



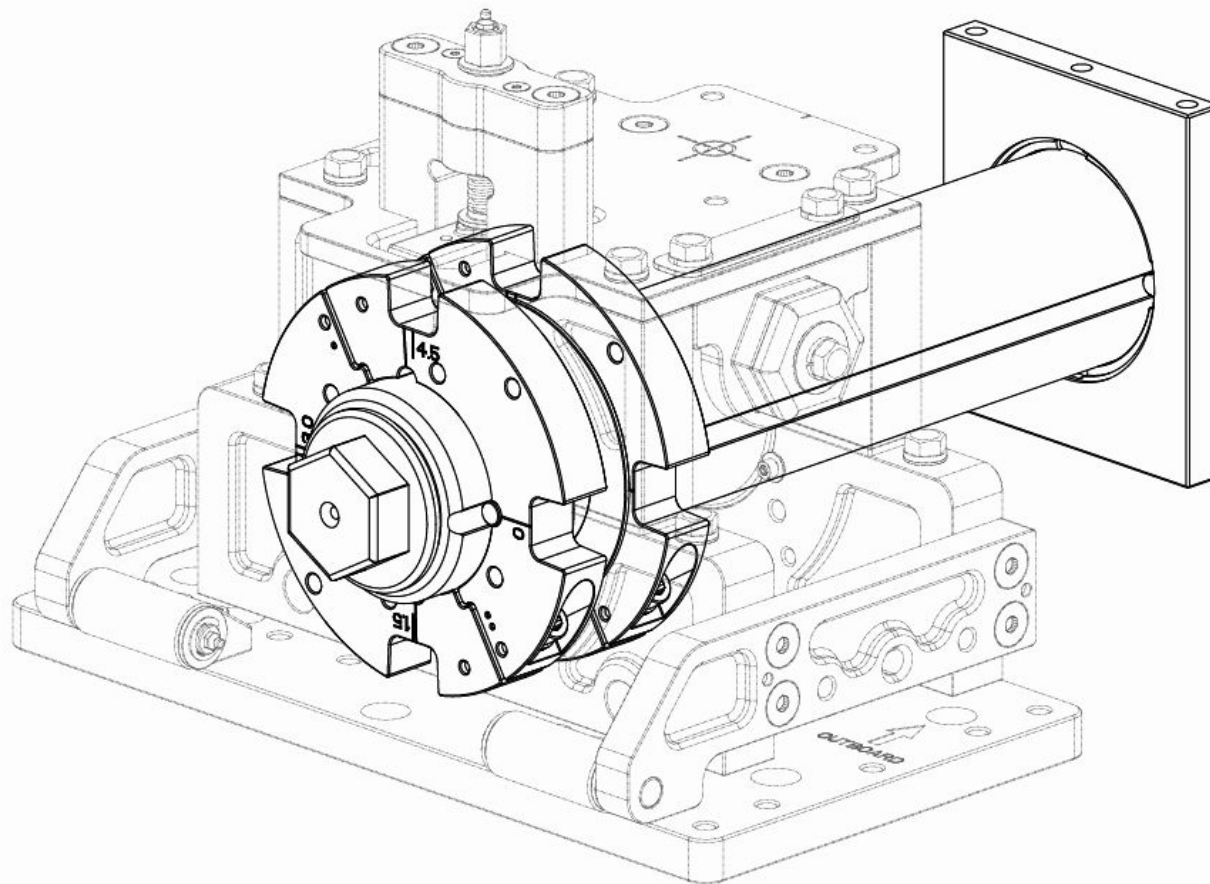
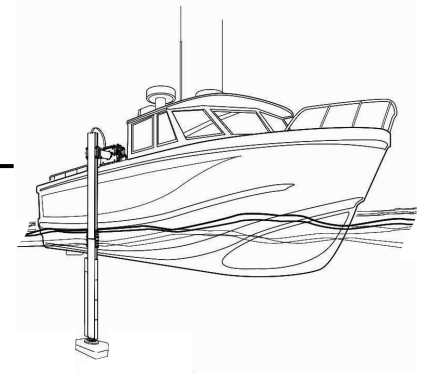
Patent #8094520

HIGHTOWER

NOTCH RINGS

USER MANUAL

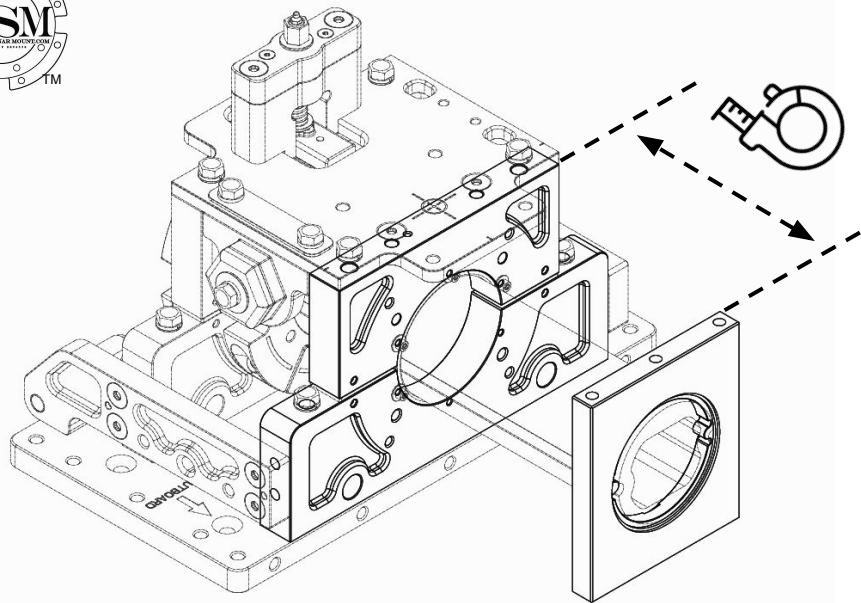
PITCH & WIDTH ADJUSTMENT



SCAN FOR VIDEO

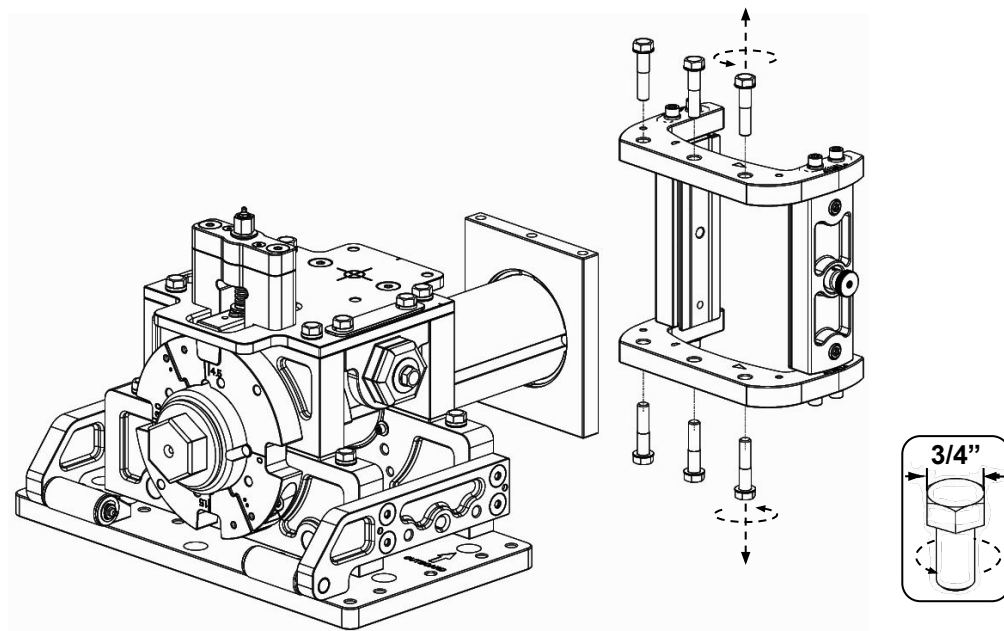


SCAN FOR ALL
USM VIDEOS



RECORD WIDTH MEASUREMENT - Measure the distance between the inside faces of X-Pole and the mount body. Reset to this measurement if adjusting *pitch* or use as a reference when adjusting *width*.

1

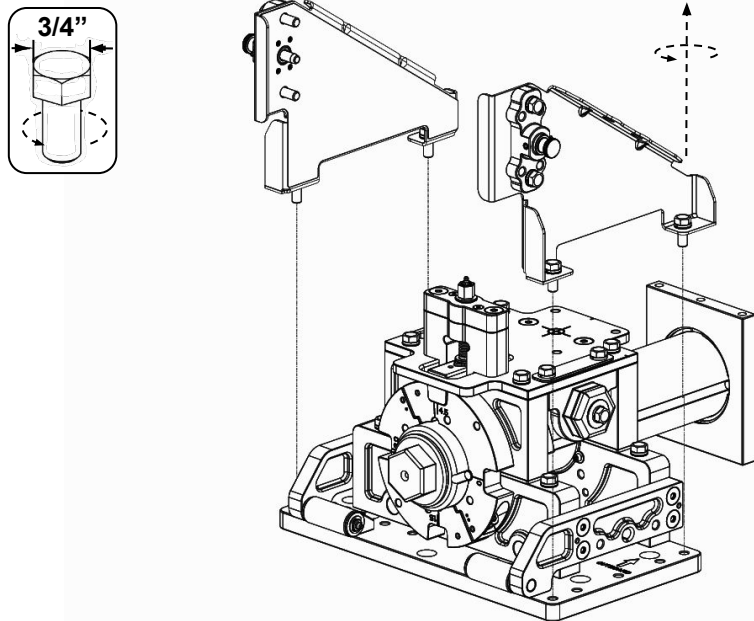


2

REMOVE Z-POLE - If necessary remove Z-Pole to relieve any binding on the X-Pole so that it may move freely for adjustment.

