AUG-15
		505-001-9030	

UNIVERSAL SONAR MOUNT			
ASSEMBLY, SECONDARY GEAR, HT			
SIZE	CUSTOMER DRAWING/PART NO.	REV	
C	---	1	
	505-001-9030		
SCALE	SHEET 1 OF 2		
0.750			

4

3

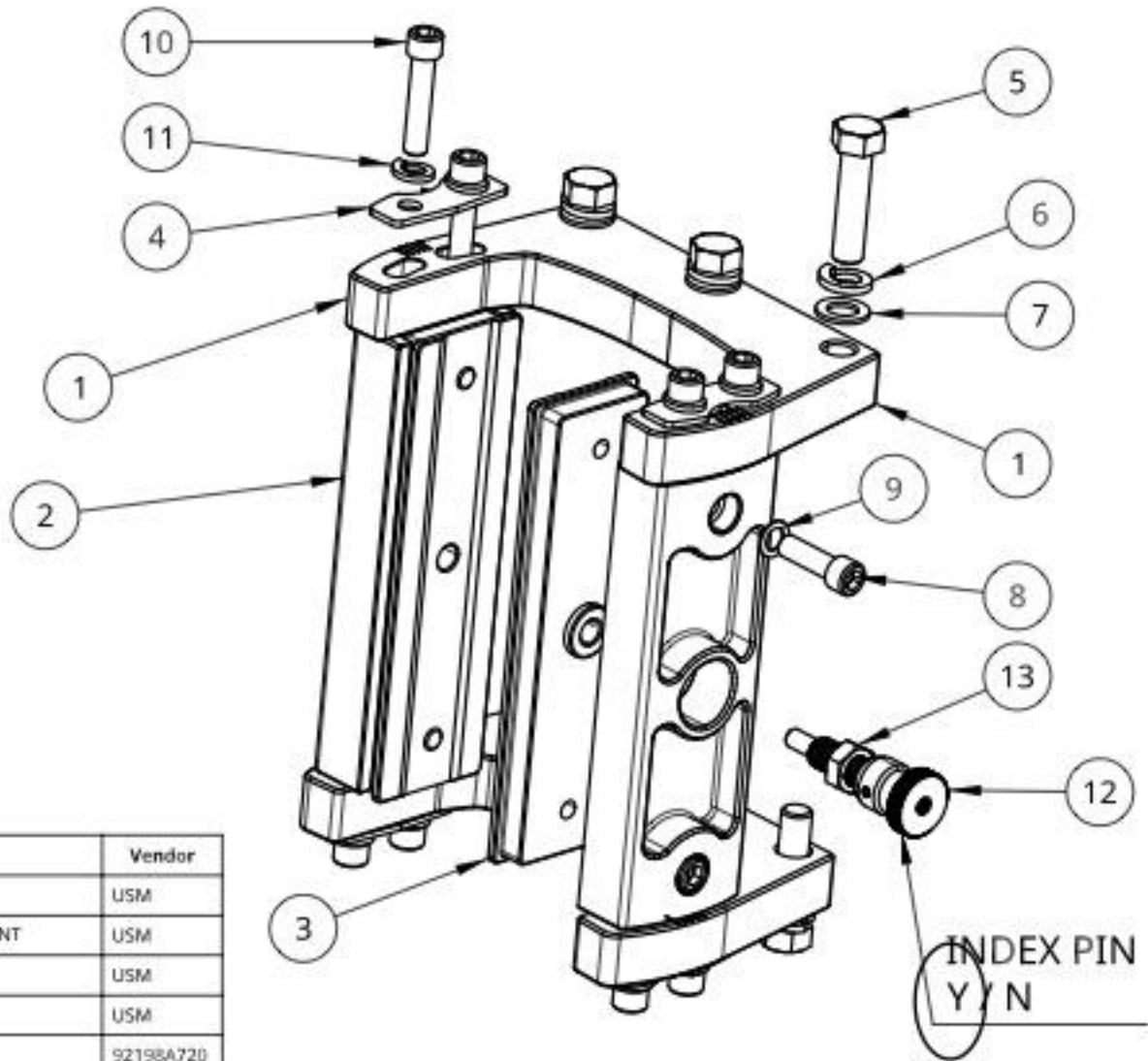
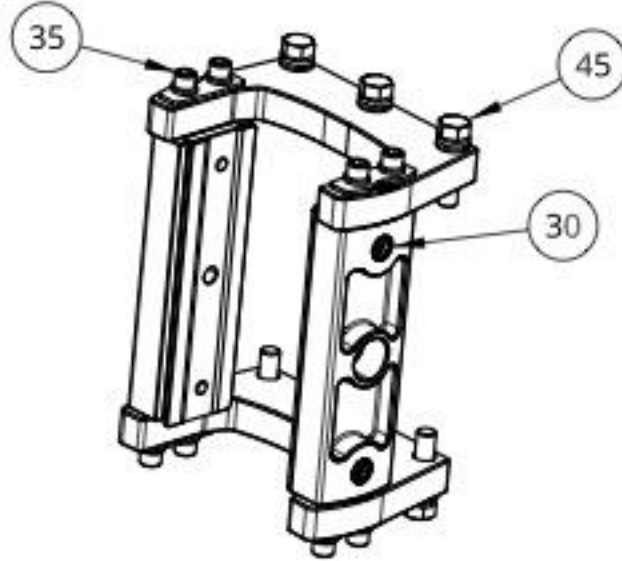
2

