

**\*\* DO NOT USE BALL END HEX WRENCHES \*\***

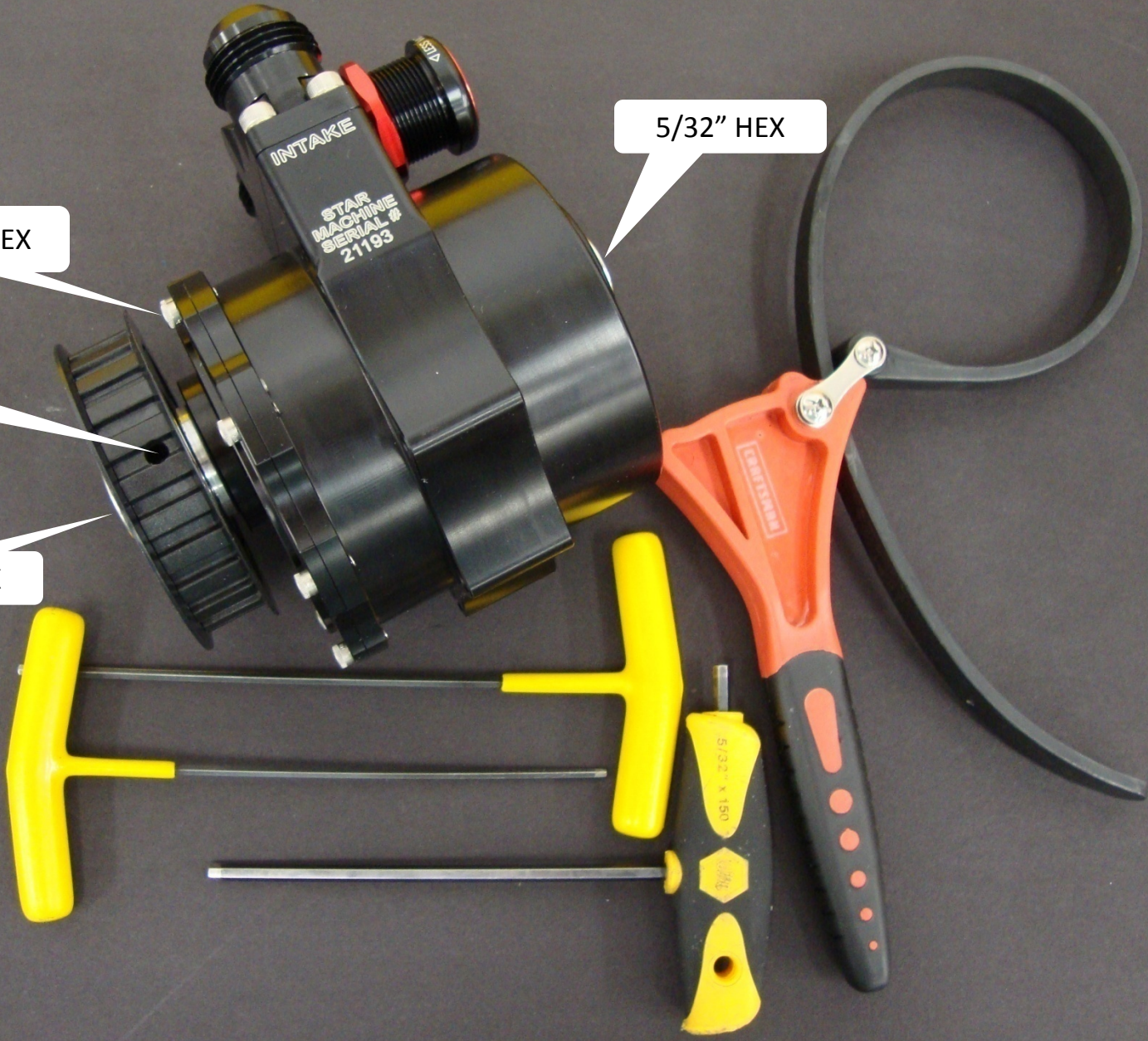
**TOOLS REQUIRED:**  
5/32" HEX  
9/64" HEX  
3/32" HEX  
STRAP WRENCH

5/32" HEX

9/64 " HEX

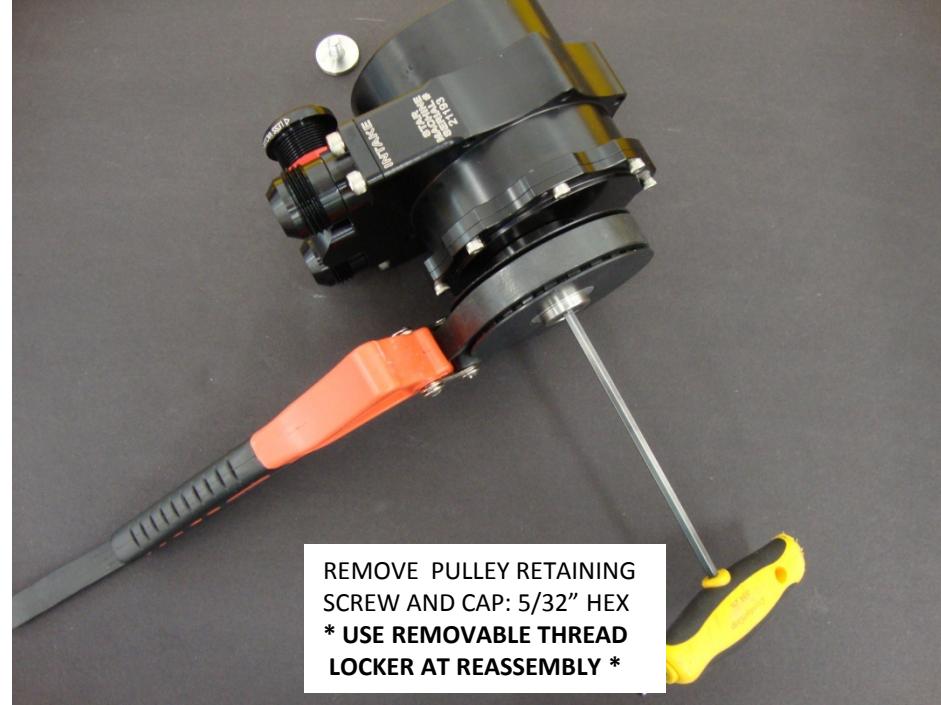
3/32" HEX  
(SET SCREW)

