INSTALLATION OF EVP (A28 MOTOR)

Star machine
Our Pumps Really Suck!®

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The Star Machine Electric Vacuum Pump (EVP) is representative of our continued efforts to provide racers with the latest vacuum pump technology. The EVP is a DC electric, reciprocating piston vacuum pump. It incorporates two dynamic seal pistons, coupled to a common yoke that is eccentrically driven in a common bore. The EVP offers the distinct advantage of ALL the HP gains, thru increased crank case vacuum, with ZERO HP lost to driving a mechanical vacuum pump.

Originally designed for Pro Stock Motorcycle to comply with the one pump rule it is also currently used in Pro Stock Car as a vacuum **assist** pump. In PSB it is producing vacuum levels of 25" Hg.(wire to wire). In PS Car applications it has shown a 15 - 20% increase over existing (with dry sump) crank case vacuum readings.
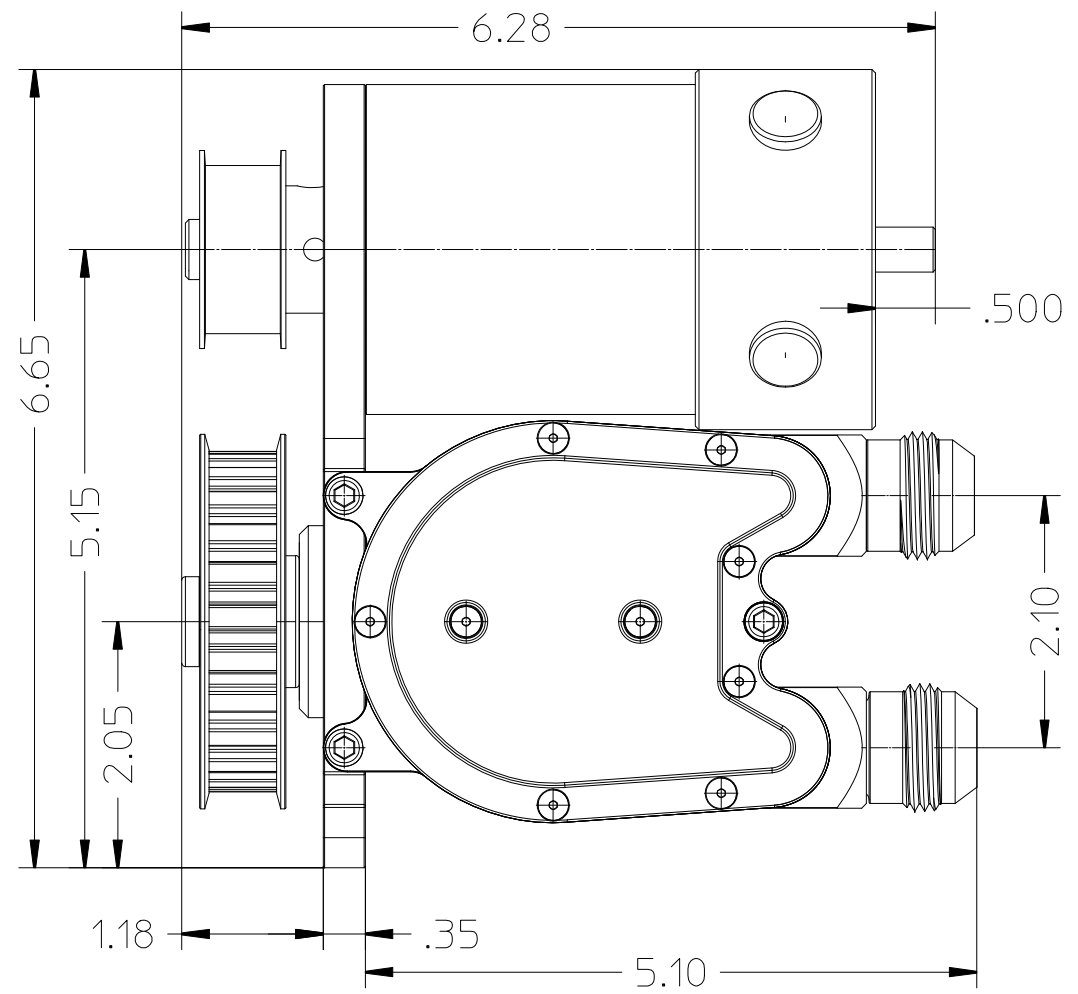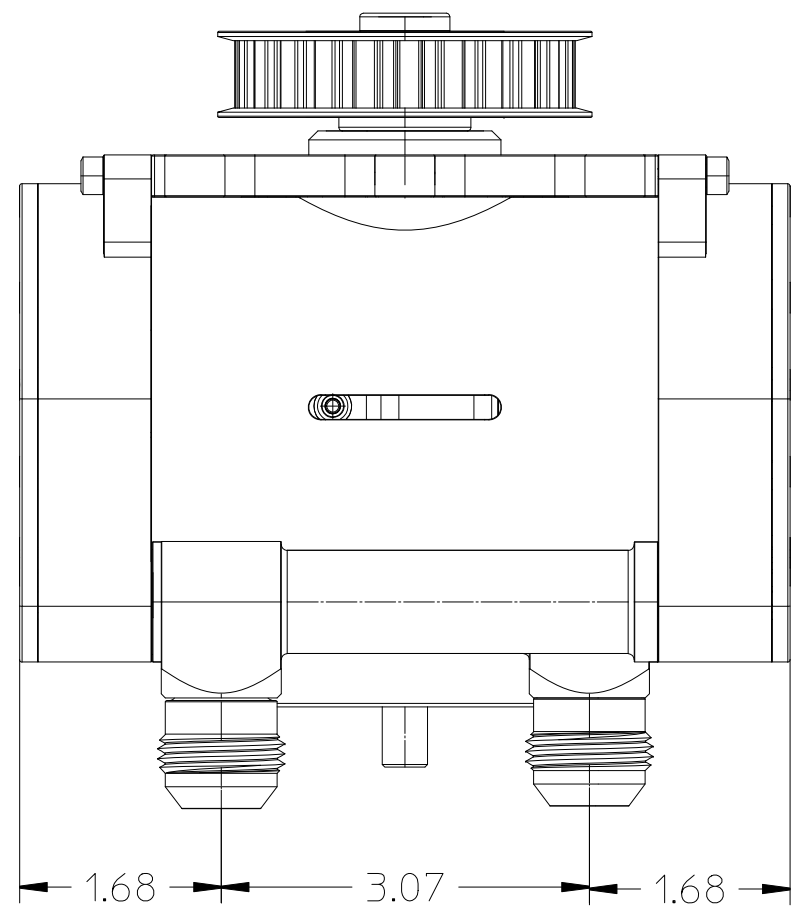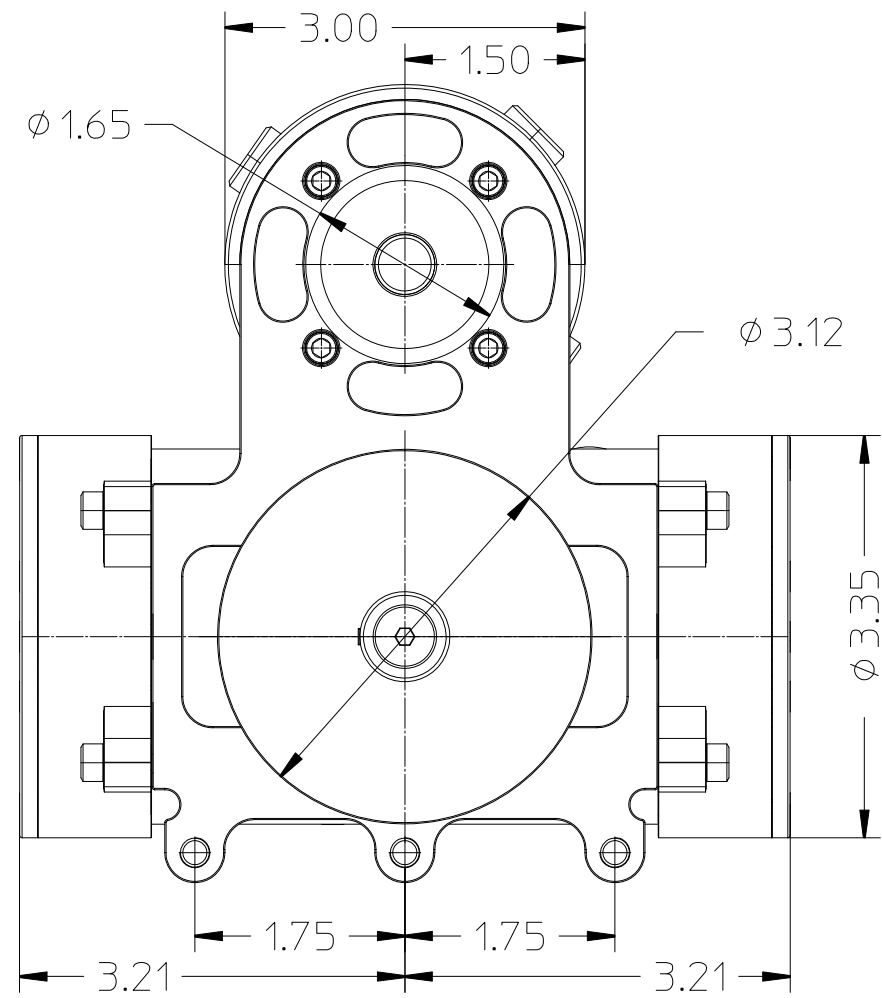
At Star Machine we realize that you don't get something for nothing. The electric motor driven EVP adds the requirement of between round battery maintenance (recharging). This will be considered, by some racers as a burden (one more between round headache). Other racers, looking for that last .01 second advantage, will view the additional maintenance as part of the game.

