



# HydroWhirl™ Orbitor Tank Washing Machine



## Instruction & Maintenance Manual

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## INTRODUCTION

Thank you for purchasing the **HydroWhirl Orbitor** from BETE Fog Nozzle, Inc.

The **HydroWhirl Orbitor** is a self-lubricated, self-cleaning orbital tank washing machine; its unique design and simplicity of operation and maintenance make it ideally suited to the hygienic environment.

The **HydroWhirl Orbitor** can be tailored to suit individual customer requirements with a selection of cycle speeds and nozzle sizes available to match the size of the tank and the medium being cleaned.

It is ideally suited for use with very hot water and because of its very low starting torque; it can be used with low supply pressures.

## OPERATING INSTRUCTIONS

Always flush the tank washing line with clean water prior to use and ensure the line has sufficient electrical continuity if the cleaning operation is to be carried out in a potential inflammable environment.

The portable machine is connected by screwing the Orbitor's threaded connection to the mating supply line connector, use only light pressure to secure.

To reduce the risk of blockage in the machine it is recommended that a filter (2.5mm holes) be fitted into the supply line.

When handling the **HydroWhirl Orbitor** never force the nozzle head beyond its 180° free rotation, as internal damage will occur.

Always introduce the supply water slowly to prevent water hammer effect.

## SECTION A - NOZZLE HEAD ASSEMBLY

### DISMANTLING:

Place the HydroWhirl Orbitor in a vice with the nozzle head – 4-way (3018) facing up.

Locate the blind nozzle head (3017) in the vice - ensure using soft jaws to prevent damage to the nozzle head finish.

By tapping with a soft mallet, or using the special tool (3000/T3), unscrew the nozzle head - 4 way (3018) with firm pressure, noting that the assembly has 180° of lost motion. Remove nozzle head - 4 way (3018) completely.

Seal (3026) can be removed by cutting it free from nozzle head - 4 way (3018).

Seal Insert (3025) may be removed if showing signs of wear to the ceramic coating.

Nozzles (3029), (3048)\* can be unscrewed to inspect stream straighteners (3034), (3044)\* these are normally firmly fixed in and need not be removed unless damaged.

Washer (3037) is normally fixed to nozzle head - 4 way (3018) and unless damaged need not be removed.

Note:

Part No.s 3029 & 3034 applies to nozzle diameters 3, 4 & 5mm

Part No.s 3048 & 3044 applies to nozzle diameters 6, 7, & 8mm

## SECTION A - NOZZLE HEAD ASSEMBLY

### RE-ASSEMBLY:

If previously removed, fit new seal insert (3025) into main body (3016) apply Loctite 270 before fitting.

Fit seal (3026) into the nozzle head 4-way (3018) ensuring that the seal face is correctly positioned with the seal lip facing out.