5/32" HEX

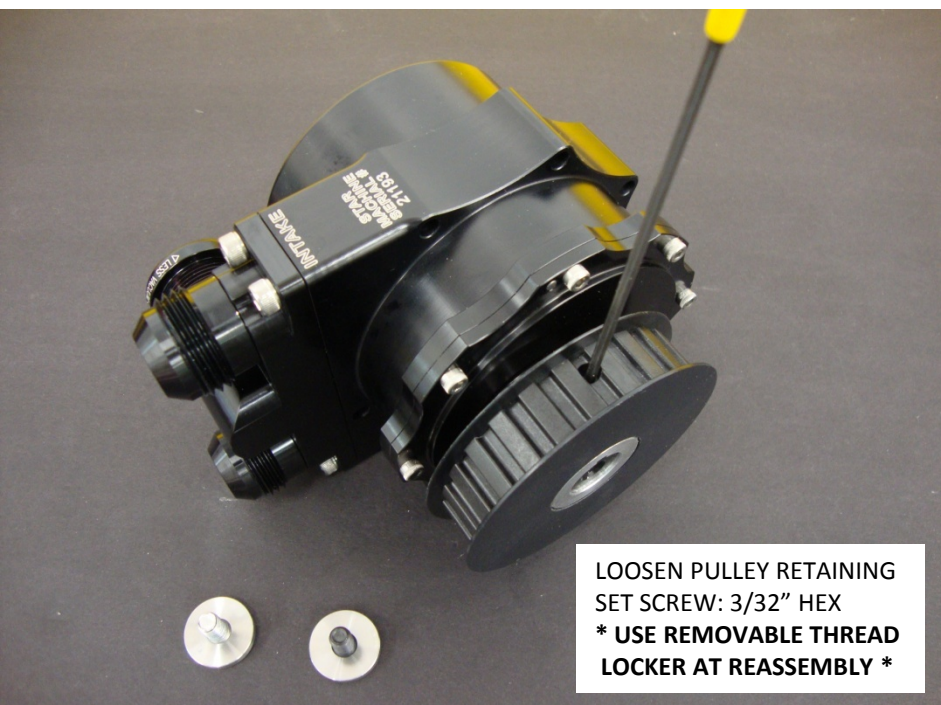




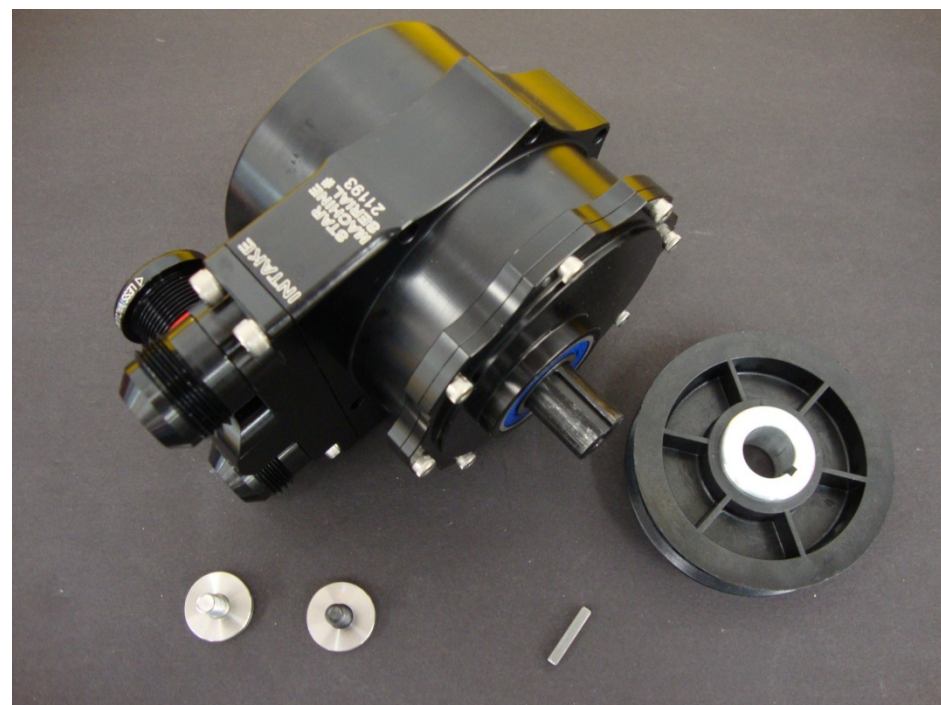
REMOVE REAR RETAINING  
SCREW AND CAP: 5/32" HEX  
\* USE REMOVABLE THREAD  
LOCKER AT REASSEMBLY \*