The EVP operates (completely) separate from your existing (12/16 VDC) electrical system. The A28 motor can be operated with voltages ranging from 22 to 36VDC. To complete the EVP installation one 12V-50A continuous (75 inrush) normally open switch (and 12ga. wire) are required to operate the pump. We recommend switching the positive side. If you would like to control the EVP with a relay we recommend the Bosch 24VDC/50A, PN 0.332.002.250.
 ** DO NOT GROUND ANY OF THE BATTERY OR SWITCH WIRES TO CHASSIS GROUND **

Activating the pump is presently (and recommended) done when the vehicle is pre-staged. In most cases at the same time the data recorder is switched on. This will guarantee the pump motor will receive the maximum available battery power.

The vacuum line (Blue tube) connection to the engine is critical to the operation of the EVP. Drawing oil into the EVP may result in damage to the reeds. Care must be taken to baffle and/or separate the engine oil from the air drawn by the pump. More important to the performance of the pump is the sealing of the engine, the better the seal the higher the potential vacuum. We also recommend that a check valve be installed in the vacuum line, at the pump inlet.

Dimensions (top-left view):
- 3.00
- 1.50
- Ø 1.65
- Ø 3.12
- Ø 3.35
- 1.75
- 1.75
- 3.21
- 3.21

Dimensions (top-right view):
- 6.28
- .500
- 6.65
- 5.15
- 2.05
- 2.10
- 1.18
- .35
- 5.10

Dimensions (bottom-left view):
- 1.68
- 3.07
- 1.68

2		
1		
0		
REV.	REVISION DESCRIPTION	DATE

STAR MACHINE
7810 OAK AVENUE
PARKVILLE, MD. 21234

DESCRIPTION: EVP, GEN2

HEAT TREATING

MATERIAL

| HARDNESS | DEPTH | DESIGNED BY |
| | | T HIGDON |

SURFACE PREPARATION

| SCALE | SHEET 1 OF 1 | SIZE B |

FINISH

DRAWING NO.
STR.21.08.100

TOLERANCES UNLESS SPECIFIED / BREAK ALL EDGES UNLESS SPECIFIED

LINEAR (INCHES)
0.05--10 ± 0.005
11---20 ± 0.010
21---30 ± 0.015
31---40 ± 0.020
44---50 ± 0.030
51--100 ± 0.050

ANGULAR
0-90 ± 0.25°
91-180 ± 0.50°
181-270 ± 0.75°
271-360 ± 1.00°

GEOMETRIC (INCHES)
0.05-10 ± 0.005   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
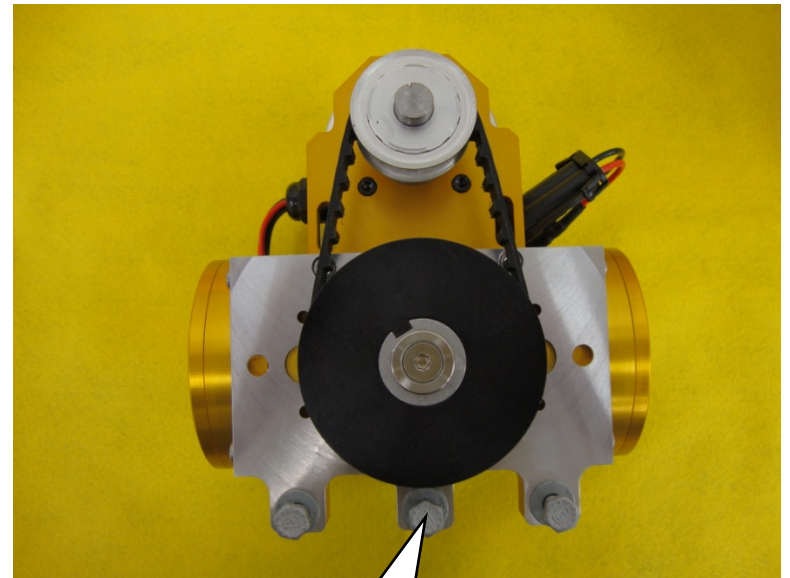44---50 ± 0.030
51--100 ± 0.050   0.002   0-100 0.015