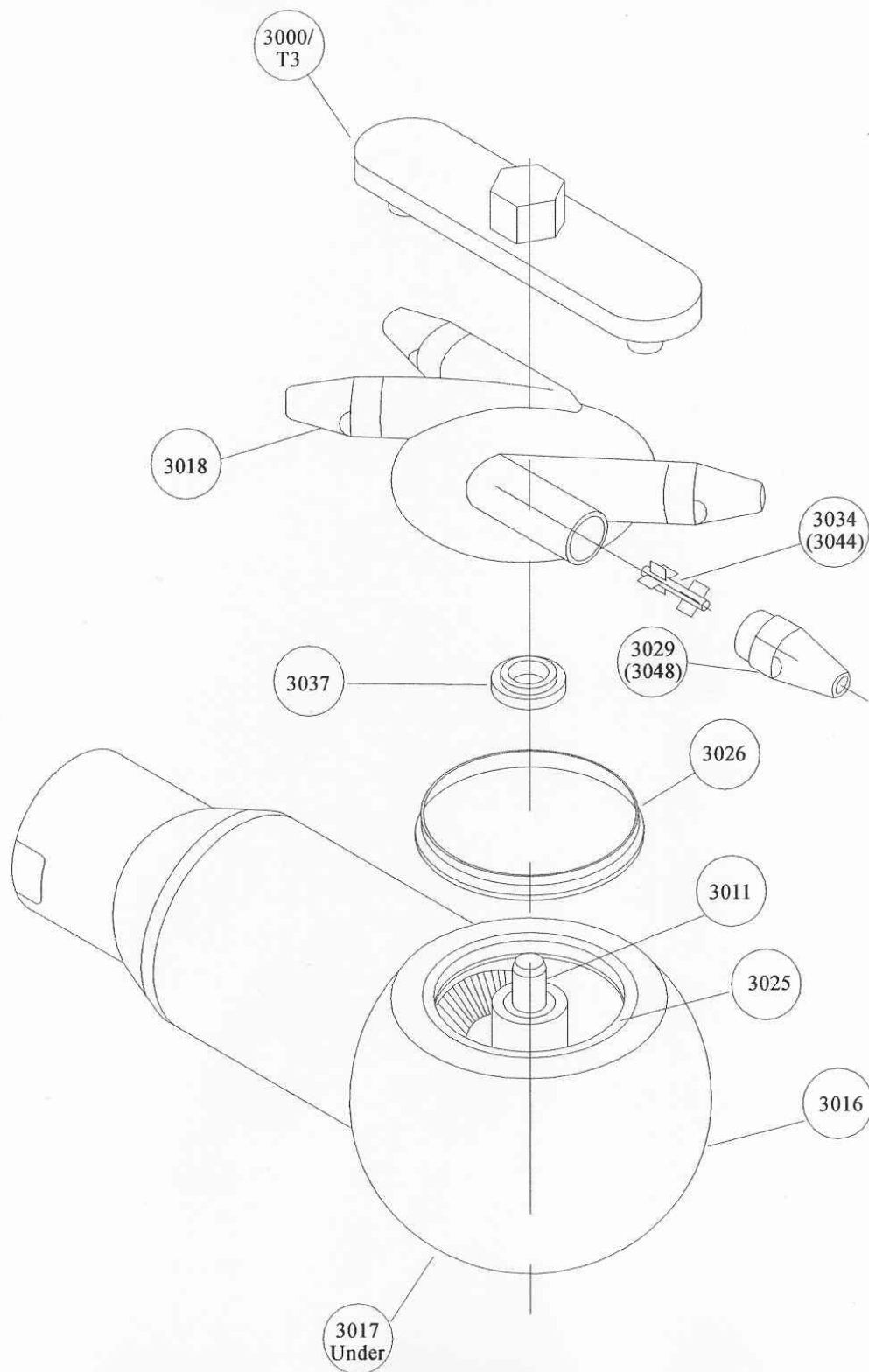
Nozzles (3029), (3048) and stream straighteners (3034), (3044) can be fitted onto the nozzle head – 4-way (3018). Washer (3037), if previously removed, can now be fitted to the nozzle head - 4 way (3018) using Loctite 270.

Locate the blind nozzle head in a soft jaw vice such that the HydroWhirl Orbitor lies in a horizontal plane. Apply Loctite 270 onto the M12 thread of the nozzle head shaft (3011), ensuring all surfaces are clean, dry and free from any contaminant.

Screw on the nozzles head - 4 way (3018) noting that the assembly has 180° of lost motion.

Using the special tool (3000/T3) tighten the nozzle head - 4 way (3018) clockwise to 60 Nm torque.

## SECTION A NOZZLE HEAD ASSEMBLY (STANDARD VERSION)



**SECTION A1 - NOZZLE HEAD ASSEMBLY  
(HIGH CAPACITY VERSION)****DISMANTLING:**

Place the HydroWhirl Orbitor in a vice with the nozzle head – 2-way (4001) facing up.

Locate the blind nozzle head (3017) in the vice - ensure using soft jaws to prevent damage to the nozzle head finish.

Using the special tool (3000/T3), unscrew the nozzle head – 2-way (4001) with firm pressure, noting that the assembly has 180° of lost motion. Remove nozzle head - 2 way (4001) completely.

Seal (3026) can be removed by cutting it free from nozzle head – 2-way (4001).

Seal Insert (3025) may be removed if showing signs of wear to the ceramic coating.

Nozzles (4004) can be unscrewed to inspect stream straighteners (JB2049) these are normally firmly fixed in and need not be removed unless damaged. Nozzle extension tubes (4002) may also be unscrewed if required.