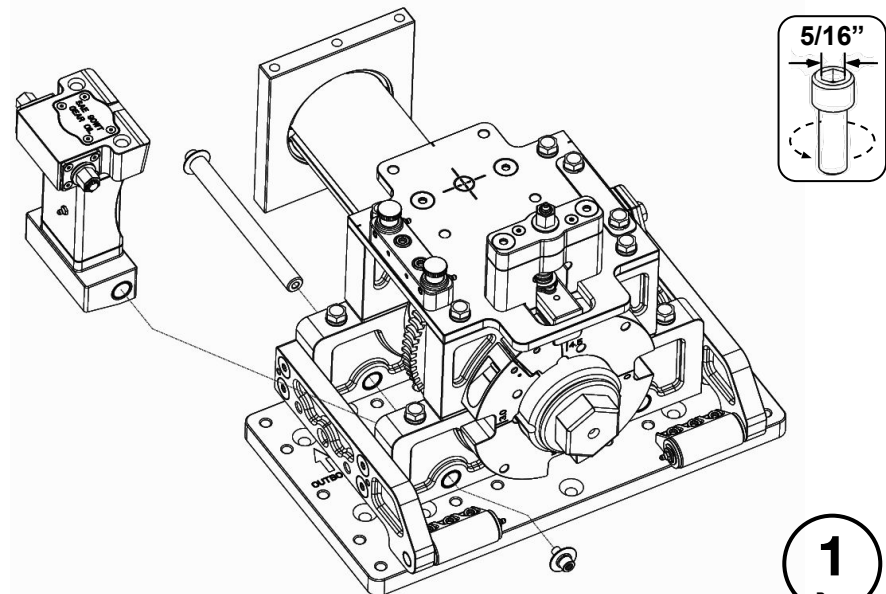
REMOVE HINGE BRACKETS - If your Hightower came equipped with the **HINGE** option, remove the Hinge Brackets for clear access to the Notch Rings.

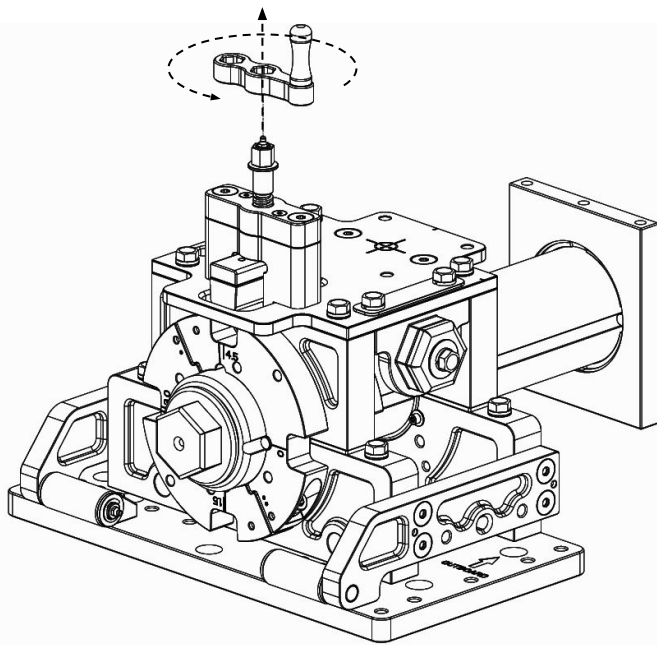
3



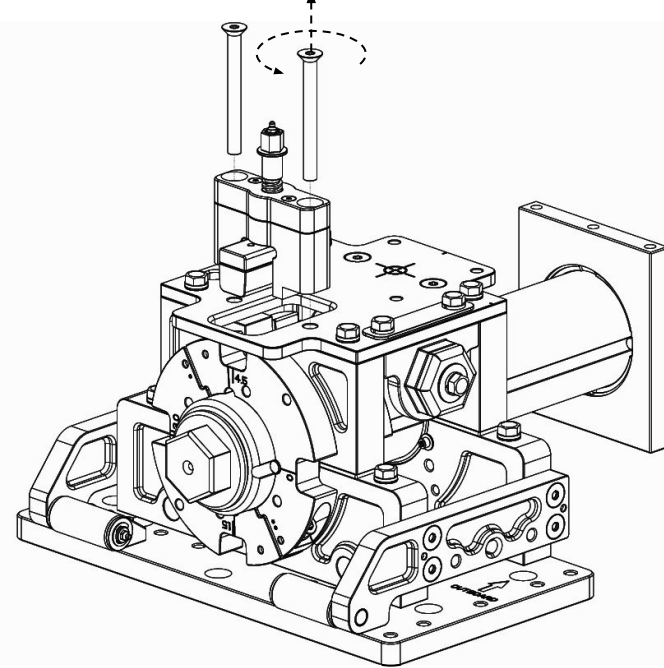
4

REMOVE GEAR DRIVE - If your Hightower came equipped with the **GEAR DRIVE** option, remove the Gear Drive for clear access to the Notch Rings.



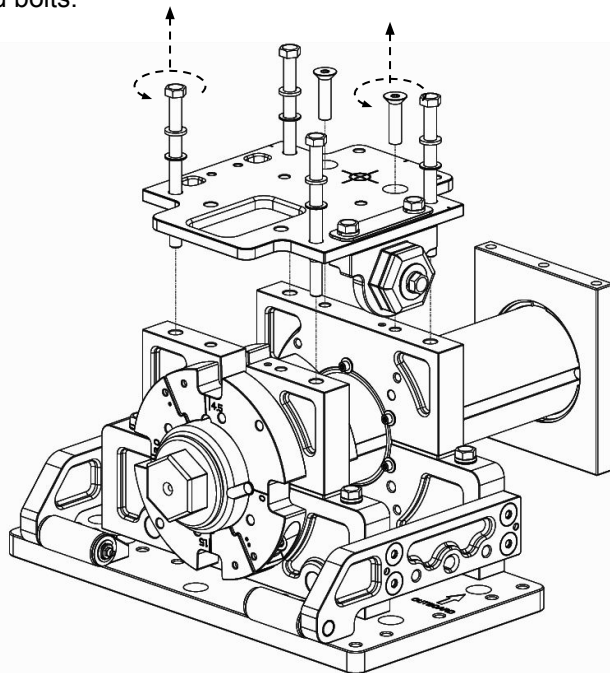


5 **DISENGAGE SHEAR BLOCK** - Using the Speed-Wrench loosen the lead-screw on top of the Shear Block Tower. Ensure the Shear Block is fully disengaged from the Notch Rings.

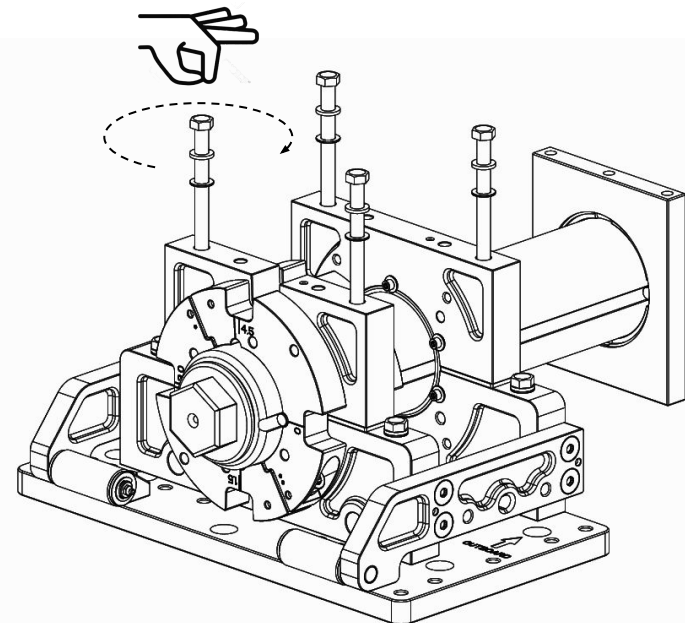


6 **REMOVE TOWER FROM MOUNT** - Using a 5/16" Allen Wrench, remove two 1/2-13 x 5.0" flat-head bolts. Lift the Shear Block Tower from the USM.

7 **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.

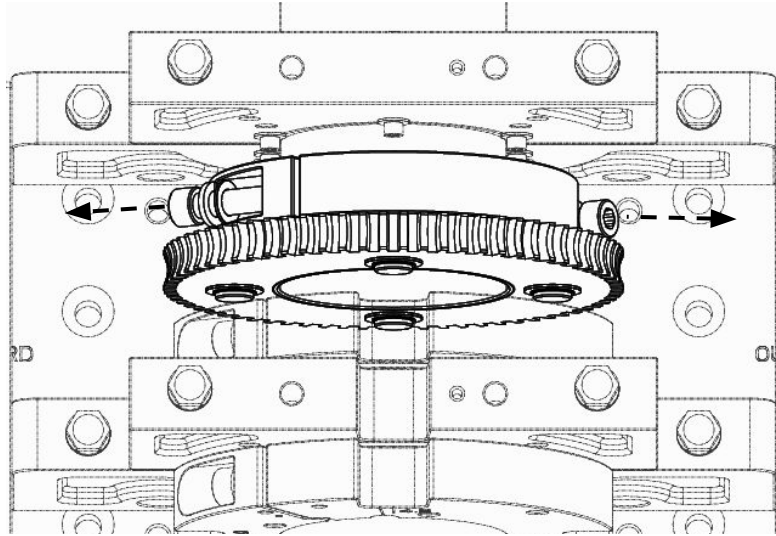


8 **REPLACE MAIN BOLTS** - Replace the four 1/2-13 x 6.5" hex-head bolts and tighten by hand.



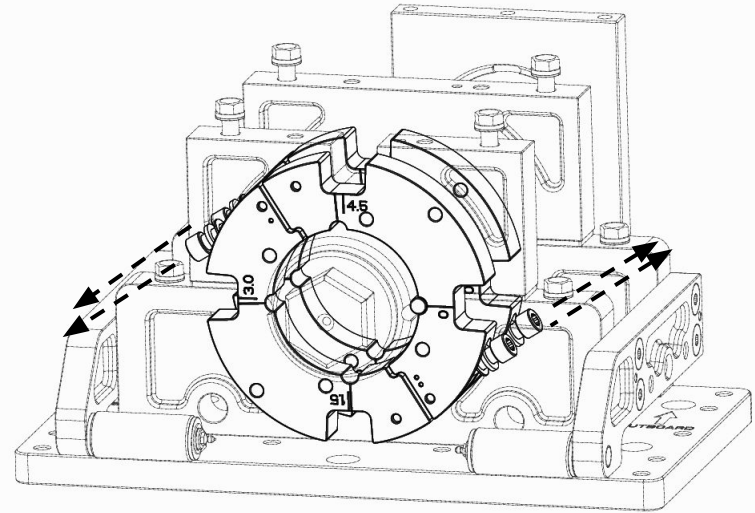


WIDTH ADJUSTMENT



LOOSEN GEAR CARRIER - If applicable, using a $\frac{3}{8}$ Allen Wrench loosen Gear Carrier so that it may slide easily on X-Pole.

