

***TriScroll™ 300
Series
Dry Scroll
Vacuum Pump***

*MAJOR MAINTENANCE
MANUAL*

TriScroll™ 300 Series Dry Scroll Vacuum Pump



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Declaration of Conformity
Konformitätserklärung
Déclaration de Conformité
Declaración de Conformidad
Verklaring de Overeenstemming
Dichiarazione di Conformità



We
Wir
Nous
Nosotros
Wij
Noi

Varian, Inc.
Vacuum Technologies
121 Hartwell Avenue
Lexington, MA, 02421-3133 USA

declare under our sole responsibility that the product,
erklären, in alleiniger Verantwortung, daß dieses Produkt,
déclarons sous notre seule responsabilité que le produit,
declaramos, bajo nuestra sola responsabilidad, que el producto,
verklaren onder onze verantwoordelijkheid, dat het product,
dichiariamo sotto nostra unica responsabilità, che il prodotto,

TriScroll Series Vacuum Pump

to which this declaration relates is in conformity with the following standard(s) or other normative documents.
auf das sich diese Erklärung bezieht, mit der/den flogenden Norm(en) oder Richtlinie(n) übereinstimmt.
auquel se réfère cette déclaration est conforme à la (aux) norme(s) ou au(x) document(s) normatif(s).
al que se refiere esta declaración es conforme a la(s) norma(s) u otro(s) documento(s) normativo(s).
waamaar deze verklaring verwijst, aan de volende norm(en) of richtlijn(en) beantwoordt.
a cui se riferisce questa dichiarazione è conforme alla/e sequente/I norma/o documento/I normativo/i.

98/37/EEC, Machinery Directive

EN 1012-2:1996 Compressors and Vacuum pumps Safety Requirements; Part 2 Vacuum Pumps
EN 1050:1996 Safety of machinery - principles for risk assessment
EN 60204-1 Electrical equipment of industrial machines; general requirements

73/023/EEC, Low Voltage Directive

EN 60034 part 1 Rotating electrical machines - Part 1: Rating and performance

89/336/EEC, Electromagnetic Compatibility Directive

EN 61000-4-2 Testing and Measurement Techniques - Electrostatic Discharge Immunity Test

A handwritten signature in black ink that reads "Frederick C. Campbell".

Frederick C. Campbell
Operations Manager
Vacuum Technologies
Varian, Inc.
Lexington, Massachusetts, USA

March 2003

Preface


This manual provides the information you need to successfully perform scheduled maintenance on your Vacuum Technologies TriScroll™ Dry Vacuum Pump. The time to perform major rebuild is typically 18,000 hours. If you have questions that are not addressed in this manual, please contact the nearest Vacuum Technologies service facility listed on the rear cover of this manual.

Safety Considerations


READ THE FOLLOWING INSTRUCTIONS. TAKE ALL NECESSARY PRECAUTIONS.

The following format is used in this manual to call attention to hazards:


WARNING *The warning messages are for attracting the attention of the operator to a particular procedure or practice which, if not followed correctly, could lead to serious injury.*



CAUTION *The caution messages are displayed before procedures, which if not followed, could cause damage to the equipment.*



NOTE *The notes contain important information taken from the text.*



Maintenance personnel must be aware of all hazards associated with this equipment. They must know how to recognize hazardous and potentially hazardous conditions, and know how to avoid them. The consequences of work performed by unskilled or improperly trained maintenance personnel, or careless operation of the equipment employed in the specified maintenance procedures can be serious.

Every maintenance person must read and thoroughly understand the materials discussed and the instructions provided in this manual, as well as any additional information provided by Vacuum Technologies.

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All warnings and cautions must be read carefully, fully understood, and strictly observed. Consult local, state/province, and national agencies regarding specific requirements and regulations. Address any safety, operation, and/or maintenance questions to the nearest Vacuum Technologies location.

WARNING *Disconnect power from the TriScroll 300 before performing any maintenance procedure.*



Allow the pump to cool before performing any maintenance procedure. Approximate cool-down time is one to two hours.

CAUTION *Wipe all O-rings clean with a lint-free cloth before installation to ensure that no foreign matter is present to impair the seal.*



Do not use alcohol, methanol or other solvents on O-rings. To do so causes deterioration and reduces their ability to hold a vacuum.

If applicable, apply a small amount of Krytox[®] GPL 224 grease and wipe the O-rings “shiny” dry.

NOTE *Vacuum Technologies recommends replacing all O-rings during routine maintenance or during any maintenance procedure requiring that O-rings be removed.*



Unless otherwise stated, apply Loctite[®] 242 or Loctite PST[®] to the first few threads only. Apply just enough to obtain a seal.

WARNING *The TriScroll 300 weighs 26.4 kg (58 lbs). To avoid injury, use proper lifting techniques when moving the pump.*



TriScroll 300 Dry Scroll Vacuum Pump

Related TriScroll Manuals

Manuals related to the installation and operation, tip seal and pump module replacement for TriScroll 300 series pumps are listed in the following table:

Title	Applicable TriScroll Model	Part Number
Pump Module Replacement	All TriScroll 300 Series Models	699904285
Tip Seal Replacement Manual	All TriScroll 300 Series Models	699904280
Installation and Operation Manual	All TriScroll 300 Series Models	699904265

Maintenance and Tool Kits

Material and tooling required to perform maintenance on TriScroll pumps is provided in kit form. A description of each kit and ordering information is provided in the following table:

Description	Contents	Applicable TriScroll Model	Part Number
Major Maintenance Tool Kit	All bearings, bearing seals, bearing lubricant, O-rings, and tip seals required to rebuild TriScroll 300 Series pumps.	All TriScroll 300 Series models	PTSS0300MK
Maintenance Tool Kit	All fixtures and tools required to perform any maintenance on TriScroll 300 Series pumps.	All TriScroll 300 Series models	PTSS0300TK
Tip Seal Tool Kit	All tools required to change the tip seals on any TriScroll Series pump.	All TriScroll Series models	PTSTSTKIT
Replacement Tip Seal Set	Replacement tip seals and static O-rings for TriScroll 300 Series pumps.	All TriScroll 300 Series models	PTSS0300TS
	<i>NOTE: The Maintenance Tool Kit or the Tip Seal Tool Kit is required for tip seal replacement.</i>		

Factory Service Options

Vacuum Technologies offers factory-rebuild service or advance exchange of complete TriScroll Pumps or TriScroll Pump Modules. Contact your nearest Vacuum, Inc. sales office for price and availability information. Select your preferred service option from the table below.

Factory Service Options	Part Number
Advance Exchange TriScroll 300 Single Phase	EXPPTS03001
Advance Exchange TriScroll 300 Three Phase	EXPPTS03003
Advance Exchange TriScroll 310 Single Phase	EXPPTS03101
Advance Exchange TriScroll 310 Three Phase	EXPPTS03103
Advance Exchange TriScroll 300 Pump Module Only	EXPTS0300SC
Advance Exchange TriScroll 310 Pump Module Only	EXPTS0310SC
Service/Rebuild TriScroll 300 Pump (Single or Three Phase)	PTS0300KMA
Service/Rebuild TriScroll 310 Pump (Single or Three Phase)	PTS0310KMA
Service/Rebuild TriScroll 300 Pump Module Only	PTS0300SCR
Service/Rebuild TriScroll 310 Pump Module Only	PTS0310SCR

Serial Number Notes

This manual applies to TriScroll 300 series with serial numbers beginning with LP, and ascending from LPB80124. For service on TriScroll series pumps with serial numbers J7000001 to A8000108, contact your nearest Varian, Inc. office.

TriScroll 300 series pumps with serial number above LPC80250 have 1/4-18 National Pipe Threads in the bearing purge, gas ballast, and exhaust ports. Pumps with serial numbers below LPC80250 were manufactured with 1/4-19 British Standard Pipe Threads. Contact your nearest Varian, Inc. office if mating hardware is required.

Contacting Vacuum Technologies

In the United States, you can contact Vacuum Technologies Customer Service at 1-800-8VARIAN. See the back cover of this manual for a listing of our sales and service offices.

Internet users:

- Send email to Customer Service & Technical Support at vpl.customer.support@varianinc.com
- Visit our web site at www.varianinc.com/vacuum
- Order on line at www.evarian.com

TriScroll 300 Dry Scroll Vacuum Pump

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Major Maintenance

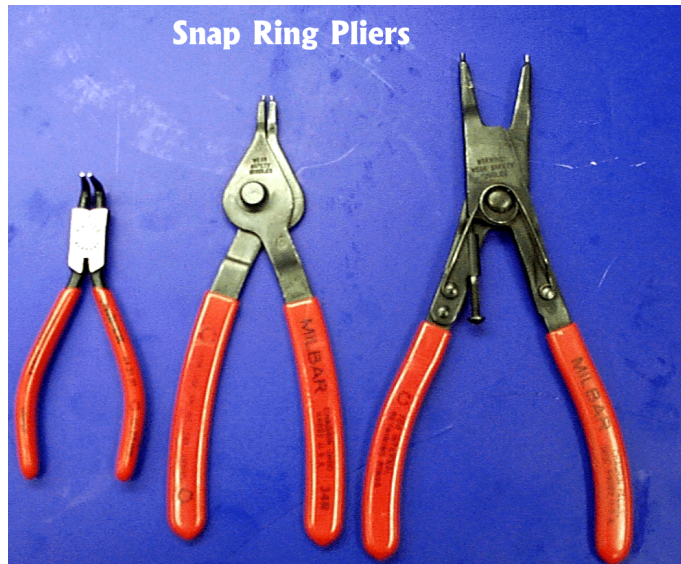
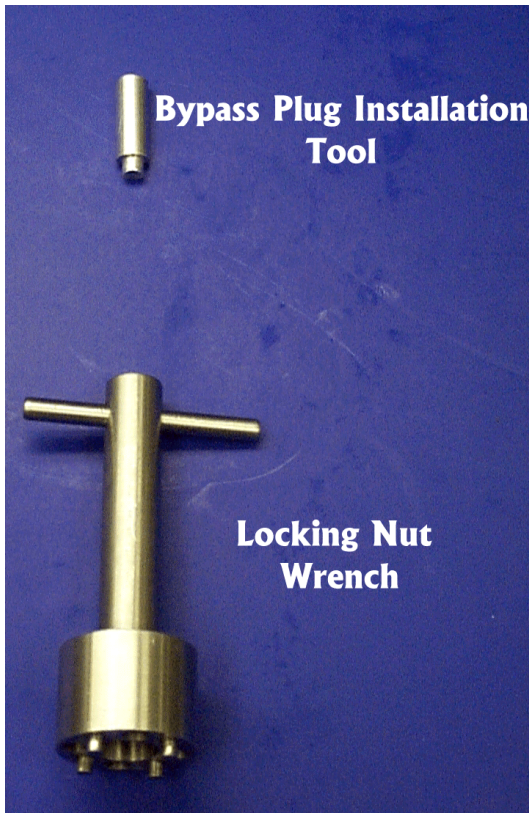
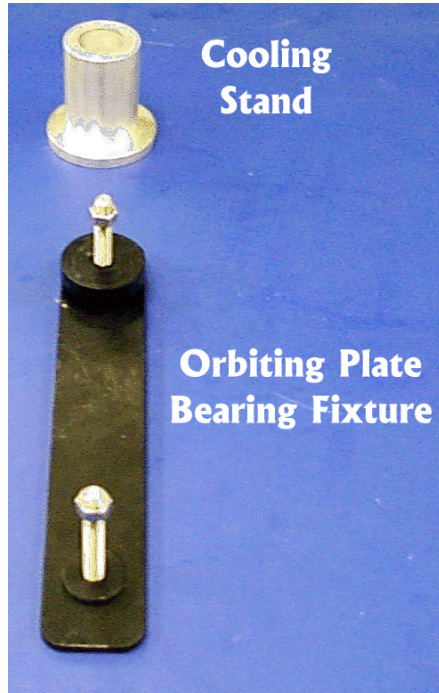
General Information

Vacuum Technologies TriScroll 300 series pumps are designed to provide years of trouble-free service if maintenance procedures and intervals are observed. Bearing grease replenishment and tip seal replacement are recommended when the pump base pressure has risen to an unacceptably high level for your application. Bearings, rotary seals and O-rings should also be replaced if the pump exhibits humming or grinding noises from the bearings. Main bearing life may be shortened if your application requires the pumping of high quantities of water vapor. Use of the bearing purge will keep this water from impacting bearing life.

Required Equipment

- ❑ **Maintenance Tool Kit:** PTSS0300TK (page 2)
- ❑ **Major Maintenance Kit:** PTSS0300MK (page 4)
- ❑ **Arbor Press:** 1/2 ton or larger, 10" work diameter capacity, 8" capacity over table
- ❑ **Oven:** 400 °F temperature capability, 11" wide x 11" deep x 4" high minimum chamber, 500 watt or higher heating capacity
- ❑ **Heat Resistant Surface**
- ❑ **Vacuum Gauge:** Capable of measuring pressure of 5 mTorr to 20 mTorr with an accuracy of ± 1 mTorr. A capacitance manometer or Pirani gauge is recommended.

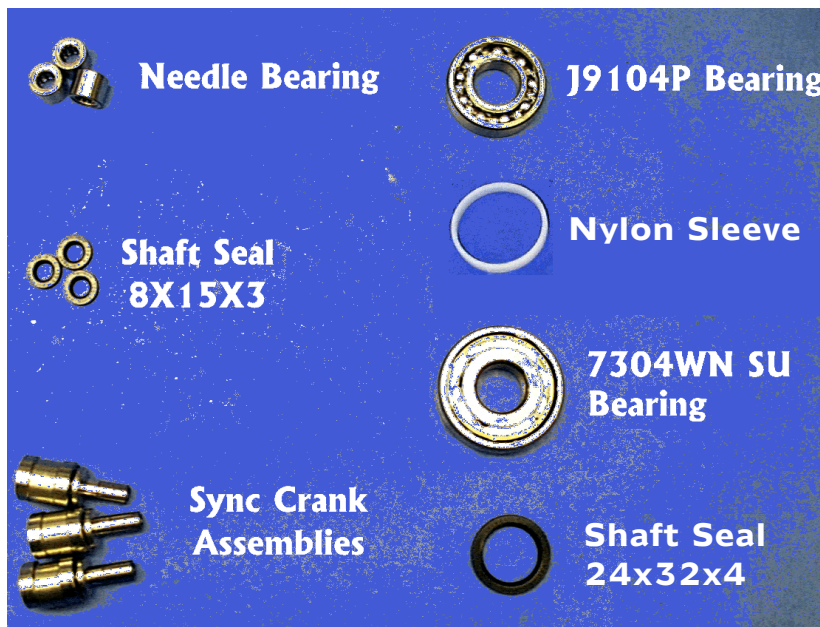
Maintenance Tool Kit



Maintenance Tool Kit (continued)



Major Maintenance Tool Kit



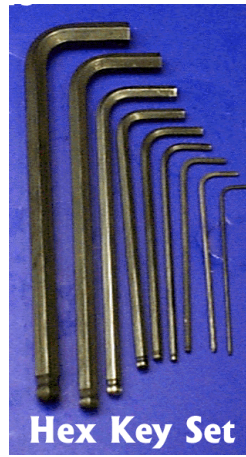
Major Maintenance Tool Kit (continued)

TS-300 O-rings

O-ring Part Number	Quantity	Inside Diameter (in.)	Cross-Section (in.)
2-016	6	0.614	0.070
2-111	2	0.424	0.103
2-115	1	0.674	0.103
2-118	3	0.862	0.103
2-121	1	1.049	0.103
2-137	1	2.050	0.103
2-152	1	3.237	0.103
2-157	1	4.487	0.103
2-205	1	0.421	0.139
2-269	1	8.734	0.139



Tip Seal Tool Kit



TriScroll 300 Disassembly



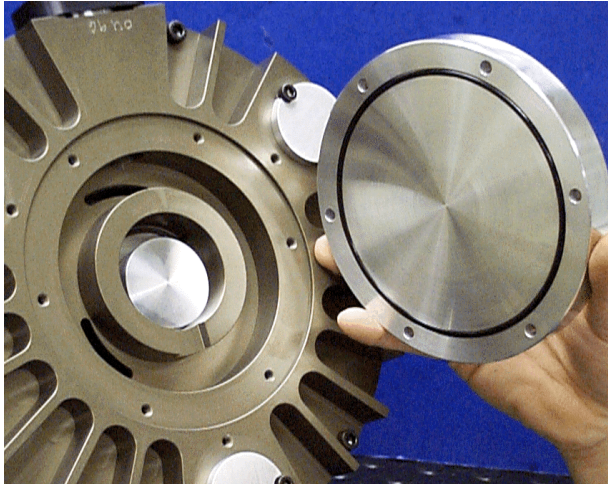
Remove and Disassemble the Outboard Housing

1. Remove the three M5x16 screws that attach the cowling to the module.
2. Remove the cowling.

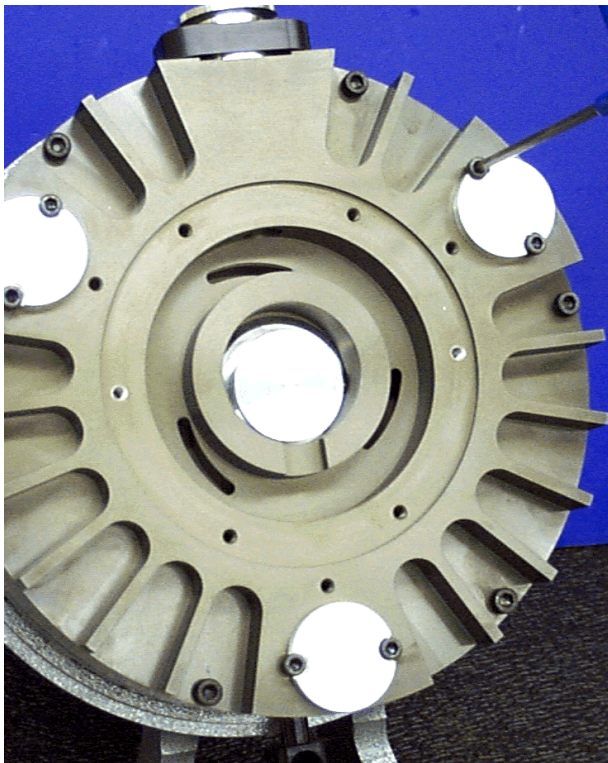


3. Remove the six M5x22 screws that attach the outboard cover to outboard housing.

TriScroll 300 Disassembly (continued)

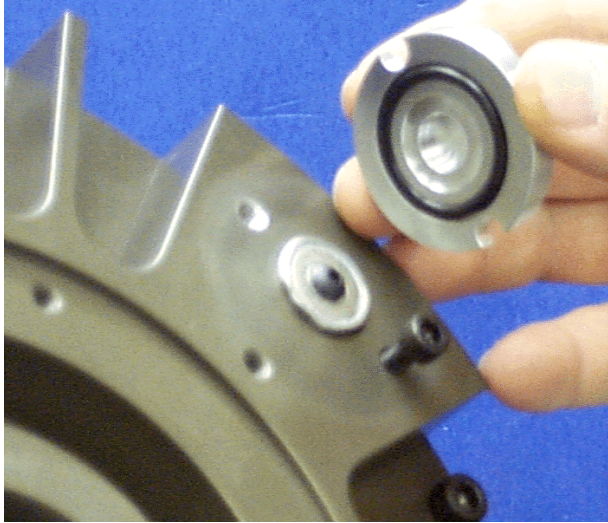


4. Remove the outboard cover.
5. Remove and discard the O-ring.

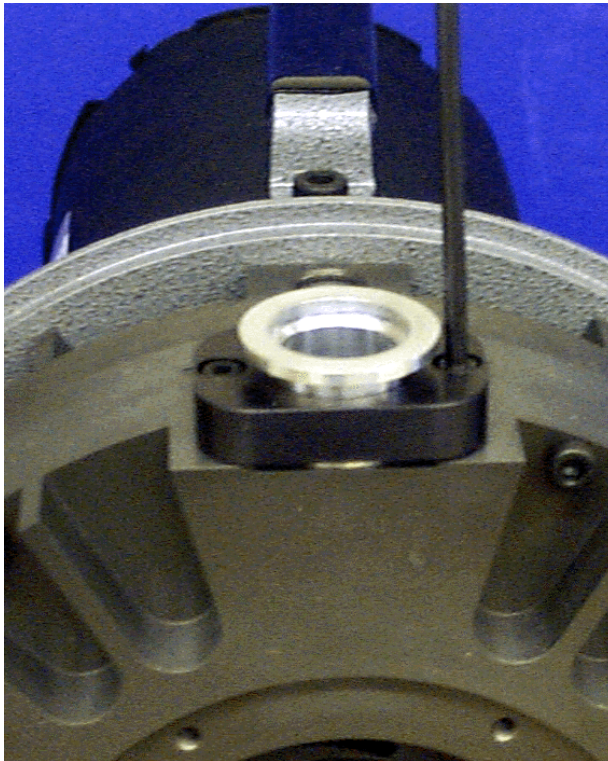


6. Remove the six M5x10 screws that attach the three sync crank covers to the outboard housing.

TriScroll 300 Disassembly (continued)

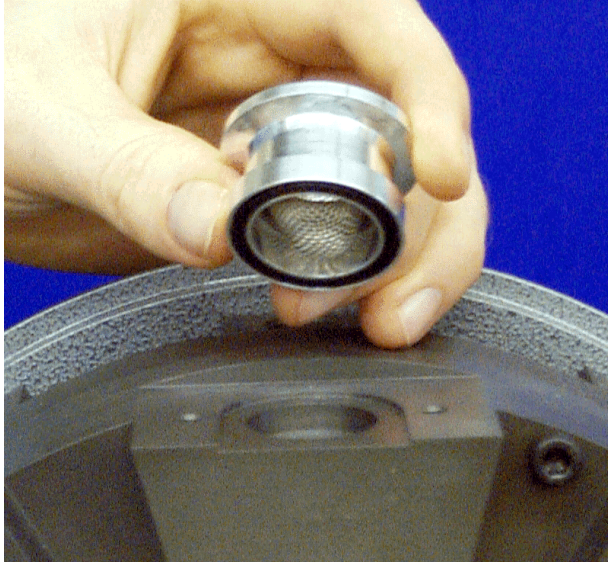


7. Remove the sync crank covers.
8. Remove and discard the O-rings.

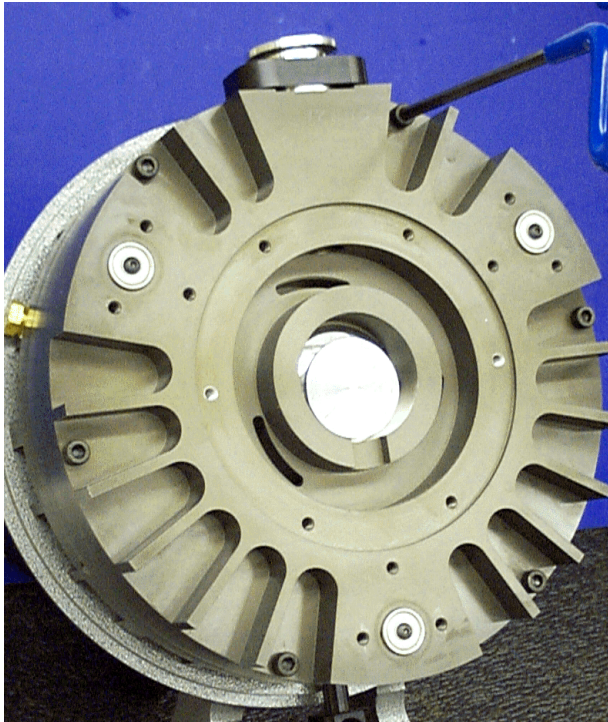


9. Remove the two M5x16 screws that attach the intake clamp to the outboard housing.

TriScroll 300 Disassembly (continued)

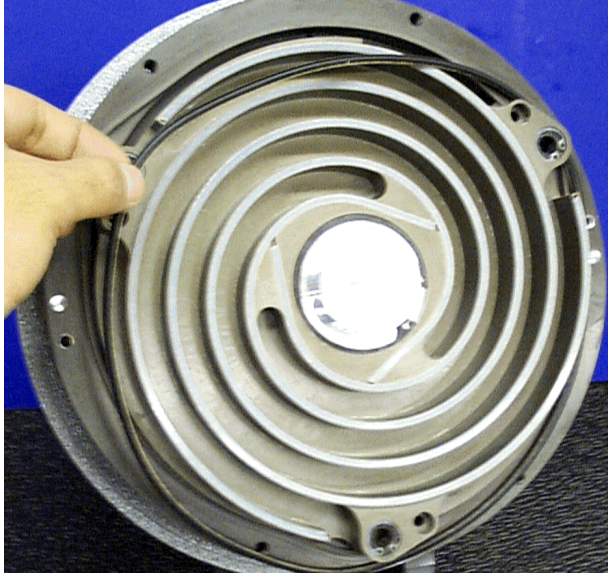


10. Remove the intake clamp and intake fitting.
11. Remove and discard the O-ring.

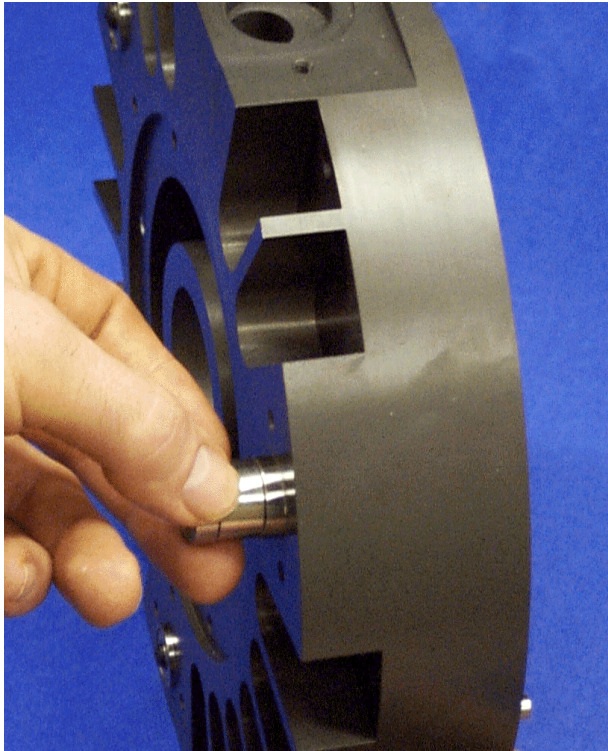


12. Remove the six M6x45 screws that attach the outboard housing to inboard housing.
13. Remove the outboard housing.

TriScroll 300 Disassembly (continued)

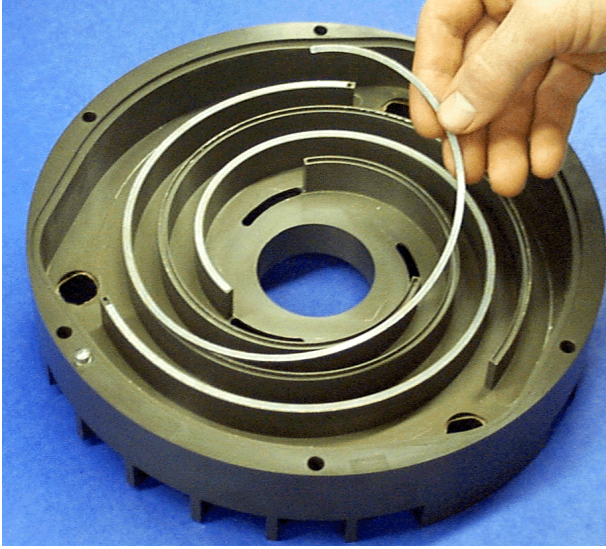


14. Remove and discard the O-ring.



15. Remove and discard the three sync crank assemblies.

TriScroll 300 Disassembly (continued)



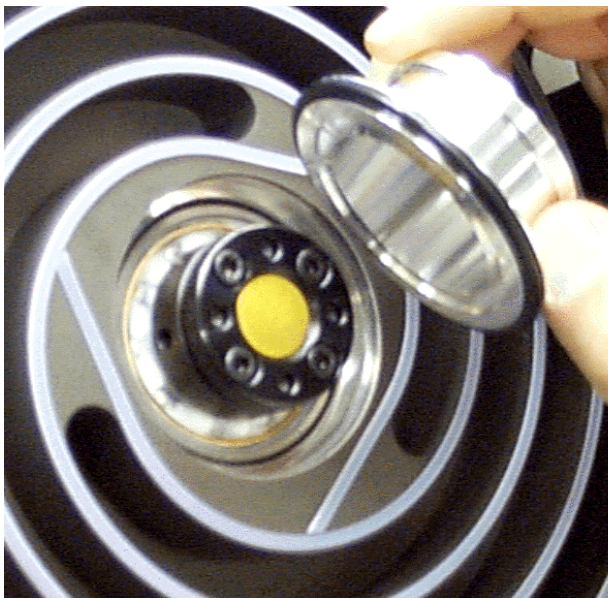
16. Remove and discard the tip seals from the outboard housing.