MOUNTING THE VACUUM PUMP AND BATTERY HOLDER

• PHOTO 1 SHOWS THE OPTIMUM POSITIONING FOR THE PUMP, THE EXHAUST TUBE (RED) IS ON THE BOTTOM AND THE INTAKE (BLUE) TUBE IS ON TOP.
• PHOTO 2 SHOWS THE THREE MOUNTING HOLES OF THE PUMP.
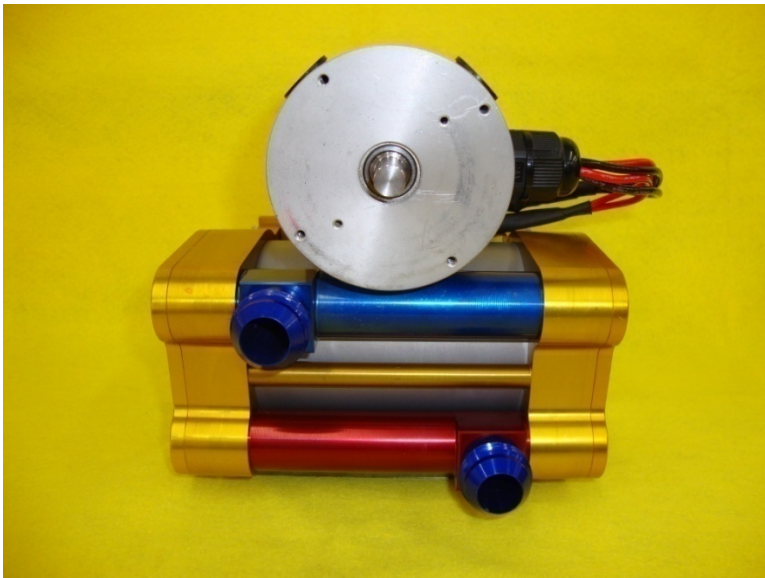
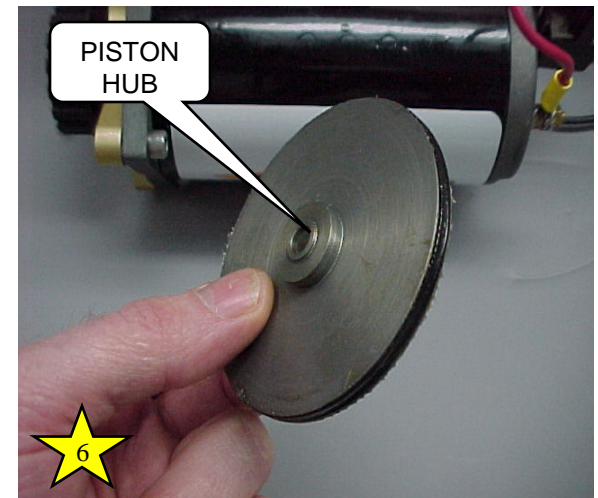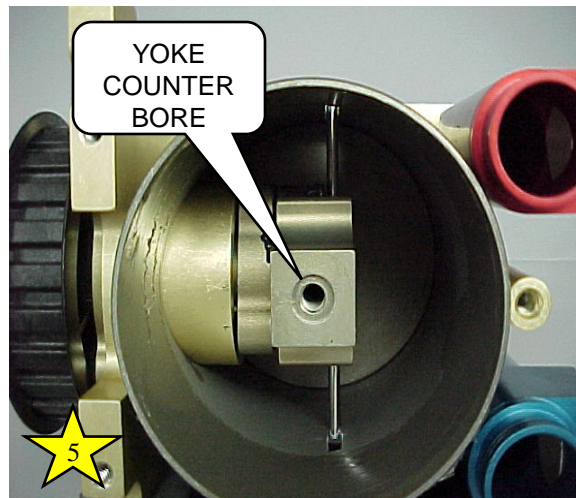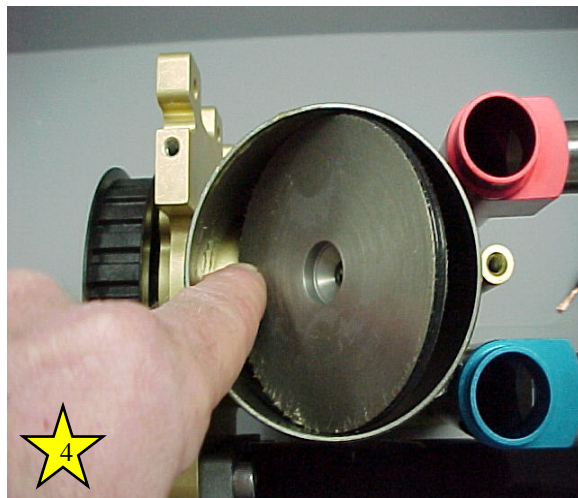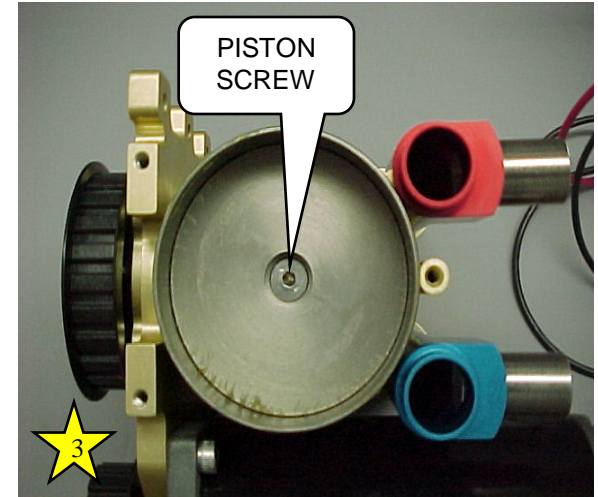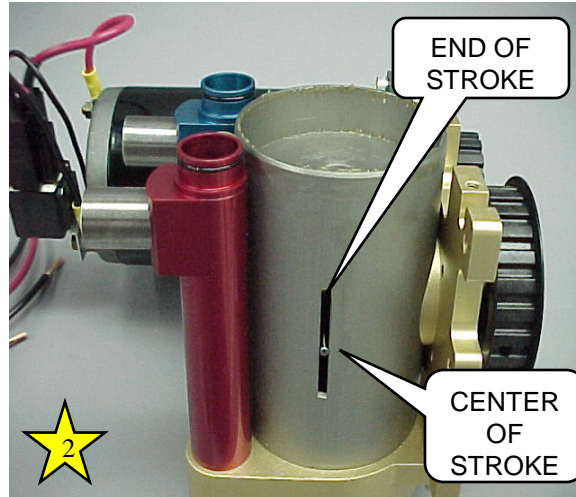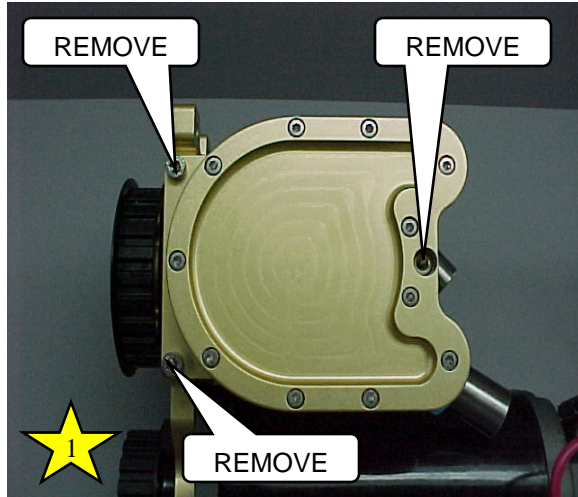¼"-20 TAPPED HOLES ON 1.75" CENTERS