1

CUSTOMER DRAWING/PART NO. 505-001-9030
 DRAWING/PART NO. 505-001-9030
 REV 1
 SHEET 1

FOR 3.5" FOIL ON
4.5" X-POLE

TORQUE VALUES, FT LBS



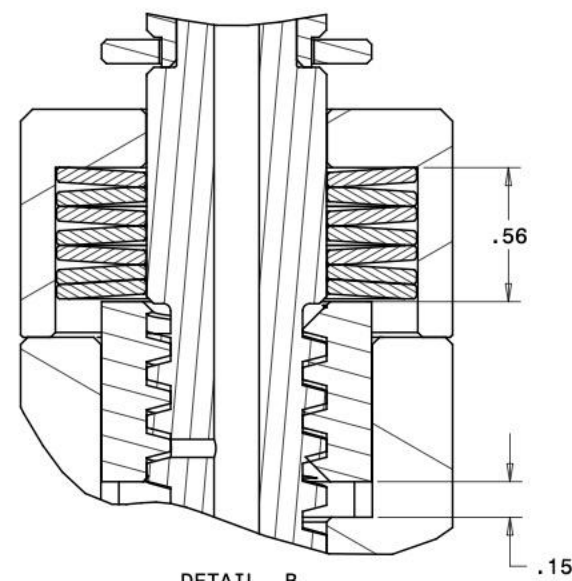
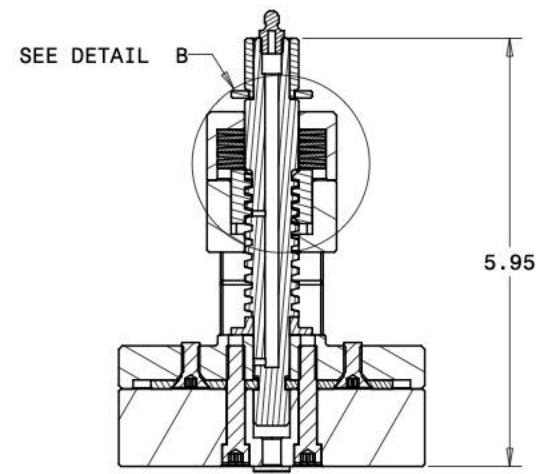
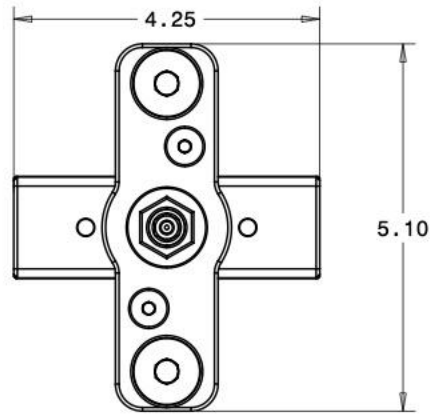
Item No.	Quantity	Part number	Description	Vendor
1	2	520-100-1057	STD-COMPACT FOIL MOUNT	USM
2	2	520-100-1058	STD CLAMPING BLOCK, FOIL MOUNT	USM
3	2	520-100-1059	STD TRACK BLOCK, FOIL MOUNT	USM
4	4	520-100-1055	POINTER	USM
5	6	90-104-500C-2000-20	HEX BOLT, 1/2-13 X 2.00 SST	92198A720
6	6	90-310-510-870-120-20	WASHER, LOCK 1/2 0.510 X 0.870 X 0.120 SST	92146A033
7	6	90-300-515-875-060-20	WASHER, FLAT 1/2 0.515 X 0.875 X 0.060 SST	98017A210
8	4	90-100-375C-1250-20	SCREW, 3/8-16 X 1.250 SHC SST	92196A626
9	4	90-300-390-625-060-20	WASHER, FLAT 3/8 0.390 X 0.625 X 0.060 SST	98017A200
10	8	90100-375C-1750-20	SCREW, 3/8-16 X 1.75 SHC SST	92196A630
11	8	90-310-380-680-090-20	WASHER, LOCK 3/8 0.380 X 0.680 X 0.90 SST	92146A031
12	1	501-9901	LOCKING PULL PIN	USM
13	1	90-201-500C-20	JAM NUT, 1/2-13 SST	91847A520