TriScroll 300 Disassembly (continued)



Remove and Disassemble the Orbiting Plate

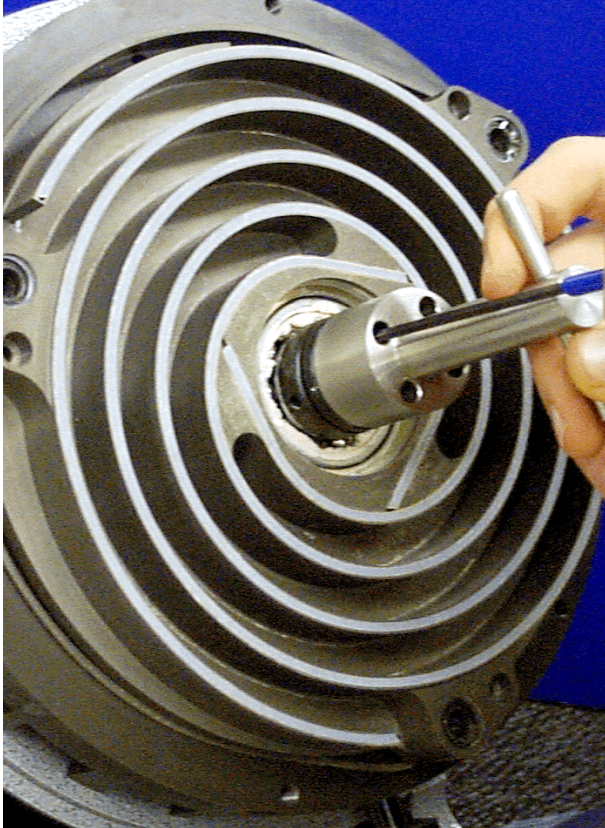
17. Remove the snap ring that is holding the orbiting cup in the orbiting plate.



18. Remove the orbiting cup.

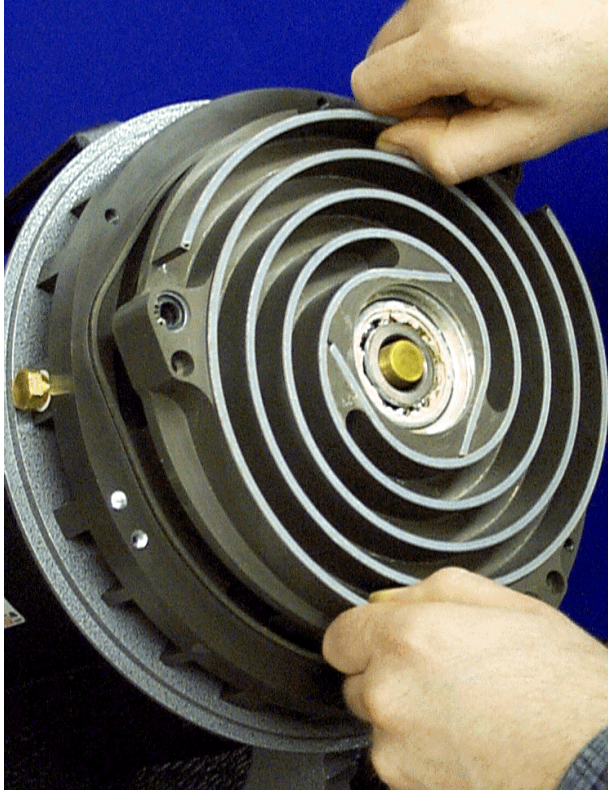
19. Remove and discard the O-ring.

TriScroll 300 Disassembly (continued)

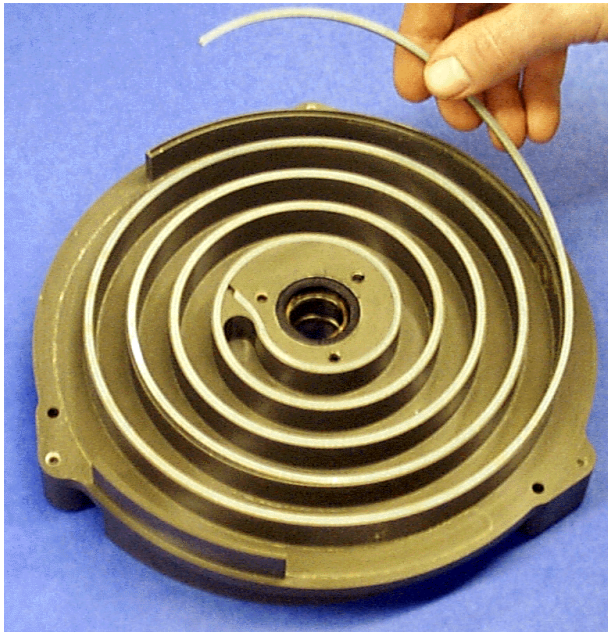


20. Use the locking nut wrench to hold the locking nut.
21. Loosen the four M4x12 screws in the locking nut.
22. Remove the locking nut.

TriScroll 300 Disassembly (continued)

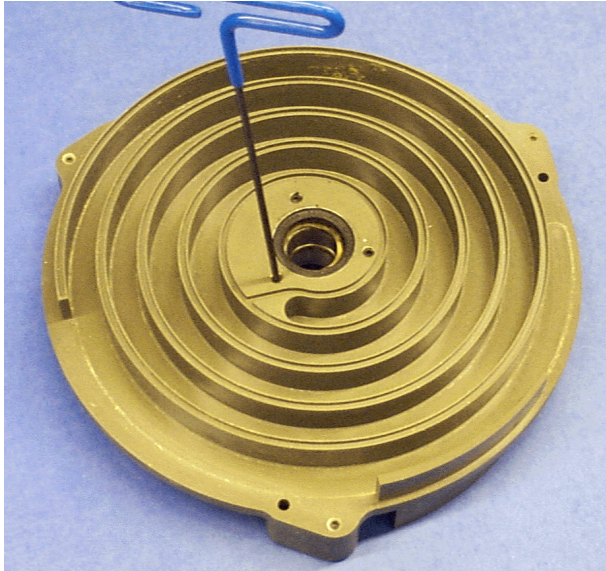


23. Remove the orbiting plate from the crankshaft.



24. Remove and discard the tip seals from both sides of the orbiting plate.

TriScroll 300 Disassembly (continued)

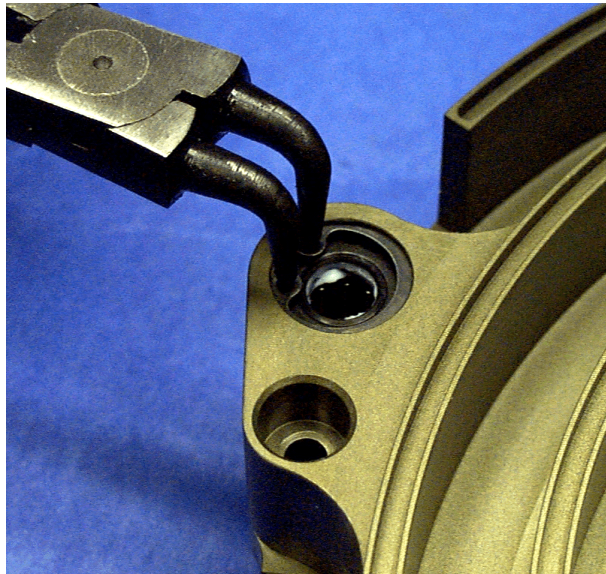


25. Remove the six M5x5 set screws from the orbiting plate.

NOTE

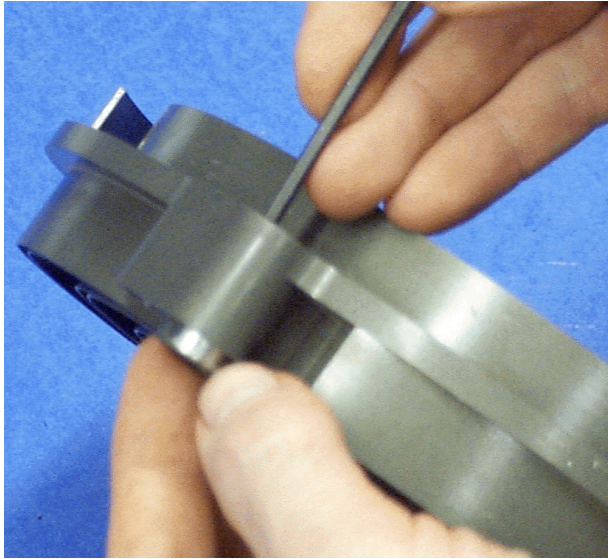


Set screws are held in with Loctite.

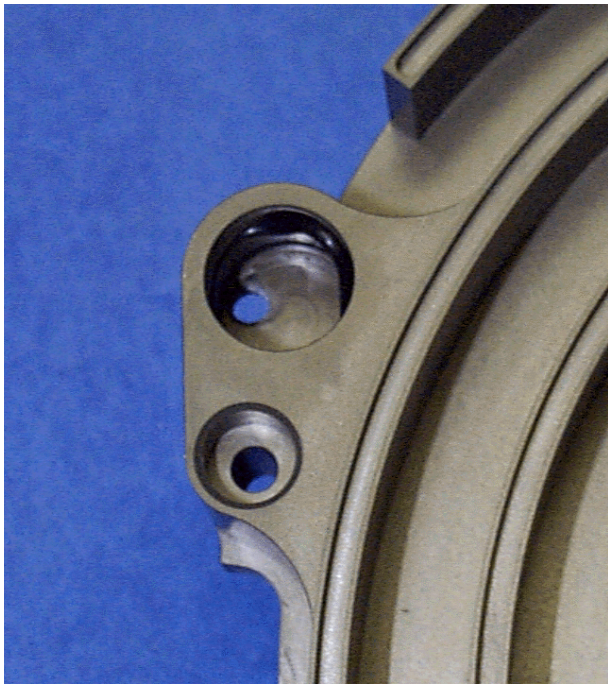


26. Remove the three snap rings holding the needle bearings and shaft seals in the orbiting plate.

TriScroll 300 Disassembly (continued)

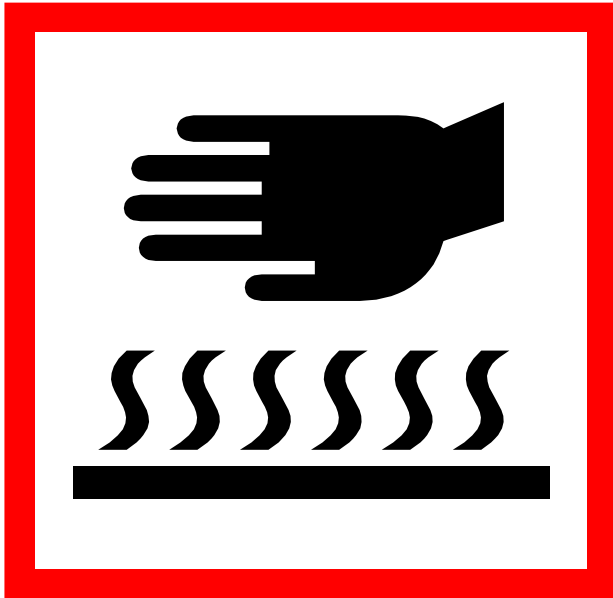


27. Push out and discard the three needle bearings and shaft seals.



28. Remove and discard the six O-rings from the three sync bearing bores in the orbiting plate.

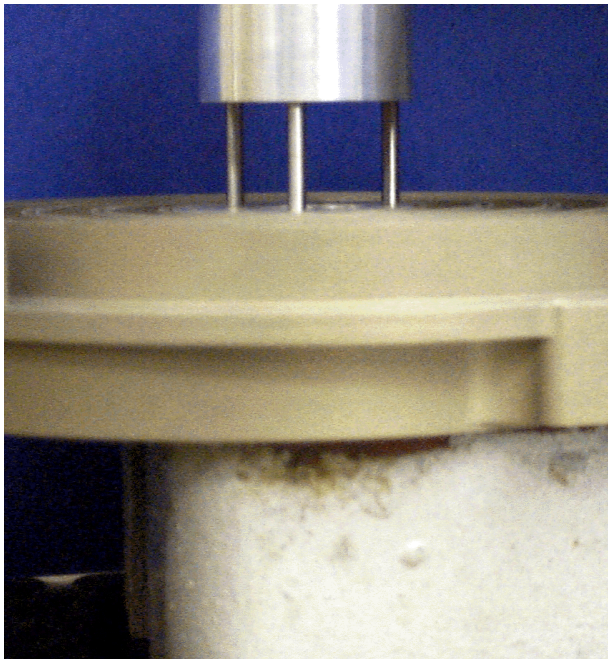
TriScroll 300 Disassembly (continued)



WARNING *This step requires the use of heat resistant gloves. Do not proceed without them!*

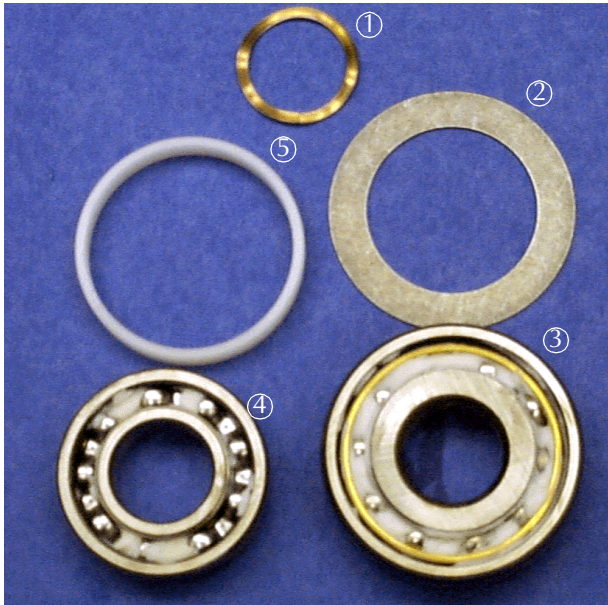


29. Heat the orbiting plate for a minimum of 1 hour in a 350 °F oven.



30. Immediately after removing the orbiting plate from oven, use the bearing extractor tool and arbor press to press out the two bearings, orbiting spacer, nylon sleeve and wave washer from the orbiting plate. The parts are shown in the photo on page 19.

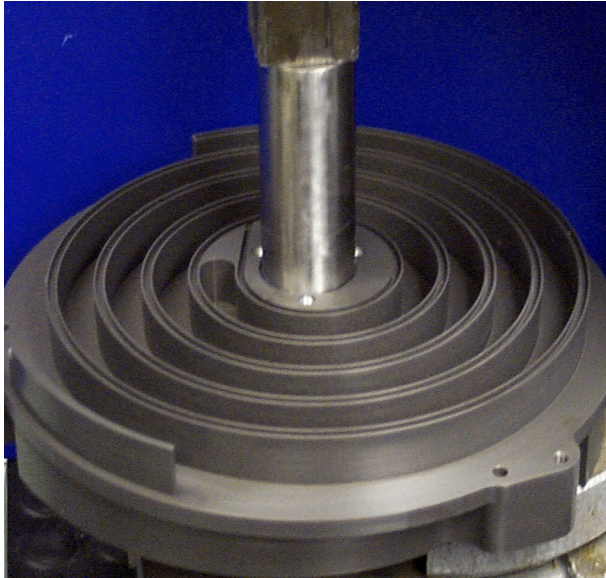
TriScroll 300 Disassembly (continued)



The parts removed from the orbiting plate are:

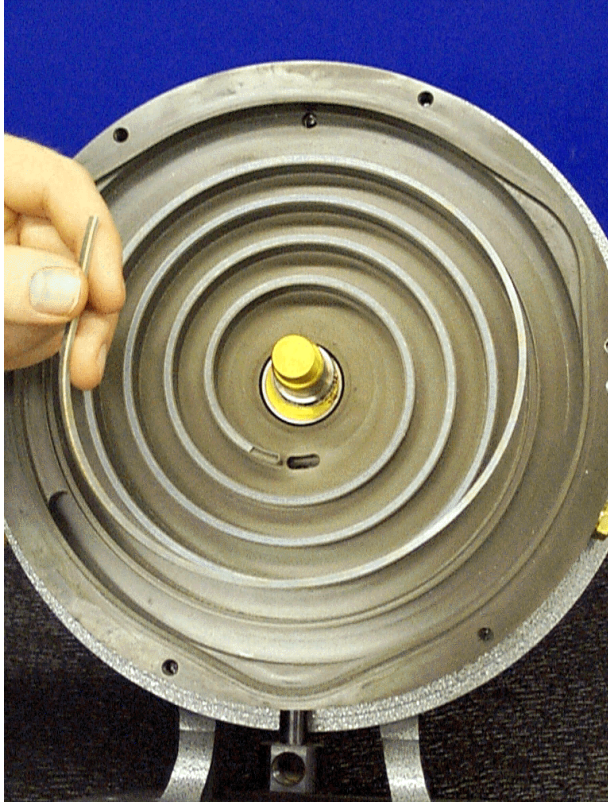
- ① Wave washer
- ② Nylon sleeve
- ③ 7305WN SU bearing
- ④ J9104P bearing
- ⑤ Orbiting spacer

31. Allow the orbiting plate to air cool until it can be handled with bare hands.
This generally takes a few hours.



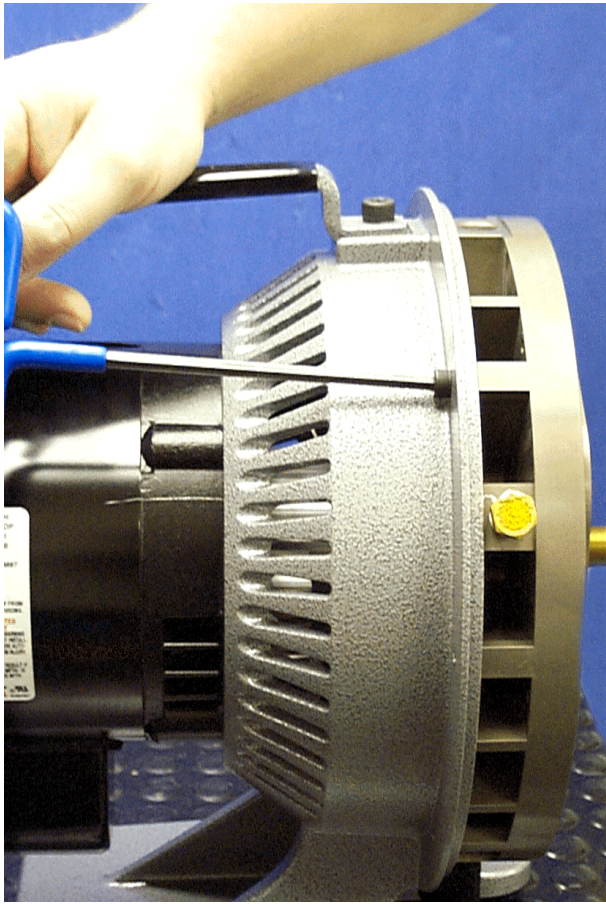
32. Remove and discard the shaft seal from the orbiting plate.

TriScroll 300 Disassembly (continued)



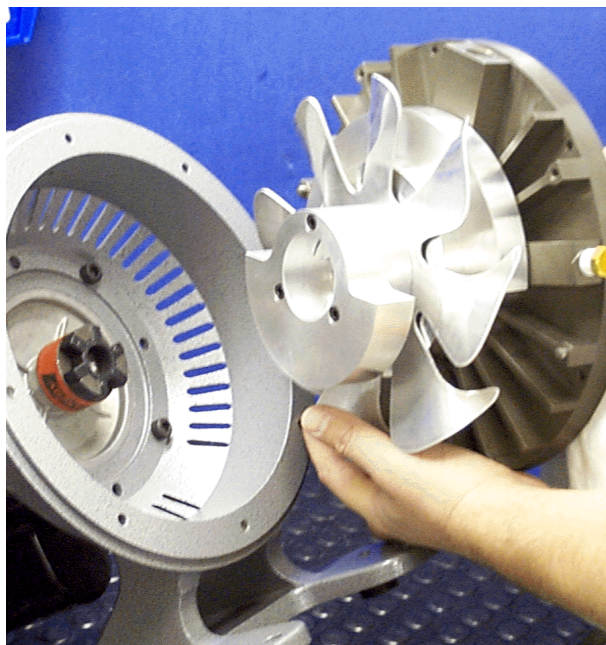
33. Remove and discard the tip seal from the inboard housing.