Washer (3037) is normally fixed to nozzle head – 2-way (4001) and unless damaged need not be removed.

**SECTION A1 - NOZZLE HEAD ASSEMBLY  
(HIGH CAPACITY)****RE-ASSEMBLY:**

If previously removed, fit new seal insert (3025) into main body (3016) apply Loctite 270 before fitting.

Fit seal (3026) into the nozzle head 2-way (4001) ensuring that the seal face is correctly positioned with the seal lip facing out.

Nozzles (4004), and stream straighteners (JB2049) can be fitted onto the extension tubes (4002)\*. Washer (3037), if previously removed can now be fitted to the nozzle head – 2-way (4001) using Loctite 270.

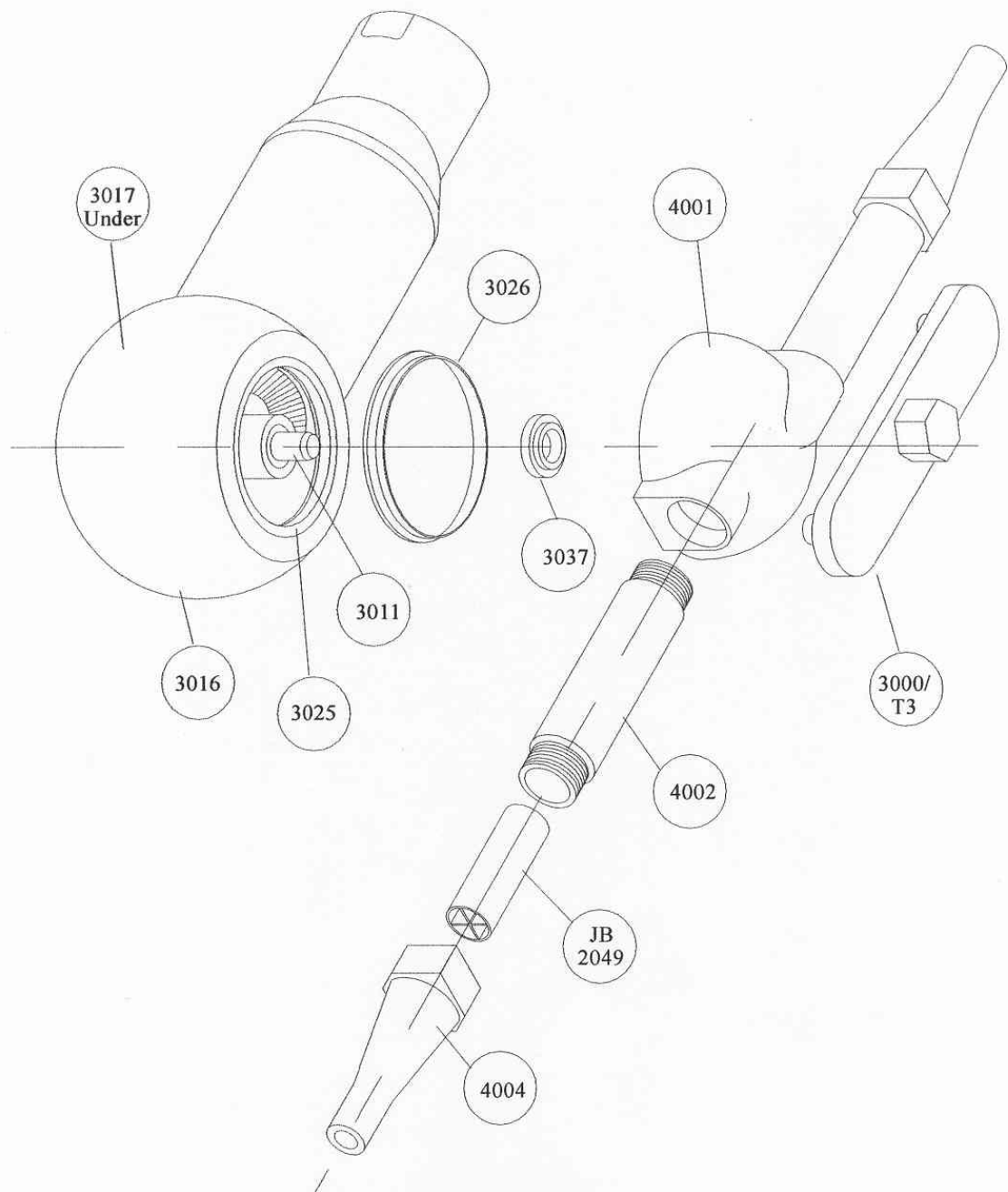
\*Noting the step inside the tube to locate the stream straightener (JB2049) correctly, the nozzle assembly can then be fitted onto the nozzle head 2-way (4001).