9



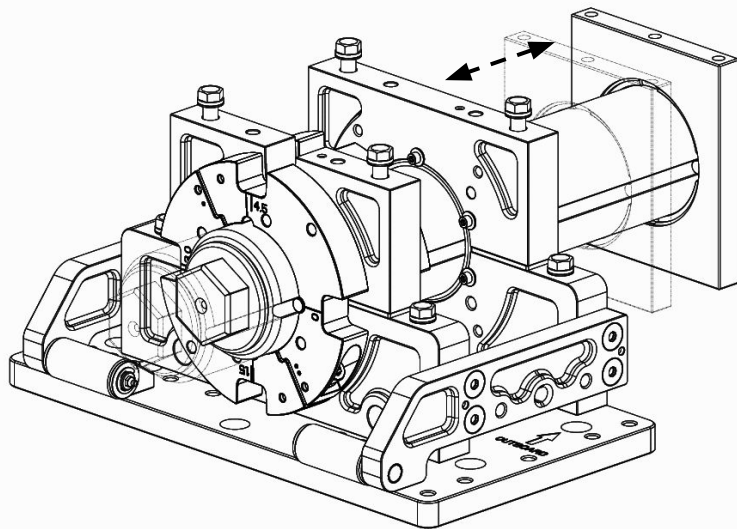
LOOSEN NOTCH RINGS - Using a $\frac{3}{8}$ Allen Wrench loosen the Notch Rings so that they may slide easily on X-Pole. Keep the Dowel Pins in place.

10

ADJUST WIDTH - Keep Notch Rings in place and slide the X-Pole inboard or outboard to set the desired width.

11

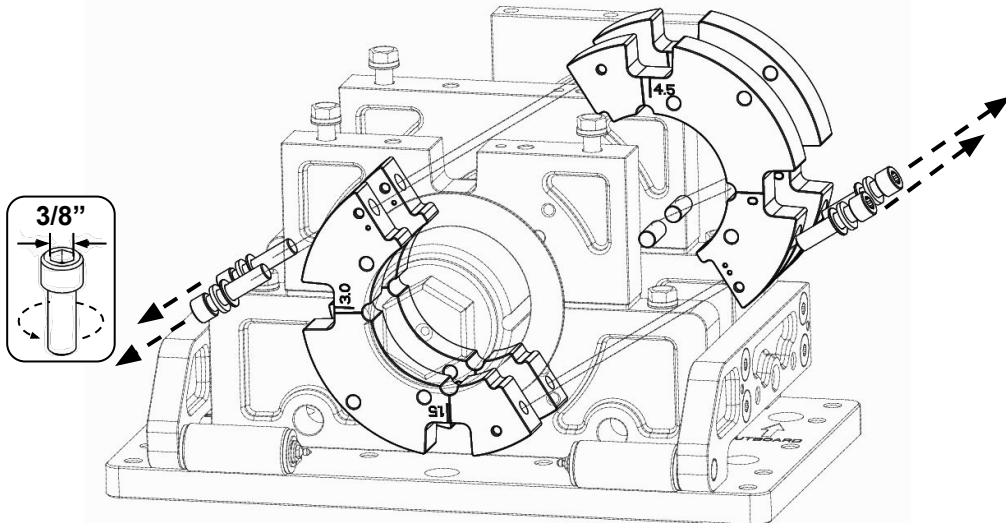
12



SKIP TO PAGE 7 IF MAINTAINING PITCH

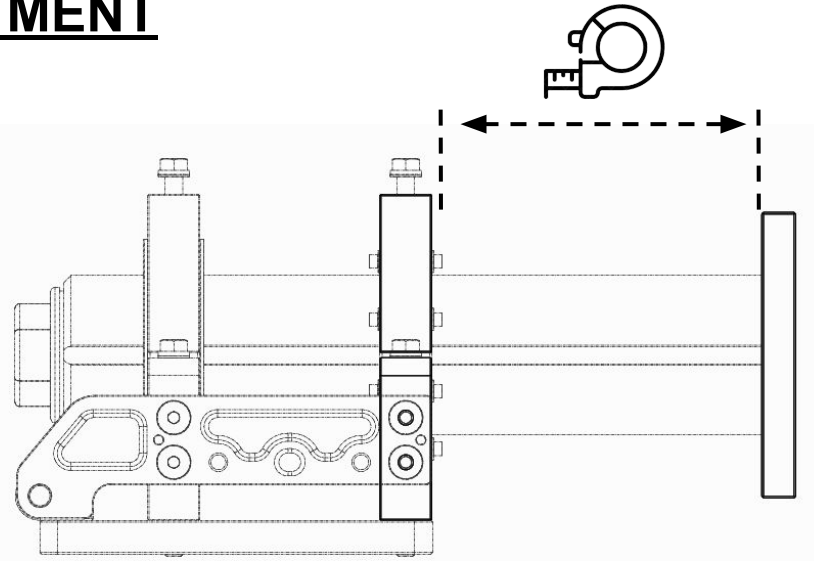


PITCH ADJUSTMENT



REMOVE NOTCH RINGS - Using a $\frac{3}{8}$ Allen Wrench remove the Notch Rings. Take note of the position of the Dowel Pins.

13

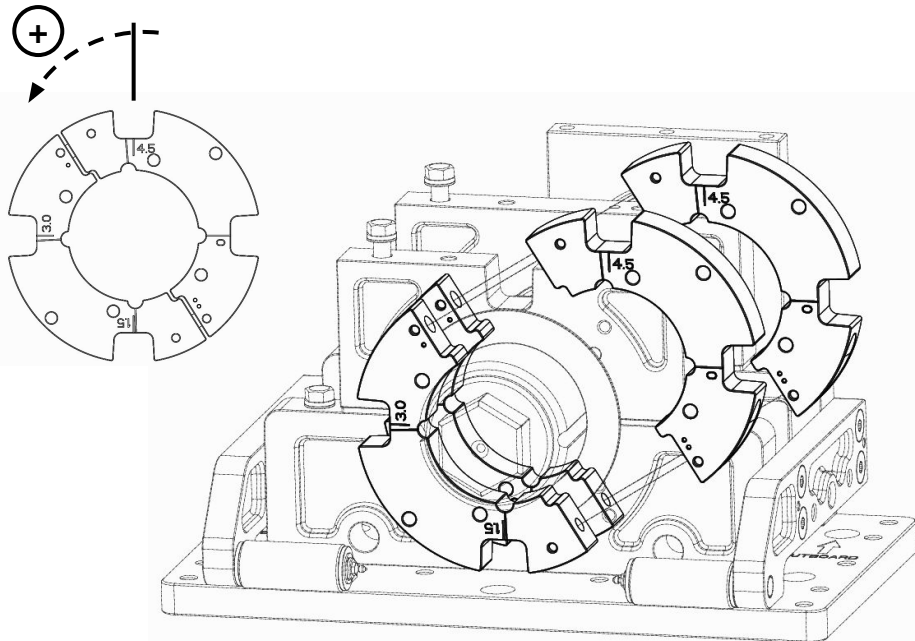


POSITION X-POLE - Maintain recorded measurement from step 1.

14

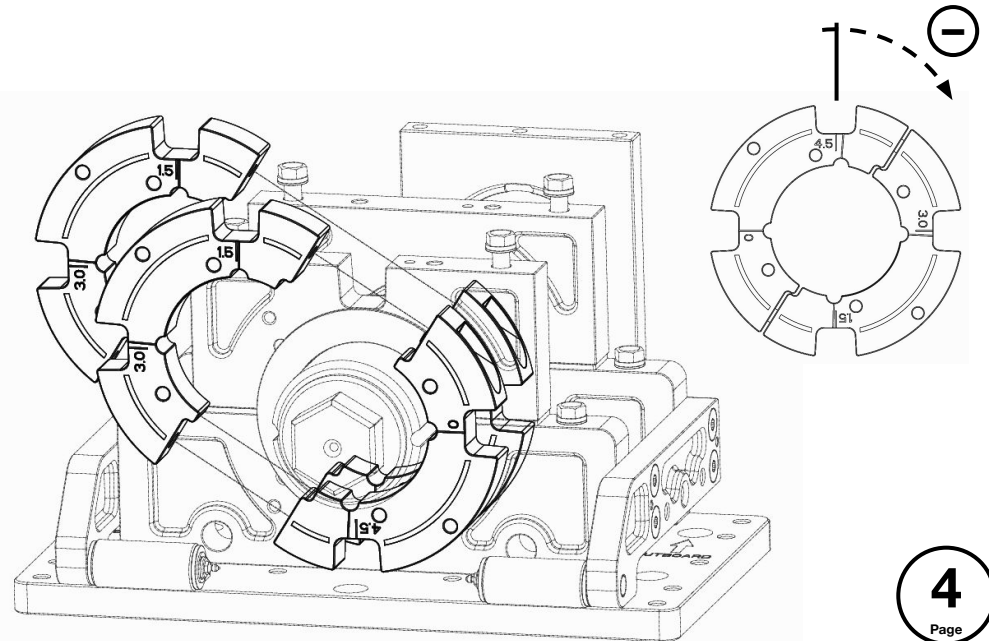
POSITIVE PITCH - Positive Pitch Face, Note Blank side of Notch Rings.