TriScroll 300 Disassembly (continued)



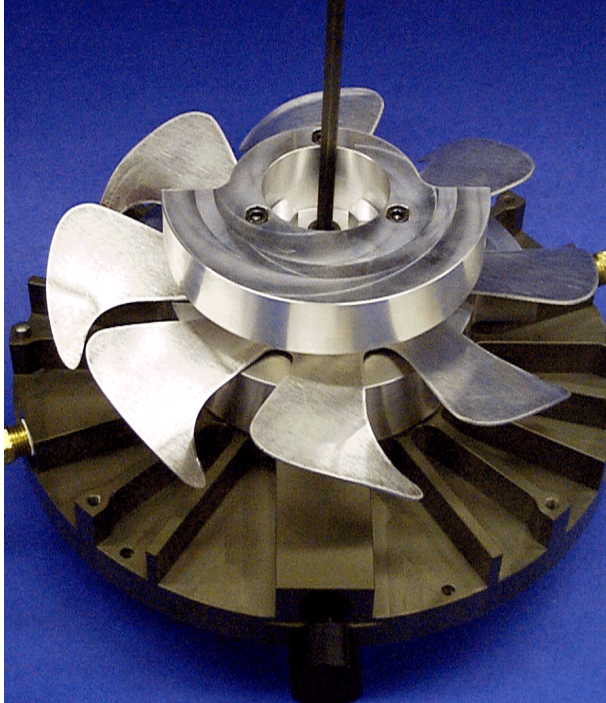
Remove and Disassemble the Inboard Housing

1. Remove the four M6x16 screws that attach the inboard housing to the frame.

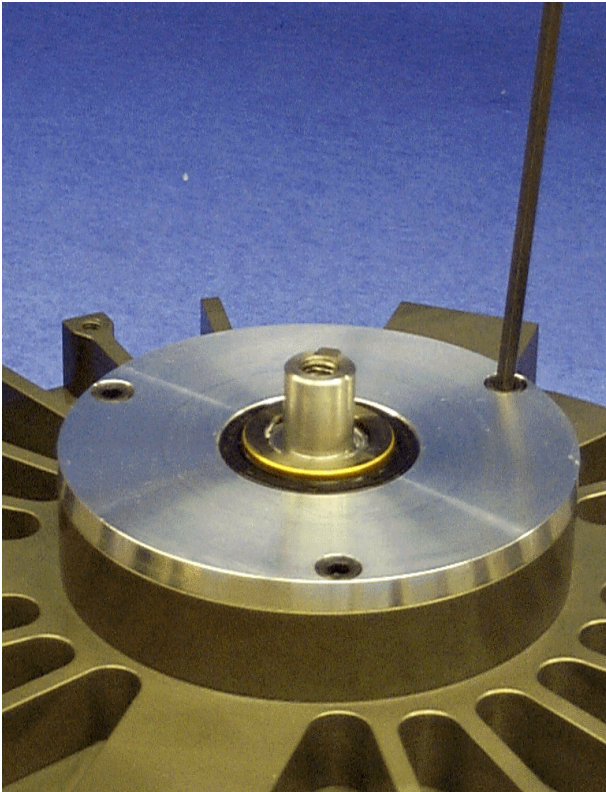


2. Remove the inboard housing from the frame.

TriScroll 300 Disassembly (continued)



3. Remove the M8x12 screw and washer that attach the fan assembly to the crankshaft, then remove the fan assembly.

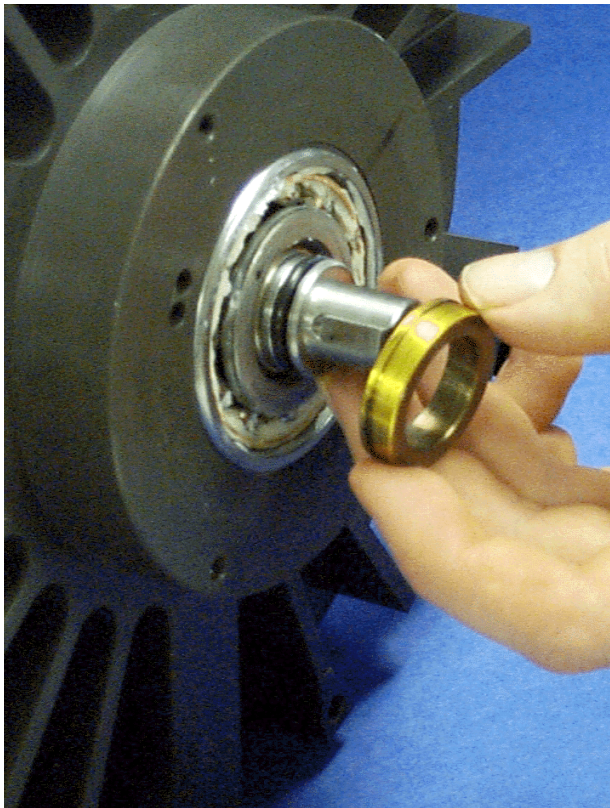


4. Remove the three M5x10 screws that hold the seal housing to the inboard housing.

TriScroll 300 Disassembly (continued)

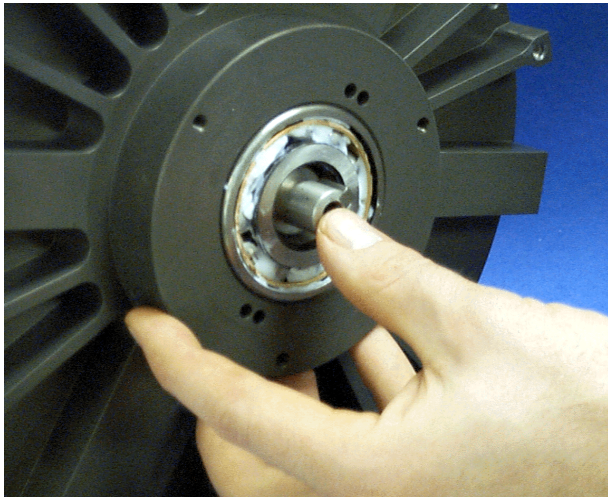


5. Remove the seal housing.
6. Remove and discard the O-rings and the shaft seal from seal housing.

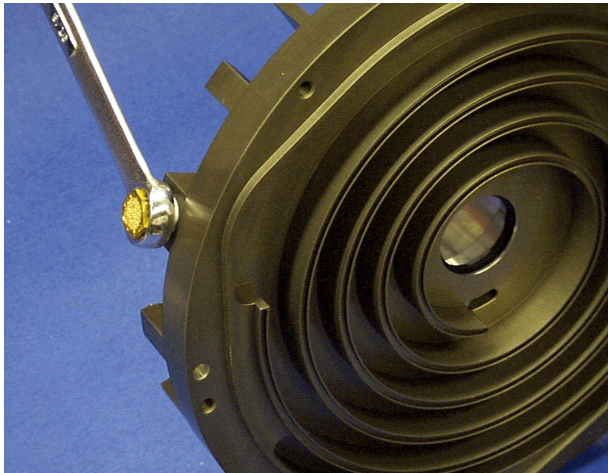


7. Remove the shaft seal spacer from the crankshaft.

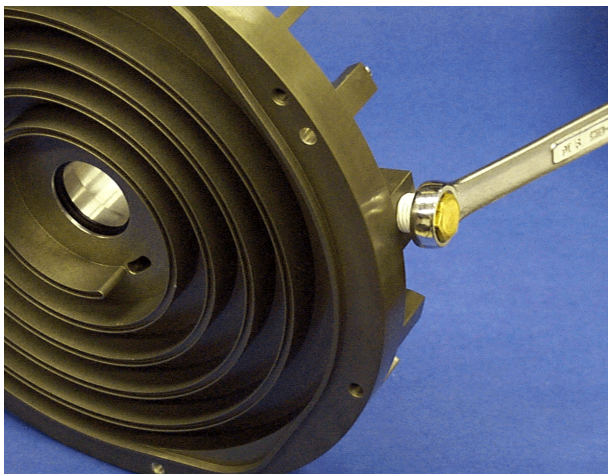
TriScroll 300 Disassembly (continued)



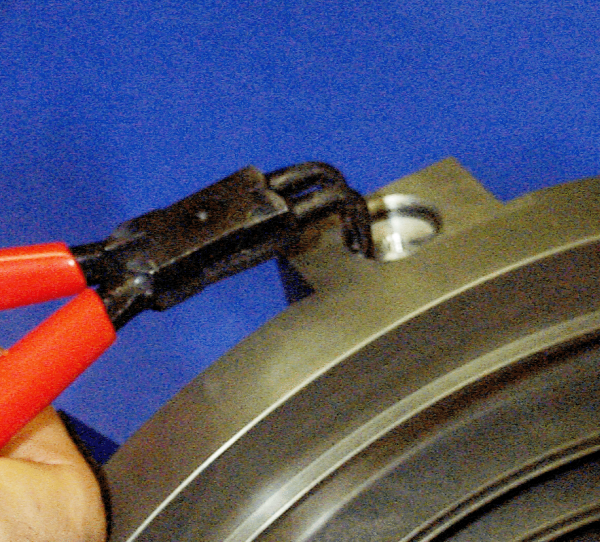
8. Push the crankshaft out of the inboard housing.
9. Remove the key from slot in the crankshaft.
10. Remove and discard the O-ring from the crankshaft.



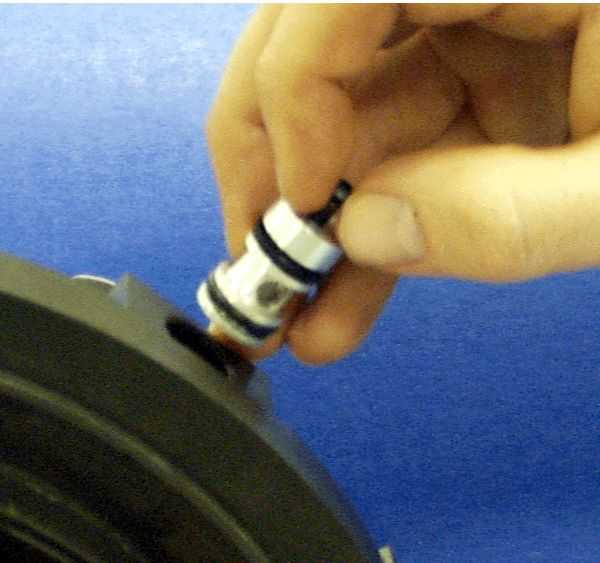
11. Remove the two pipe plugs from the inboard housing.



TriScroll 300 Disassembly (continued)



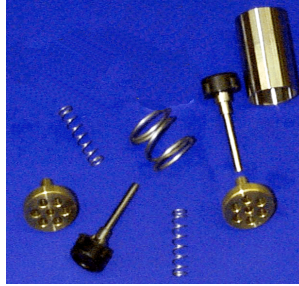
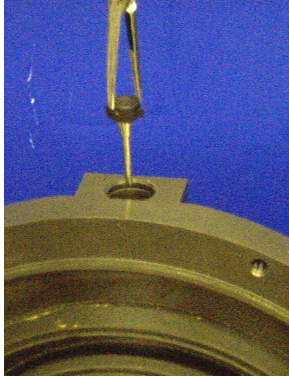
12. Remove the snap ring that is holding the check valve plug in the inboard housing.



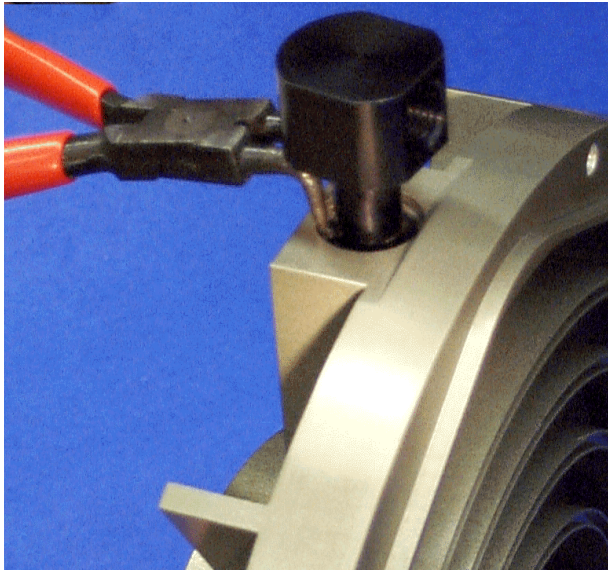
13. Remove the check valve plug by installing an M4 screw and then pulling out the plug.

14. Remove and discard the two O-rings.

TriScroll 300 Disassembly (continued)



15. Using the hemostat pliers, remove the two check valves, two small springs, one large spring, two plunger guides and one spacer from the port in the inboard housing.

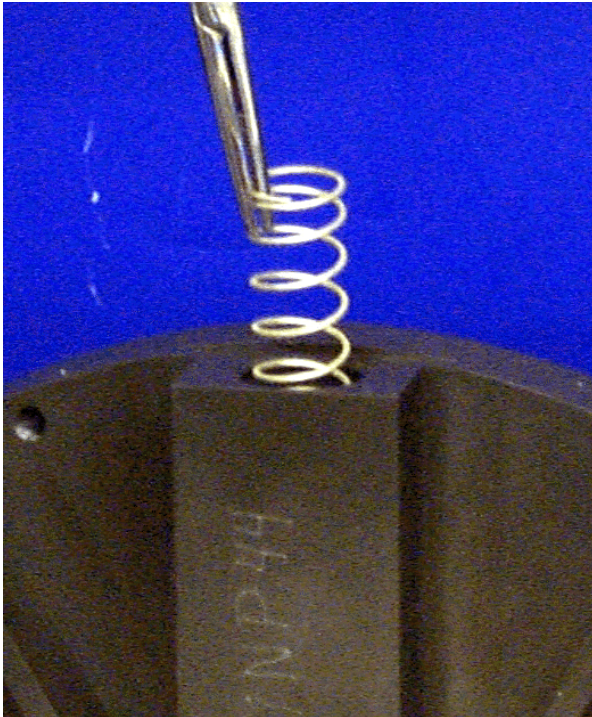


16. Remove the snap ring that is holding the exhaust fitting in the inboard housing.

TriScroll 300 Disassembly (continued)



17. Remove the exhaust fitting.
18. Remove and discard the O-ring.

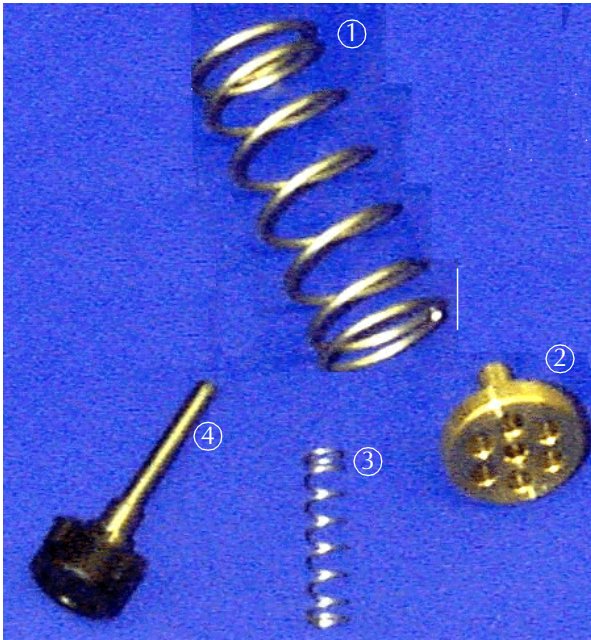


NOTE *The next step applies to all models except the 310.*



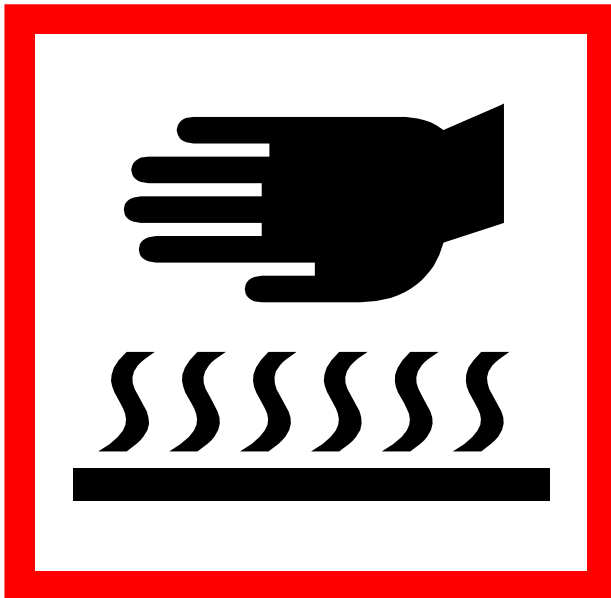
19. Using the hemostat pliers, remove the large spring, plunger guide, small spring and check valve from the exhaust port in the inboard housing.

TriScroll 300 Disassembly (continued)



The parts removed from the exhaust are:

- ① Large spring
- ② Plunger guide
- ③ Small spring
- ④ Check valve

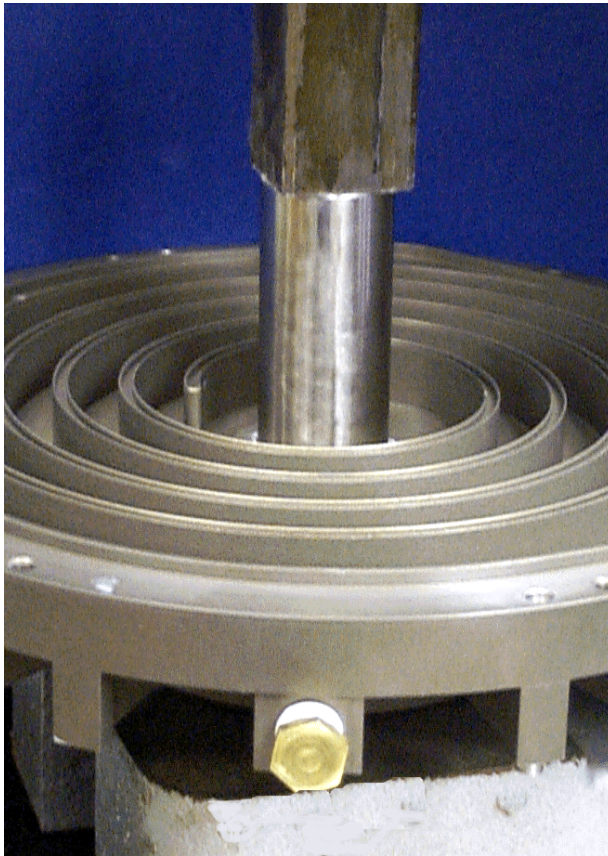


WARNING *This step requires the use of heat resistant gloves. Do not proceed without them!*



20. Heat the inboard housing for a minimum of 1 hour in a 350 °F oven.

TriScroll 300 Disassembly (continued)



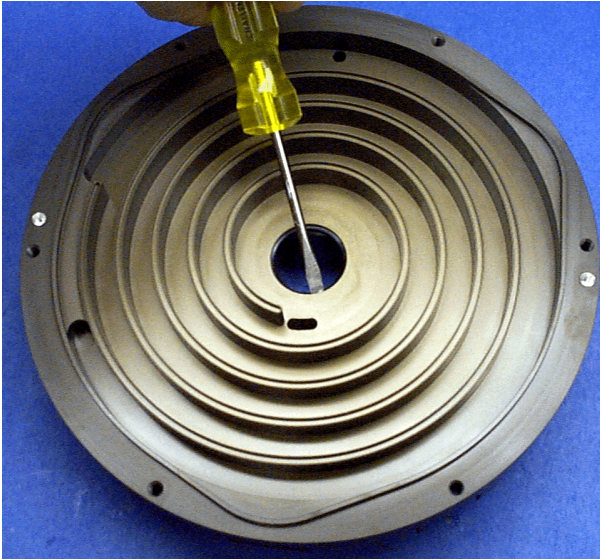
21. Immediately after removing the inboard housing from oven, remove the two bearings, bearing spacer and wave washer from inboard housing.
22. Use the main bearing extractor tool to push bearings out if the bearings do not fall out.



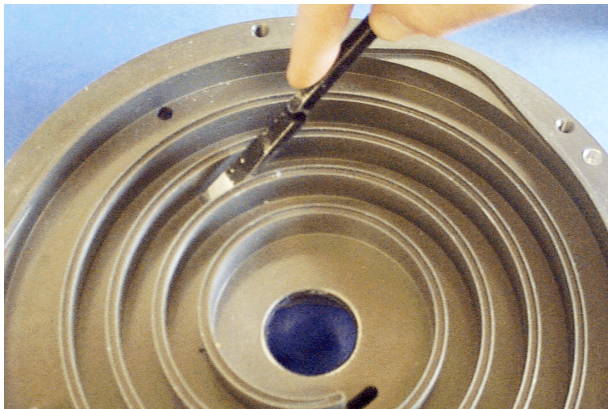
The parts removed from the inboard housing are:

- ① Bearing spacer
- ② 7205W SU bearing, included in maintenance kit
- ③ 7305WN SU bearing, included in maintenance kit
- ④ Wave washer

TriScroll 300 Disassembly (continued)



23. Allow the inboard housing to air cool until it can be handled with bare hands.
24. Remove and discard the shaft seal from the inboard housing.



25. Carefully scrape with a chisel to loosen the tip seal dust from the orbiting plate, inboard and outboard housing. If seal debris is attached to the sides of the scroll walls, use a razor blade or Exacto knife to scrape this debris off.
26. Use dry compressed air to remove the tip seal debris.
27. Clean all the parts.

NOTE

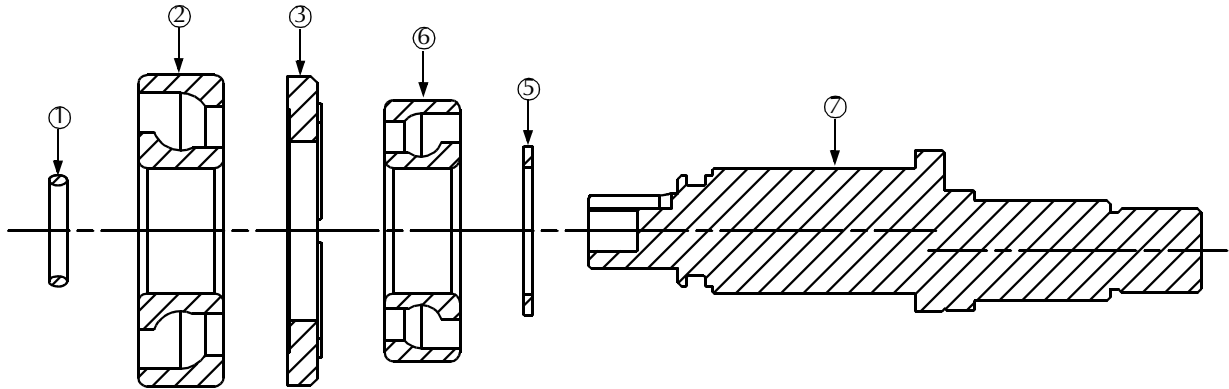


The use of an industrial detergent and water is recommended.

28. Ensure that all parts are dry.

Crankshaft Assembly

Crankshaft Exploded View



Callout	Part Number	Description	Quantity
①	MK*	2-115 Viton [®] O-ring	1
②	MK*	7305WN SU Bearing	1
③	S4770001	VDS4- Bearing Spacer	1
⑤	S4769001	Wave Washer - Crank	1
⑥	MK*	7205W SU Bearing	1
⑦	S4711001	VDS4- Crankshaft	1

MK = Included in major maintenance kit

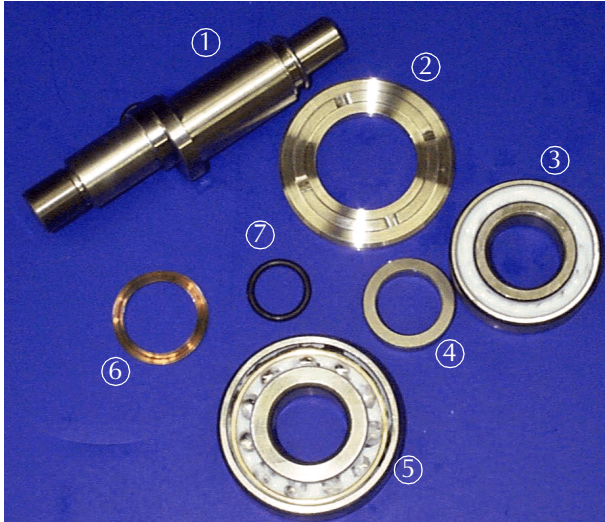
TSK = Included in tip seal kit

NSS = Not sold separately

Assemble the Crankshaft

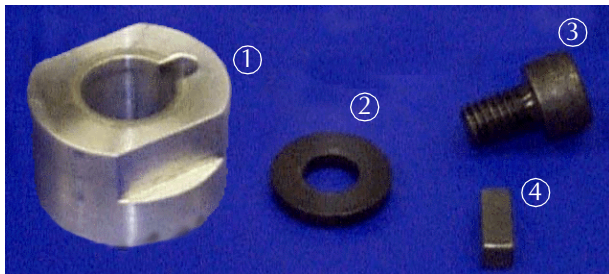
Tools required:

- ❑ Allen wrench
- ❑ Bearing pre-load tool
- ❑ Arbor press
- ❑ Krytox GPL 224 grease, included in maintenance kit



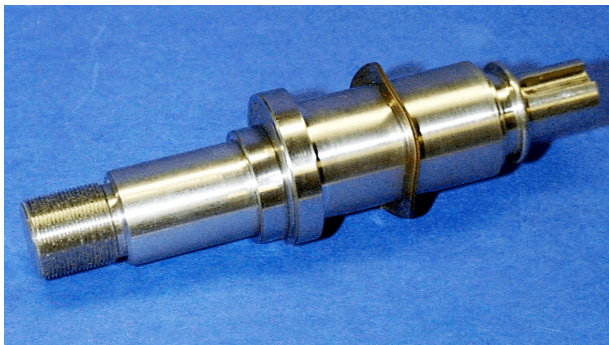
Locate the following parts shown in the photo to the left:

- ① Crankshaft
- ② Bearing spacer
- ③ 7205W SU bearing, included in maintenance kit
- ④ Seal spacer
- ⑤ 7305WN SU bearing, included in maintenance kit
- ⑥ Wave washer-crank
- ⑦ O-ring, 2-115, included in maintenance kit



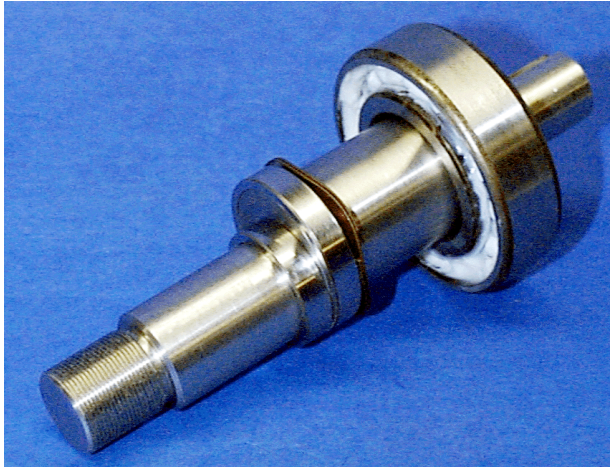
Locate the following parts in the photo to the left:

- ① Bearing pre-load tool
- ② Washer
- ③ M8x12 screw
- ④ 5x5x12 key



1. Install the wave washer onto the crankshaft.

Assemble the Crankshaft (continued)

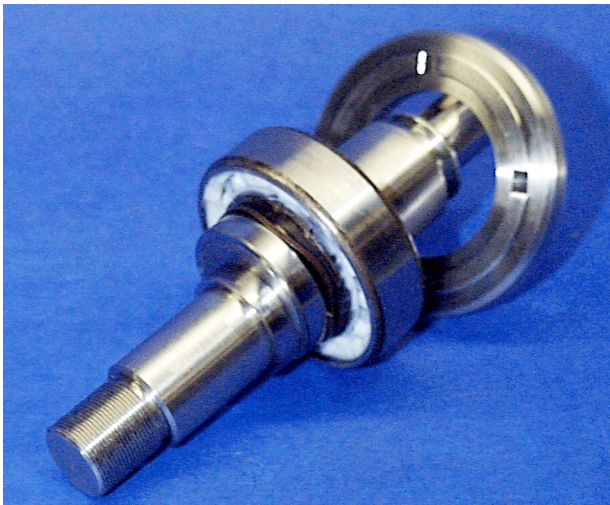


2. Install 7205W SU bearing on crankshaft.

Observe Proper Orientation

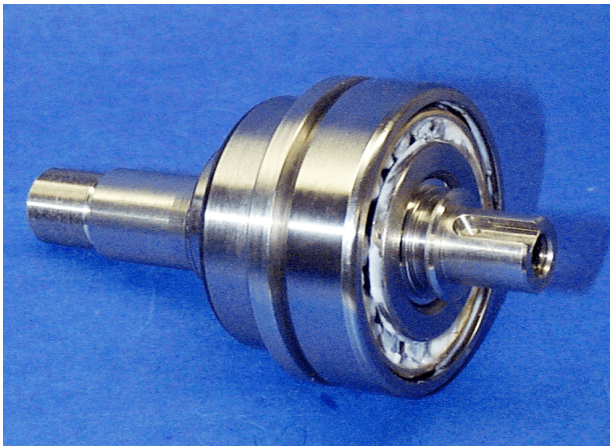


Toward Wave Washer



3. Install bearing spacer on crankshaft.

Observe Proper Orientation



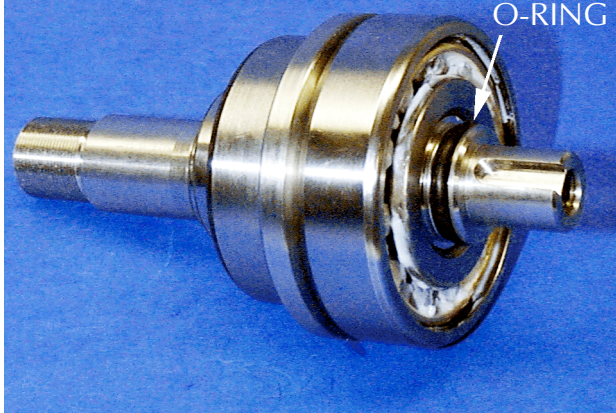
4. Install 7305WN SU bearing on crankshaft.