Locate the blind nozzle head in a soft jaw vice such that the HydroWhirl Orbitor lies in a horizontal plane. Apply Loctite 270 onto the M12 thread of the nozzle head shaft (3011), ensuring all surfaces are clean, dry and free from any contaminant.

Screw on the nozzle head – 2-way (4001) noting that the assembly has 180° of lost motion.

Using the special tool (3000/T3) tighten the nozzle head – 2-way (4001) clockwise to 60 Nm torque.

## SECTION A NOZZLE HEAD ASSEMBLY (HIGH CAPACITY VERSION)



**SECTION B - BLIND NOZZLE HEAD ASSEMBLY****DISMANTLING:**

Withdraw the blind nozzle head assembly (3017) from the main body (3016).

Nozzle head bevel (3002) can be slid off the nozzle head shaft (3011) and seal (3026) can be removed by cutting it free from the blind nozzle head (3017).

Seal Insert (3025) may be removed if showing signs of wear to the ceramic coating.

Remove bushings (3021) from the main body (3016).

**Important:**

Ensure that pin (3047) is now removed before any further dismantling.

**SECTION B - BLIND NOZZLE HEAD ASSEMBLY****RE-ASSEMBLY:****Important**

Ensure that the pin (3047) is refitted into the main body (3016).

Push bushings (3021) into the main body (3016).

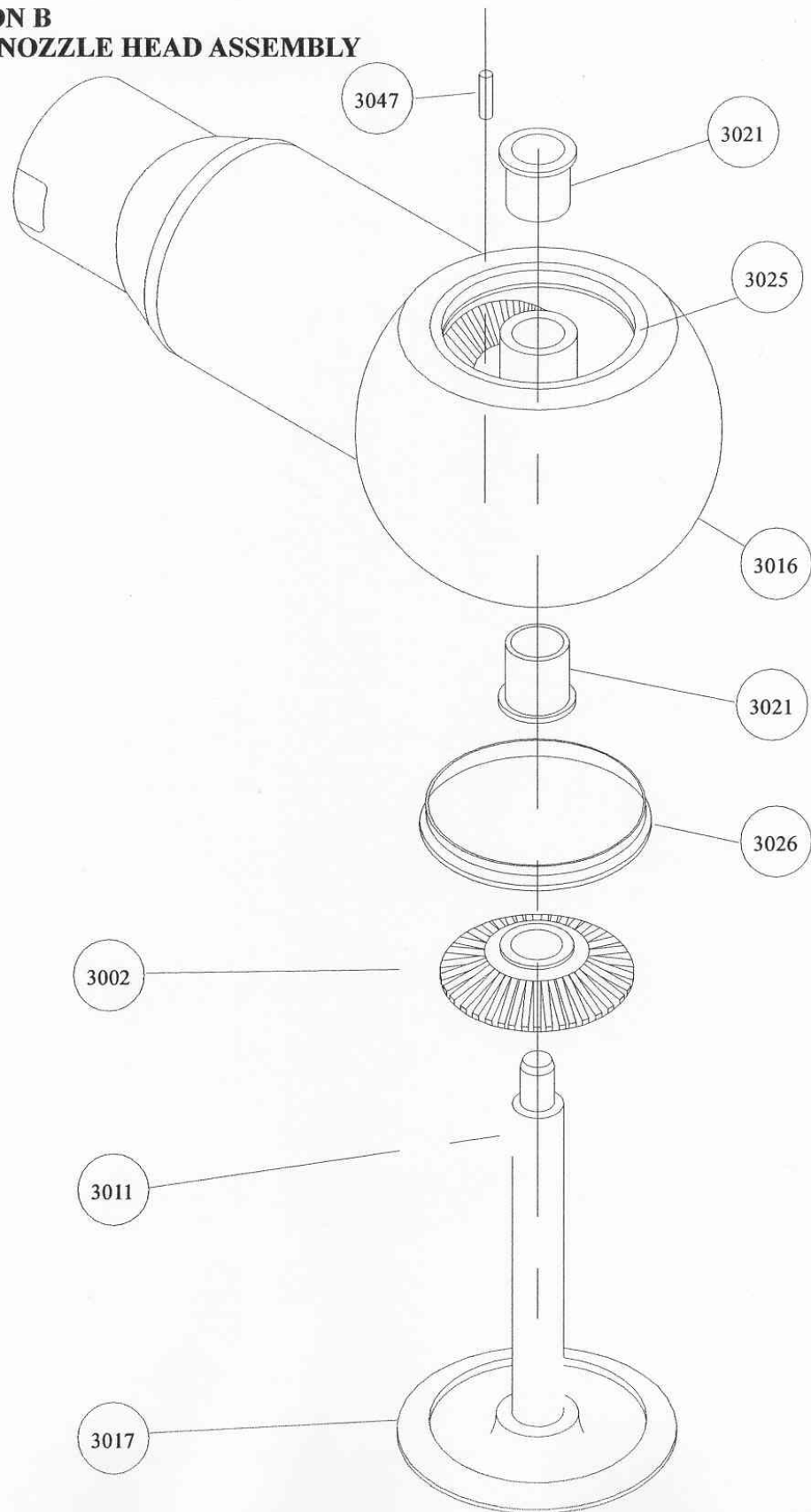
If previously removed, fit new seal insert (3025) into main body (3016) apply Loctite 270 before fitting.