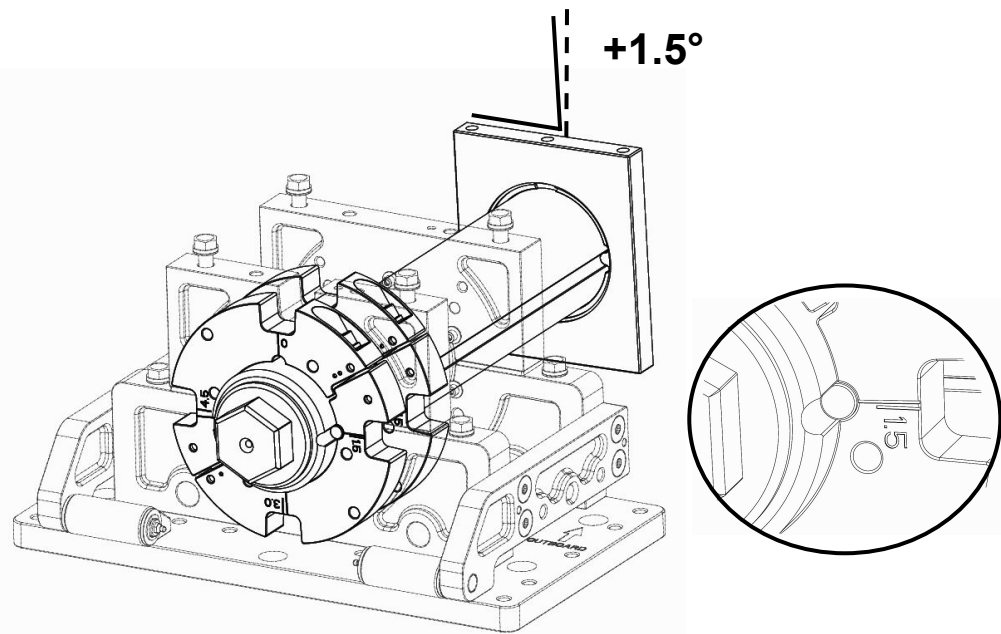
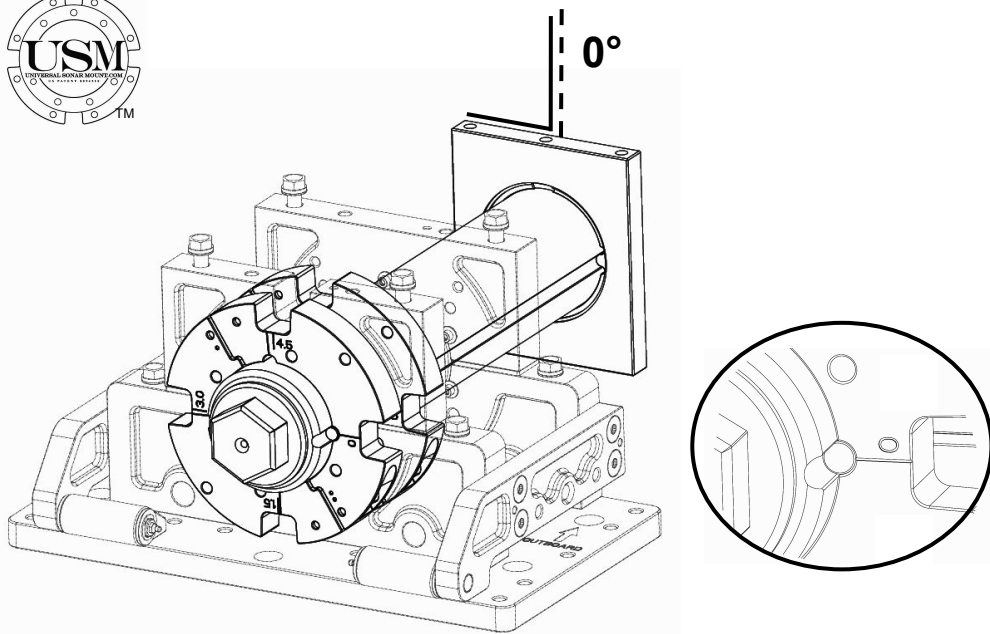
15



NEGATIVE PITCH - Negative Pitch Face, Note Striped side of Notch Rings.

16





ADJUST PITCH - Adjusting the pitch of the Z-Pole on your USM is done by rotating the Notch Rings around the X-Pole. Your USM's pitch comes setup at 0°. This can be adjusted to 1.5°, 3.0° and 4.5° in either direction.

17

18

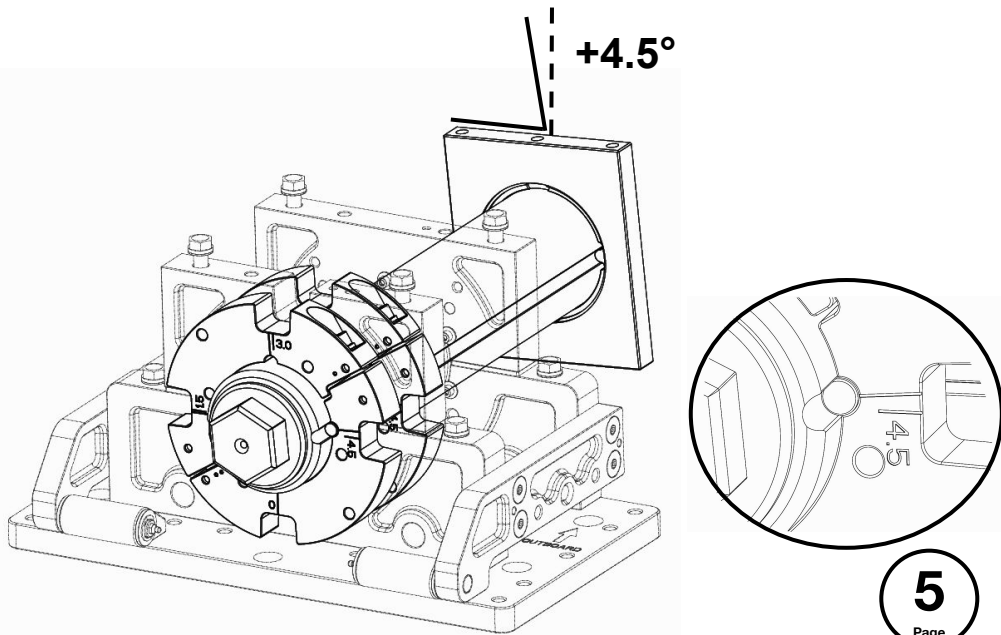
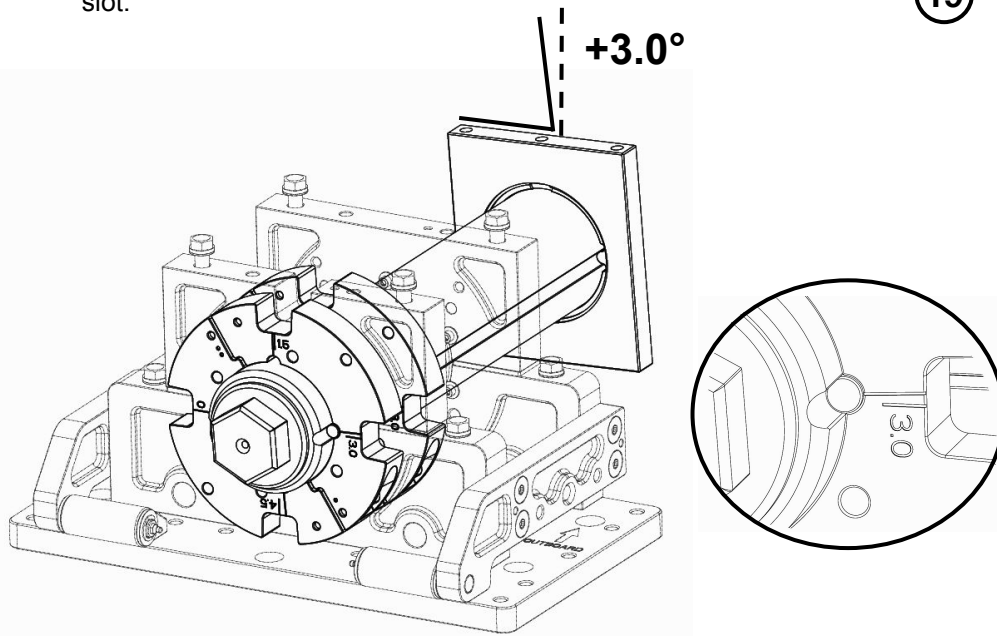
+1.5° PITCH ADJUSTMENT - Note position of Dowel Pin at 1.5° slot.

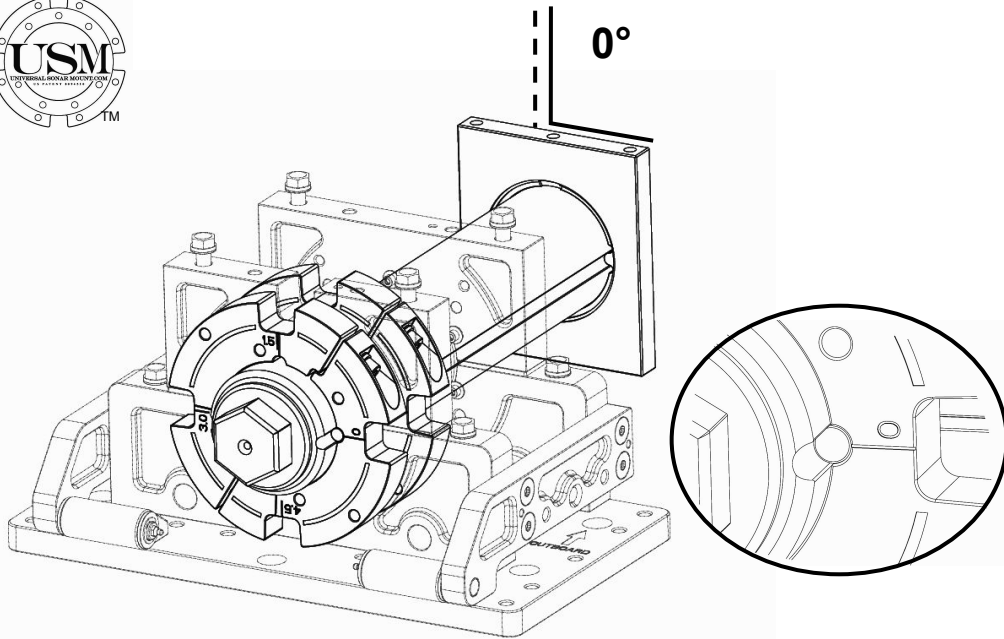
+3.0° PITCH ADJUSTMENT - Note position of Dowel Pin at 3.0° slot.

19

20

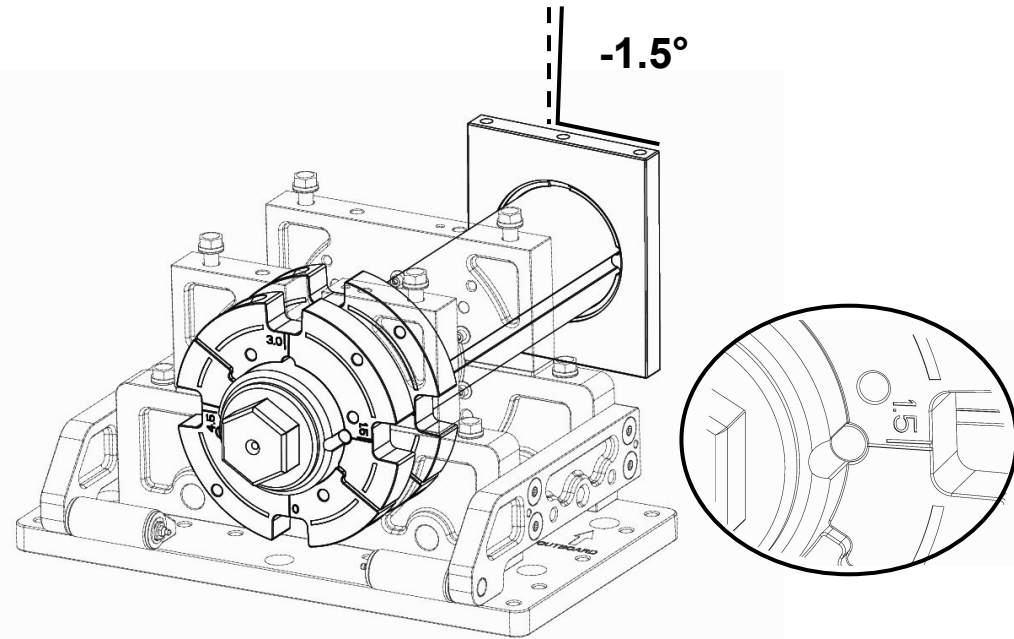
+4.5° PITCH ADJUSTMENT - Note position of Dowel Pin at 4.5° slot.