PLUMBING THE VACUUM PUMP

•THE PUMP IS DESIGNED FOR ¾" ID VACUUM HOSE SUPPLIED WITH THE PUMP. ALTHOUGH THERE ARE PRETTIER BRAIDED LINES AVAILABLE, THEY ARE OFTEN PRONE TO SUCKING FLAT DECREASING FLOW IN TURN REDUCING VACUUM POTENTIAL.

•CONNECT THE HOSE FROM THE ENGINE TO THE BLUE TUBE

•CONNECT A HOSE FROM THE RED TUBE TO A CATCH CAN. THE CATCH MUST BE CAPABLE OF FLOWING A MINIMUM OF 16 SCFM.

•THE POSITION OF THE INTAKE AND EXHAUST TUBE/FITTING OF THE PUMP CAN BE CHANGED. IN THE PHOTO THE BLUE TUBE FITTING IS ON THE LEFT, THE RED ON THE RIGHT. THEY CAN BE PLACED: BOTH TO THE RIGHT (OR LEFT) OR BLUE-LEFT, RED- LEFT (SEE PAGE 14, REPOSITIONING INT/EXH TUBES).
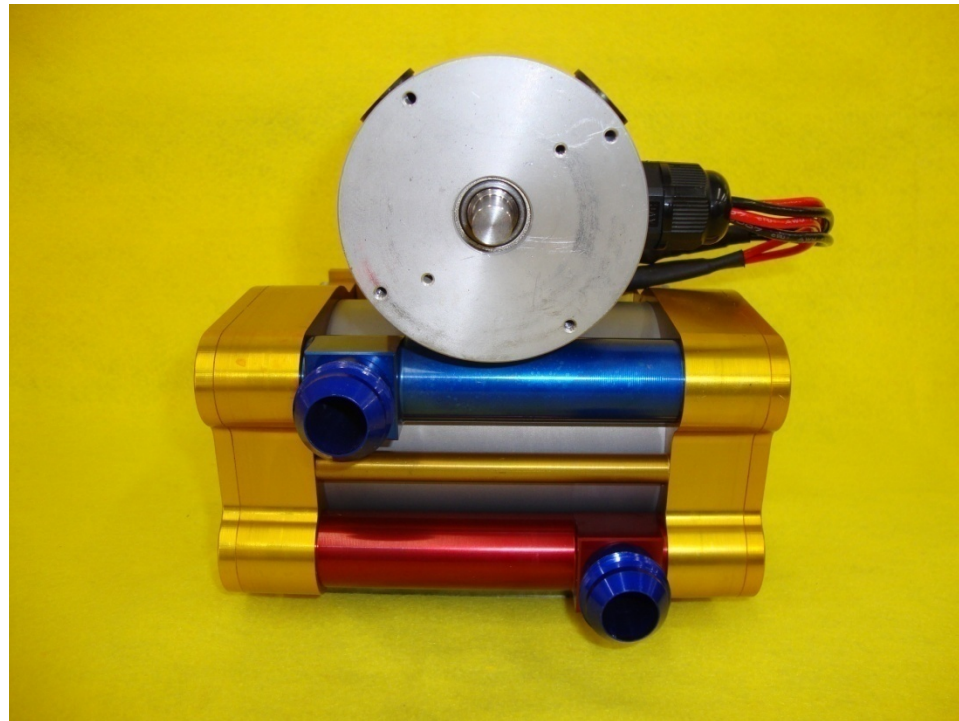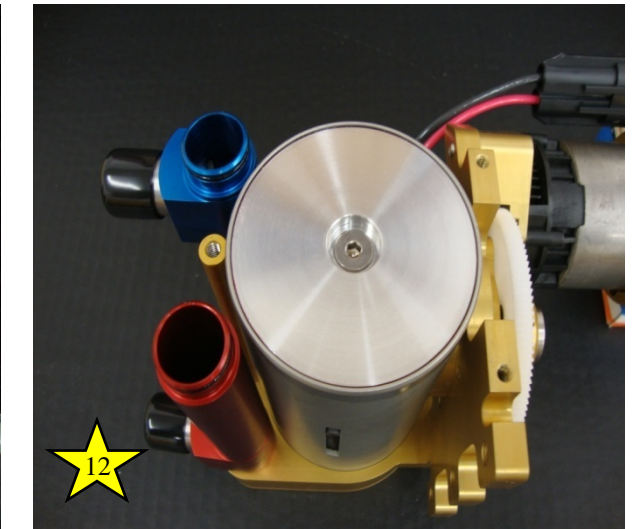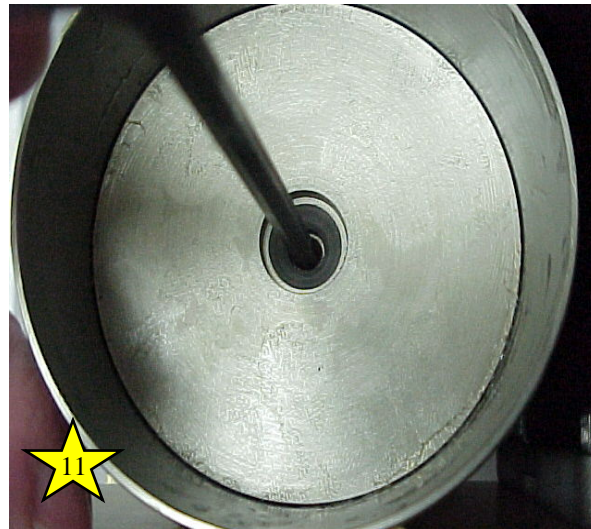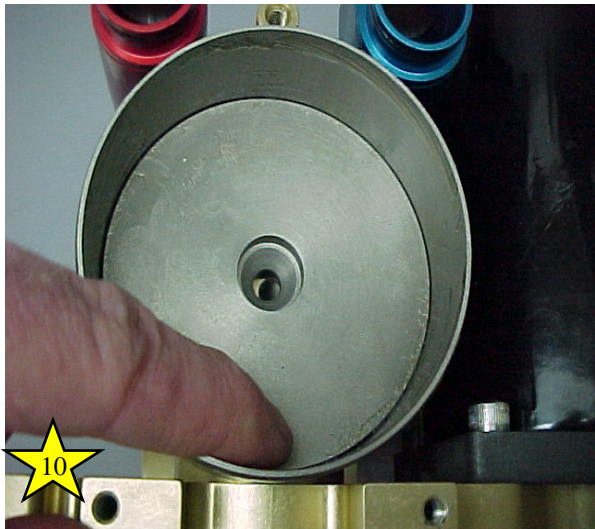
DYNAMIC SEAL REPLACEMENT