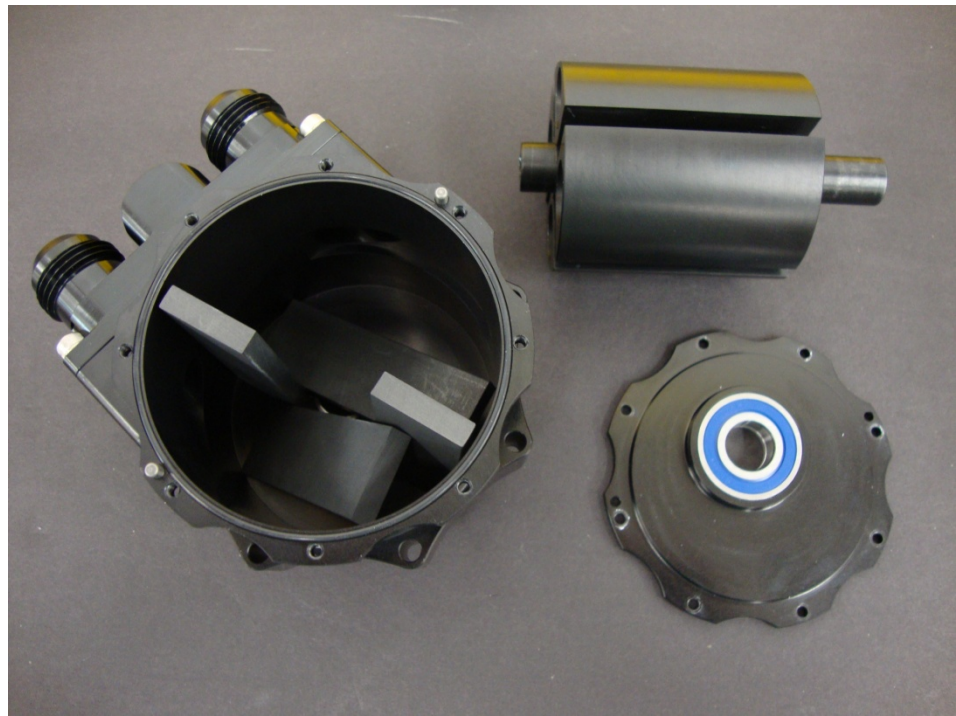
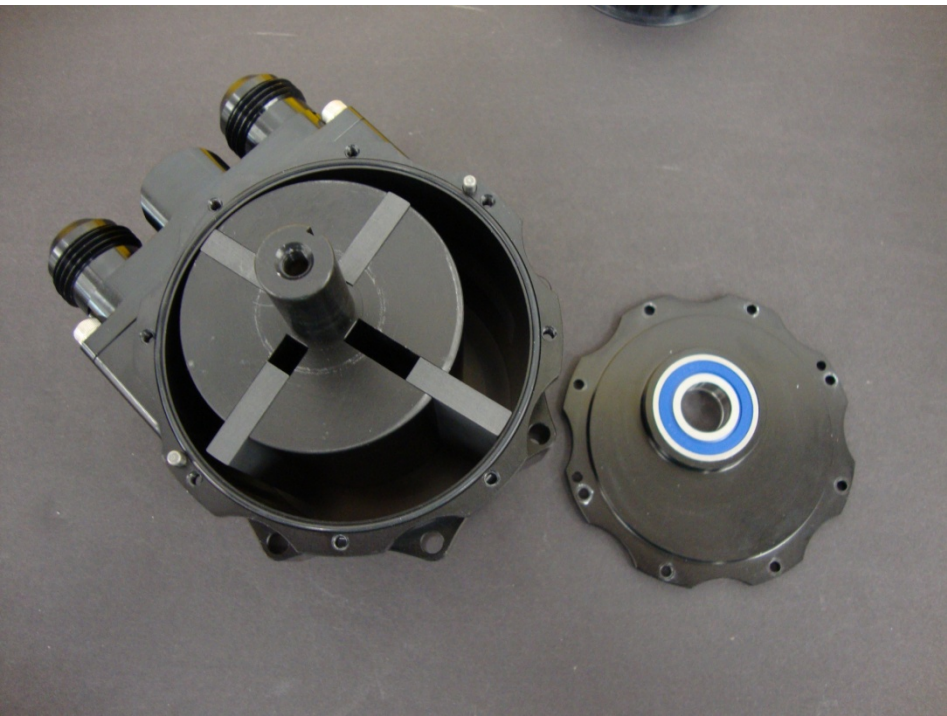
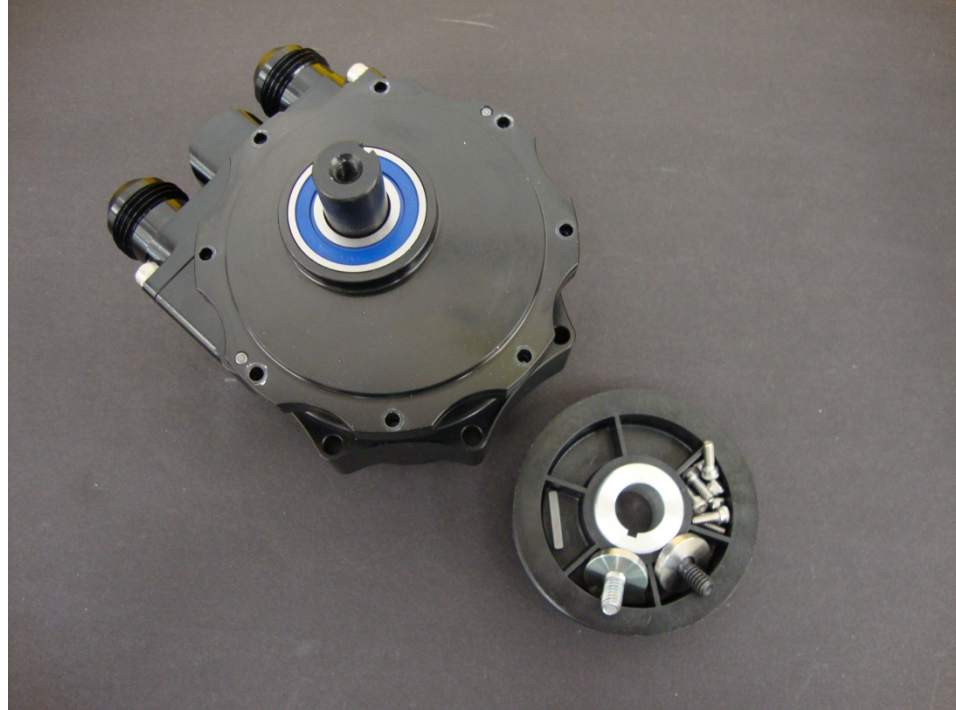
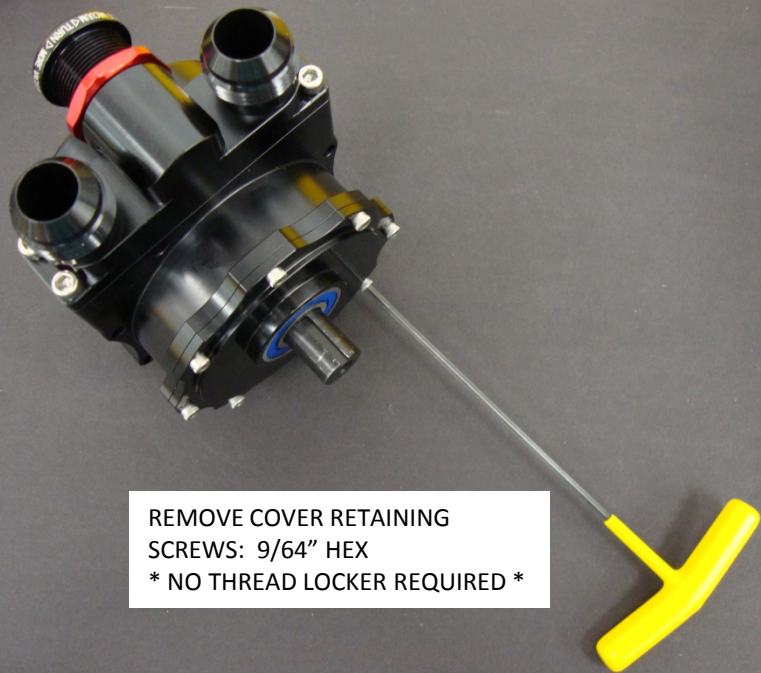