Observe Proper Orientation

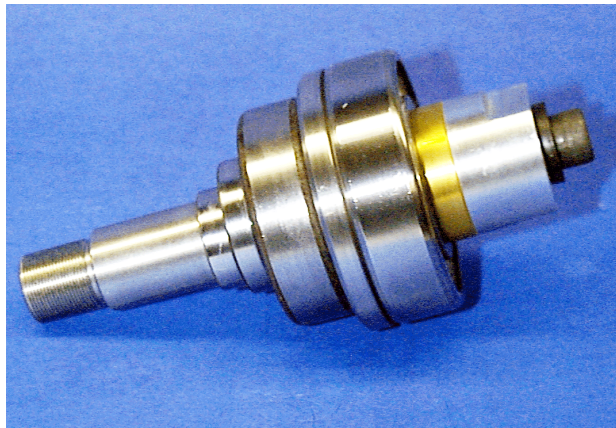


Toward Wave Washer

Assemble the Crankshaft (continued)



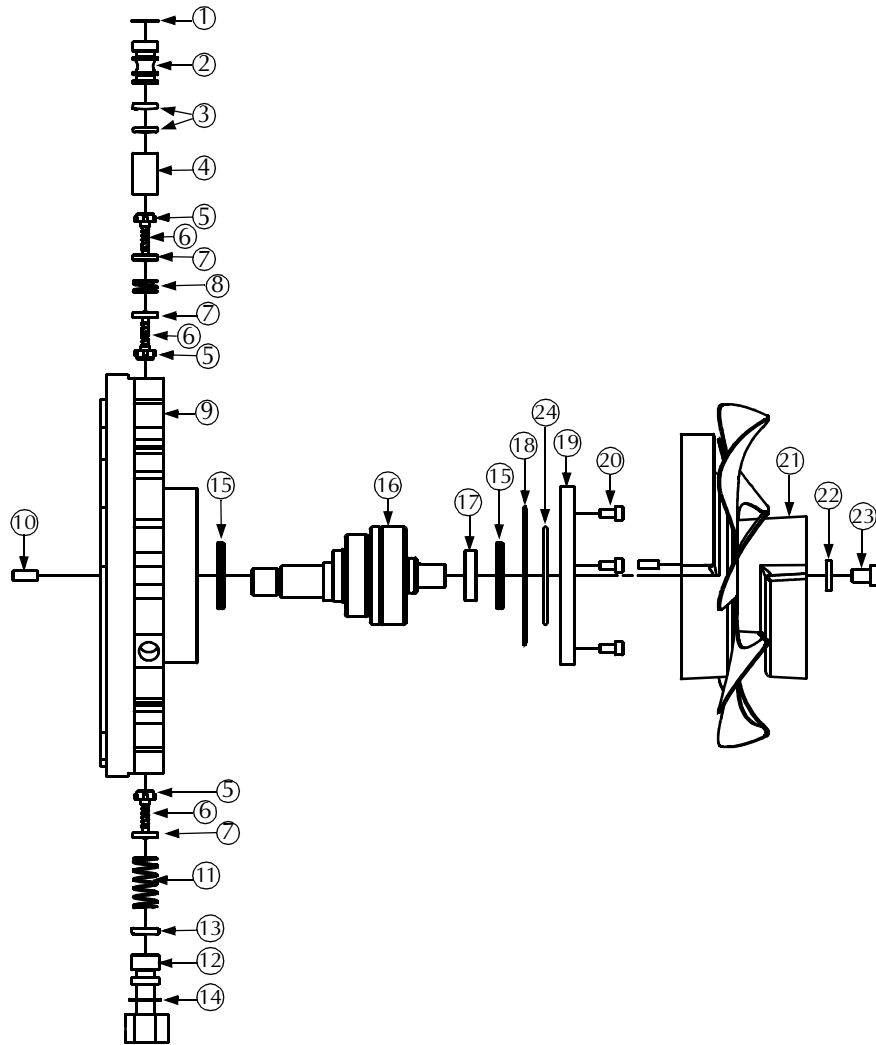
5. Lightly grease the O-ring and install it in the groove on the crankshaft.
6. Install the key in the slot.
7. Install the seal spacer over the O-ring.



8. Slide the bearing pre-load tool onto the crankshaft engaging key and secure it with the M8x12 screw and washer.

Inboard Housing Assembly

Inboard Housing Exploded View



TriScroll 300 Dry Scroll Vacuum Pump

Callout	Part Number	Description	Quantity	
			PTS03101UNIV, PTS03103UNIV	PTS03001UNIV, PTS03003UNIV
①	NSS*	Snap Ring N500-62	1	1
②	S4735001	VDS4- Check Valve Plug	1	1
③	MK*	O-ring, Viton 2-111	2	2
④	S4737001	VDS4- Check Valve Spacer	1	1
⑤	S4723001	VDS4- Check Valve Assembly	2	3
⑥	660285573	Spring, S/S, .18 OD x .75 L x .014 Wire OD	2	3
⑦	S4720001	VDS4- Plunger Guide	2	3
⑧	660285565	Spring, S/S, .60 OD x .50 L x .045 Wire OD	1	1
⑨	NSS*	VDS4- Inboard Housing	1	1
⑩	NSS*	Dowel Pin, Steel, M6x16	2	2
⑪	660285568	Spring, S/S, .60 x 1.50 L x .045 Wire OD	-	1
⑫	S4706001	VDS4- Exhaust Fitting	1	1

MK = Included in major maintenance kit

TSK = Included in tip seal kit

NSS = Not sold separately

TriScroll 300 Dry Scroll Vacuum Pump

Callout	Part Number	Description	Quantity	
			PTS03101UNIV, PTS03103UNIV	PTS03001UNIV, PTS03003UNIV
⑬	MK*	O-ring, Viton 2-205	1	1
⑭	NSS*	Snap Ring, N5000-75	1	1
⑮	MK*	Shaft Seal, 32mm x 42mm x 4mm	2	2
⑯	NSS*	VDS4- Crankshaft Assembly	1	1
⑰	S4727001	VDS4- Seal Spacer	1	1
⑱	MK*	O-ring, Viton 2-152	1	1
⑲	S4712001	VDS4- Seal Housing	1	1
⑳	NSS*	Screw, Socket Head Cap, M5x10, Black Steel	3	3
㉑	NSS*	VDS4- Fan Assembly	1	1
㉒	NSS*	Washer, 11/32 x 3/4 x 1/8	1	1
㉓	NSS*	Screw, Socket Head Cap, M8x12, Black Steel	1	1
㉔	MK*	O-ring, Viton 2-140	1	1

MK = Included in major maintenance kit

TSK = Included in tip seal kit

NSS = Not sold separately

Inboard Housing Assembly



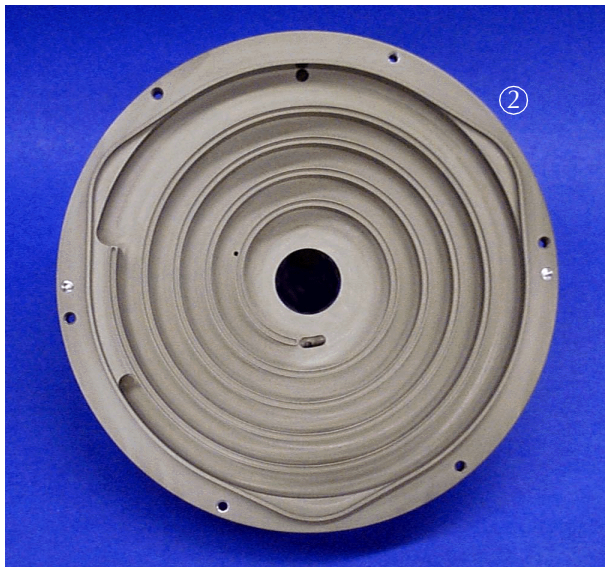
Insert the Shaft Seal

Tools required:

- Arbor press
- Seal installation tool
- Krytox GPL 224 grease

Locate the following parts shown in the photos to the left:

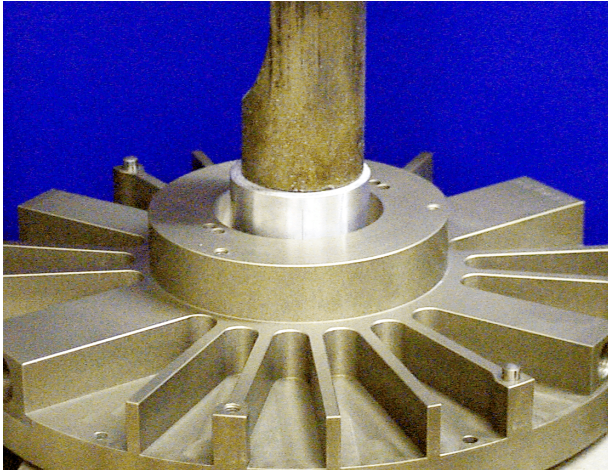
- ① Shaft seal, 32x42x4, included in maintenance kit
- ② Inboard housing



Inboard Housing Assembly (continued)



1. Using Krytox GPL 224, grease the inner diameter of the shaft seal between its lips.



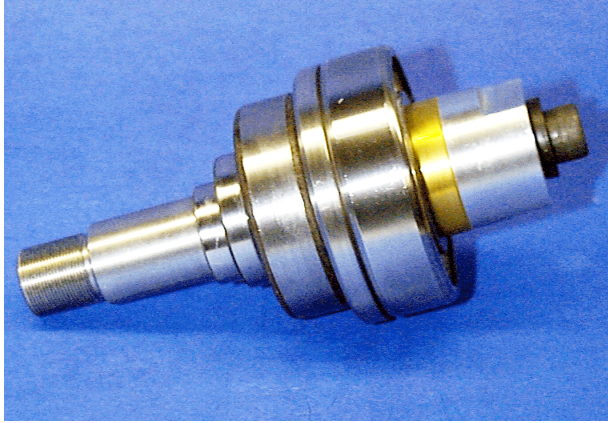
2. Using the seal insertion tool, press the shaft seal (32x42x4) into the bore of inboard housing from the fin side.

Observe Proper Orientation



↓
Into Bore

Inboard Housing Assembly (continued)



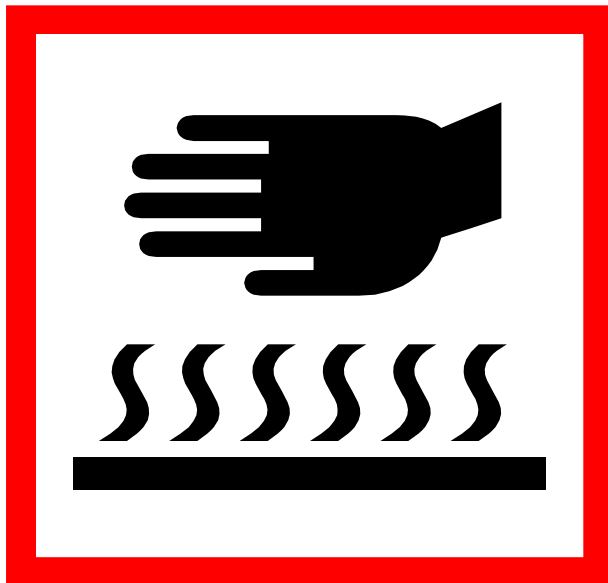
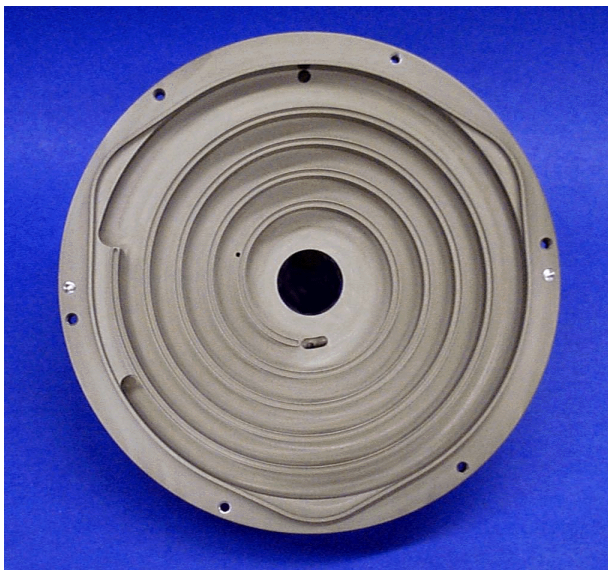
Insert the Crankshaft

Tools required:

- Cooling stand
- Gloves

Locate the following items:

- Crankshaft assembly
- Inboard housing

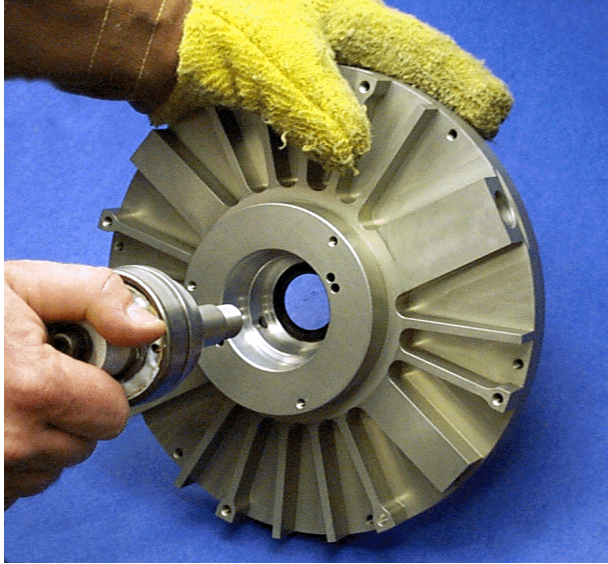


WARNING *This step requires the use of heat resistant gloves. Do not proceed without them!*



1. Heat the inboard housing for a minimum of 1 hour in a 350 °F oven.

Inboard Housing Assembly (continued)



WARNING *Assembly is hot. Use heat resistant gloves for this step.*



2. Immediately after removing the inboard housing from oven, push the crankshaft assembly into the inboard housing, external threads first.



3. Place assembly in cooling stand and allow to air cool.

CAUTION *Be careful not to let crankshaft drop out.*



Inboard Housing Assembly (continued)



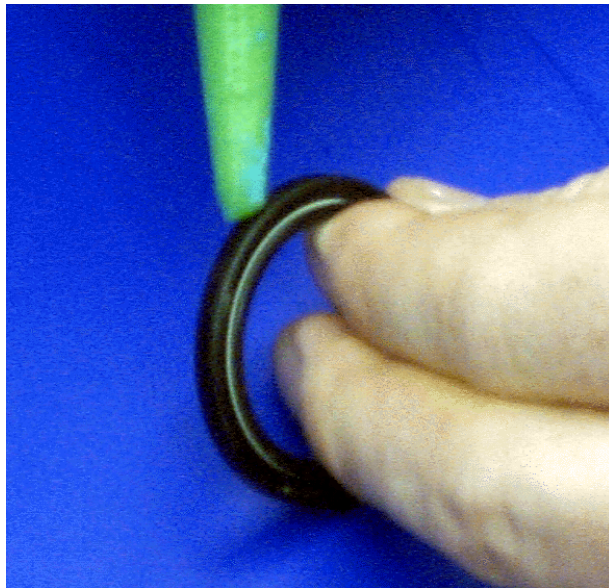
Insert the Seal Housing

Tools required:

- Allen wrench
- Seal installation tool
- Krytox GPL 224 grease
- Locite[®] 242

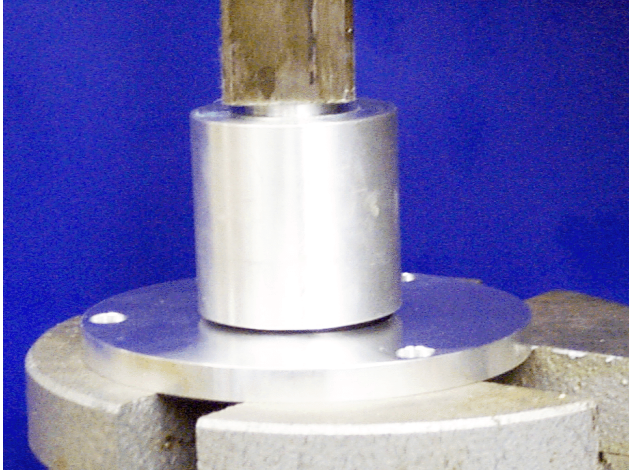
Locate the following parts shown in the photo on the left:

- ① Seal housing
- ② Shaft seal, 32x42x4, included in maintenance kit
- ③ M5x10 screw (3)
- ④ O-ring, 2-152, included in maintenance kit
- ⑤ O-ring, 2-140, included in maintenance kit



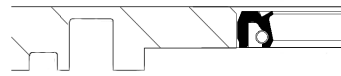
1. Spread a thin film of Locite[®] 242 onto the outer surface of the shaft seal, (32x42x4).

Inboard Housing Assembly (continued)



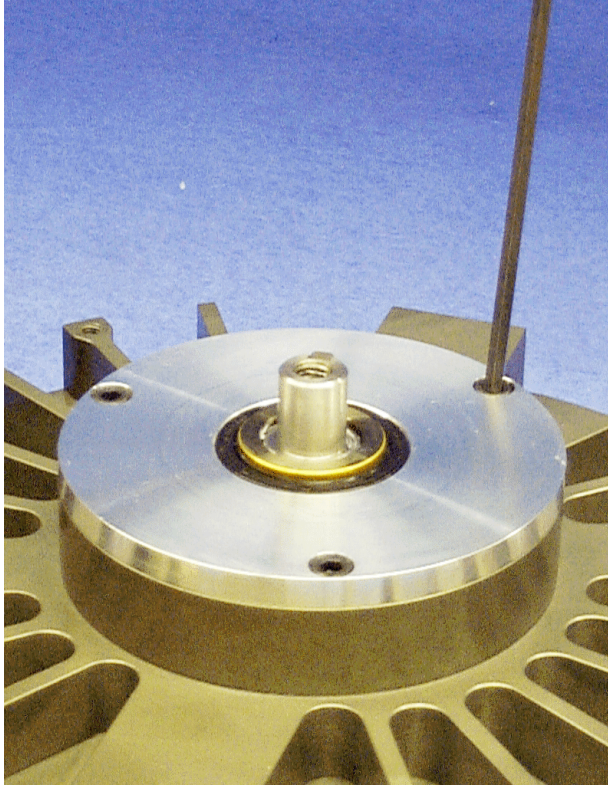
2. Press the shaft seal into the seal housing.

Observe Proper Orientation



3. Using Krytox GPL 224, grease the inner diameter of the shaft seal between lips.
4. Remove the screw, washer and bearing pre-load tool from crankshaft.
5. Lightly grease the 2-152 O-ring and insert it into the outer groove on the seal housing.
6. Lightly grease the 2-140 O-ring and insert it into the middle groove on the seal housing.

Inboard Housing Assembly (continued)



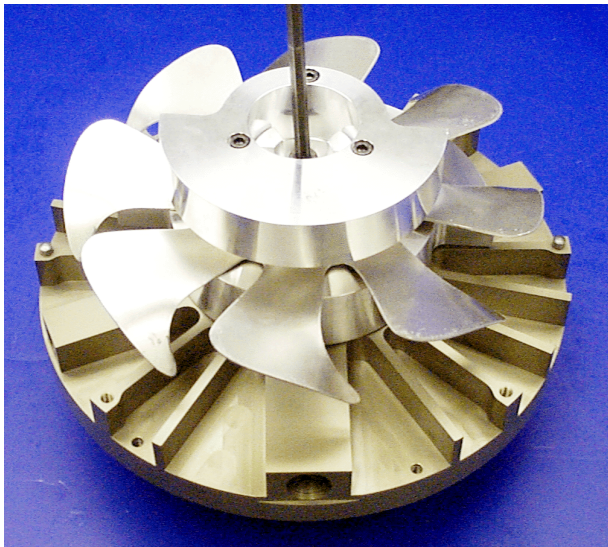
7. Secure the seal housing to the inboard housing with three M5x10 screws.
8. Tighten the screws to 75 in-lb.

CAUTION



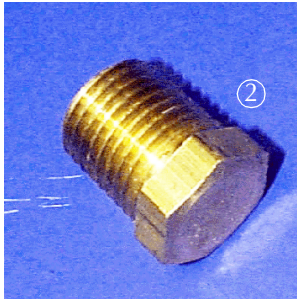
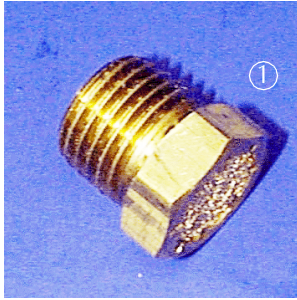
Avoid damage to the seal. Carefully rocking the seal housing onto the crankshaft will avoid damage to the seal during installation.

9. Place the key into the slot in the crankshaft.



10. Slide the fan assembly onto the crankshaft, engaging the key and against the seal spacer.
11. Secure with the M8x12 screw and washer previously removed (see page 22).
12. Tighten screws to 250 in-lb.

Inboard Housing Assembly (continued)



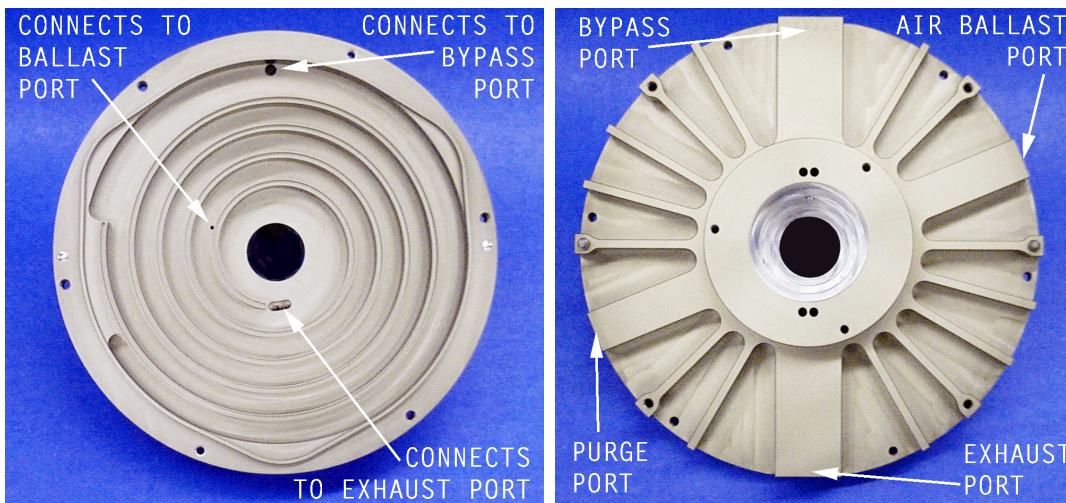
Install the Vents and Plugs

Tools required:

- ❑ 14 mm wrench
- ❑ Loctite PST 567 pipe sealant, included in maintenance kit

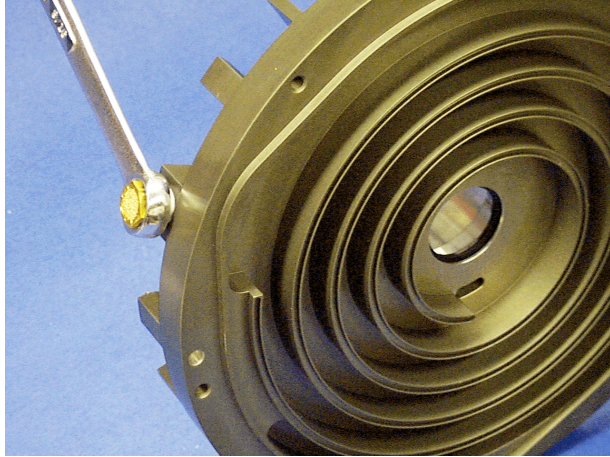
Locate the following parts:

- ① Breather Vent, PTS03001UNIV and PTS03003UNIV, 1 required
- ② 1/4 NPT brass plug, PTS03001UNIV and PTS03003UNIV, 1 required
PTS03101UNIV and PTS03103UNIV, 2 required



Inboard Housing Port Definition

Inboard Housing Assembly (continued)



PTS03001UNIV and PTS03003UNIV *only*

1. Apply a small amount of Loctite PST 567 pipe sealant to the first few threads of breather vent.
2. Insert and tighten the breather vent into the air ballast port.