ADJUST PITCH - Adjusting the pitch of the Z-Pole on your USM is done by rotating the Notch Rings around the X-Pole. Your USM's pitch comes setup at 0°. This can be adjusted to 1.5°, 3.0° and 4.5° in either direction.

(21)

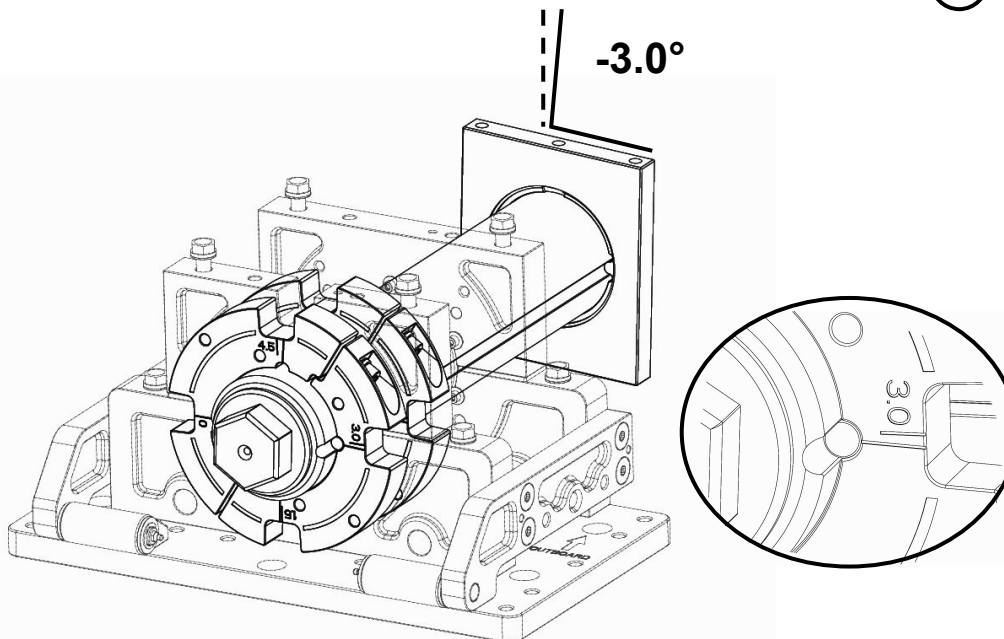


-1.5° PITCH ADJUSTMENT - Note position of Dowel Pin at 1.5° slot.

(22)

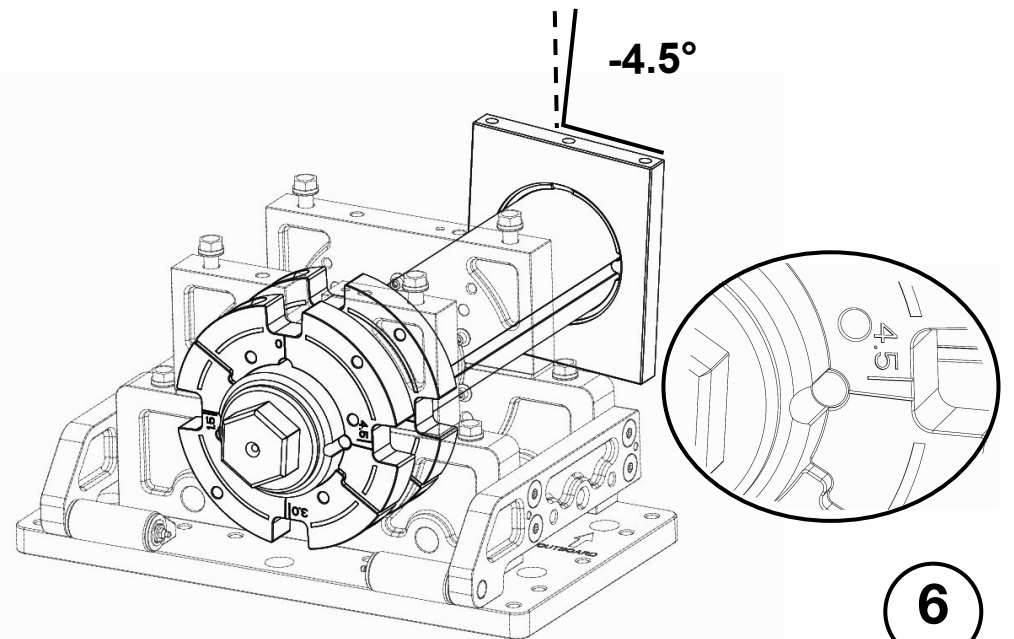
-3.0° PITCH ADJUSTMENT - Note position of Dowel Pin at 3.0° slot.

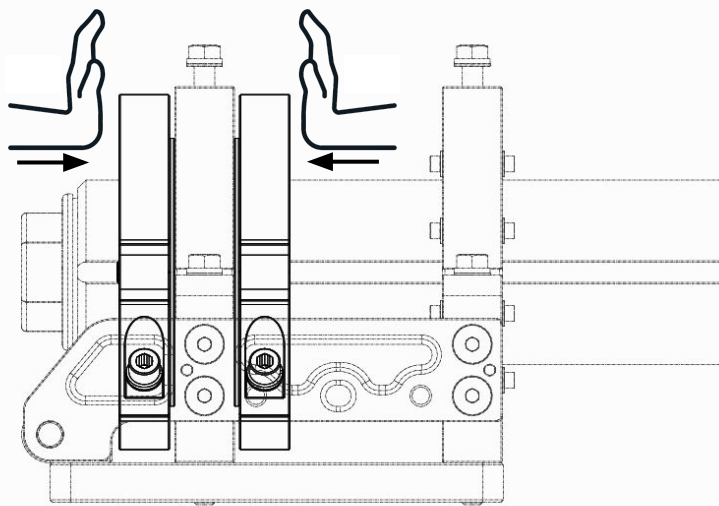
(23)



-4.5° PITCH ADJUSTMENT - Note position of Dowel Pin at 4.5° slot.

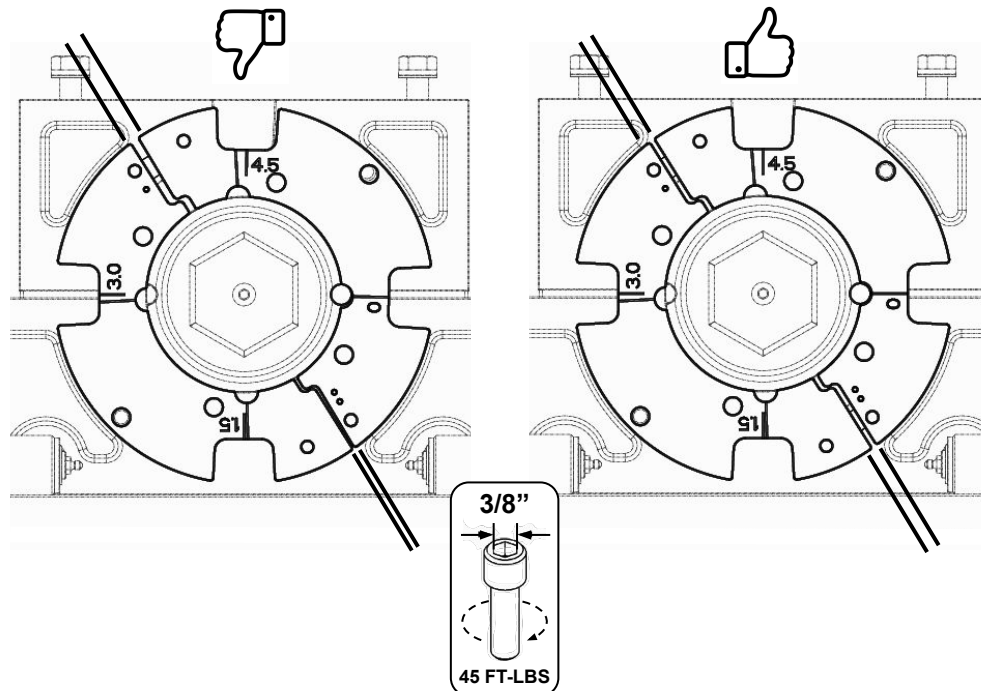
(24)





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

25



26

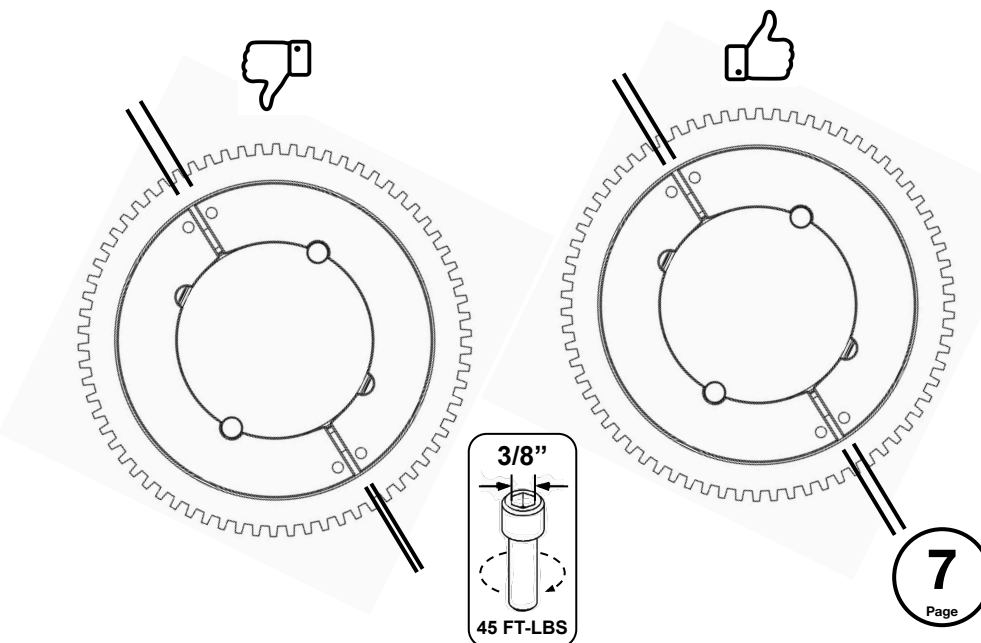
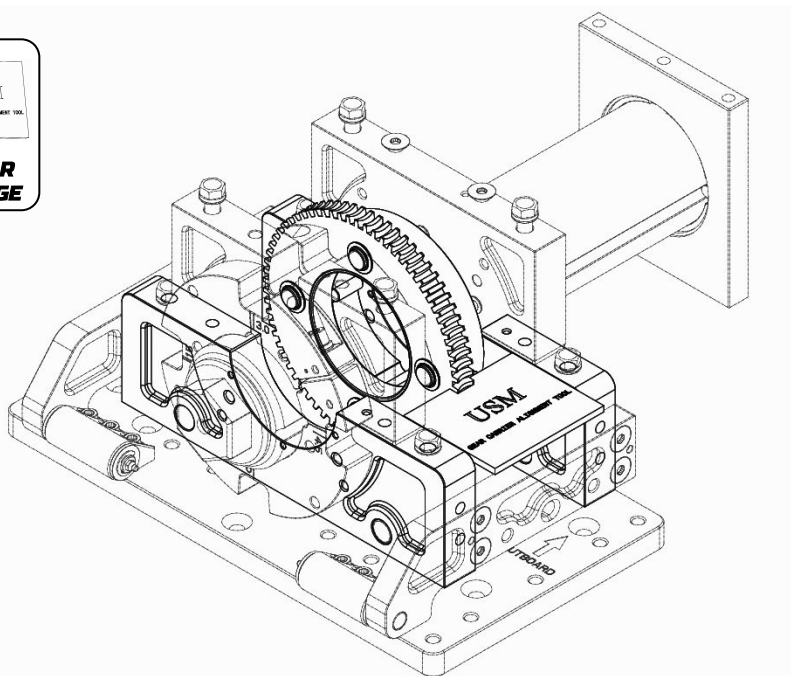
TIGHTEN NOTCH RINGS - Using a 3/8 Allen Wrench tighten the Notch Rings. Be sure to maintain an *even* gap on each side.