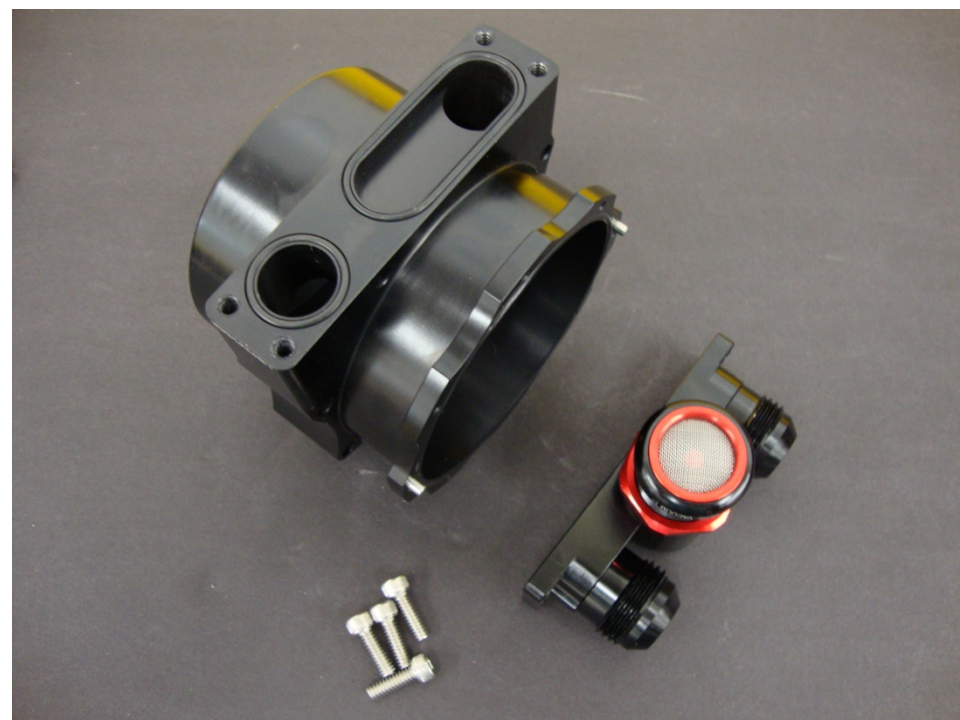
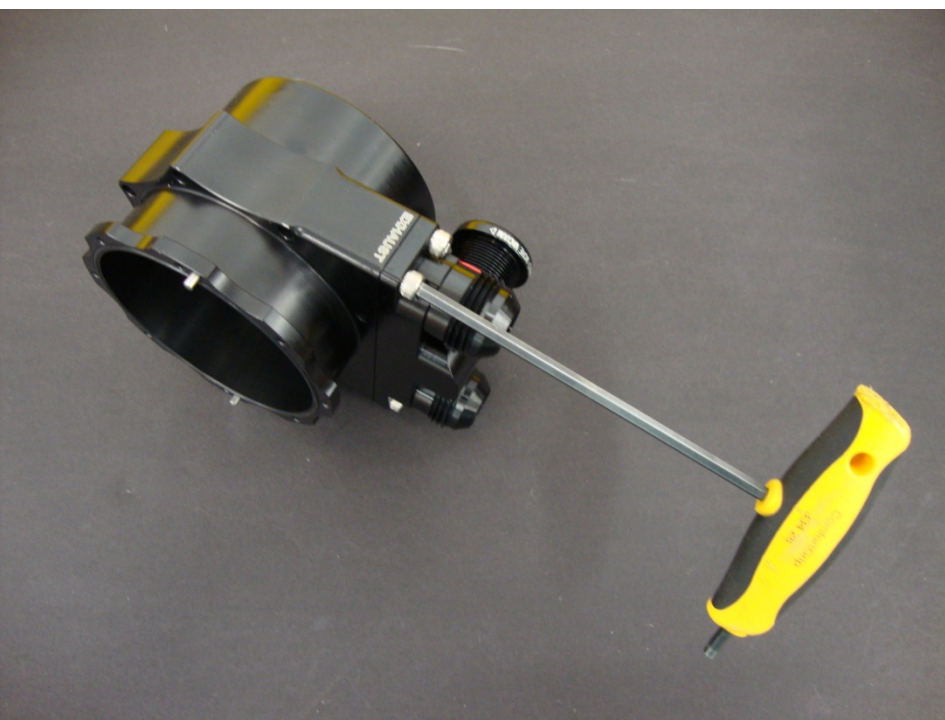
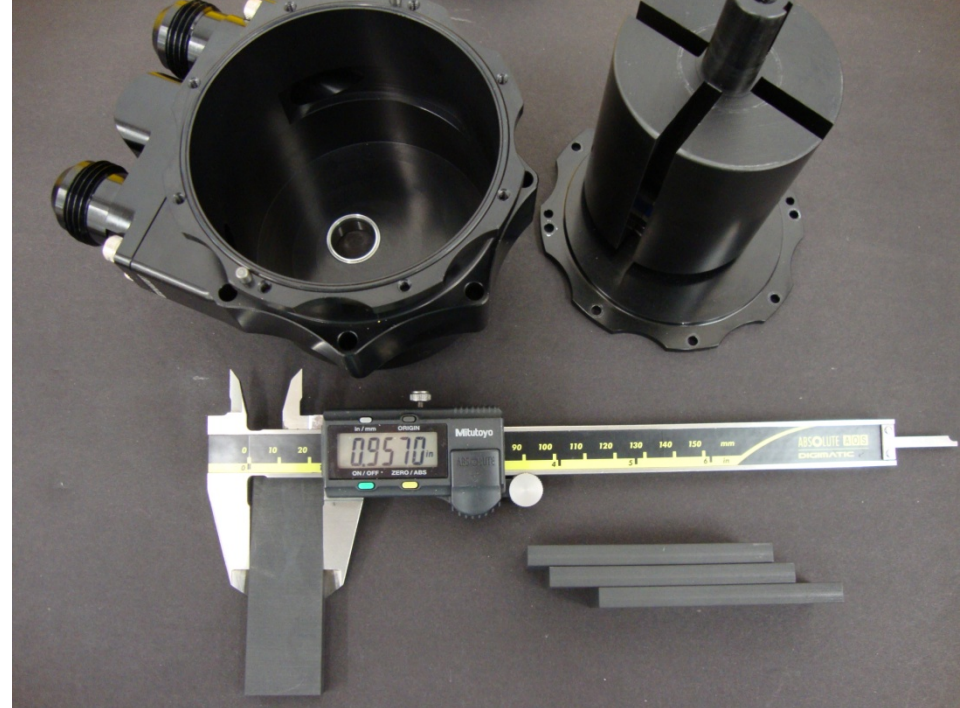
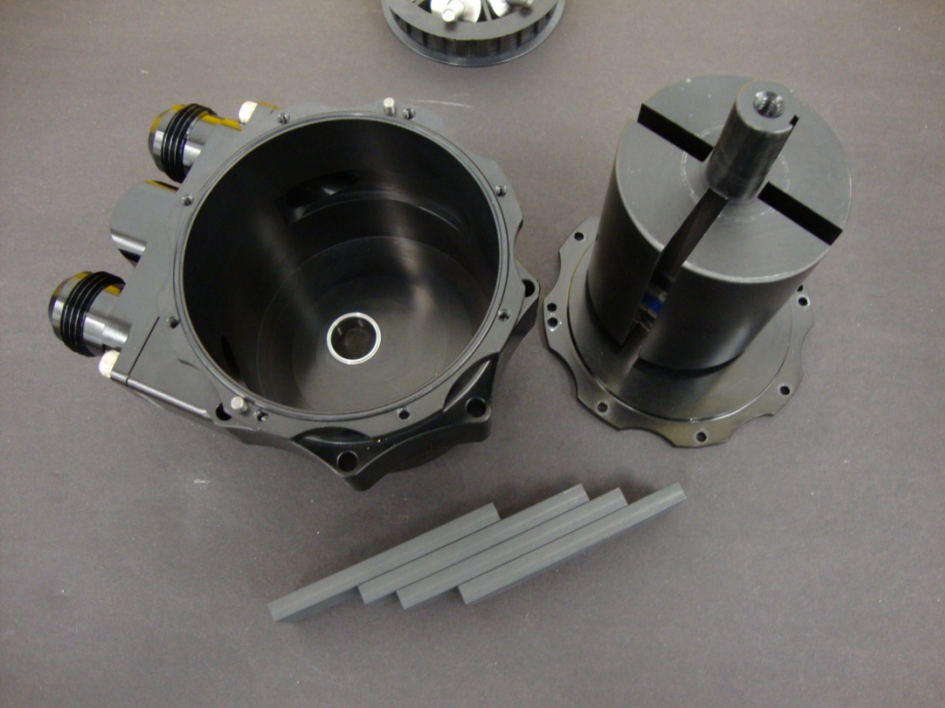
REMOVE PULLEY RETAINING  
SCREW AND CAP: 5/32" HEX  
\* USE REMOVABLE THREAD  
LOCKER AT REASSEMBLY \*