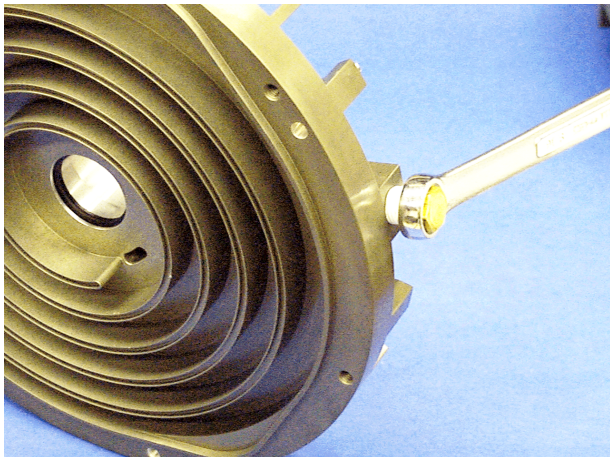
PTS03101UNIV and PTS03103UNIV *only*

1. Apply a small amount of Loctite PST 567 pipe sealant to the first few threads of 1/4 NPT brass plug.
2. Insert the plug into the air ballast port and tighten.

NOTE



The photo shows a breather vent being installed into the air ballast port.



3. Apply a small amount of Loctite PST 567 pipe sealant to the first few threads of the second 1/4 NPT brass plug.
4. Insert the plug into the bearing purge port and tighten.

Inboard Housing Assembly (continued)

Exhaust Port Reassembly

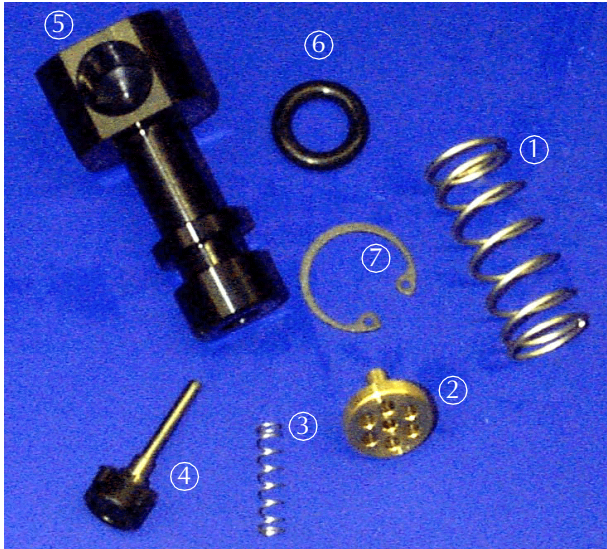
PTS03001UNIV and PTS03003UNIV only

Tools required:

- ❑ Right angle snap ring pliers
- ❑ Krytox GPL 224 grease

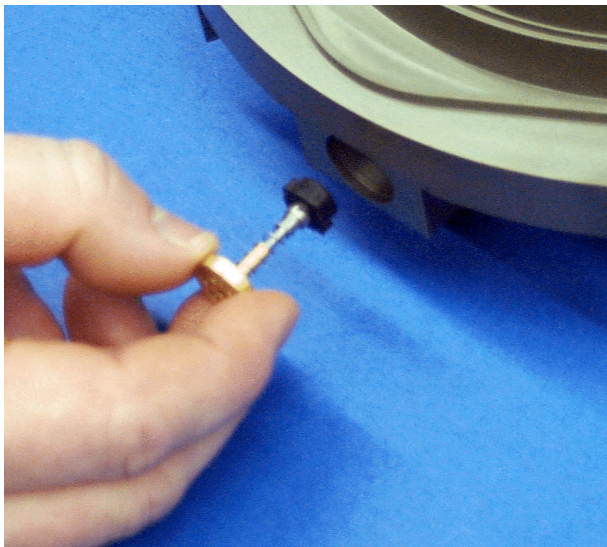
Locate the following parts:

- ① Spring, large
- ② Plunger guide
- ③ Spring, small
- ④ Check valve assembly
- ⑤ Exhaust fitting
- ⑥ O-ring, 2-205, included in maintenance kit
- ⑦ Snap ring

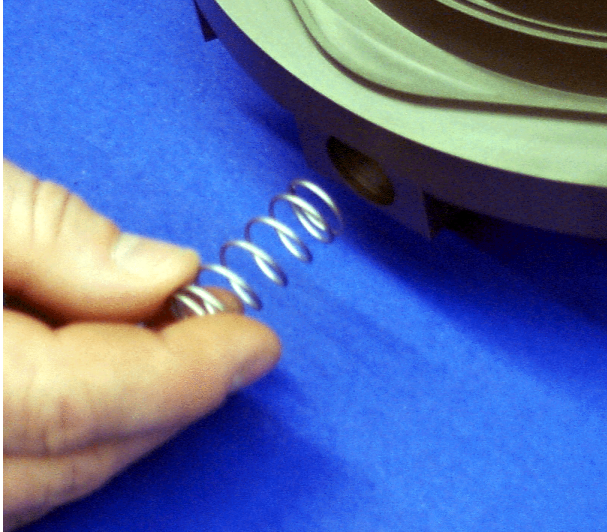


PTS03001UNIV and PTS03003UNIV only

1. Place the small spring onto the plunger guide.
2. Place the check valve onto the plunger guide.
3. Insert the check valve assembly, check valve first, into the exhaust port on the inboard housing.
4. Observe the proper orientation as shown in photo on the left.

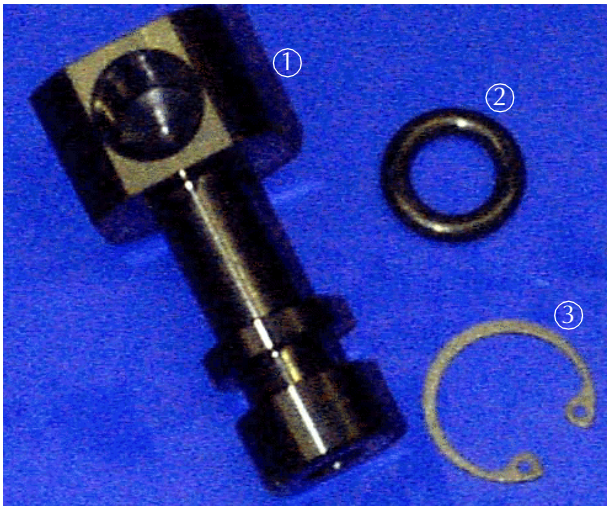


Inboard Housing Assembly (continued)



PTS03001UNIV and PTS03003UNIV *only*

- ❑ Insert the larger spring into the exhaust port, pushing against the plunger guide.



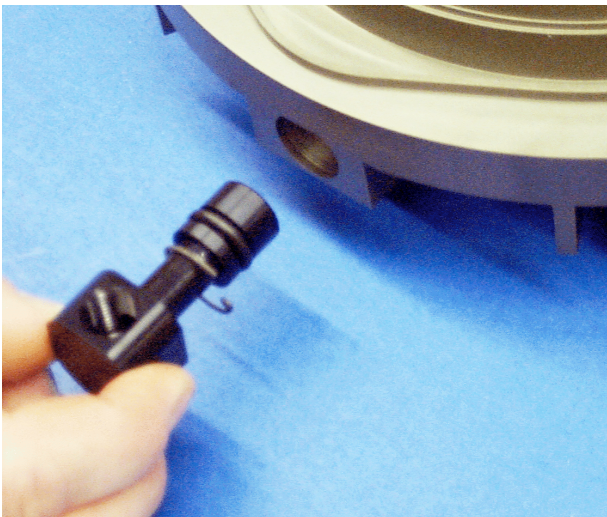
PTS03101UNIV and PTS03103UNIV *only*

Tools required:

- ❑ Right angle snap ring pliers
- ❑ Krytox GPL 224 grease

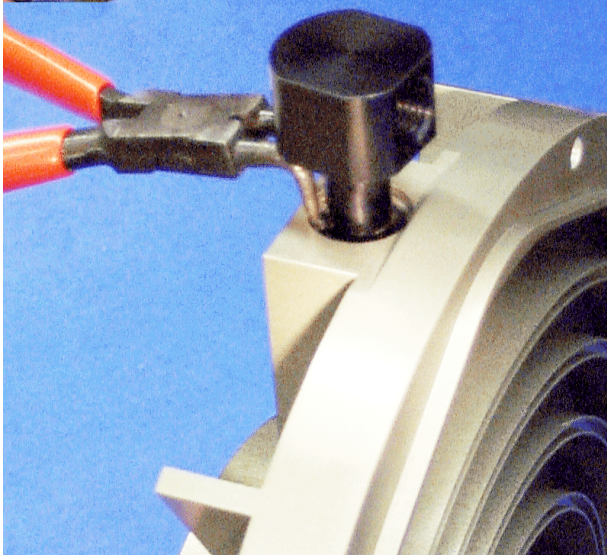
Locate the following parts:

- ① Exhaust fitting
- ② O-ring, 2-205, included in maintenance kit
- ③ Snap ring

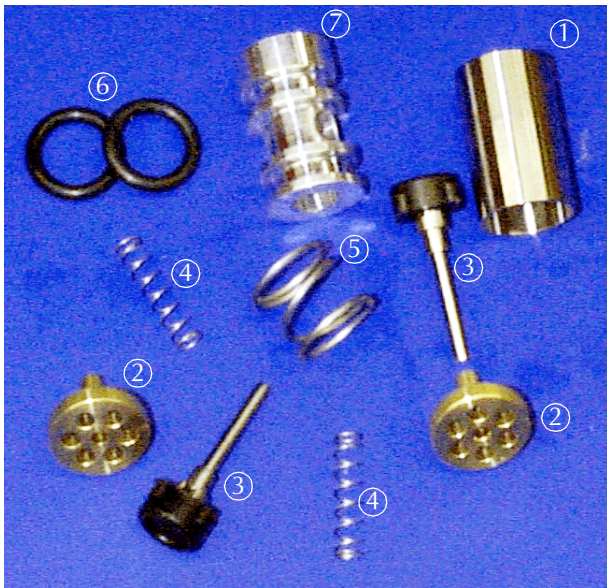


1. Lightly grease the O-ring, then install it in the groove on exhaust fitting.
2. Place the snap ring on the exhaust fitting. The snap ring must be bent slightly to fit around the exhaust fitting.

Inboard Housing Assembly (continued)



3. Push the exhaust fitting into the exhaust port and against the spring.
4. Secure it by inserting the snap ring into the groove in the exhaust port.



Bypass Port Reassembly

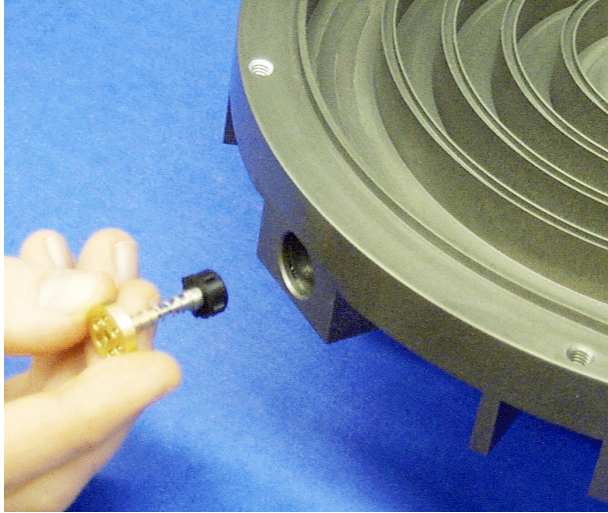
Tools required:

- ❑ Right angle snap ring pliers
- ❑ Bypass plug insertion tool
- ❑ Krytox GPL 224 grease

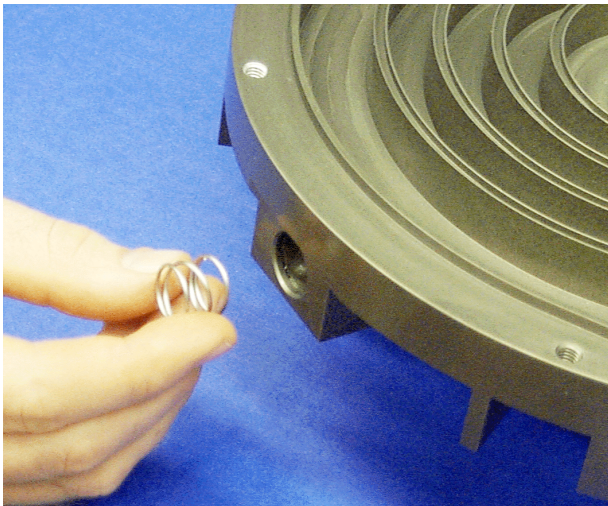
Locate the following parts:

- ① Check valve spacer
- ② Plunger guide (2)
- ③ Check valve assembly (2)
- ④ Spring, small (2)
- ⑤ Spring, large
- ⑥ O-rings, 2-111 (2), included in maintenance kit.
- ⑦ Check valve plug
Snap ring (not shown)

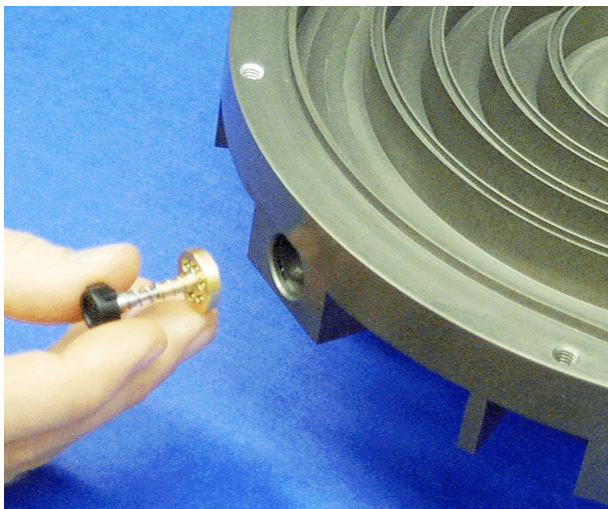
Inboard Housing Assembly (continued)



5. Place the small spring onto the plunger guide.
6. Place the check valve onto the plunger guide.
7. Insert the check valve assembly, check valve first, into the exhaust port on the inboard housing.
8. Observe the proper orientation as shown in the photo on the left.

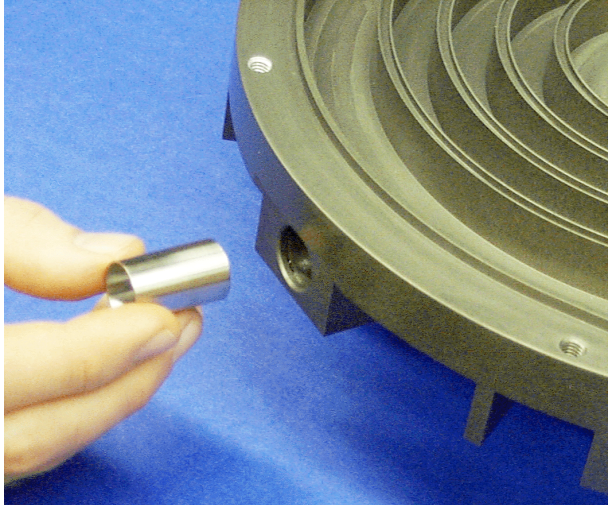


9. Insert the large spring into the bypass port, pushing against the plunger guide.

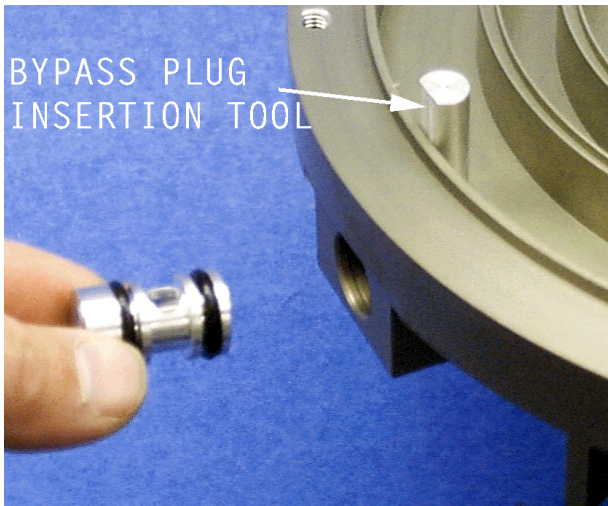


10. Place the small spring onto the plunger guide.
11. Place the check valve onto the plunger guide.
12. Insert the check valve assembly, plunger guide first, into the exhaust port on the inboard housing.
13. Observe the proper orientation as shown in the photo on the left.

Inboard Housing Assembly (continued)



14. Insert the check valve spacer into bypass port around the check valve assembly until it pushes against plunger guide.



15. Lightly grease the two O-rings and install them in the grooves on the check valve plug.
16. Insert the bypass plug insertion tool into the guide hole above the post.

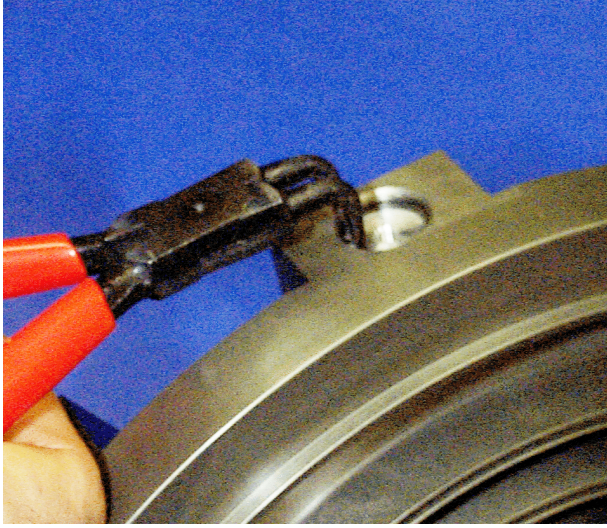
CAUTION



Be careful not to cut the O-ring on the 1/4" diameter cross-port in the bypass of the inboard housing. Use the bypass plug insertion tool.

17. Insert the check valve plug into bypass port against the check valve spacer.
18. Observe the proper orientation as shown in photo on the left.

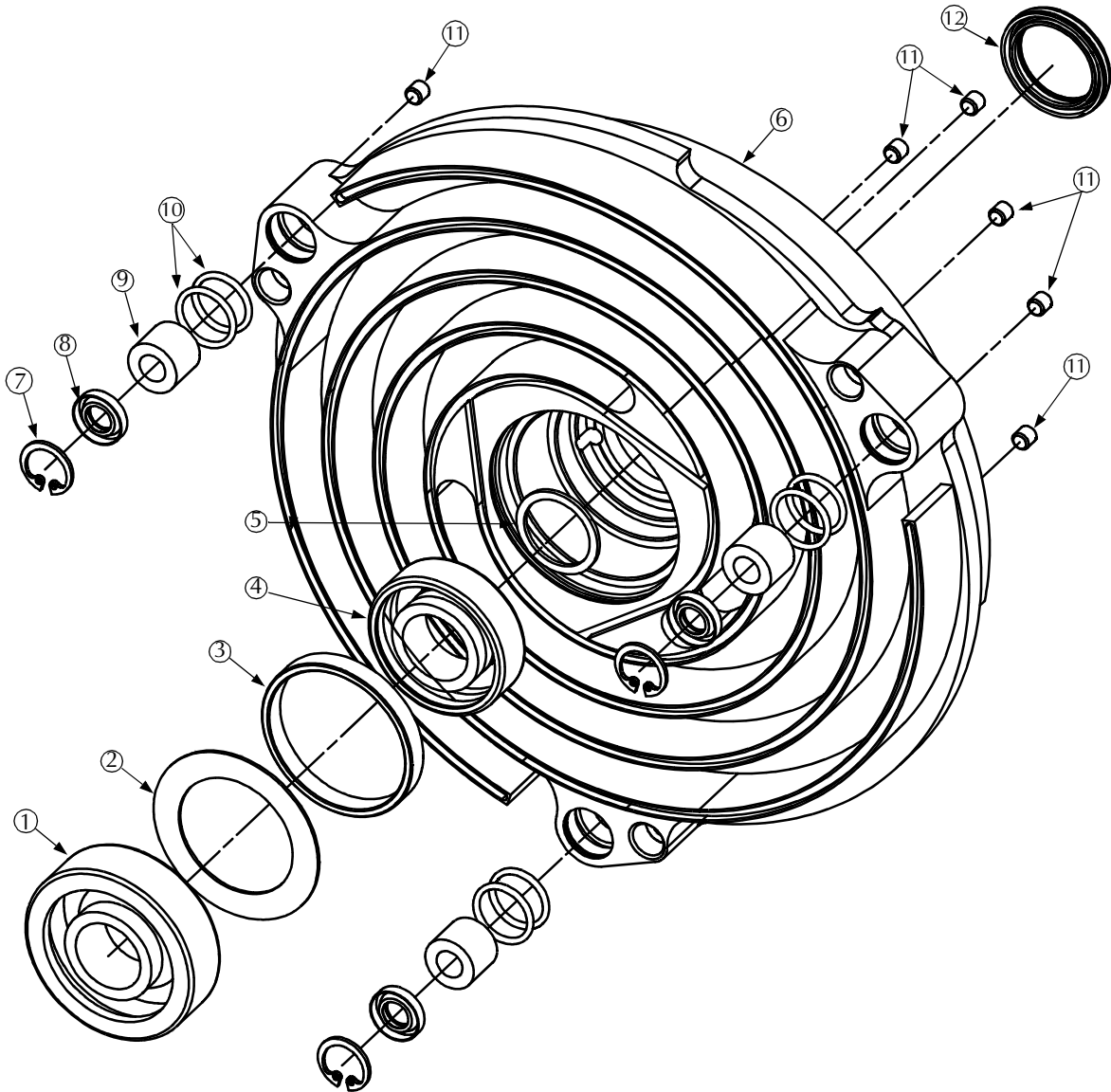
Inboard Housing Assembly (continued)



19. Secure the check valve plug by inserting the snap ring into the bypass port groove.

Orbiting Plate Assembly

Orbiting Plate Exploded View



TriScroll 300 Dry Scroll Vacuum Pump

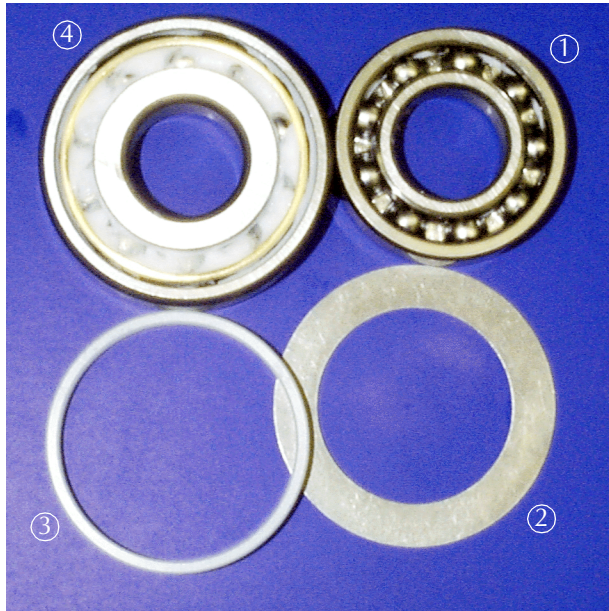
Callout	Part Number	Description	Quantity
①	MK*	7304WN SU Bearing	1
②	S4729001	VDS4- Orbiting Spacer	1
③	MK*	VDS4- Nylon Sleeve	1
④	MK*	J9104P x1527 Bearing	1
⑤	S4758001	Wave Washer - Nested	1
⑥	NSS*	VDS4- Center Orbiting Plate	1
⑦	NSS*	DIN472-0150 Snap Ring	3
⑧	MK*	Shaft Seal, 8x15x3	3
⑨	MK*	NK 8/12 Needle Bearing	3
⑩	MK*	2-016 Viton O-ring	6
⑪	NSS*	M5x5 Set Screw	6
⑫	MK*	Shaft Seal 24x32x4	1

MK = Included in major maintenance kit

TSK = Included in tip seal kit

NSS = Not sold separately

Orbiting Plate Assembly



Install the Bearing Assembly

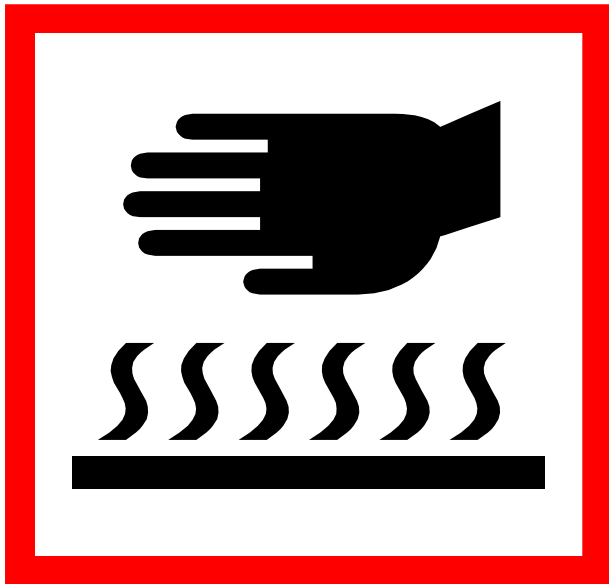
Tools required:

- ❑ Heat resistant gloves
- ❑ Orbiting plate fixture

Locate the following parts:

- ① J9104P bearing, included in maintenance kit
- ② Nylon sleeve, included in maintenance kit
- ③ Orbiting spacer
- ④ 7304WN SU bearing, included in maintenance kit

Orbiting plate (not shown in photo)



WARNING *This step requires the use of heat resistant gloves. Do not proceed without them!*



1. Heat the orbiting plate for a minimum of 1 hour in 350 °F oven. While the orbiting plate is heating, prepare the bearing fixture. The posts of the orbiting plate bearing fixture have two different sized bottom disks. Use the end that has the larger of the bottom disks.
2. Remove the nut and the seal with the larger bottom disk from the fixture in preparation for sealing the assembly.