Fit seal (3026) into the blind nozzle head (3017) ensuring that the seal face is correctly positioned with the seal lip facing out.

Nozzle head bevel (3002) can now be slid onto the nozzle head shaft (3011).

The blind nozzle head assembly can now be fitted into the shorter boss of the main body (3016).



**SECTION B  
BLIND NOZZLE HEAD ASSEMBLY**

**SECTION C - TURBINE ASSEMBLY (1)****DISMANTLING:**

Hold the inlet casing (3045) and rotate body shell (3015) in an opposing direction to allow removal of spring clip (3010). It may be advisable to introduce soapy water into the slot to ease removal of the spring clip.

The inlet casing (3045) may now be separated from the body shell (3015) and main body (3016) to allow access to the turbine assembly and gear cartridges.

**SECTION C - TURBINE ASSEMBLY (1)****RE-ASSEMBLY:**

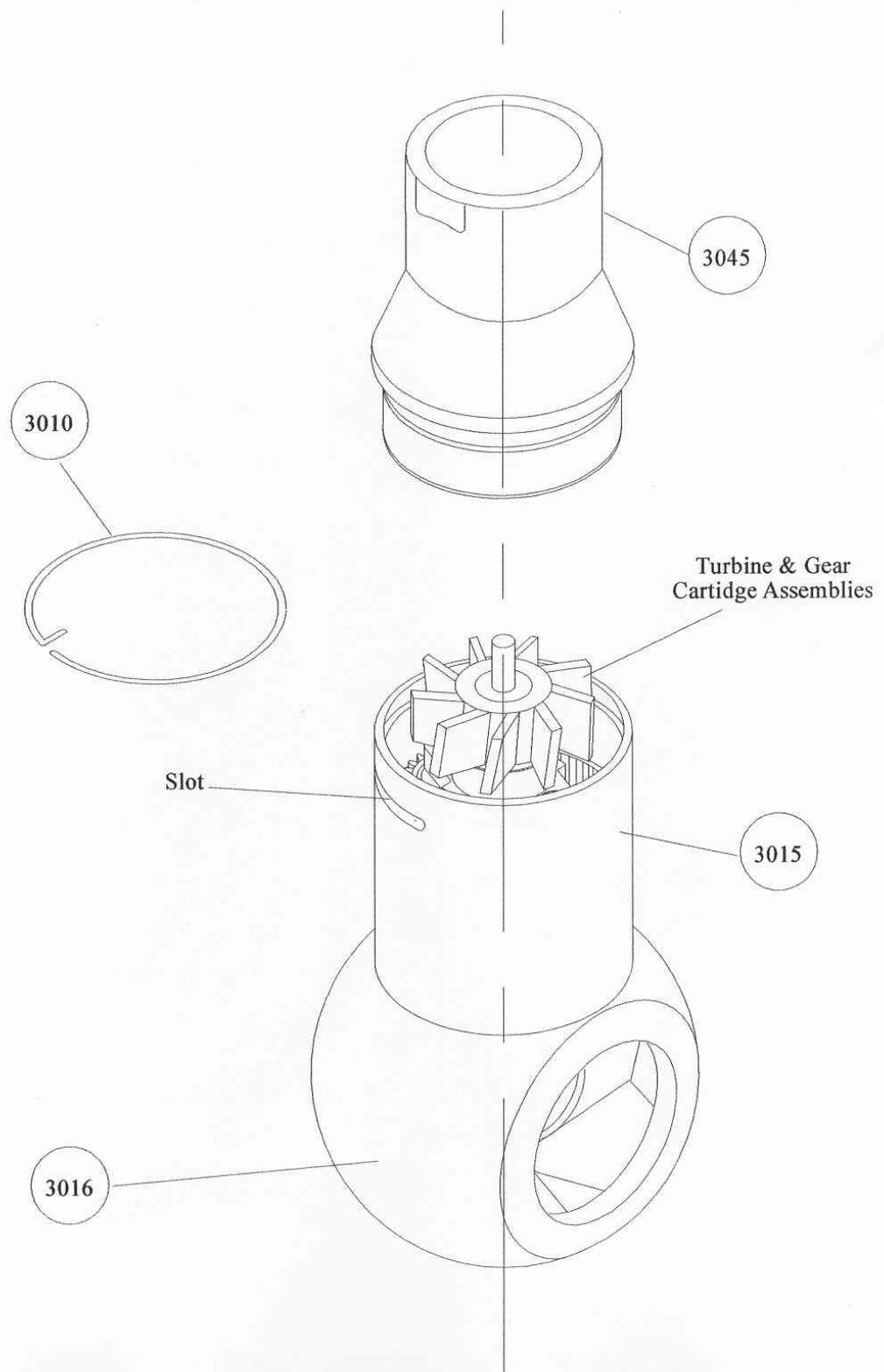
Rotate the inlet casing (3045) such that the counter sunk hole is aligned with the slot in the body shell (3015).

Slide the inlet casing (3045) into the body shell (3015). Locate the spring clip (3010) into position such that the tang end locates into the counter-sunk hole of the inlet casing (3045).

Hold the inlet casing (3045) stationary and turn the body shell (3015) counter clockwise to allow the spring clip (3010) entry into its housing groove.

Turn the body shell (3015) one and a half turns to effect correct attachment.

## SECTION C TURBINE ASSEMBLY (1)



**SECTION D - TURBINE ASSEMBLY (2)****DISMANTLING:**

Both the gear cartridge assembly and turbine assembly can be removed from the shell casing (3015) for inspection.

Stator bushing (3022) can be removed from the inlet casing (3045).