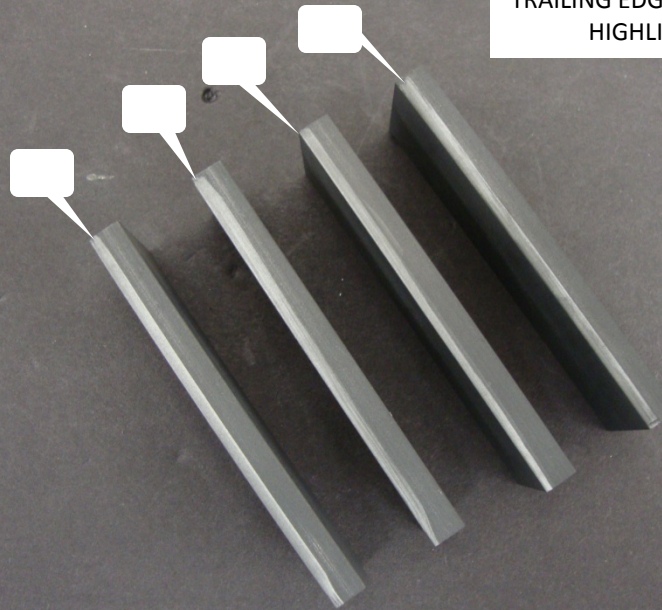
LOOSEN PULLEY RETAINING  
SET SCREW: 3/32" HEX  
\* USE REMOVABLE THREAD  
LOCKER AT REASSEMBLY \*



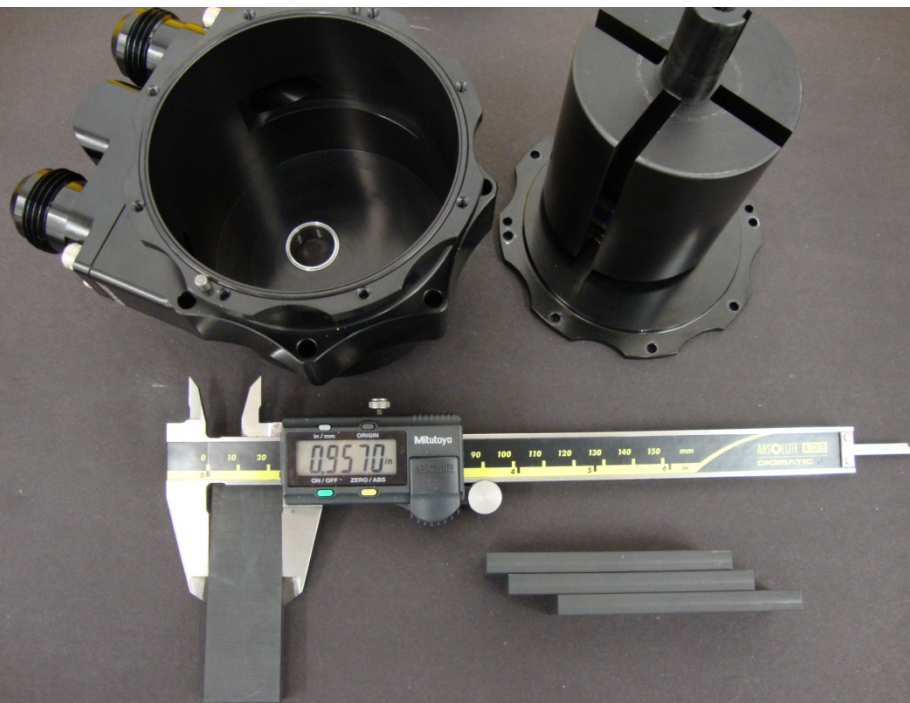
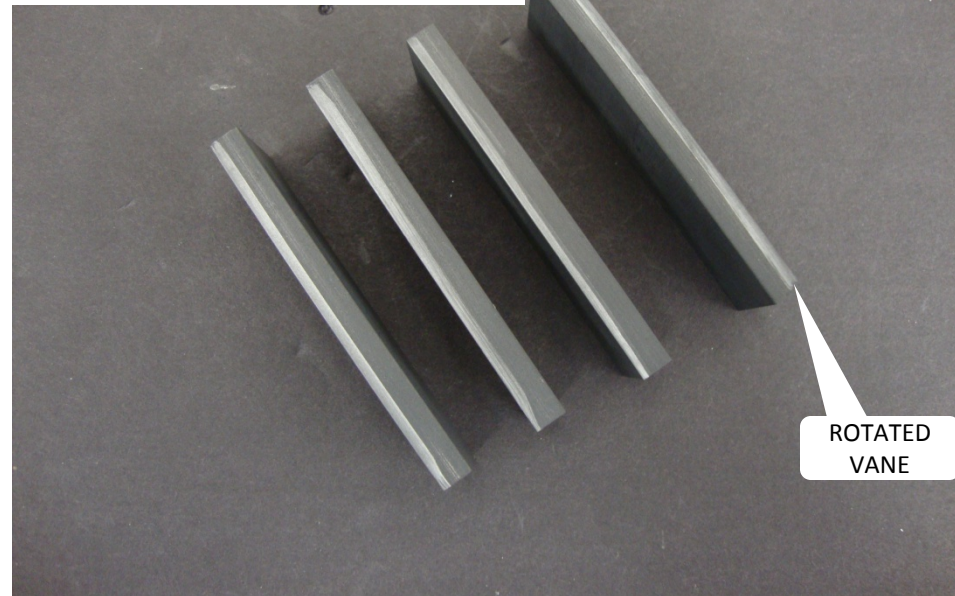