• REPLACE ONE SEAL AT A TIME (REMOVE ONE HEAD ONLY)

• REMOVE THE THREE #10-24 SHCS MOUNTING THE HEAD (PG. 11, PHOTO 1)
 ROTATE THE PUMP PULLEY TO POSITION THE YOKE (PIN) IN THE CENTER OF STROKE (PG. 11, PHOTO 2)

• REMOVE THE PISTON SCREW, PUSH ON ONE SIDE OF THE PISTON, ROTATING IT 90 DEGS.
 PULL THE PISTON OUT (PG. 11, PHOTO 4)

• REMOVE AND DISCARD THE RUBBER SEAL. CLEAN THE PISTON GROOVE. INSTALL NEW PISTON RING
STR.18.02.124. (PG. 12, PHOTOS 7 & 8)

• PLACE PISTON INTO BORE (PG. 12, PHOTO 9)

• PUSH ON EDGE TO ROTATE PISTON SQUARE IN BORE (PG. 12, PHOTO 10)

• USE ALLEN WRENCH TO ALIGN BOLT HOLE IN PISTON TO TAPPED HOLE IN YOKE (PG. 12, PHOTO 11)
 INSTALL SCREW (DO NOT TIGHTEN)

• ROTATE PULLEY TO PUT THE PISTON (PIN) TO END OF STOKE (PG. 11, PHOTO 2)

• BEFORE TIGHTENING THE SCREW, BE SURE THAT THE PISTON HUB (PG. 11 PHOTO 6) IS SEATED INTO
 THE YOKE COUNTER BORE (PG. 11 PHOTO 5) THIS IS EVIDENT WHEN THE PISTON (WITH THE YOKE
AT END OF STROKE) IS .030" DOWN FROM THE CYLINDER LIP.