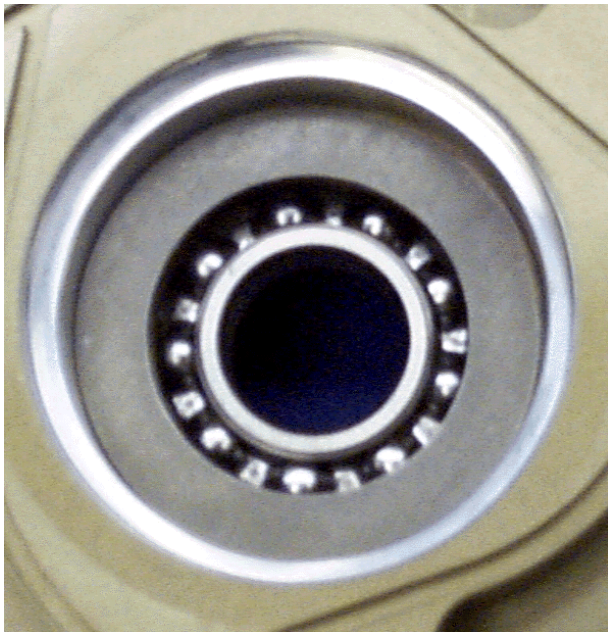
Orbiting Plate Assembly (continued)



WARNING *Assembly is hot, use heat resistant gloves.*



3. Immediately after removing the orbiting plate from the oven, insert the J9104P bearing, sealed side toward the bore.

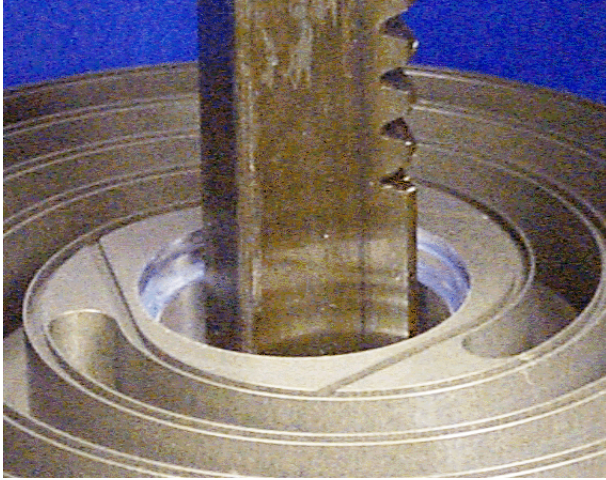


WARNING *Assembly is hot, use heat resistant gloves.*



4. Immediately, and while the orbiting plate is still hot, drop the nylon sleeve into bore and around the J9104P bearing.
5. Drop the orbiting spacer on top of the nylon sleeve.

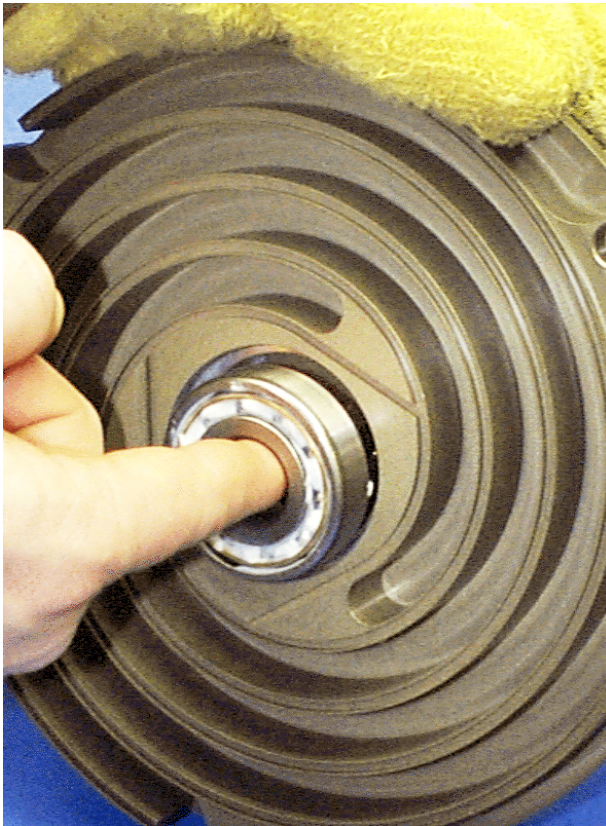
Orbiting Plate Assembly (continued)



WARNING *Assembly is hot, use heat resistant gloves.*



6. Using an arbor press, press against the orbiting spacer until it is flush with the open end of the J9104P bearing.

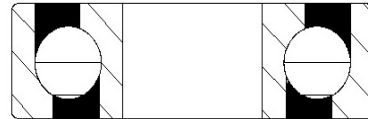


WARNING *Assembly is hot, use heat resistant gloves.*



7. Immediately, while orbiting plate is still hot, insert the 7304WN SU bearing into the bore and against the orbiting spacer.

Observe Proper Orientation



↓
Toward Bore

Orbiting Plate Assembly (continued)



8. Immediately, while the orbiting plate is still hot, place the orbiting plate onto the post of the orbiting plate fixture that has the larger bottom disk.
9. Place the large seal and the locking nut onto the post and tighten the entire assembly.

WARNING *Assembly is hot, use heat resistant gloves.*



10. Allow the orbiting plate to air cool completely.
11. Once it is cooled, remove the orbiting plate from the orbiting plate fixture.
12. Replace the seal and tighten the nut onto the orbiting plate fixture.



Install the Wave Washer and Shaft Seal

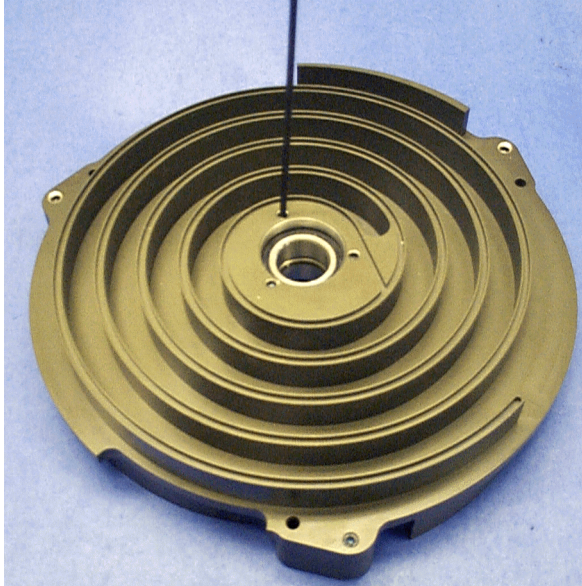
Tools required:

- Allen wrench
- Arbor press
- Seal installation tool
- Krytox GPL 224 grease
- Loctite 242

Locate the following parts:

- ① Wave washer - nested
- ② M5x5 set screw (6)
- ③ Shaft seal, 24x32x4, included in maintenance kit

Orbiting Plate Assembly (continued)

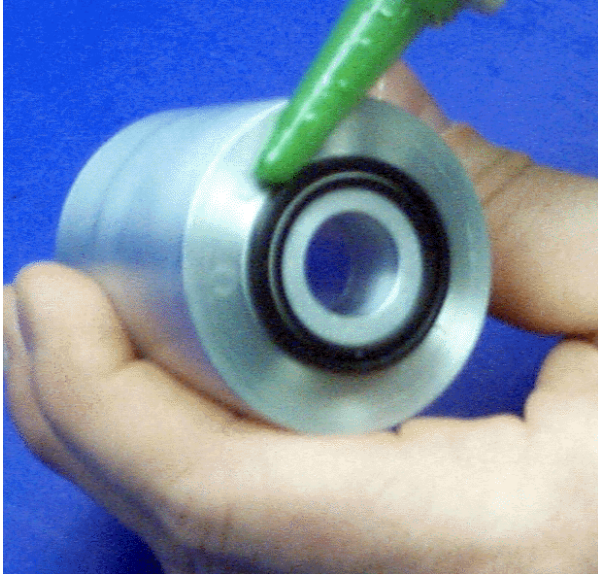


1. Apply a small amount of Loctite 242 to the lower threads of the six M5x5 screws, then install one screw into each threaded hole in the orbiting plate.
2. Tighten the screws until they are slightly below the surface.

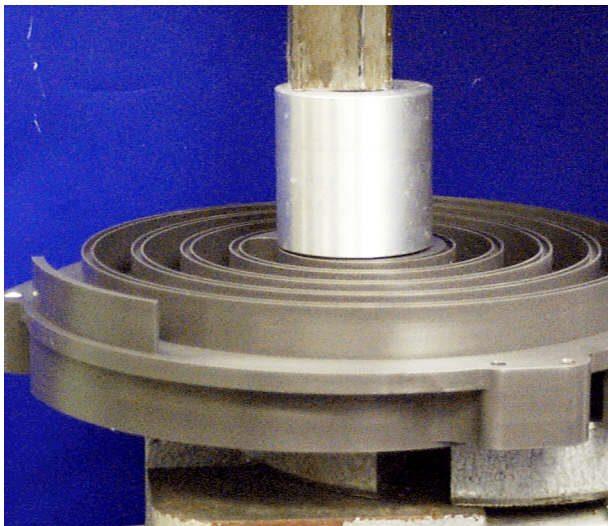


3. Install the wave washer into the orbiting plate.

Orbiting Plate Assembly (continued)



4. Apply a thin film of Loctite 242 to the outer edge of the shaft seal.



5. Place the shaft seal onto the shaft seal installation tool.
6. Using the shaft seal installation tool, press the shaft seal into the orbiting plate.

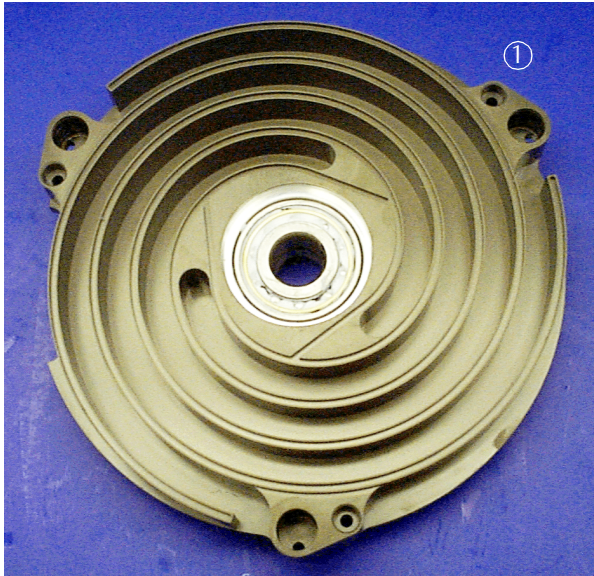
Observe Proper Orientation



Toward Bore

7. Apply Krytox GPL 224 to the inner diameter of the seal between the lips.

Orbiting Plate Assembly (continued)



Install the Needle Bearings

Tools required:

- ❑ Right angled snap ring pliers
- ❑ Krytox GPL 224 grease

Locate the following part in the photo on the left:

- ① Orbiting plate



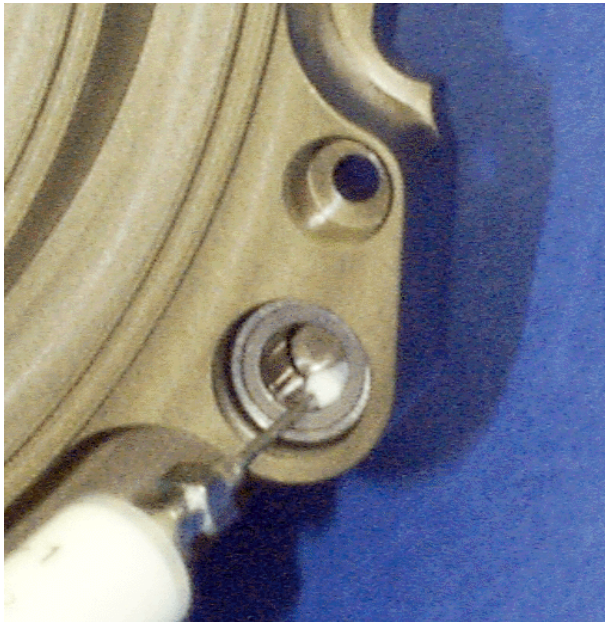
Locate the following parts in the photo on the left:

- ① Snap rings (3)
- ② O-rings, 2-016 (6), included in maintenance kit
- ③ Needle bearing (3), included in maintenance kit
- ④ Shaft seals, 8x15x3 (3), included in maintenance kit

Orbiting Plate Assembly (continued)

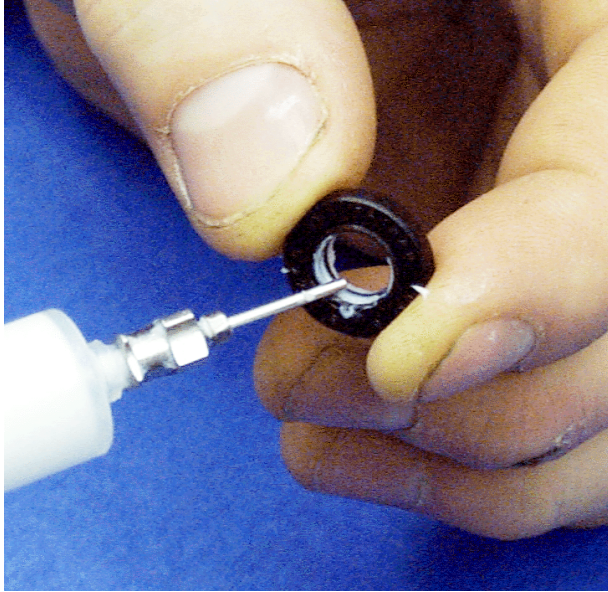


1. Lightly grease the O-rings, then insert them into the two grooves in each of three sync crank bearing bores in the orbiting plate.
2. Push one needle bearing into each bearing bore.



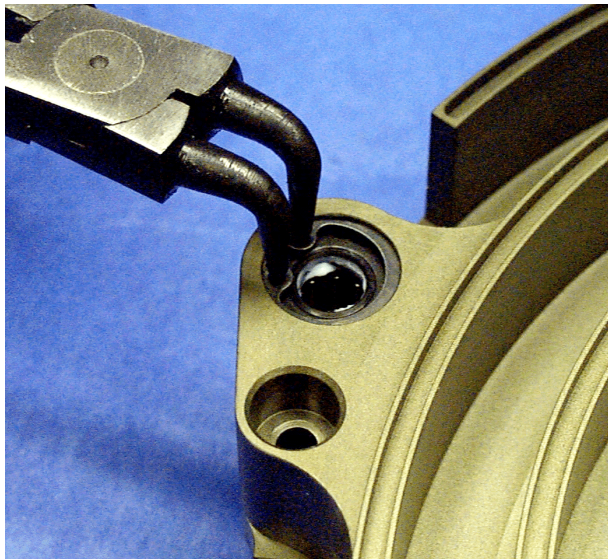
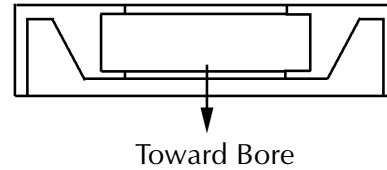
3. Squeeze a 1/4" diameter dot of Krytox into each of the three needle bearings.
4. Smear grease over all the needles.

Orbiting Plate Assembly (continued)



5. Coat the lips of the three shaft seals with grease.
6. Insert one shaft seal into each bore against the needle bearing.

Observe Proper Orientation



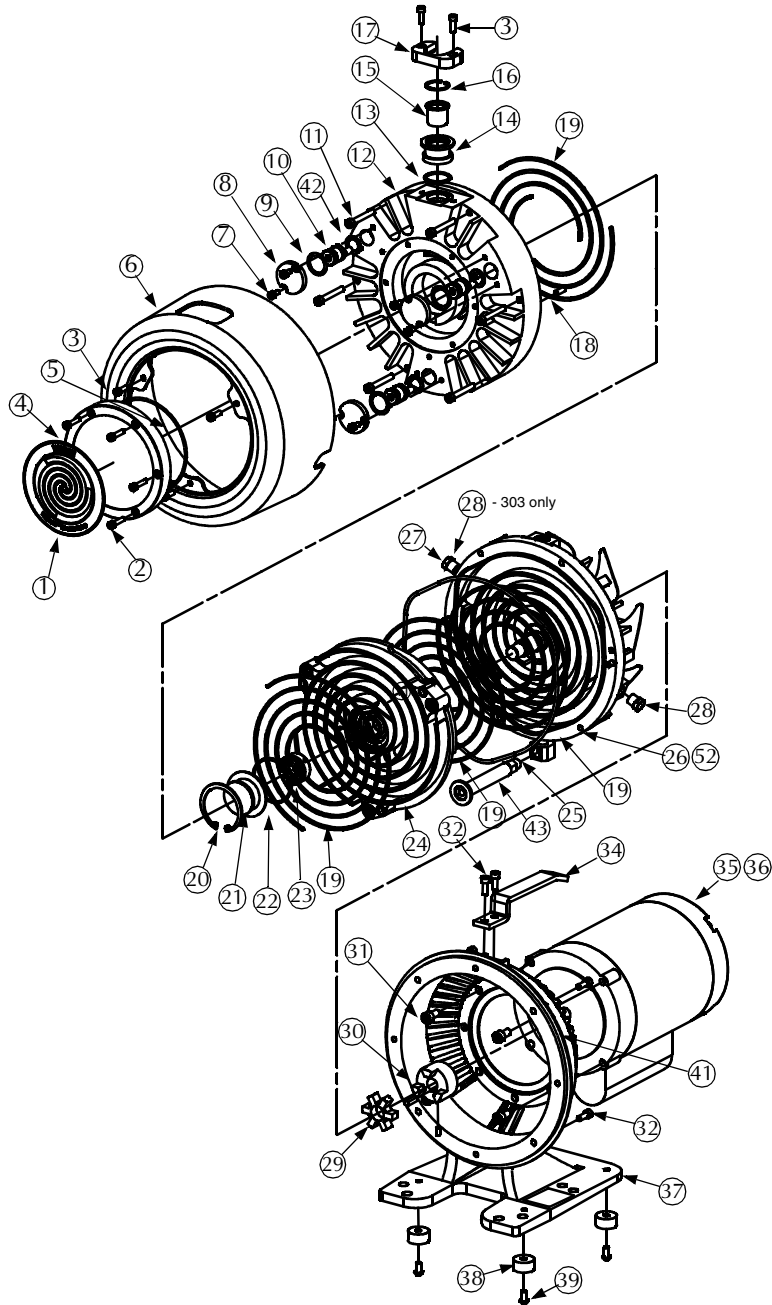
7. Secure the sync crank by inserting the snap ring into the bearing bore groove.

TriScroll 300 Dry Scroll Vacuum Pump

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TriScroll 300 Assembly

TriScroll 300 Exploded View



TriScroll 300 Dry Scroll Vacuum Pump

Callout	Part Number	Description	Quantity			
			PTS03103UNIV	PTS03101UNIV	PTS03003UNIV	PTS03001UNIV
①	S4744001	TriScroll Pump Front Label	1	1	1	1
②	NSS*	M5x22 SHCS, Black Steel	6	6	6	6
③	NSS*	M5x16 SHCS, Black Steel	5	5	5	5
④	S4703001	VDS4 - Outboard Cover	1	1	1	1
⑤	MK*	2-157 Viton O-ring	1	1	1	1
⑥	S4705001	VDS4 - Cowling	1	1	1	1
⑦	NSS*	M5x10 SHCS, Black Steel	6	6	6	6
⑧	S4717001	VDS4 - Sync Crank Cover	3	3	3	3
⑨	MK*	2-118 Viton O-ring	3	3	3	3
⑩	MK*	VDS4 - Sync Crank Assembly	3	3	3	3
⑪	NSS*	M6x45 SHCS, Black Steel	6	6	6	6
⑫	NSS*	VDS4 - Outboard Housing	1	1	1	1
⑬	MK*	2-121 Viton O-ring	1	1	1	1
⑭	S4709001	VDS4 - NW25 Intake Fitting	1	1	1	1
⑮	S4724001	VDS4 - Intake Screen	1	1	1	1
⑯	NSS*	N5000-106 Snap Ring	1	1	1	1

MK = Included in major maintenance kit

TSK = Included in tip seal kit

NSS = Not sold separately

TriScroll 300 Dry Scroll Vacuum Pump

Callout	Part Number	Description	Quantity			
			PTS03103UNIV	PTS03101UNIV	PTS03003UNIV	PTS03001UNIV
⑰	S4708001	VDS4- Intake Clamp	1	1	1	1
⑱	NSS*	M6x16 Steel Dowel Pin	2	2	2	2
⑲	MK* & TSK*	VDS4 - Tip Seal	1	1	1	1
⑳	NSS*	N5000-225 Snap Ring	1	1	1	1
㉑	S4719001	VDS4- Orbiting Cup	1	1	1	1
㉒	MK* & TSK*	2-137 Viton O-ring	1	1	1	1
㉓	617919032	Spieth Locknut	1	1	1	1
㉔	NSS*	VDS4- Orbiting Plate Assembly	1	1	1	1
㉕	MK* & TSK*	2-269 Viton O-ring	1	1	1	1
㉖	NSS*	TS300 Inboard Assembly	-	-	1	1
㉗	642971040	Breather Vent	-	-	1	1
㉘	NSS*	1/4 Brass Plug	2	2	1	1
㉙	670086120	Spider, L075 Open	1	1	1	1
㉚	622471058	Coupling, L075 W/15 mm Key	1	1	1	1
㉛	NSS*	M8x16 SHCS	4	4	4	4
㉜	NSS*	M6x16 SHCS	6	6	6	6
㉝	S4721001	VDS4- Handle	1	1	1	1
㉞	S4743001	VDS4- 3/4 HP Single Phase Motor	-	1	-	1

MK = Included in major maintenance kit

TSK = Included in tip seal kit

NSS = Not sold separately

TriScroll 300 Dry Scroll Vacuum Pump

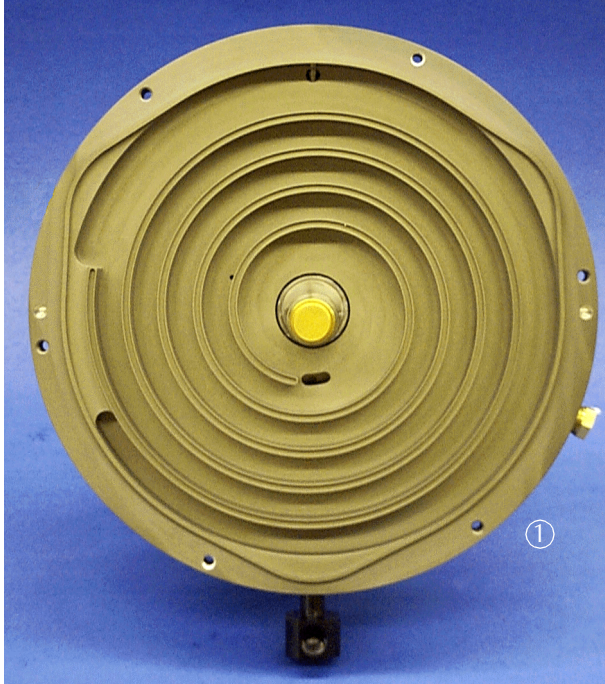
Callout	Part Number	Description	Quantity			
			PTS03103UNIV	PTS03101UNIV	PTS03003UNIV	PTS03001UNIV
③⑥	S4739002	VDS4-3/4 HP 3 Phase Motor	1	-	1	-
③⑦	S4704001	VDS4- Transition Frame	1	1	1	1
③⑧	648099055	Rubber Foot	4	4	4	4
③⑨	NSS*	M6x12 Socket Head Button Screw	4	4	4	4
④①	NSS*	Arrow Decal	1	1	1	1
④②	660288087	SSB-0087, Wave Spring	3	3	3	3
④③	S4707002	VDS4- NW16 Pipe Fitting	-	1	1	1
⑤②	NSS*	TS310 Inboard Assembly	1	1	-	-

MK = Included in major maintenance kit

TSK = Included in tip seal kit

NSS = Not sold separately

Final Assembly

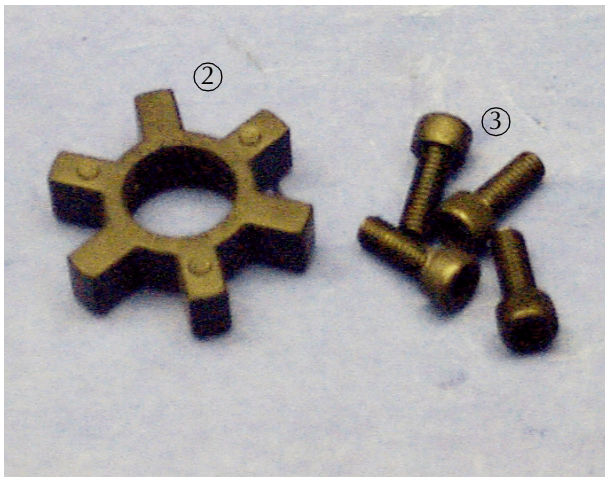


Tools required:

- Allen wrench

Locate the following items:

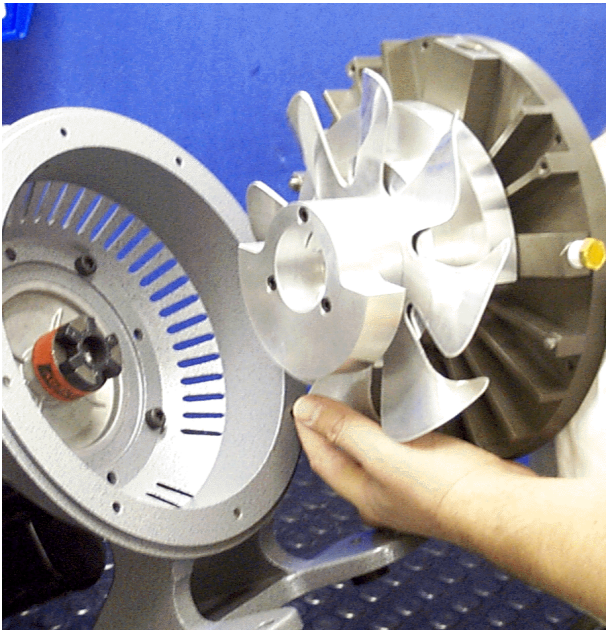
- ① Inboard housing assembly
- ② Spider coupling
- ③ M6x16 screws (4)



Final Assembly (continued)



1. Insert the spider into the motor coupling.



2. Install the inboard assembly into the TriScroll frame, aligning the fingers on the fan assembly with the fingers on the coupling.