TRAILING EDGE VANE WEAR  
HIGHLIGHTED



VANES CAN BE ROTATED AS INDICATED.  
THE RADIUS FACE MUST BE FACING OUT,  
IN CONTACT WITH THE HOUSING BORE

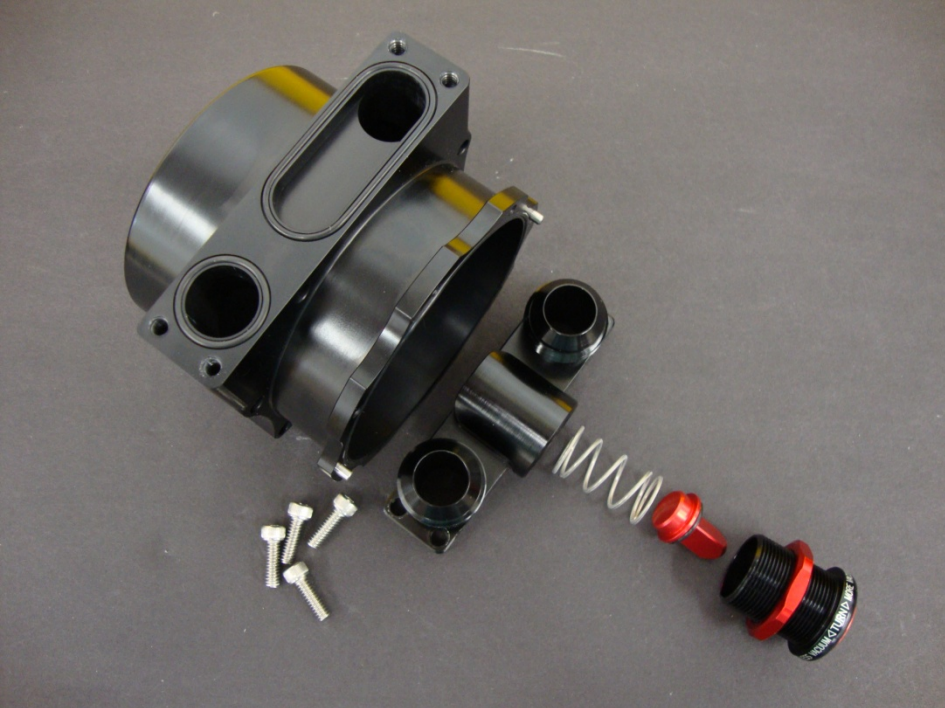


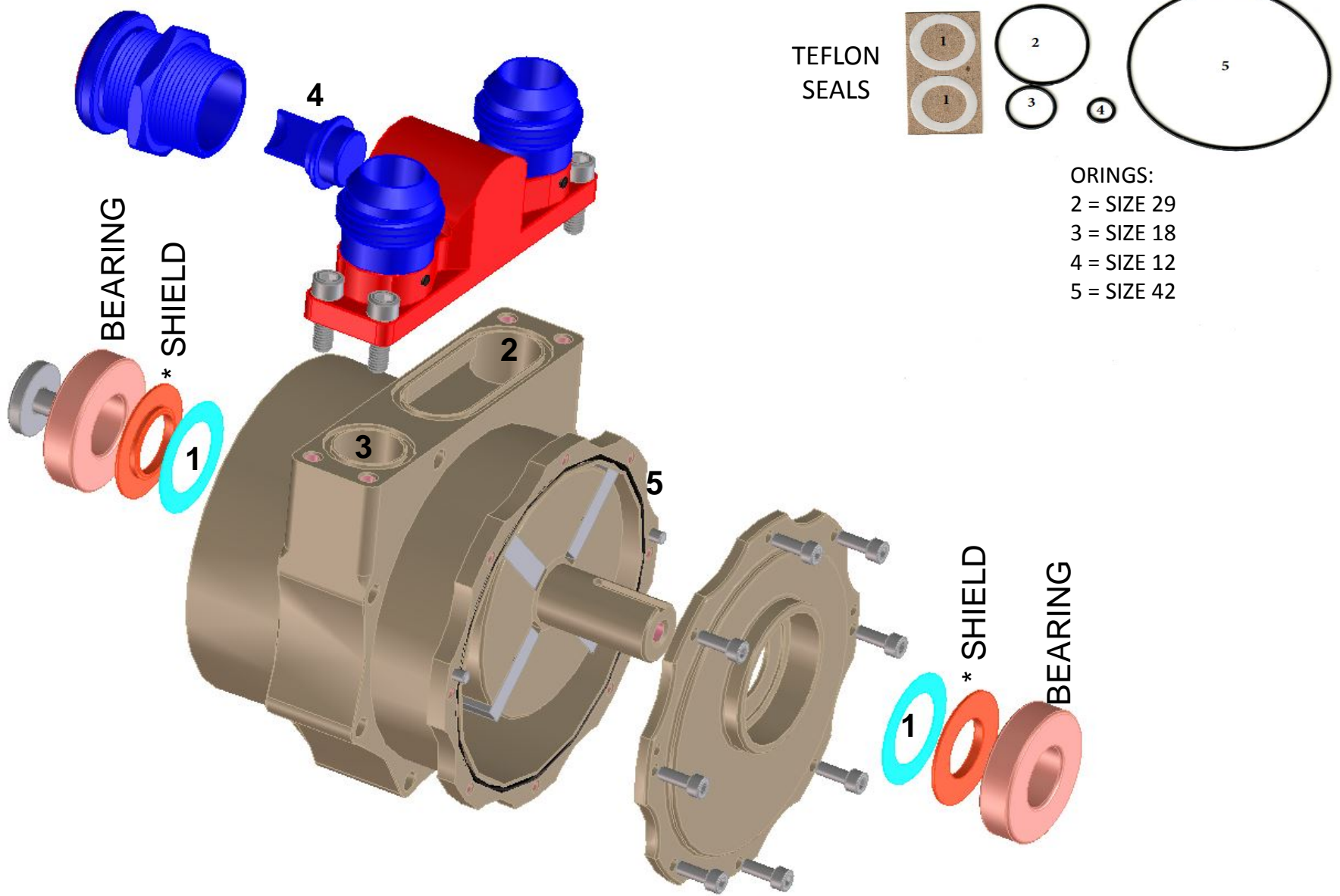
CHIPS AND SCRATCHES ALONG THE TRAILING EDGE ARE NORMAL WEAR. ALTHOUGH THE CHIPS AND SCRATCHES ARE PRESENT ALONG THE ENTIRE EDGE, OUR TEST HAVE SHOWN THE VACUUM LOSS TO BE LESS THAN 1 In. Hg. AT WOT.