UNIVERSAL SONAR MOUNT

4.5" X-POLE, 3.5" FOIL CLAMP

500-100-9059-3.5

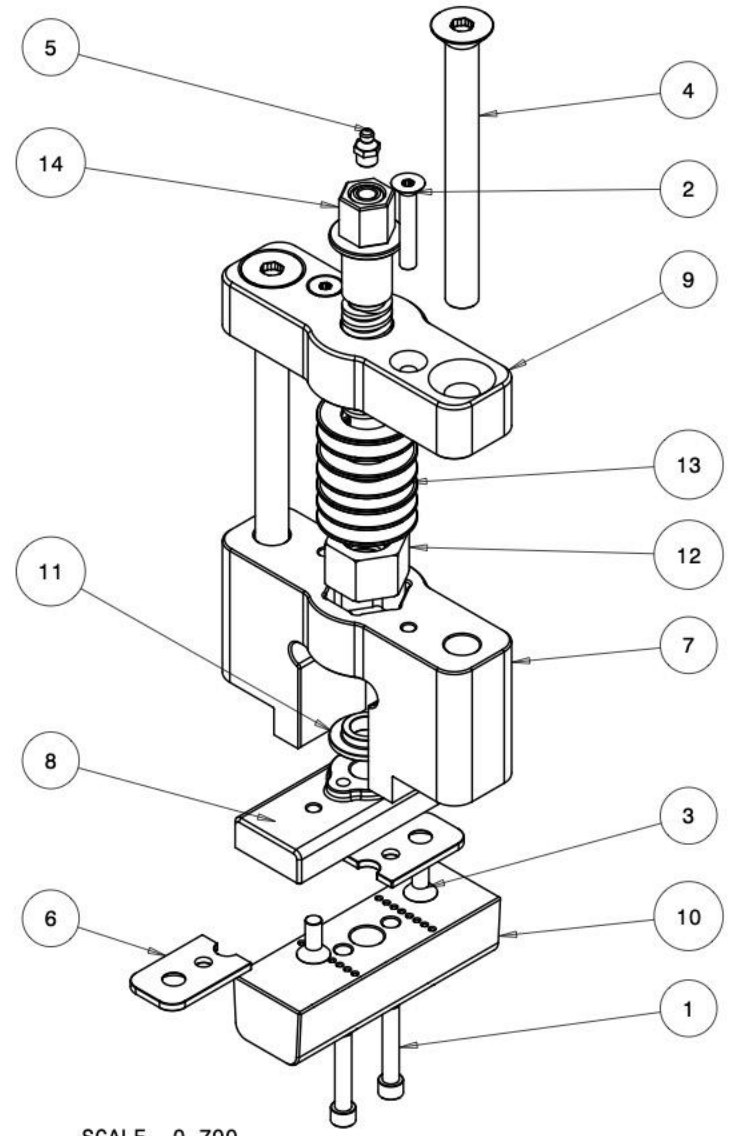
REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
--	1	INITIAL RELEASE	02022-JAN-19	MZ