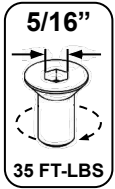
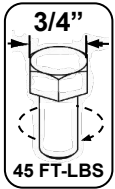
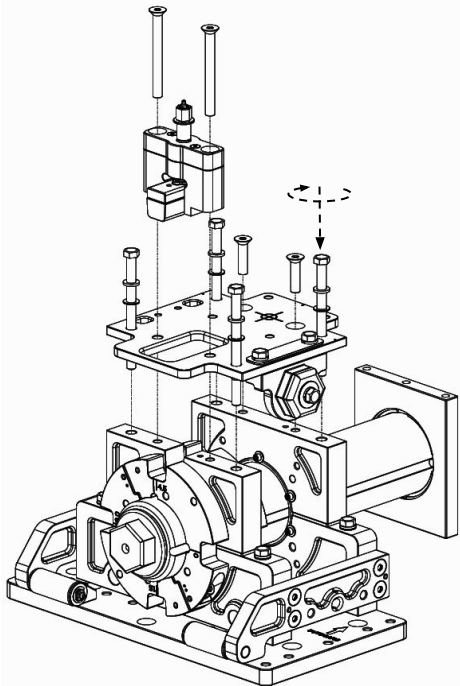
REPOSITION GEAR - If necessary, set the Gear to the correct location. Use the spacer-tool provided. Refer to Gear Drive Manual for precise instructions.

27

28

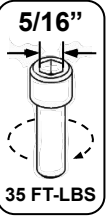
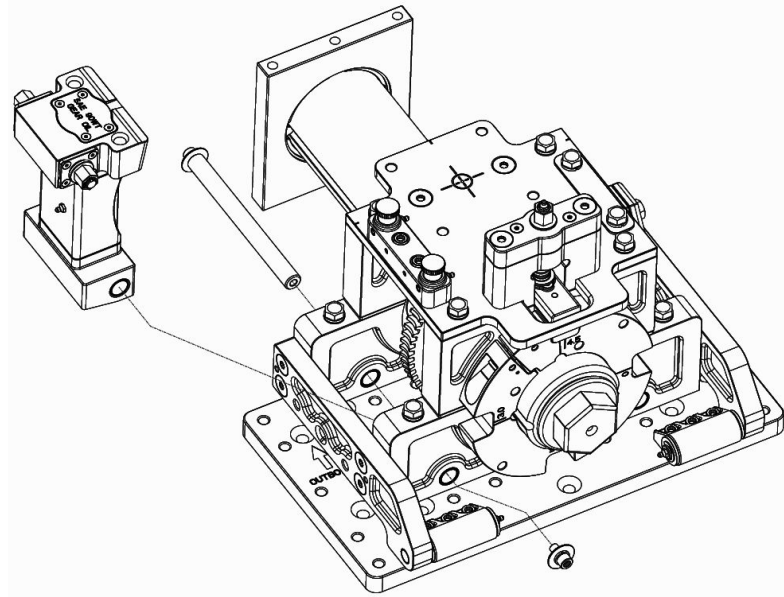
TIGHTEN GEAR CARRIER - If applicable, using a 3/8 Allen Wrench tighten Gear Carrier. Be sure to maintain an *even* gap on each side, in the same way as on step 26.





REASSEMBLE MOUNT - Install Top Plate and Shear Block Tower.

29

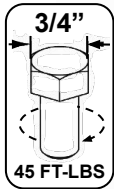
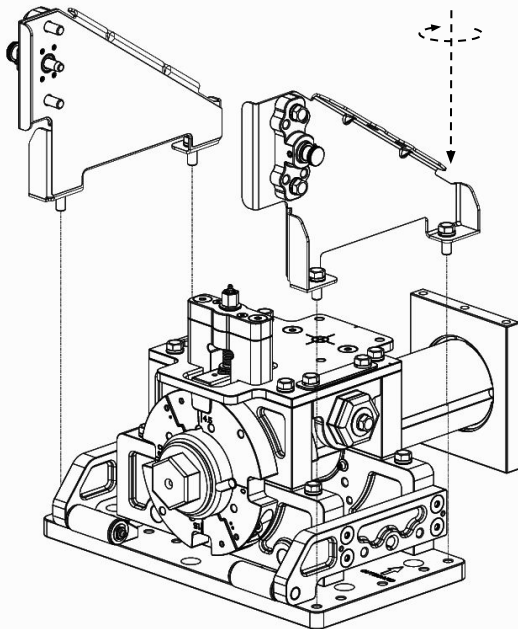


30

INSTALL GEAR DRIVE - If your Hightower came equipped with the **GEAR DRIVE** option, reinstall the Gear Drive.

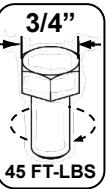
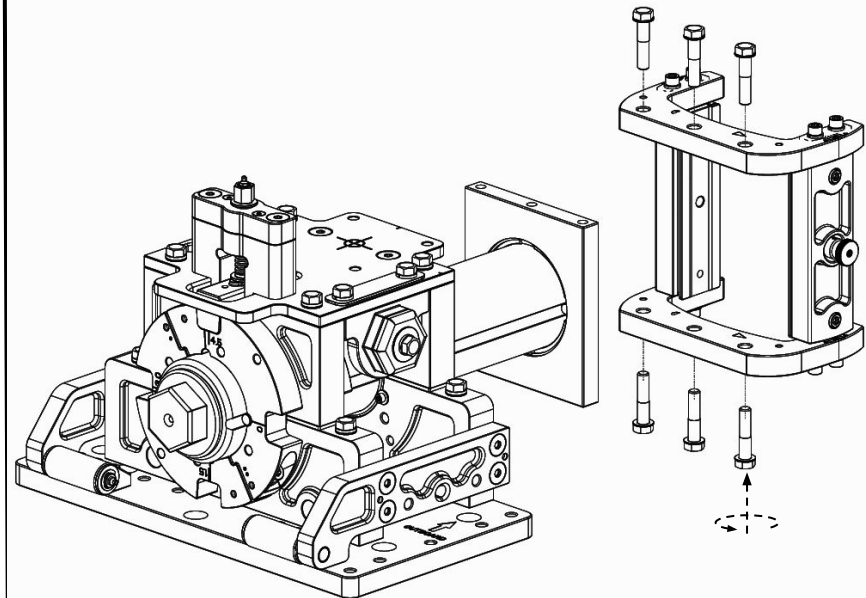
INSTALL HINGE BRACKETS - If your Hightower came equipped with the **HINGE** option, reinstall the Hinge Brackets.

31

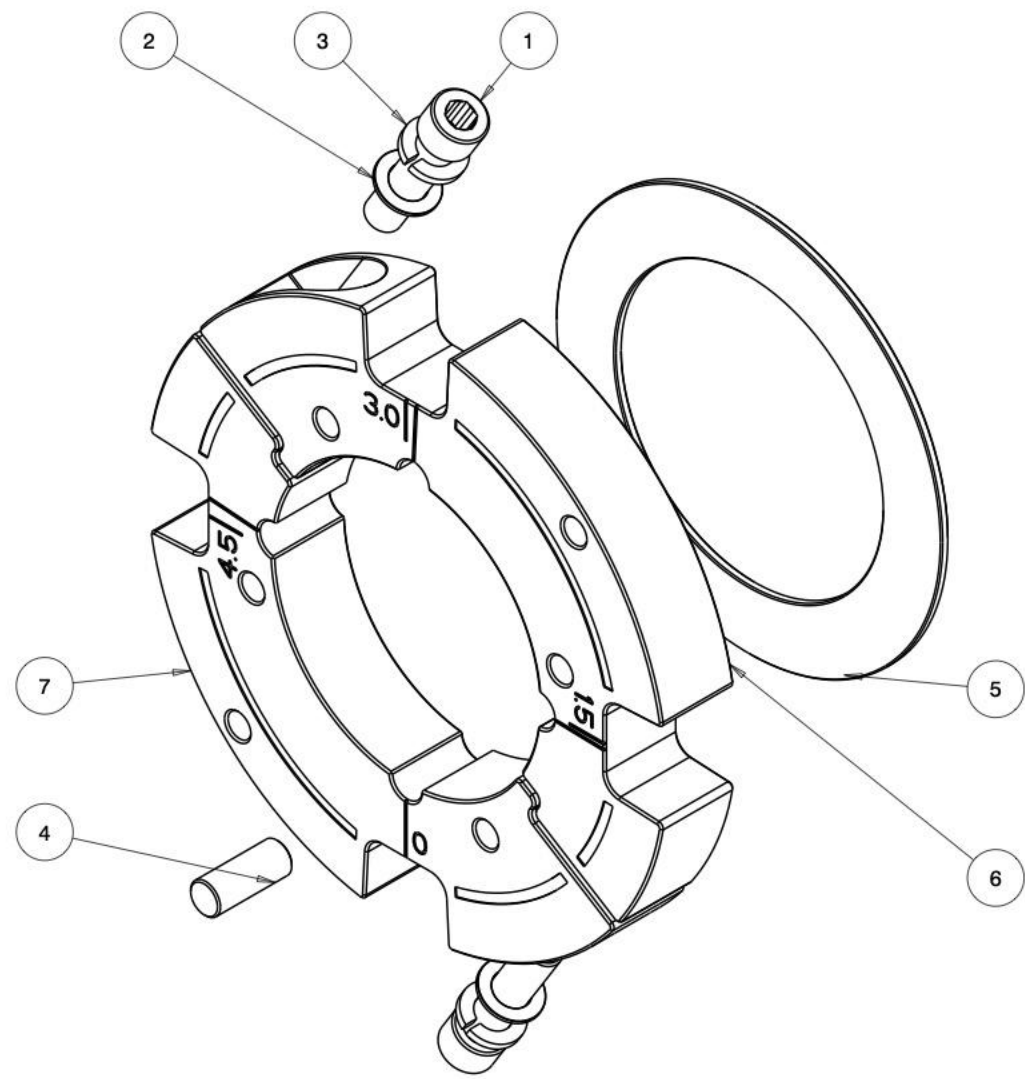


32

INSTALL Z-POLE - If necessary reinstall Z-Pole.