OUR TEST HAVE SHOWN THE VANE HEIGHT WEAR IS MORE IMPORTANT,. HEIGHT WEAR CAN RESULT IN AS MUCH AS A 2 In. Hg. VACUUM LOSS AT WOT. NEW VANES MEASURE 0.957", REPLACE THE VANES IF THEY MEASURE BELOW 0.950".

A MAJOR LOSS (5+ In. Hg.) OR A COMPLETE LOSS OF VACUUM AT WOT IS NOT DUE TO VANE WEAR . A MAJOR LOSS OF VACUUM IS MOST LIKELY A RESULT OF THE VANES STUCK IN THE ROTOR SLOT. THE VANE(S) CAN BE STUCK IN THE ROTOR DUE TO SOLIDIFIED OIL. THE VACUUM REGULATOR MAY BE STUCK OPEN RESULTING IS MAJOR VACUUM LOSS.

A COMPLETE LOSS OF VACUUM IS OFTEN THE RESULT OF DEBRIS FROM THE ENGINE HAS ROLLED OVER THE ROTOR SLOT FACE(S) PREVENTING THE VANE(S) FROM MOVING OUTWARD. IF LARGE PIECES FROM THE ENGINE ENTER THE PUMP THEY MAY DESTROY THE VANES AND DAMAGE THE HOUSING.

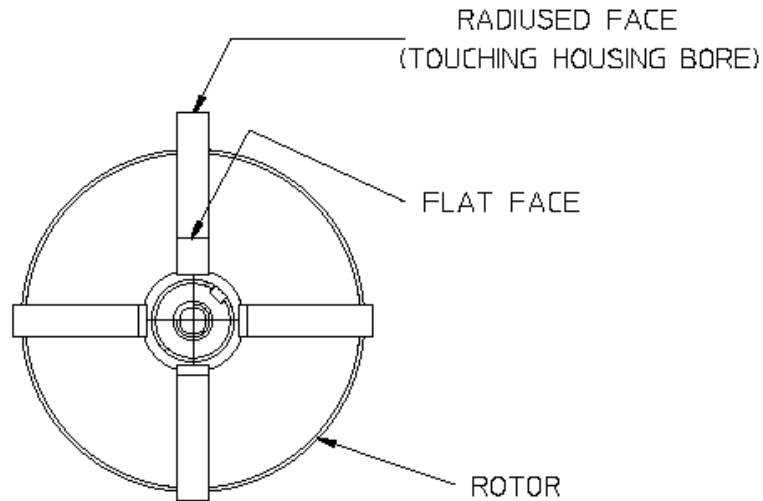




\* SHIELDS NOT INCLUDED  
IN OUR STANDARD REBUILD KIT

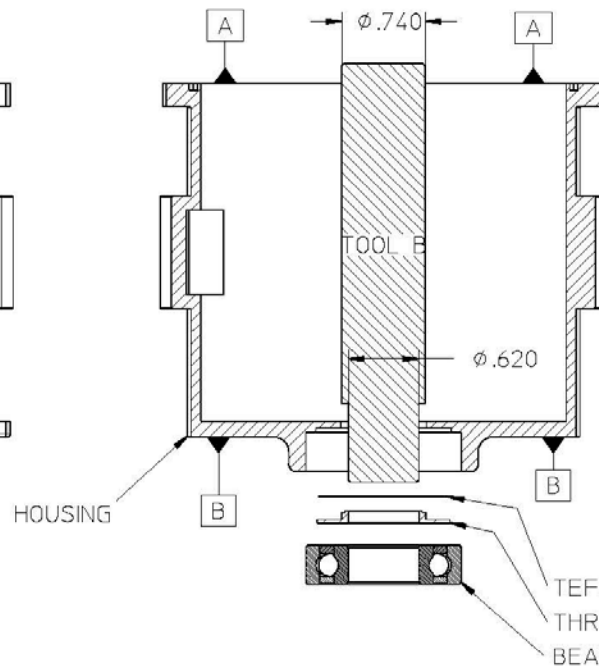
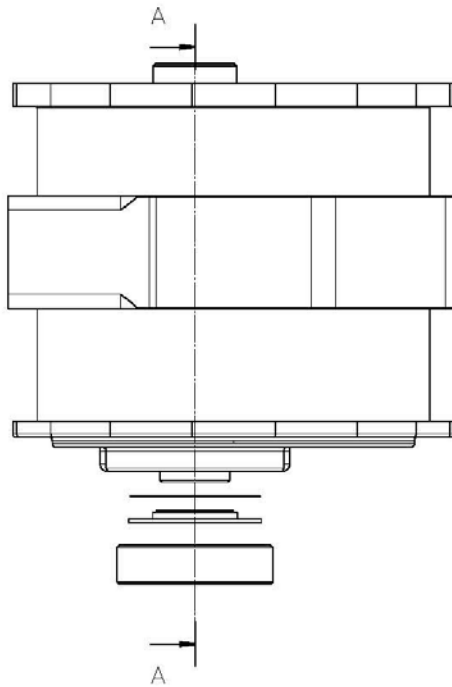
## VANE INSTALLATION

The vanes contain two long narrow faces.  
 One these faces is flat, the other has a radius.  
 Place the vanes into the slot of the rotor with the radiused face facing "out" in contact with the bore of the housing.  
 Once worn, the vanes cannot be turned over to be reused.