DETAIL B
SCALE 2.500

NOTE: BELLEVILLE WASHER ORIENTATION

SECTION A-A



SCALE 0.700

ITEM NO.	QTY.	PART NO.	DRAWING TITLE OR DESCRIPTION	MANUFACTURER	MFG PART NO.
14	1	540-001-9011	ASSEMBLY, LEAD SCREW, HT	ASSY	---
13	7	500-001-BV-750-450LBS	BELLEVILLE SPRING WASHER, 750 ID X 450LBS	MCMaster	9713K99
12	1	500-001-1026	ACME NUT, 3/4-5, BRASS, HT	FAB	---
11	1	500-001-1017	THRUST BUSHING, HT	FAB	---
10	1	500-001-1014	SHEAR BLOCK, HT	FAB	---
9	1	500-001-1013	TOWER NUT RETAINER, HT	FAB	---
8	1	500-001-1012	SHEAR BLOCK BACKING PLATE, HT	FAB	---
7	1	500-001-1010	TOWER BLOCK, HT	FAB	---
6	2	500-001-1009	RETAINER, SHEAR BLOCK, HT	FAB	---
5	1	94-350-313F-344-01-23	GREASE FITTING, 5/16-24-UNF STRAIGHT 303 SST	MCMaster	1293K44
4	2	90-110-500C-5000-20	SCREW, 1/2-13 UNC X 5.0 FHC 18-8	MCMaster	92210A732
3	2	90-110-250C-625-20	SCREW, 1/4-20 X .625 FHC 18-8	MCMaster	92210A539
2	2	90-110-250C-1500-20	SCREW, 1/4-20 X 1.50 FHC 18-8	MCMaster	92210A546
1	2	90-100-250C-1375-20	SCREW, 1/4-20 X 1.375 SHC 18-8	MCMaster	92196A545

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES.	PRO/E REPORTED PARAMETERS	DESIGNER
		G STAPLES
TOLERANCES ARE:	PRO/E MATERIAL	ENGINEER
.X +/- 0.1	N/A	G STAPLES
.XX +/- 0.01	PRO/E MASS	DATE
.XXX +/- 0.001	4.546	02019-AUG-15
ANGLES +/- 0.5	PRO/E VOLUME	CHECKED
	N/A	---
INTERPRET DIMENSIONS PER ASME Y14.5M 1994 (R2004)	PRO/E DRAWING FILE NAME:	DO NOT SCALE DRAWING
	540-001-9010	

UNIVERSAL SONAR MOUNT		
ASSEMBLY, SHEAR TOWER, HT		
SIZE	CUSTOMER DRAWING/PART NO.	REV
C	---	1
DRAWING/PART NO.		
540-001-9010		
SCALE	SHEET 1 OF 2	
0.750		

DRAWING/PART NO. 540-001-9010