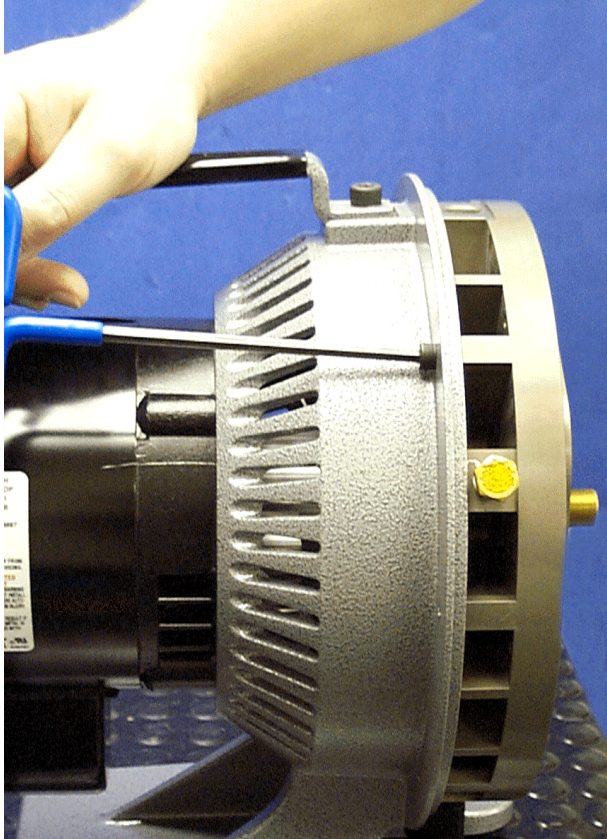
Ensure that the dowel pins fit properly on the mating holes in frame.

NOTE



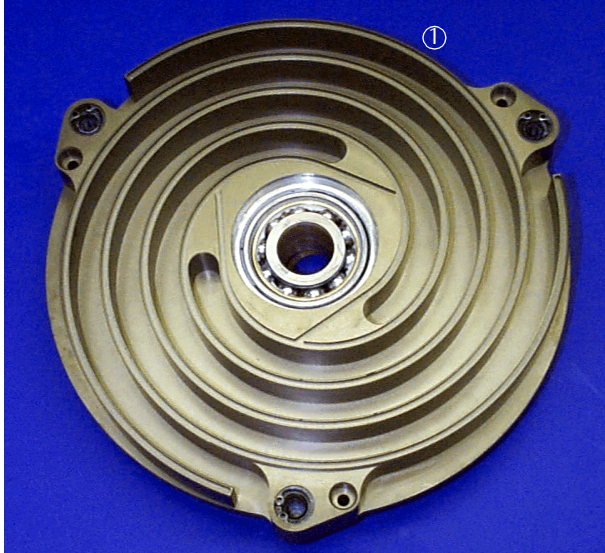
Exhaust fitting located in the downward position.

Final Assembly (continued)



3. Secure the inboard assembly to the frame with the four M6x16 screws.

Final Assembly (continued)



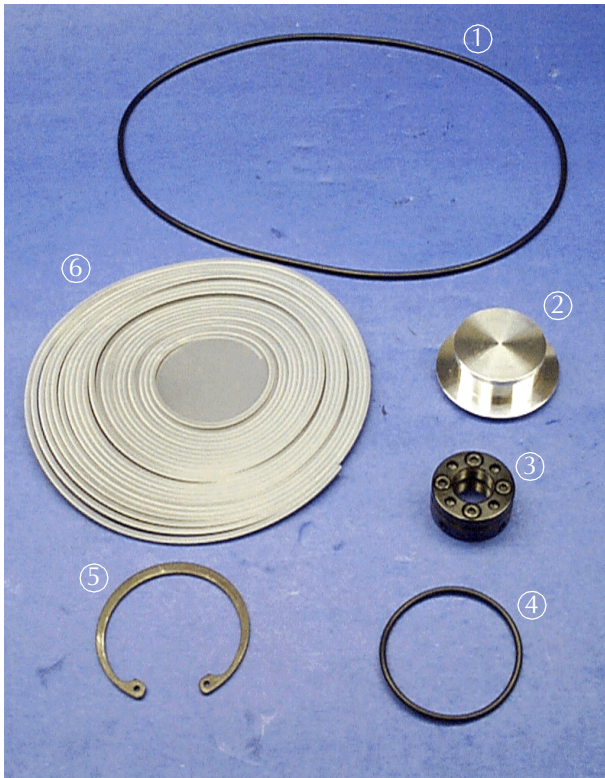
Install the Orbiting Plate

Tool required:

- Locking nut wrench
- Snap ring pliers
- Allen wrench
- Depth Gauge
- Krytox GPL 224 grease

Locate the following parts:

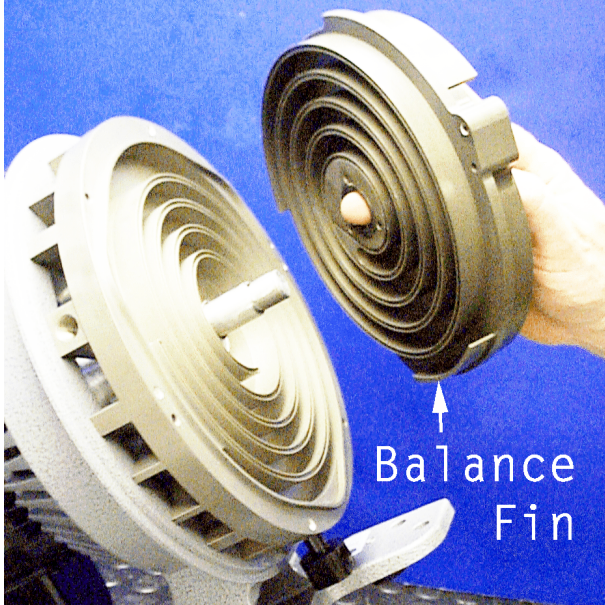
- Orbiting plate assembly



Locate the following parts:

- ① O-ring, large, 2-269, included in maintenance kit
- ② Orbiting cup
- ③ Locking nut
- ④ O-ring, small, 2-137, included in maintenance kit
- ⑤ Snap ring
- ⑥ Tip seals, included in maintenance kit

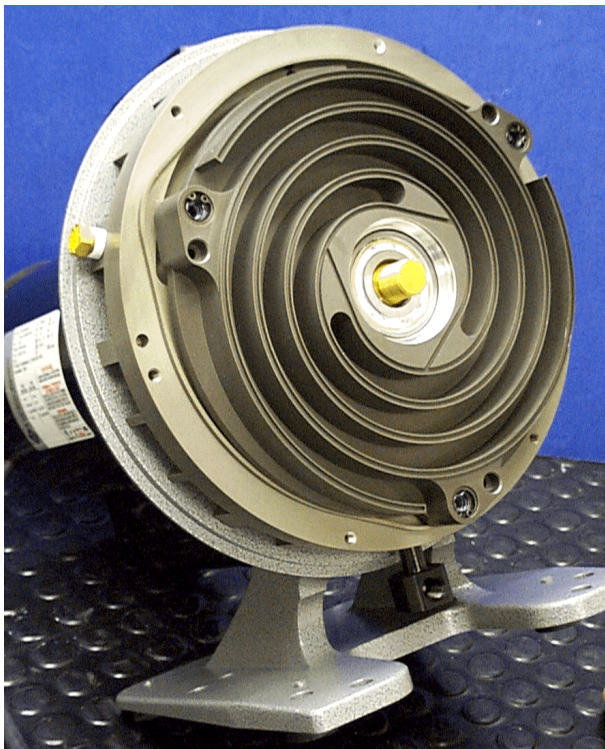
Final Assembly (continued)



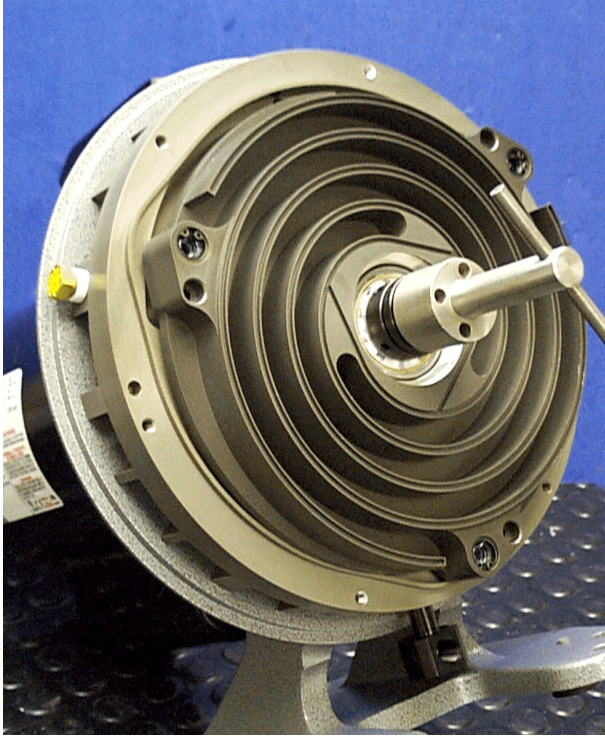
1. Slide the orbiting plate assembly onto the crankshaft and into the inboard housing.



NOTE *The balance fin on the orbiting plate should be oriented in the downward position when sliding the orbiting plate onto the crankshaft and into the inboard housing.*

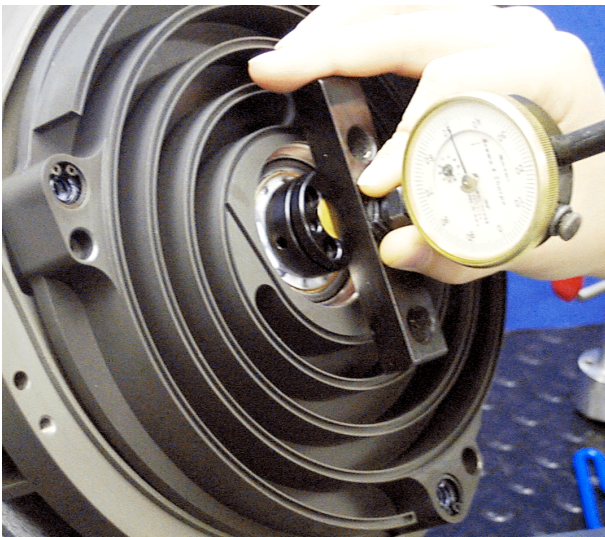


Final Assembly (continued)



2. Remove the four M4x12 locking screws from the locking nut.
3. Secure the orbiting plate with the locking nut.
4. Tighten snugly with locking nut wrench.

CAUTION *Do not overtighten.
Overtightening can cause bearing damage.*

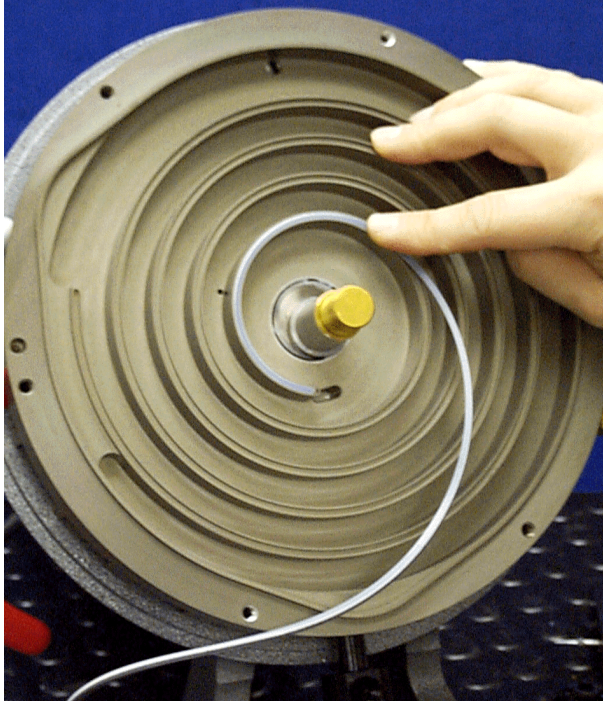


5. Measure the distance from the face of the locking nut to the crankshaft end using the depth gauge.
6. Note and record the distance.

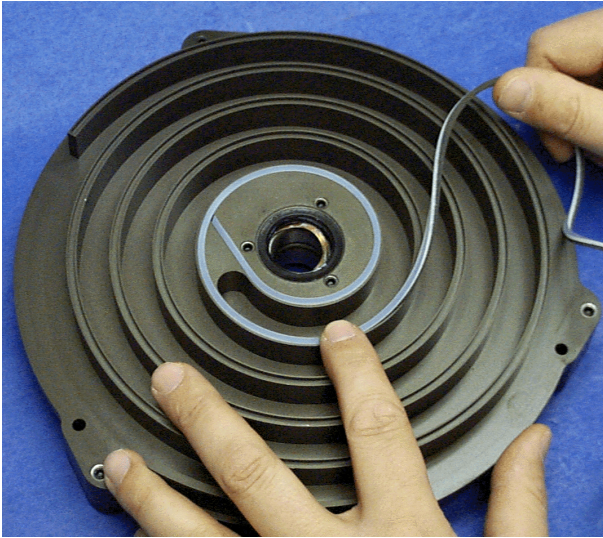
Date _____
Distance _____

7. Disassemble the locking nut and orbiting plate assembly from the inboard assembly.

Final Assembly (continued)

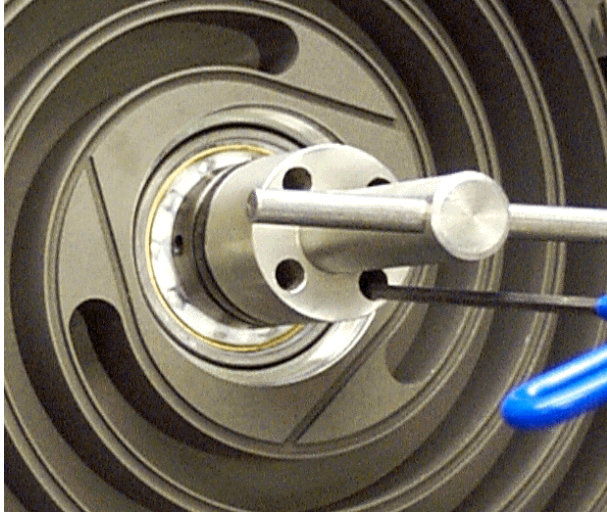


8. Insert the tip seal into the scroll tip grooves on the inboard housing.
9. Cut to the correct length at the end of each groove.



10. Insert the tip seal into the scroll tip grooves on the inboard side of orbiting plate.
11. Cut to the correct length at the end of each groove.

Final Assembly (continued)

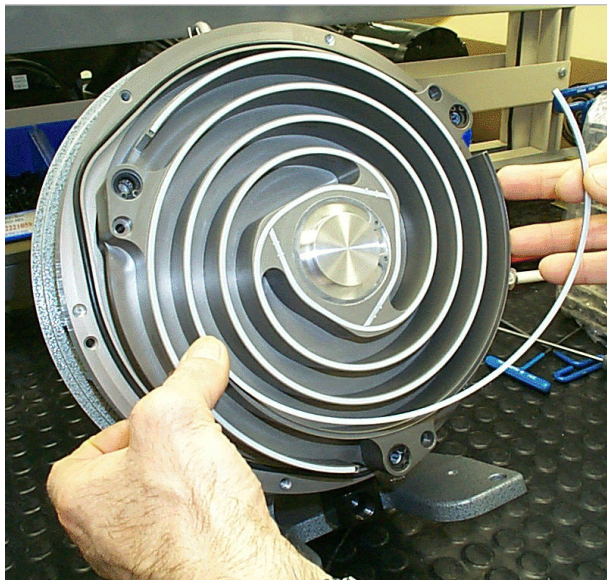


12. Repeat steps 1 through 3 to reassemble the orbiting plate assembly and locking nut on the inboard assembly.
13. Using the locking nut wrench, tighten the locking nut until the distance from the face of the locking nut to the crankshaft end equals the distance noted in step 6 on page 74, plus 0.007 inch.
14. Secure the locking nut by installing the four M4x12 locking screws.
15. Use the locking nut wrench to maintain the locking nut position while tightening the locking screws.

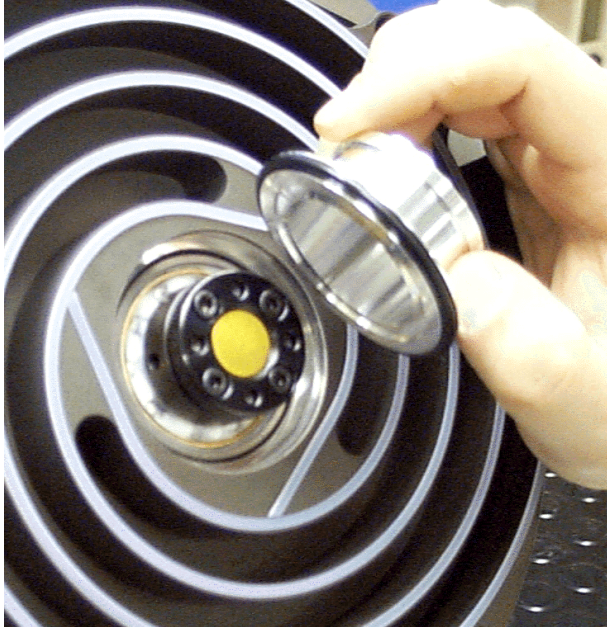
CAUTION *Make sure that the locking nut does not rotate relative to the crankshaft.*



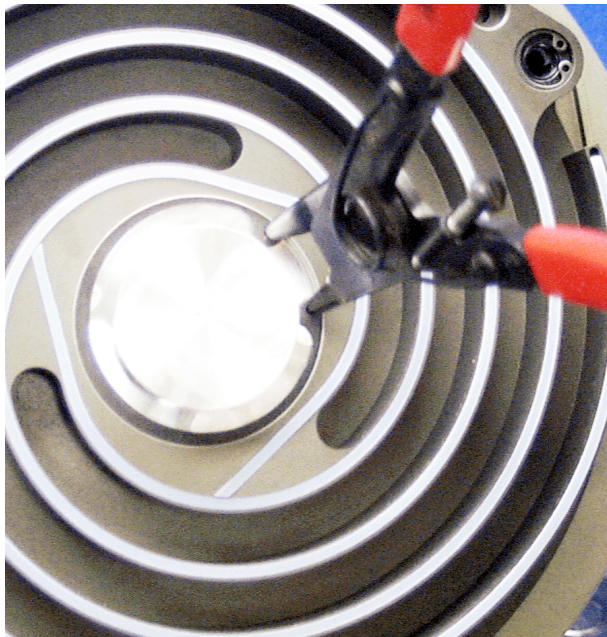
16. Ensure that all four locking screws are tightened to at least 40 in-lb.
17. Insert tip seal in scroll tip grooves on orbiting plate.
18. Cut to length at the end of each groove.



Final Assembly (continued)



19. Lightly grease the O-ring and place it onto the orbiting cup.



20. Insert the orbiting cup into the center of the orbiting plate.

21. Push the orbiting cup into place and hold it securely while engaging the snap ring

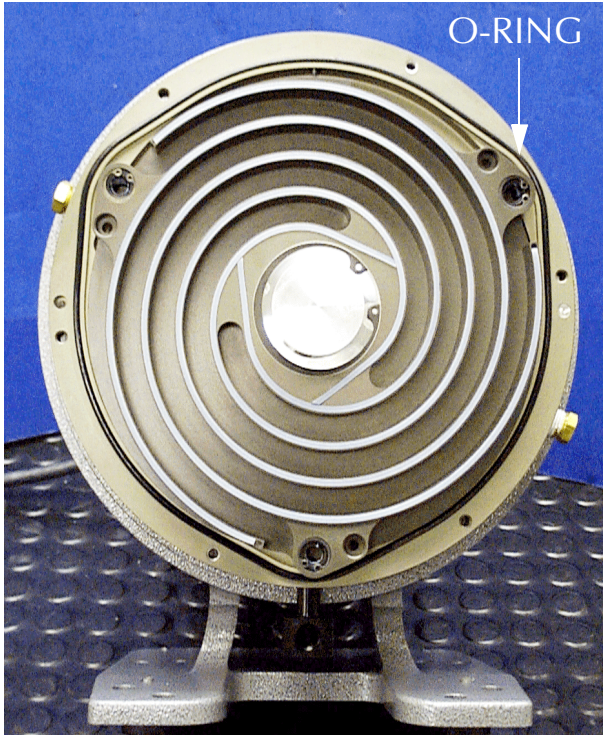
CAUTION



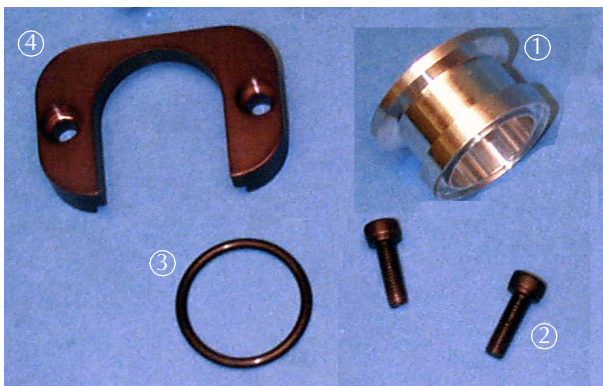
If the orbiting cup slips out prior to installing the snap ring, remove the orbiting cup, re-install the O-ring and re-insert the orbiting cup into the orbiting plate.

Use care not to shear the O-ring while pushing the orbiting cup into the orbiting plate.