• LUBRICATE THE HEAD O-RING AND THE TUBE BORES WITH MOTOR OIL. (PG. 13 PHOTO 13)

• REPLACE THE HEAD (PG. 13. PHOTOS 14 & 15)

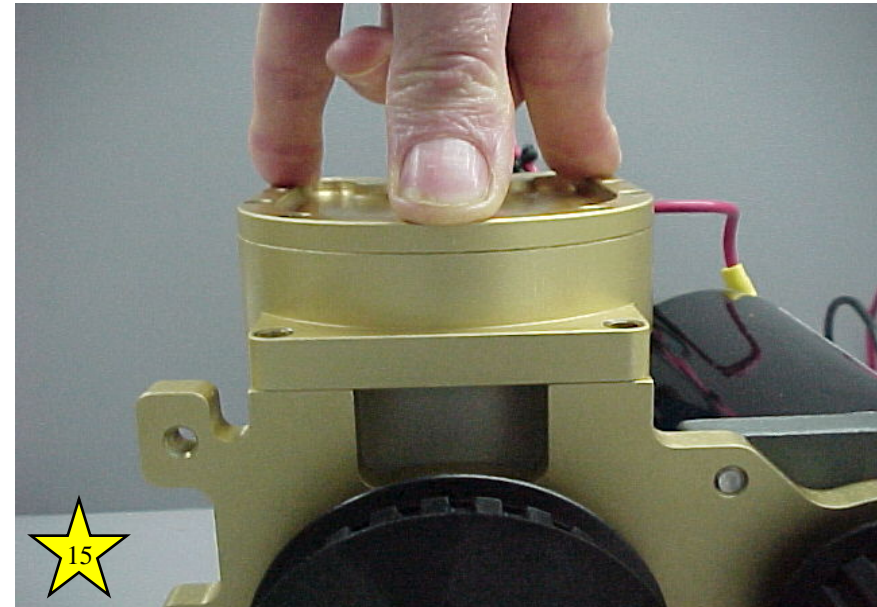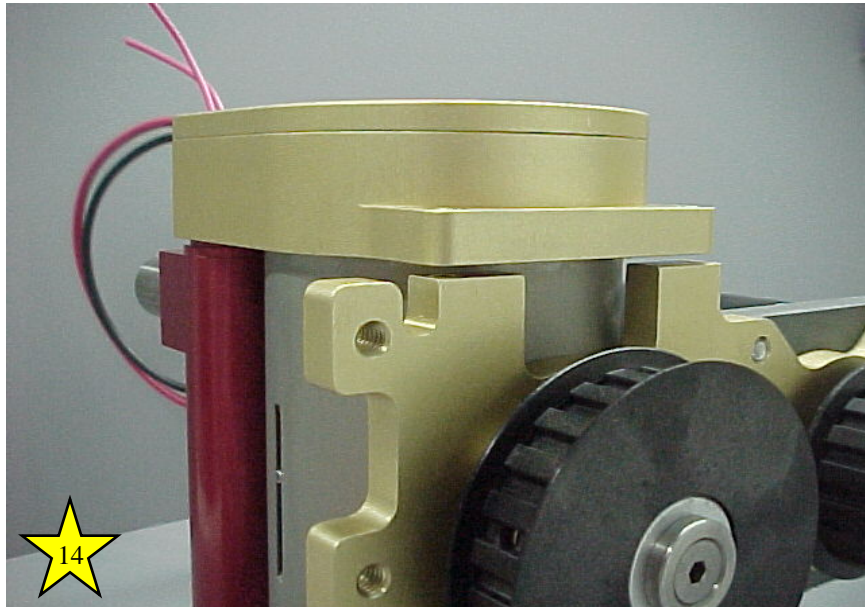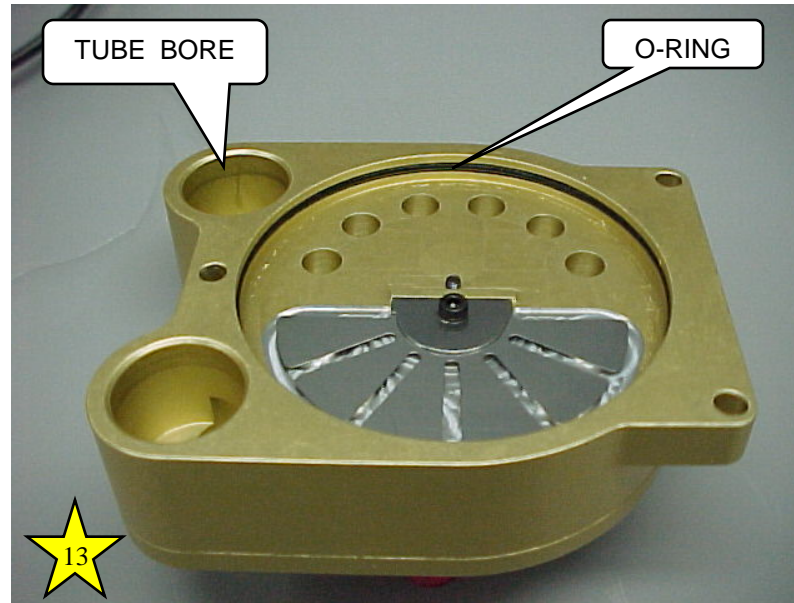• REPEAT ABOVE TO REPLACE THE OTHER PISTON RING