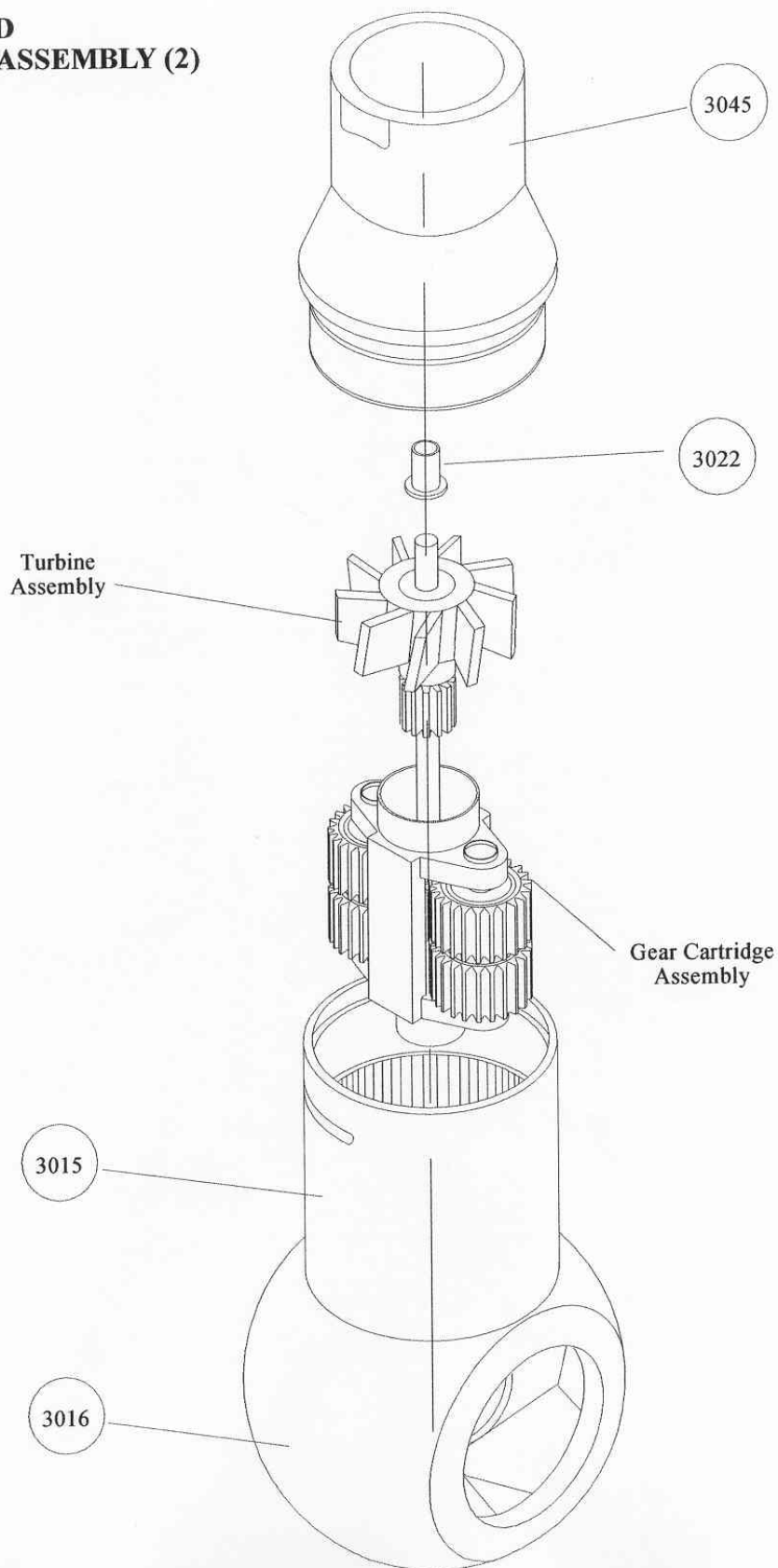
**SECTION D - TURBINE ASSEMBLY (2)****RE-ASSEMBLY:**

Push stator bushing (3022) in the inlet casing (3045), with the head of the bushing innermost.

Slight adjustment of the gear train may be necessary to locate correctly.

Locate the gear cartridge assembly into shell and locate turbine assembly into the gear cartridge

## SECTION D TURBINE ASSEMBLY (2)



**SECTION E - TURBINE SHAFT ASSEMBLY****DISMANTLING:**

Remove the set screw (3035) to slide the rotor (3014) off the turbine shaft (3030).