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		---

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

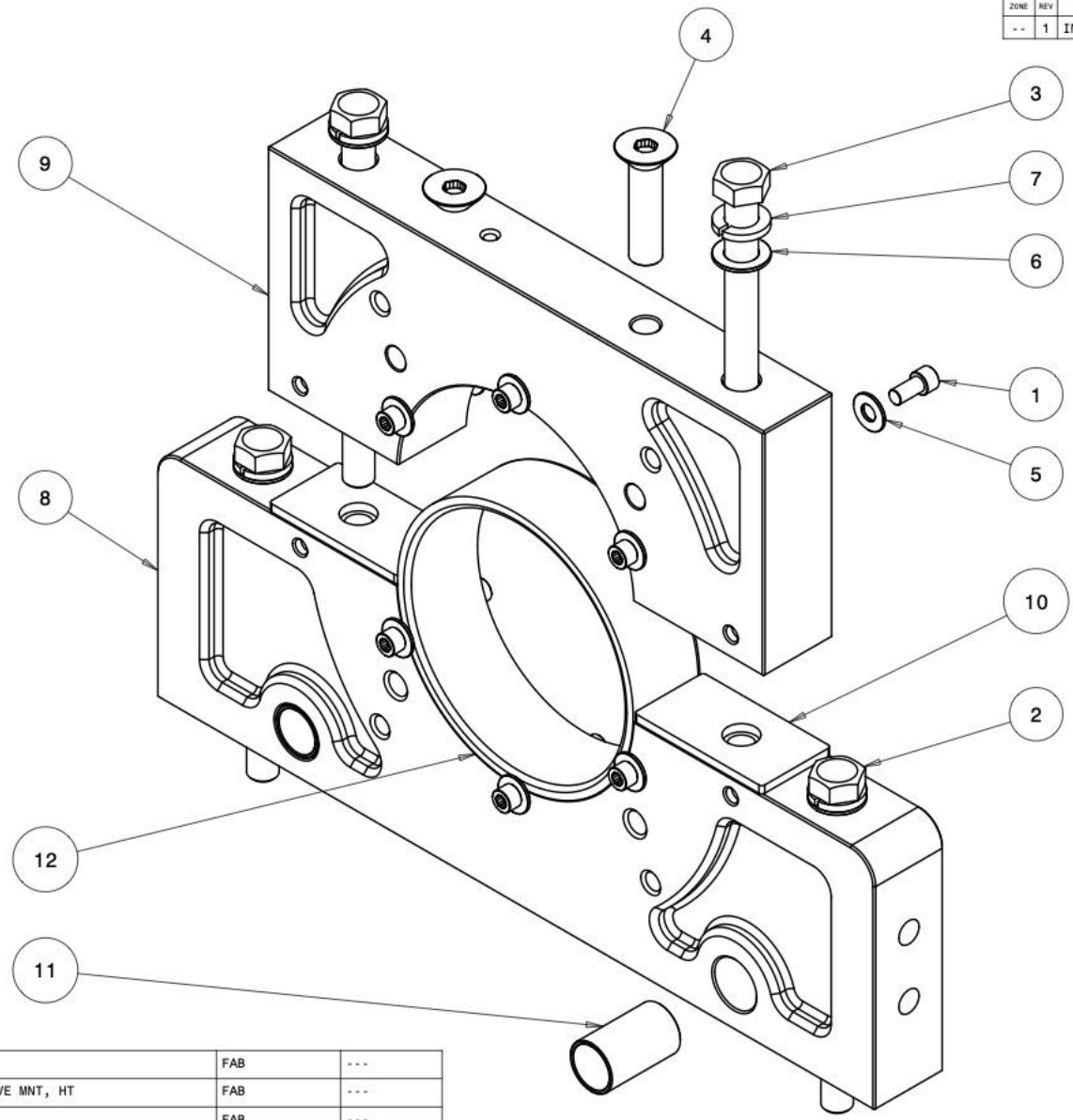
4

3

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	MCMMASTER	92146A033
6	4	90-300-515-875-060-20	WASHER, .515 ID X .875 OD X .060 THICK, SST	MCMMASTER	98017A210
5	12	90-300-281-625-050-20	WASHER, .281 X .625 OD X .050 THICK, SST	MCMMASTER	92141A029
4	2	90-110-500C-2000-20	SCREW, 1/2-13 UNC X 2.0 FHC 18-8	MCMMASTER	92210A720
3	2	90-104-500C-6500-20	HEX BOLT, 1/2-13 X 6.50 SST 18-8	MCMMASTER	92198A754
2	2	90-104-500C-5750-20	HEX BOLT, 1/2-13 X 5.75 SST 18-8	MCMMASTER	92314A413
1	12	90-100-250C-500-20	SCREW, 1/4-20 X .50 SHC 18-8	MCMMASTER	92196A537

TOLERANCES ARE:	CREO REPORTED PARAMETERS	DESIGNER	
		ENGINEER	G STAPLES
.X +/- 0.1	CREO MATERIAL	G STAPLES	02021-JAN-28
.XX +/- 0.01	CREO MASS	DRAFTER	G STAPLES
.XXX +/- 0.001	CREO VOLUME	CHECKED	---
ANGLES +/- 0.5	131.415	---	02021-MMJ-DD
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

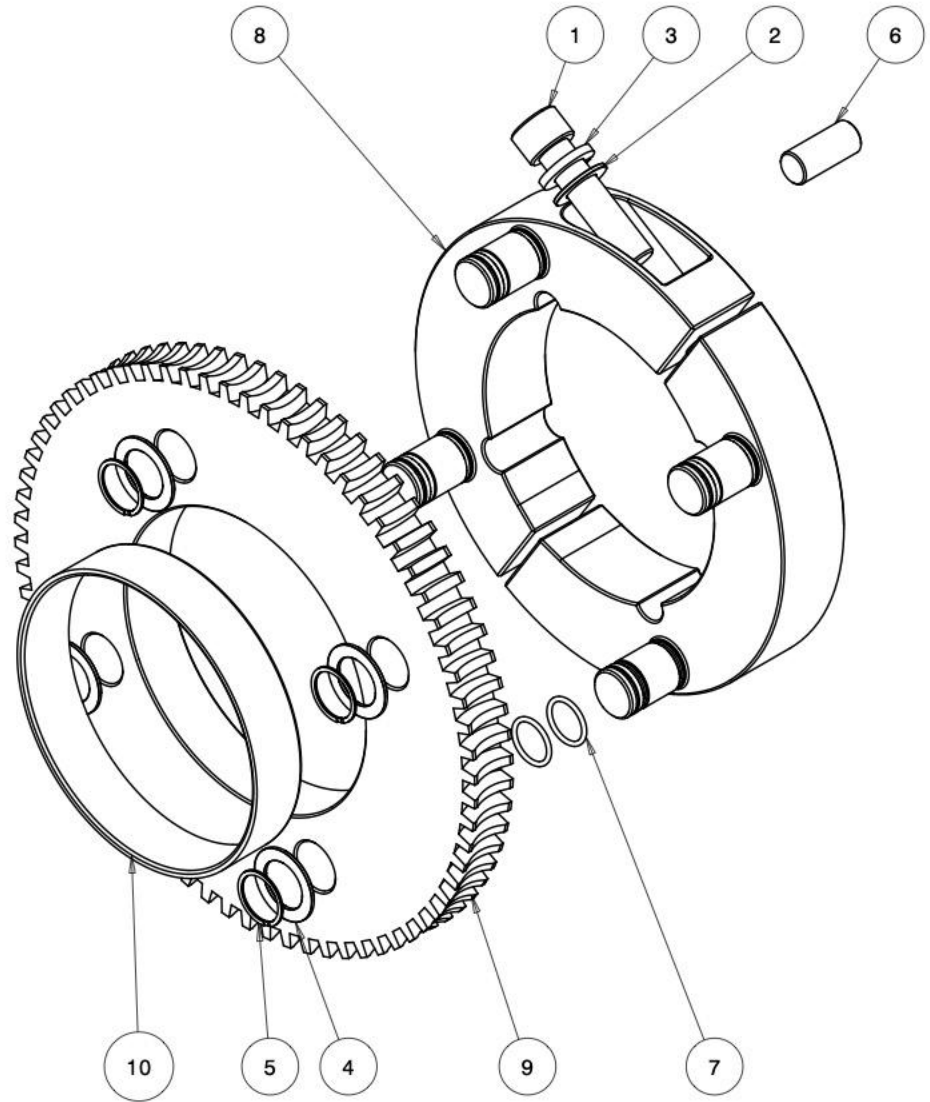
4

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

			02019-AUG-15
INTERPRET DIMENSIONS PER ASME Y14.5M 1994 (R2004)		PRO/E DRAWING FILE NAME:	DO NOT SCALE DRAWING
		505-001-9030	