DYNAMIC SEAL REPLACEMENT

DYNAMIC SEAL REPLACEMENT

CLEAN SEAL GROOVE

DISCARD RUBBER SEAL

INSTALL NEW UHMW RING STR.18.02.124

7

8

10

11

12

DYNAMIC SEAL REPLACEMENT

TUBE BORE

O-RING

13

14

15

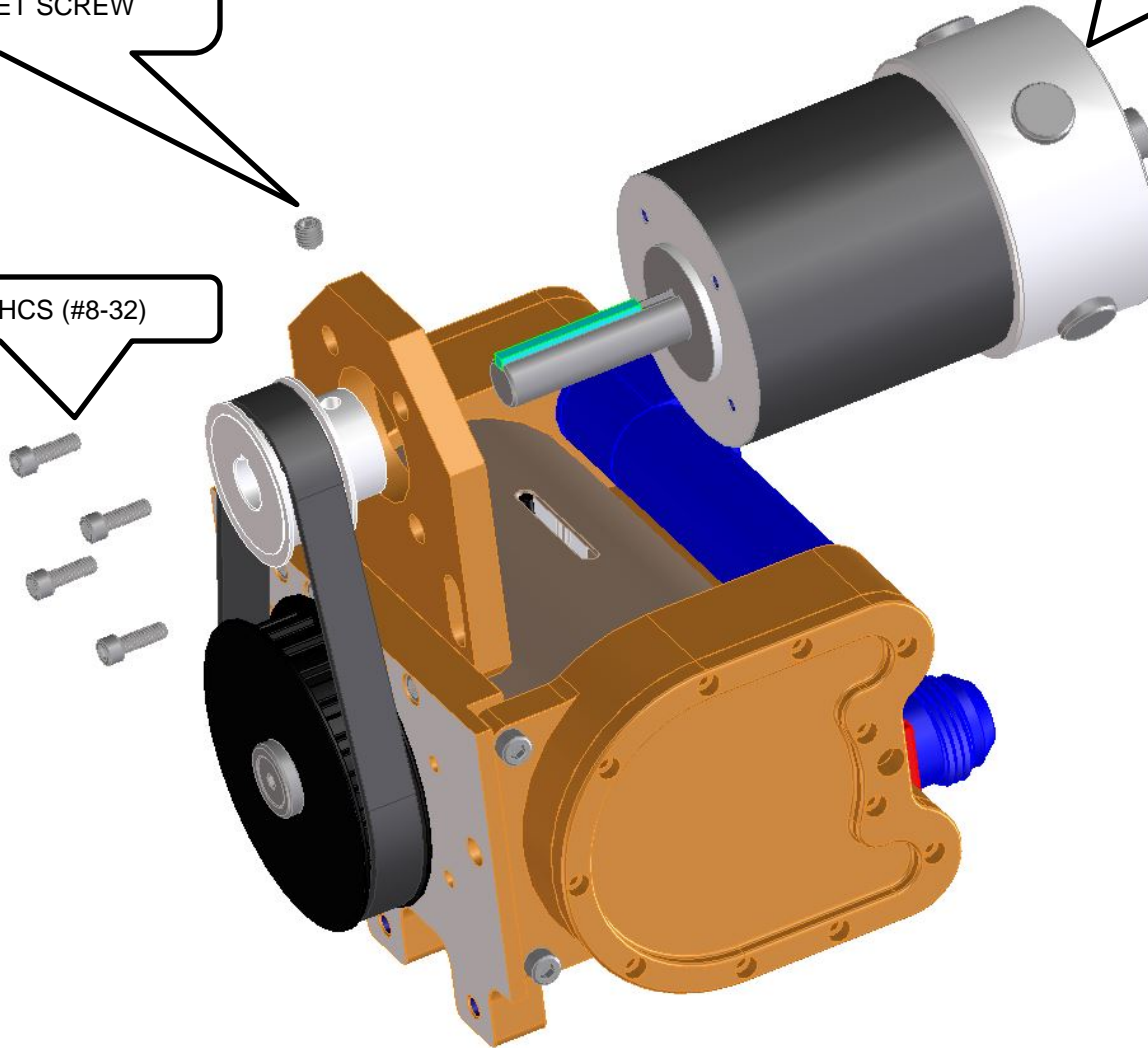# INTAKE/EXHAUST TUBE/FITTING REPOSITIONING

• FOLLOW THE INSTRUCTIONS ON PG. 6, 7, & 8

• MOVE THE TUBES, KEEP THE BLUE TUBE DIRECTLY BELOW THE MOTOR.
 LUBE THE O-RINGS. REINSTALL THE HEAD.

BELT REPLACEMENT

LOOSEN OR REMOVE THE SET SCREW (1/4"-20) . THERE IS ONLY ONE SET SCREW REQUIRED, ALWAYS HAVE THE SET SCREW OVER THE KEY.

MOVE THE MOTOR AWAY TO REMOVE THE PULLEY

REMOVE THE FOUR SHCS (#8-32)

FEMALE CONNECTOR WIRING

STRIP INSULATION BACK ¼"

CRIMP WIRE IN TERMINAL

CRIMP SEAL IN TERMINAL

INSERT TERMINAL INTO CONNECTOR

* TERMINAL LOCKING TAB IS UP
* CONNECTOR SHELL LOCKING TAB IS UP

INSTALL WIRE RETAINING CLIP