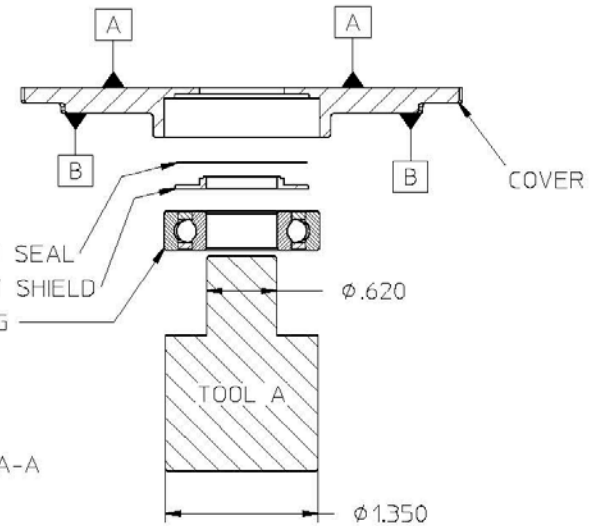
2																		
1																		
0																		
REV.	REVISION DESCRIPTION	DATE																
<b>STAR MACHINE</b>		DESCRIPTION ORIENTATION, VANE																
7830 OAK AVENUE PARKVILLE, MD. 21234		HEAT TREATING	MATERIAL															
T TOLERANCES UNLESS SPECIFIED		HARDNESS	DEPTH	DESIGNED BY T HIGDON														
<table border="1" style="font-size: 8px;"> <thead> <tr> <th>LINEAR INCHES</th> <th>ANGULAR</th> </tr> </thead> <tbody> <tr> <td>0.05--10 ± 0.005</td> <td>0--90 ± 0.02</td> </tr> <tr> <td>11--20 ± 0.010</td> <td>91--180 ± 0.02</td> </tr> <tr> <td>21--30 ± 0.015</td> <td>181--270 ± 0.02</td> </tr> <tr> <td>31--40 ± 0.020</td> <td>271--360 ± 1.00</td> </tr> <tr> <td>41--50 ± 0.030</td> <td></td> </tr> <tr> <td>51--100 ± 0.050</td> <td></td> </tr> </tbody> </table>		LINEAR INCHES	ANGULAR	0.05--10 ± 0.005	0--90 ± 0.02	11--20 ± 0.010	91--180 ± 0.02	21--30 ± 0.015	181--270 ± 0.02	31--40 ± 0.020	271--360 ± 1.00	41--50 ± 0.030		51--100 ± 0.050		SURFACE PREPARATION		SCALE
LINEAR INCHES	ANGULAR																	
0.05--10 ± 0.005	0--90 ± 0.02																	
11--20 ± 0.010	91--180 ± 0.02																	
21--30 ± 0.015	181--270 ± 0.02																	
31--40 ± 0.020	271--360 ± 1.00																	
41--50 ± 0.030																		
51--100 ± 0.050																		
<table border="1" style="font-size: 8px;"> <thead> <tr> <th colspan="2">GEOMETRIC (INCHES)</th> </tr> </thead> <tbody> <tr> <td>0.05--10 ± 0.005</td> <td>0.05--20 ± 0.005</td> </tr> <tr> <td>11--20 ± 0.010</td> <td>21--30 ± 0.010</td> </tr> <tr> <td>31--40 ± 0.015</td> <td>41--50 ± 0.015</td> </tr> <tr> <td>51--100 ± 0.020</td> <td>0.010</td> </tr> <tr> <td>0.002</td> <td>0-100 0.015</td> </tr> </tbody> </table>		GEOMETRIC (INCHES)		0.05--10 ± 0.005	0.05--20 ± 0.005	11--20 ± 0.010	21--30 ± 0.010	31--40 ± 0.015	41--50 ± 0.015	51--100 ± 0.020	0.010	0.002	0-100 0.015	FINISH		SHEET 1 OF 1		
GEOMETRIC (INCHES)																		
0.05--10 ± 0.005	0.05--20 ± 0.005																	
11--20 ± 0.010	21--30 ± 0.010																	
31--40 ± 0.015	41--50 ± 0.015																	
51--100 ± 0.020	0.010																	
0.002	0-100 0.015																	
<table border="1" style="font-size: 8px;"> <thead> <tr> <th colspan="2">BREAK ALL EDGES UNLESS SPECIFIED</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> </tr> </tbody> </table>		BREAK ALL EDGES UNLESS SPECIFIED				DRAWING NO.		SIZE A										
BREAK ALL EDGES UNLESS SPECIFIED																		
		THIS DRAWING IS THE PROPERTY OF STAR MACHINE. IT SHALL NOT BE DISCLOSED OR COPIED WITHOUT THE WRITTEN AUTHORIZATION OF STAR MACHINE.																





BEARING, SEAL AND SHIELD REMOVAL  
SUPPORT SURFACE B - USE TOOL B

BEARING, SEAL AND SHIELD INSTALL  
SUPPORT SURFACE A - USE TOOL A



Section A-A

<b>STAR MACHINE</b> 7810 OAK AVENUE PARKVILLE, MD. 21204		DESCRIPTION															
		HEAT TREATING	MATERIAL														
TOLERANCES UNLESS SPECIFIED <table border="1"> <thead> <tr> <th>LINEAR (INCHES)</th> <th>ANGULAR</th> </tr> </thead> <tbody> <tr> <td>0.05--10 ± 0.005</td> <td>0-90 ± 0.25°</td> </tr> <tr> <td>11--20 ± 0.010</td> <td>91-180 ± 0.50°</td> </tr> <tr> <td>21--30 ± 0.015</td> <td>181-270 ± 0.75°</td> </tr> <tr> <td>31--40 ± 0.020</td> <td>271-360 ± 1.00°</td> </tr> <tr> <td>41--50 ± 0.030</td> <td></td> </tr> <tr> <td>51--100 ± 0.050</td> <td></td> </tr> </tbody> </table>		LINEAR (INCHES)	ANGULAR	0.05--10 ± 0.005	0-90 ± 0.25°	11--20 ± 0.010	91-180 ± 0.50°	21--30 ± 0.015	181-270 ± 0.75°	31--40 ± 0.020	271-360 ± 1.00°	41--50 ± 0.030		51--100 ± 0.050		DESIGNED BY <b>T HIGDON</b>	
LINEAR (INCHES)	ANGULAR																
0.05--10 ± 0.005	0-90 ± 0.25°																
11--20 ± 0.010	91-180 ± 0.50°																
21--30 ± 0.015	181-270 ± 0.75°																
31--40 ± 0.020	271-360 ± 1.00°																
41--50 ± 0.030																	
51--100 ± 0.050																	
<table border="1"> <thead> <tr> <th>GEOMETRIC (INCHES)</th> <th>DEPTH</th> </tr> </thead> <tbody> <tr> <td>0.05--10 ± 0.002</td> <td>0.05--20 0.005</td> </tr> <tr> <td>11--20 ± 0.010</td> <td>21--40 0.010</td> </tr> <tr> <td>21--30 ± 0.015</td> <td>41--50 0.015</td> </tr> <tr> <td>31--40 ± 0.020</td> <td>51--100 0.020</td> </tr> <tr> <td>41--50 ± 0.030</td> <td></td> </tr> <tr> <td>51--100 ± 0.050</td> <td></td> </tr> </tbody> </table>		GEOMETRIC (INCHES)	DEPTH	0.05--10 ± 0.002	0.05--20 0.005	11--20 ± 0.010	21--40 0.010	21--30 ± 0.015	41--50 0.015	31--40 ± 0.020	51--100 0.020	41--50 ± 0.030		51--100 ± 0.050		SCALE	SHEET 1 of 1
GEOMETRIC (INCHES)	DEPTH																
0.05--10 ± 0.002	0.05--20 0.005																
11--20 ± 0.010	21--40 0.010																
21--30 ± 0.015	41--50 0.015																
31--40 ± 0.020	51--100 0.020																
41--50 ± 0.030																	
51--100 ± 0.050																	
FINISH BREAK ALL EDGES UNLESS SPECIFIED		DRAWING NO.	SIZE B														
THIS DRAWING IS THE PROPERTY OF STAR MACHINE. IT SHALL NOT BE DISCLOSED OR COPIED WITHOUT THE WRITTEN AUTHORIZATION OF STAR MACHINE.																	