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

4

3

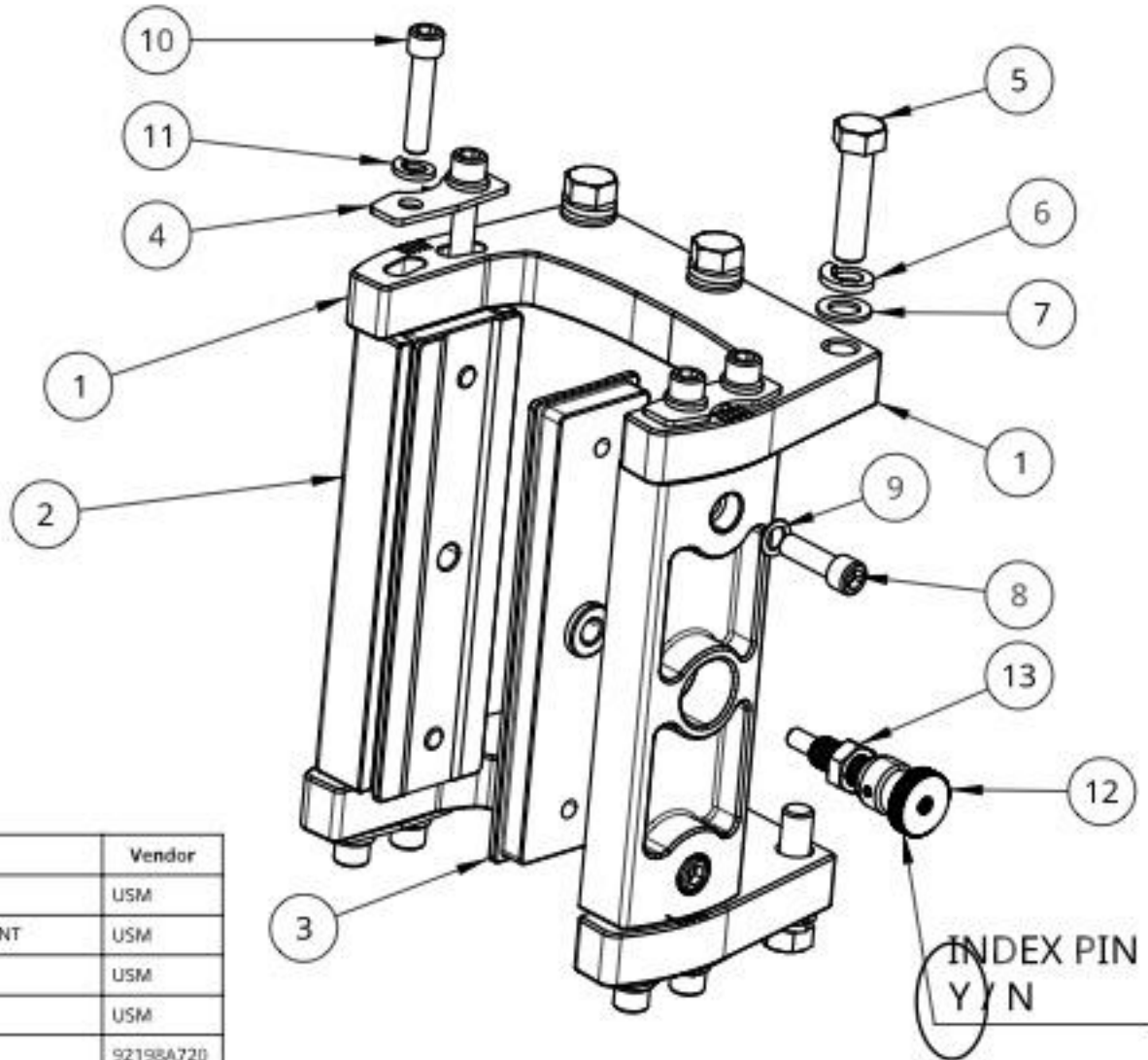
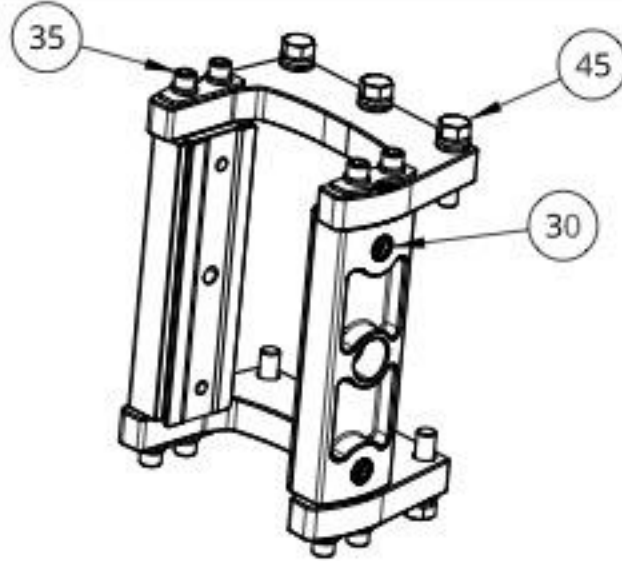
2

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



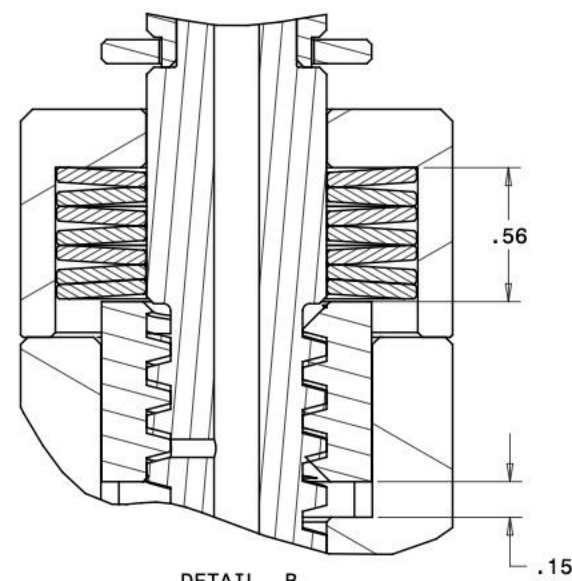
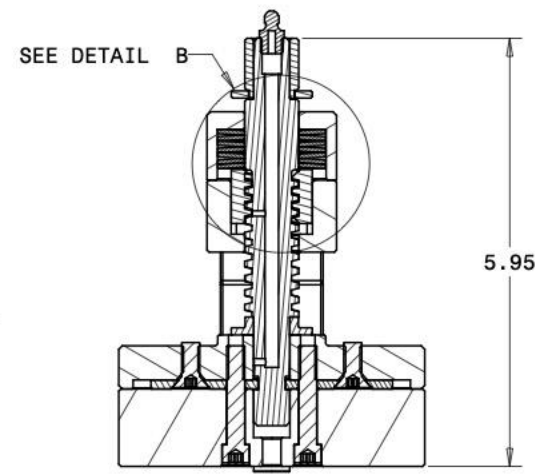
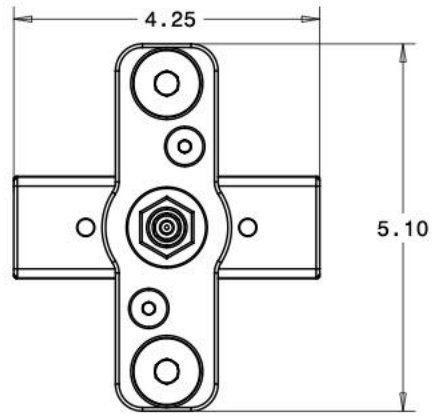
Item No.	Quantity	Part number	Description	Vendor
1	2	520-100-1057	STD-COMPACT FOIL MOUNT	USM
2	2	520-100-1058	STD CLAMPING BLOCK, FOIL MOUNT	USM
3	2	520-100-1059	STD TRACK BLOCK, FOIL MOUNT	USM
4	4	520-100-1055	POINTER	USM
5	6	90-104-500C-2000-20	HEX BOLT, 1/2-13 X 2.00 SST	92198A720
6	6	90-310-510-870-120-20	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

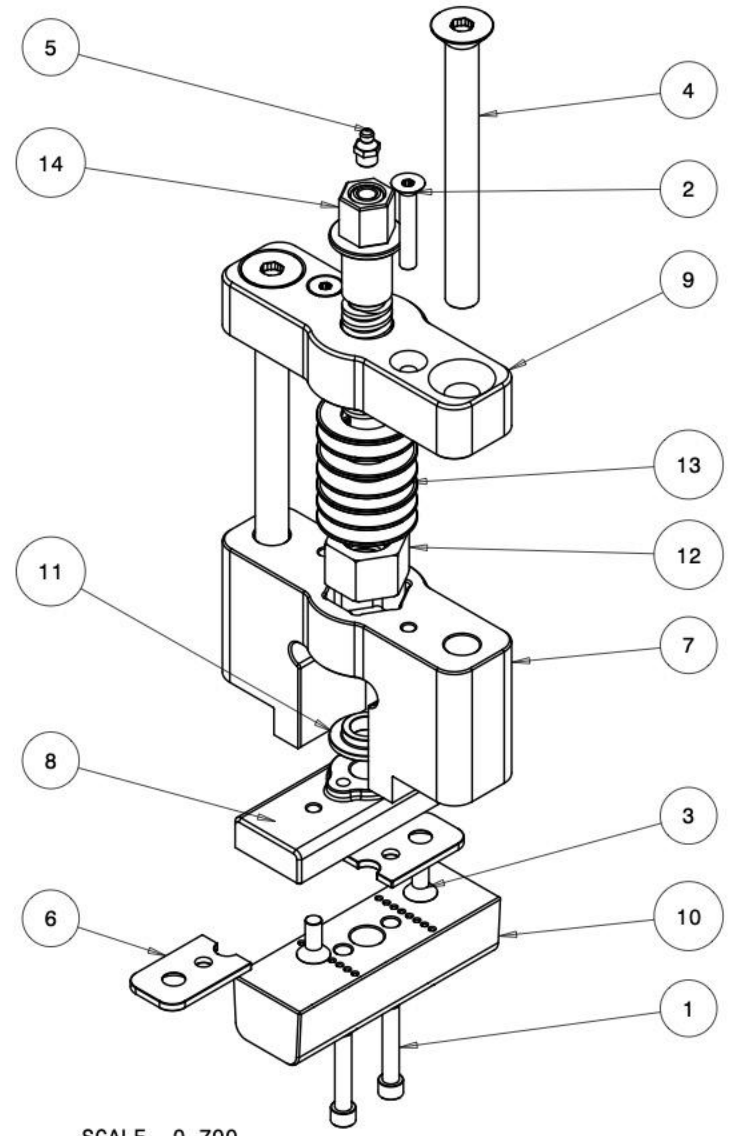
500-100-9059-3.5

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



DETAIL B
SCALE 2.500

NOTE: BELLEVILLE WASHER ORIENTATION



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	02019-AUG-15
.XXX +/- 0.001	4.546	DRAFTER
ANGLES +/- 0.5	PRO/E VOLUME	---
	N/A	02019-AUG-15
INTERPRET DIMENSIONS PER ASME Y14.5M 1994 (R2004)	PRO/E DRAWING FILE NAME:	CHECKED
	540-001-9010	---
		02019-AUG-15
		DO NOT SCALE DRAWING

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 REV 1 SHEET 1