Final Assembly (continued)



22. Lightly grease the large O-ring and install it around the lip of the inboard housing.



Install the Outboard Housing

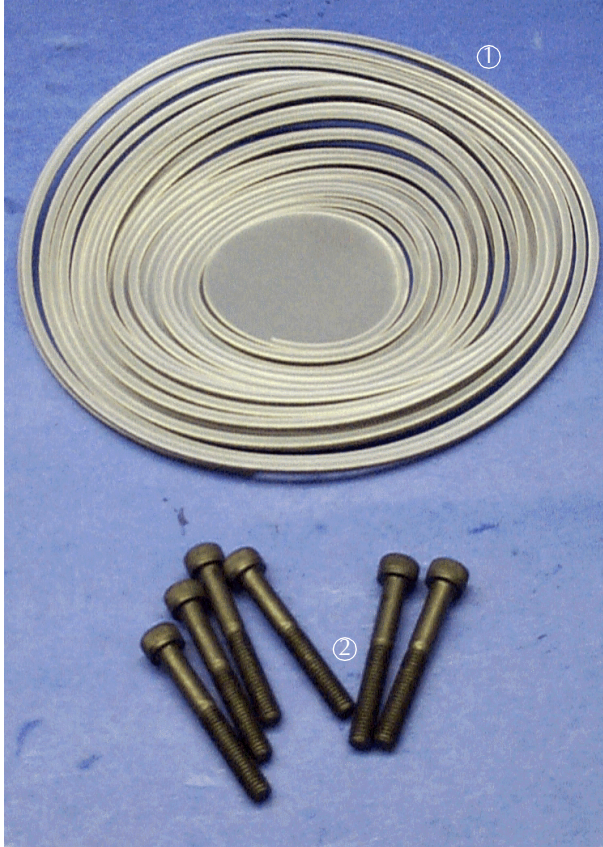
Tools required:

- Snap ring pliers
- Allen wrench
- Krytox GPL 224 grease

Locate the following items shown in the photo to the left:

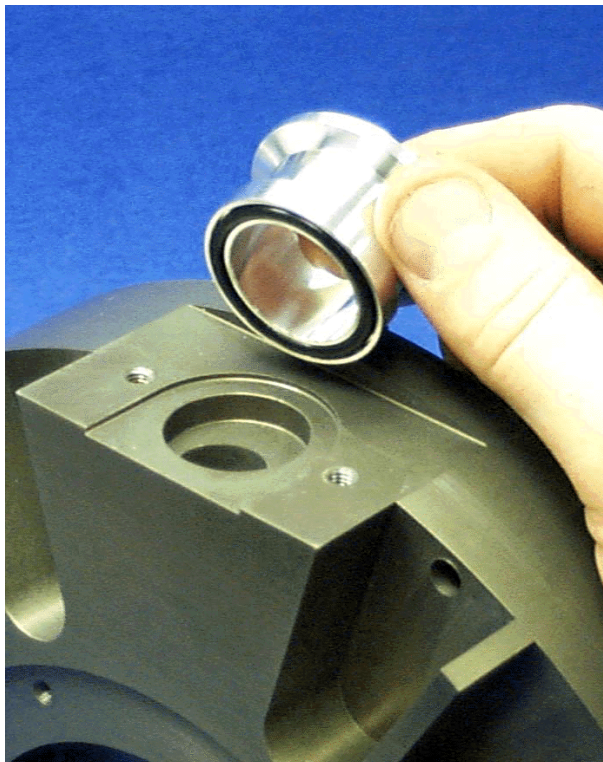
- ① Intake fitting
- ② M5x16 screws (2)
- ③ O-ring, 2-121, included in maintenance kit
- ④ Intake clamp

Final Assembly (continued)



Locate the following items shown in the photo to the left:

- ① Tip seal, included in maintenance kit
- ② M6x45 screws (6)
Outboard housing (not shown in photo)

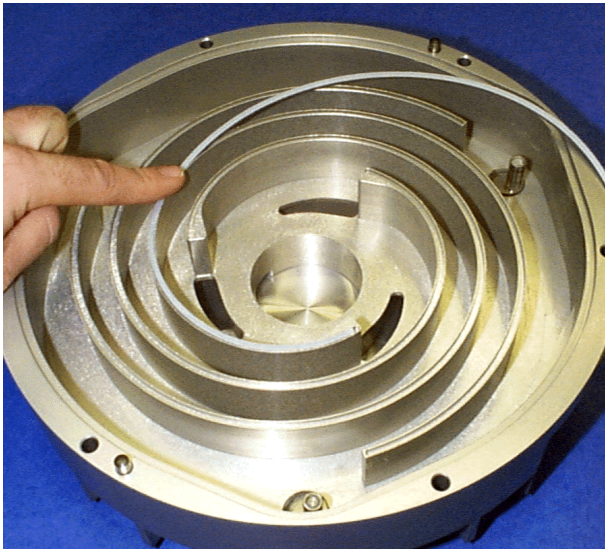


1. Lightly grease the O-ring and insert it in the groove on the intake fitting.

Final Assembly (continued)

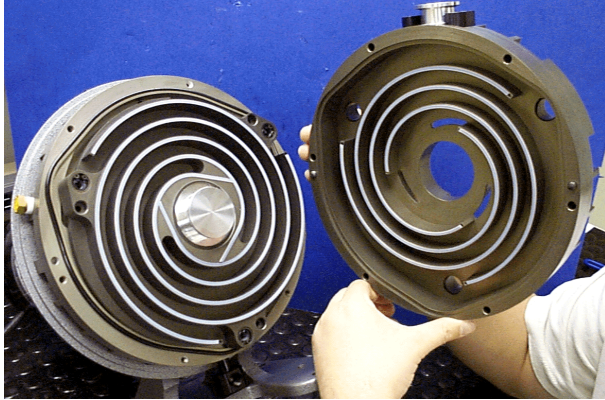


2. Place the intake fitting over the intake hole in the outboard housing.
3. Slide the intake clamp around the intake fitting.
4. Secure it with two M5x16 screws.
5. Tighten to 75 in-lb.

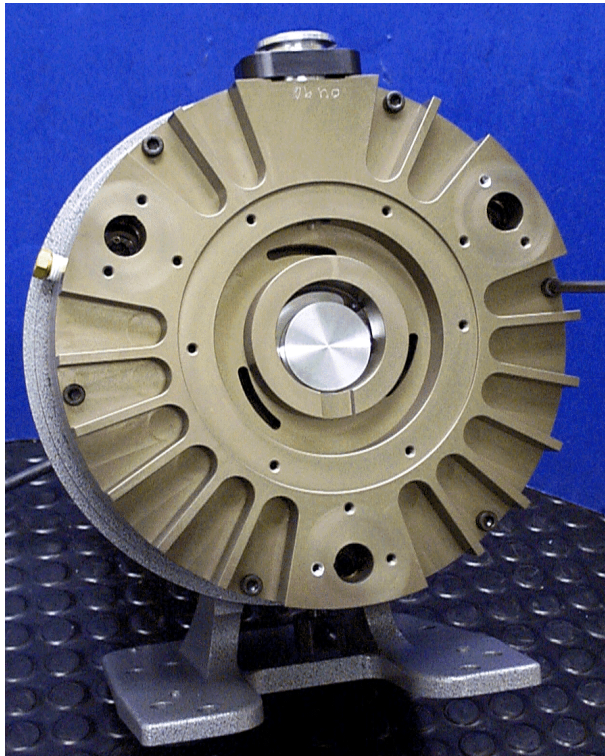


6. Insert the tip seals in the grooves on the outboard housing.
7. Cut to length at the end of grooves.

Final Assembly (continued)

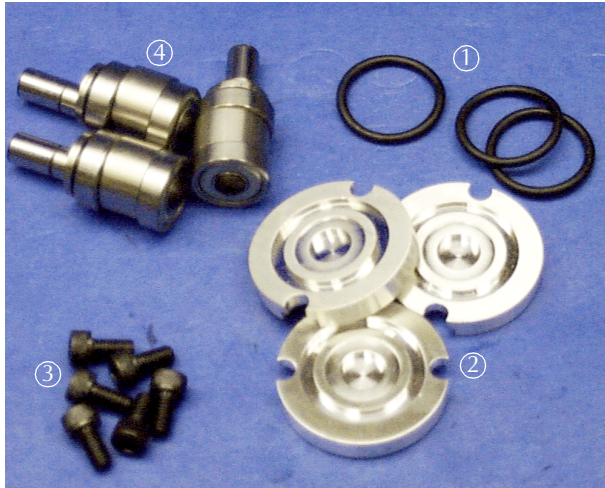


8. Install the outboard housing over the orbiting plate and against the inboard housing, engaging the dowel pins.



9. Secure the outboard housing to the inboard housing with the six M6x45 screws.
10. Tighten the screws sequentially in a diagonal pattern to 130 in-lb.

Final Assembly (continued)



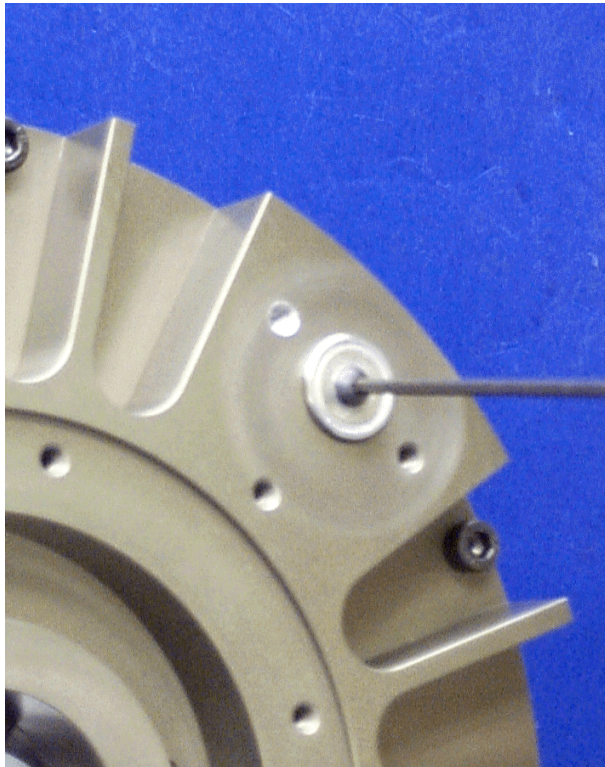
Install the Sync Crank into the Outboard Housing

Tools required:

- Allen wrench
- Krytox GPL 224 grease

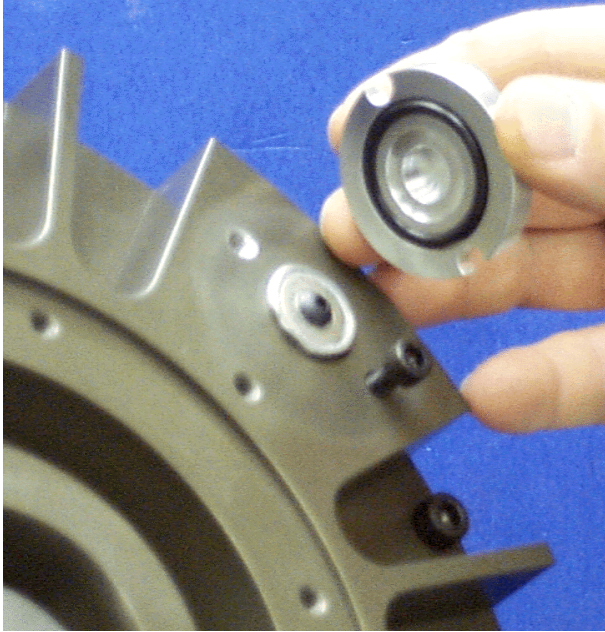
Locate the following parts shown in the photo at the left:

- ① O-ring, 2-118 (3) included in maintenance kit
- ② Sync crank cover (3)
- ③ M5x10 screws (6)
- ④ Sync crank assembly (3) included in maintenance kit

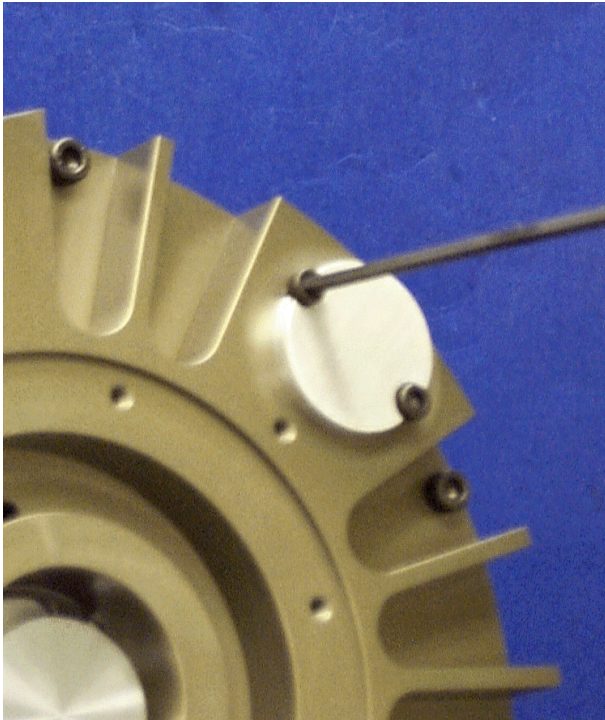


1. Insert one sync crank assembly into each of three bores in the outboard housing.
2. Ensure that the pin on the sync crank assembly end engages with the needle bearing in the orbiting plate.

Final Assembly (continued)

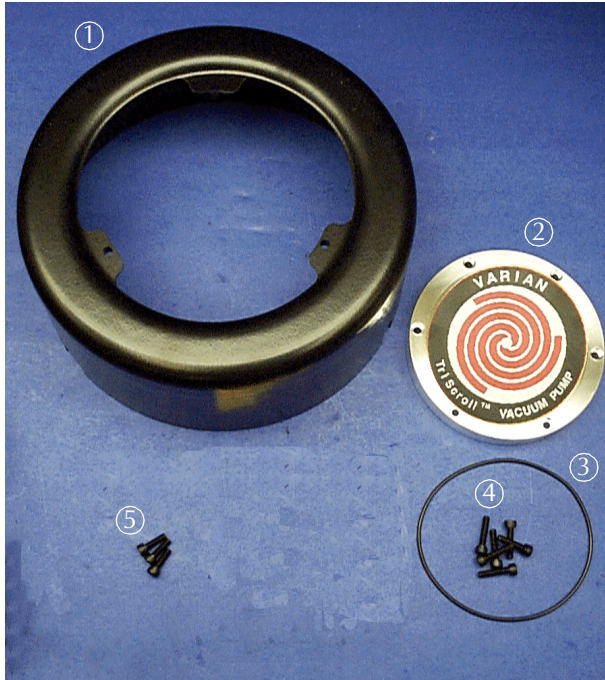


3. Lightly grease the three O-rings and insert them into the grooves on the three sync crank covers.



4. Install one sync crank cover over each sync crank bore.
5. Secure each cover with two M5x10 screws.
6. Tighten to 75 in-lb.

Final Assembly (continued)



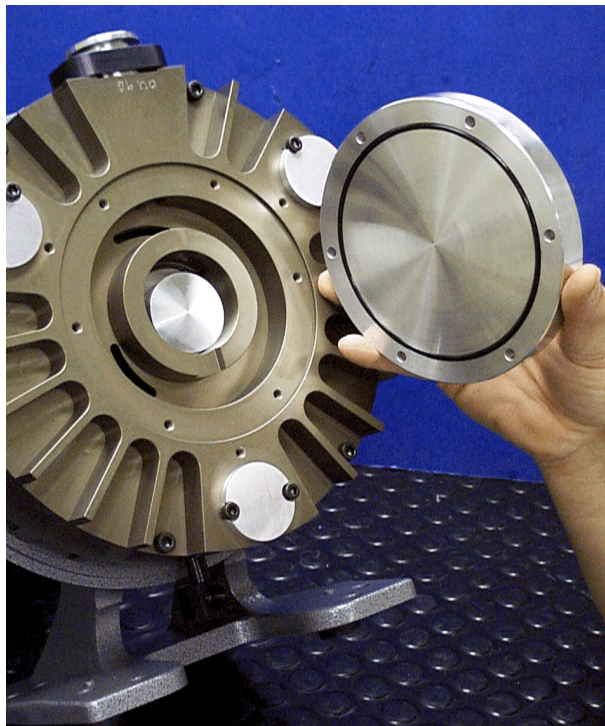
Replace the Cowling and Cover

Tools required:

- Allen wrench
- Krytox GPL 224 grease

Locate the following parts:

- ① Cowling
- ② Outboard cover
- ③ O-ring, 2-157, included in maintenance kit
- ④ M5x22 screws (6)
- ⑤ M5x16 screws (3)



1. Lightly grease the O-ring and insert it into the groove on the outboard cover.

Final Assembly (continued)



2. Secure the outboard cover to the outboard housing with the six M5x22 screws.

Final Assembly (continued)




3. Install the cowling over the pump module.
4. Secure it with the three M5x16 screws.



This figure illustrates a fully reassembled TriScroll 300 pump.

Put the Pump Back into Service

The TriScroll 300 pump can be placed into service immediately after maintenance is complete. However, 24 hours of run time is required before base pressure of 10 mTorr can be achieved.

NOTE  *The 24 hour run time does not have to be continuous. If your application requires a low base pressure, it is wise to run the pump for the 24-hour period for optimum performance.*



Request for Return Health and Safety Certification



- Return authorization numbers (RA#) **will not** be issued for any product until this Certificate is completed and returned to a Varian, Inc. Customer Service Representative.
- Pack goods appropriately and drain all oil from rotary vane and diffusion pumps (for exchanges please use the packing material from the replacement unit), making sure shipment documentation and package label clearly shows assigned Return Authorization Number (RA#) VVT cannot accept any return without such reference.
- Return product(s) to the nearest location:

North and South America

Varian, Inc.
Vacuum Technologies
121 Hartwell Ave.
Lexington, MA 02421
Fax: (781) 860-9252

Europe and Middle East

Varian S.p.A.
Via F.lli Varian, 54
10040 Leini (TO) – ITALY
Fax: (39) 011 997 9350

Asia and ROW

Varian Vacuum Technologies
Local Office

For a complete list of phone/fax numbers see www.varianinc.com/vacuum

- If a product is received at Varian, Inc. in a contaminated condition, **the customer is held responsible** for all costs incurred to ensure the safe handling of the product, and **is liable** for any harm or injury to Varian, Inc. employees occurring as a result of exposure to toxic or hazardous materials present in the product.

CUSTOMER INFORMATION		
Company name:		
Contact person: Name:	Tel:.....	
Fax:	E-mail:	
Ship method:	Shipping Collect #:	P.O.#:
Europe only: VAT Reg Number:	USA only: <input type="checkbox"/> Taxable <input type="checkbox"/> Non-taxable	
Customer ship to:	Customer bill to:	
.....	
.....	

PRODUCT IDENTIFICATION

Product Description	Varian, Inc. Part Number	Varian, Inc. Serial Number

TYPE OF RETURN (check appropriate box)

<input type="checkbox"/> Paid Exchange	<input type="checkbox"/> Paid Repair	<input type="checkbox"/> Warranty Exchange	<input type="checkbox"/> Warranty Repair	<input type="checkbox"/> Loaner Return
<input type="checkbox"/> Credit	<input type="checkbox"/> Shipping Error	<input type="checkbox"/> Evaluation Return	<input type="checkbox"/> Calibration	<input type="checkbox"/> Other

HEALTH and SAFETY CERTIFICATION

VACUUM TECHNOLOGIES CANNOT ACCEPT ANY BIOLOGICAL HAZARDS, RADIOACTIVE MATERIAL, ORGANIC METALS, OR MERCURY AT ITS FACILITY. CHECK ONE OF THE FOLLOWING:		
<input type="checkbox"/> I confirm that the above product(s) has (have) NOT pumped or been exposed to any toxic or dangerous materials in a quantity harmful for human contact.		
<input type="checkbox"/> I declare that the above product(s) has (have) pumped or been exposed to the following toxic or dangerous materials in a quantity harmful for human contact (<u>Must be filled in</u>):		
Print Name.....	Signature	Date

PLEASE FILL IN THE FAILURE REPORT SECTION ON THE NEXT PAGE

Do not write below this line

Notification (RA) #: Customer ID #: Equipment #:

FAILURE REPORT

(Please describe in detail the nature of the malfunction to assist us in performing failure analysis):

TURBO PUMPS AND TURBOCONTROLLERS

Claimed Defect	Position	Parameters
<input type="checkbox"/> Does not start <input type="checkbox"/> Does not spin freely <input type="checkbox"/> Does not reach full speed <input type="checkbox"/> Mechanical Contact <input type="checkbox"/> Cooling defective <input type="checkbox"/> Noise <input type="checkbox"/> Vibrations <input type="checkbox"/> Leak <input type="checkbox"/> Overtemperature <input type="checkbox"/> Clogging	<input type="checkbox"/> Vertical <input type="checkbox"/> Horizontal <input type="checkbox"/> Upside-down <input type="checkbox"/> Other	Power: Rotational Speed: Current: Inlet Pressure: Temp 1: Foreline Pressure: Temp 2: Purge flow: Operation Time:
Describe Failure:		
Turbocontroller Error Message:		

ION PUMPS/CONTROLLERS

<input type="checkbox"/> Bad feedthrough <input type="checkbox"/> Vacuum leak <input type="checkbox"/> Error code on display <input type="checkbox"/> Poor vacuum <input type="checkbox"/> High voltage problem <input type="checkbox"/> Other
Describe failure:
Customer application:

VALVES/COMPONENTS

<input type="checkbox"/> Main seal leak <input type="checkbox"/> Solenoid failure <input type="checkbox"/> Damaged sealing area <input type="checkbox"/> Bellows leak <input type="checkbox"/> Damaged flange <input type="checkbox"/> Other
Describe failure:
Customer application:

LEAK DETECTORS

<input type="checkbox"/> Cannot calibrate <input type="checkbox"/> Vacuum system unstable <input type="checkbox"/> Failed to start <input type="checkbox"/> No zero/high background <input type="checkbox"/> Cannot reach test mode <input type="checkbox"/> Other
Describe failure:
Customer application:

INSTRUMENTS

<input type="checkbox"/> Gauge tube not working <input type="checkbox"/> Communication failure <input type="checkbox"/> Error code on display <input type="checkbox"/> Display problem <input type="checkbox"/> Degas not working <input type="checkbox"/> Other
Describe failure:
Customer application:

ALL OTHER VARIAN, INC.

<input type="checkbox"/> Pump doesn't start <input type="checkbox"/> Doesn't reach vacuum <input type="checkbox"/> Pump seized <input type="checkbox"/> Noisy pump (describe) <input type="checkbox"/> Overtemperature <input type="checkbox"/> Other
Describe failure:
Customer application:

DIFFUSION PUMPS

<input type="checkbox"/> Heater failure <input type="checkbox"/> Doesn't reach vacuum <input type="checkbox"/> Vacuum leak <input type="checkbox"/> Electrical problem <input type="checkbox"/> Cooling coil damage <input type="checkbox"/> Other
Describe failure:
Customer application:

Sales and Service Offices

Argentina

Varian Argentina Ltd.

Sucursal Argentina
Av. Ricardo Balbin 2316
1428 Buenos Aires
Argentina
Tel:(54) 1 783 5306
Fax:(54) 1 786 5172

Benelux

Varian Vacuum Technologies

Rijksstraatweg 269 H,
3956 CP Leersum
The Netherlands
Tel:(31) 343 469910
Fax:(31) 343 469961

Brazil

Varian Industria e Comercio Ltda.

Avenida Dr. Cardoso de Mello 1644
Vila Olimpia
Sao Paulo 04548 005
Brazil
Tel:(55) 11 3845 0444
Fax:(55) 11 3845 9350

Canada

Central coordination through:

Vacuum Technologies
121 Hartwell Avenue
Lexington, MA 02421
USA
Tel:(781) 861 7200
Fax:(781) 860 5437
Toll Free: (800) 882 7426

China

Varian Technologies - Beijing

Room 1201, Jinyu Mansion
No. 129A, Xuanwumen Xidajie
Xicheng District
Beijing 1000031 P.R. China
Tel:(86) 10 6641 1530
Fax:(86) 10 6641 1534

France and Wallonie

Varian s.a.

7 avenue des Tropiques
Z.A. de Courtaboeuf – B.P. 12
Les Ulis cedex (Orsay) 91941
France
Tel:(33) 1 69 86 38 13
Fax:(33) 1 69 28 23 08

Germany and Austria

Varian Deutschland GmbH

Alsfelder Strasse 6
Postfach 11 14 35
64289 Darmstadt
Germany
Tel:(49) 6151 703 353
Fax:(49) 6151 703 302

India

Varian India PVT LTD

101-108, 1st Floor
1010 Competent House
7, Nangal Raya Business Centre
New Delhi 110 046
India
Tel:(91) 11 5548444
Fax:(91) 11 5548445

Italy

Varian Vacuum Technologies

Via F.Ili Varian, 54
10040 Leini, (Torino)
Italy
Tel:(39) 011 997 9 111
Fax:(39) 011 997 9 350

Japan

Varian Vacuum Technologies

Sumitomo Shibaura Building, 8th Floor
4-16-36 Shibaura
Minato-ku, Tokyo 108
Japan
Tel:(81) 3 5232 1253
Fax:(81) 3 5232 1263

Korea

Varian Technologies Korea, Ltd.

Shinsa 2nd Building 2F
966-5 Daechi-dong
Kangnam-gu, Seoul
Korea 135-280
Tel:(82) 2 3452 2452
Fax:(82) 2 3452 2451

Mexico

Varian S.A.

Concepcion Beistegui No 109
Col Del Valle
C.P. 03100
Mexico, D.F.
Tel:(52) 5 523 9465
Fax:(52) 5 523 9472

Taiwan

Varian Technologies Asia Ltd.

14F-16 No.77, Hsin Tai Wu Road Sec. 1,
Hsi Chih, Taipei Hsien
Taiwan, R.O.C.
Tel:(886) 2 2698 9555
Fax:(886) 2 2698 9678

UK and Ireland

Varian Ltd.

28 Manor Road
Walton-On-Thames
Surrey KT 12 2QF
England
Tel:(44) 1932 89 8000
Fax:(44) 1932 22 8769

United States

Varian Vacuum Technologies

121 Hartwell Avenue
Lexington, MA 02421
USA
Tel:(781) 861 7200
Fax:(781) 860 5437

Other Countries

Varian Vacuum Technologies

Via F.Ili Varian, 54
10040 Leini, (Torino)
Italy
Tel:(39) 011 997 9 111
Fax:(39) 011 997 9 350

Customer Support and Service:

North America

Tel: 1 (800) 882-7426 (toll-free)
vtl.technical.support@varianinc.com

Europe

Tel: 00 (800) 234 234 00 (toll-free)
vtl.technical.support@varianinc.com

Japan

Tel: (81) 3 5232 1253 (dedicated line)
vtj.technical.support@varianinc.com

Korea

Tel (82) 2 3452 2452 (dedicated line)
vtk.technical.support@varianinc.com

Taiwan

Tel: 0 (800) 051 342 (toll-free)
vtw.technical.support@varianinc.com

Worldwide Web Site, Catalog and On-line Orders:

www.varianinc.com

Representatives in most countries



VARIAN