**Note:**

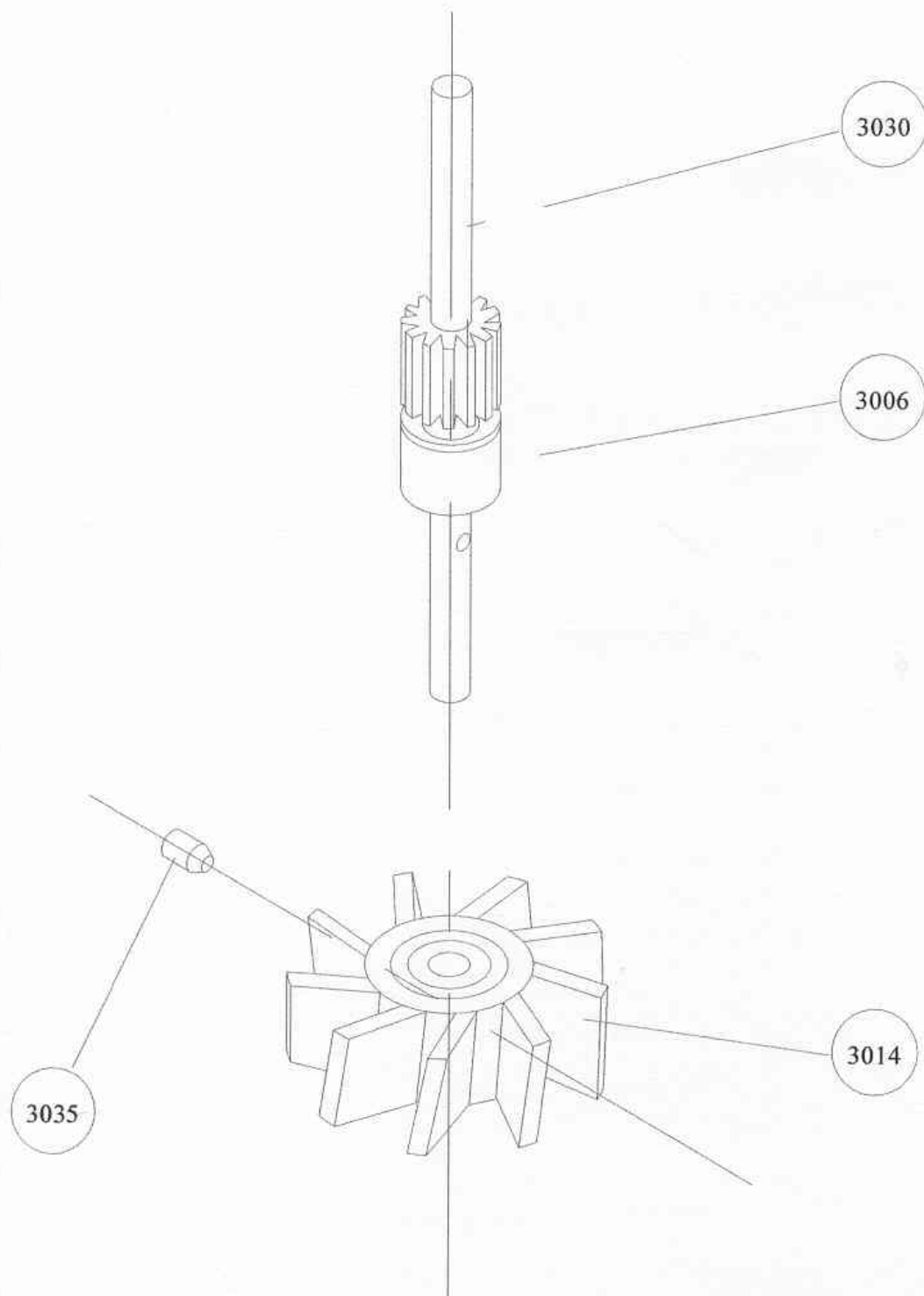
The sun gear (3006) and the turbine shaft (3030) are supplied as an assembly.

**SECTION E - TURBINE SHAFT ASSEMBLY****RE-ASSEMBLY:**

Slide the rotor (3014) onto the turbine shaft (3030) so that it abuts directly against the shoulder of the sun gear (3006).

Align the tapped hole in the rotor (3014) over the counter-sunk hole in the turbine shaft (3030) and secure with the set screw (3035).

## SECTION E TURBINE SHAFT ASSEMBLY



## **SECTION F - GEAR CARTRIDGE ASSEMBLY**

### **DISMANTLING:**

Remove 2 set screws (3035) from the planet gears (3001A and 3001B).

Remove the shafts (3008) to allow the planet gears (3001A and 3001B) to be removed from the cartridge (3007).

The cartridge bushing (3023) and 4 bushings (3024) can now be removed.

The washer (3009) is normally secured to the cartridge (3007) and need not be removed unless damaged.

## **SECTION F - GEAR CARTRIDGE ASSEMBLY**

### **RE-ASSEMBLY:**

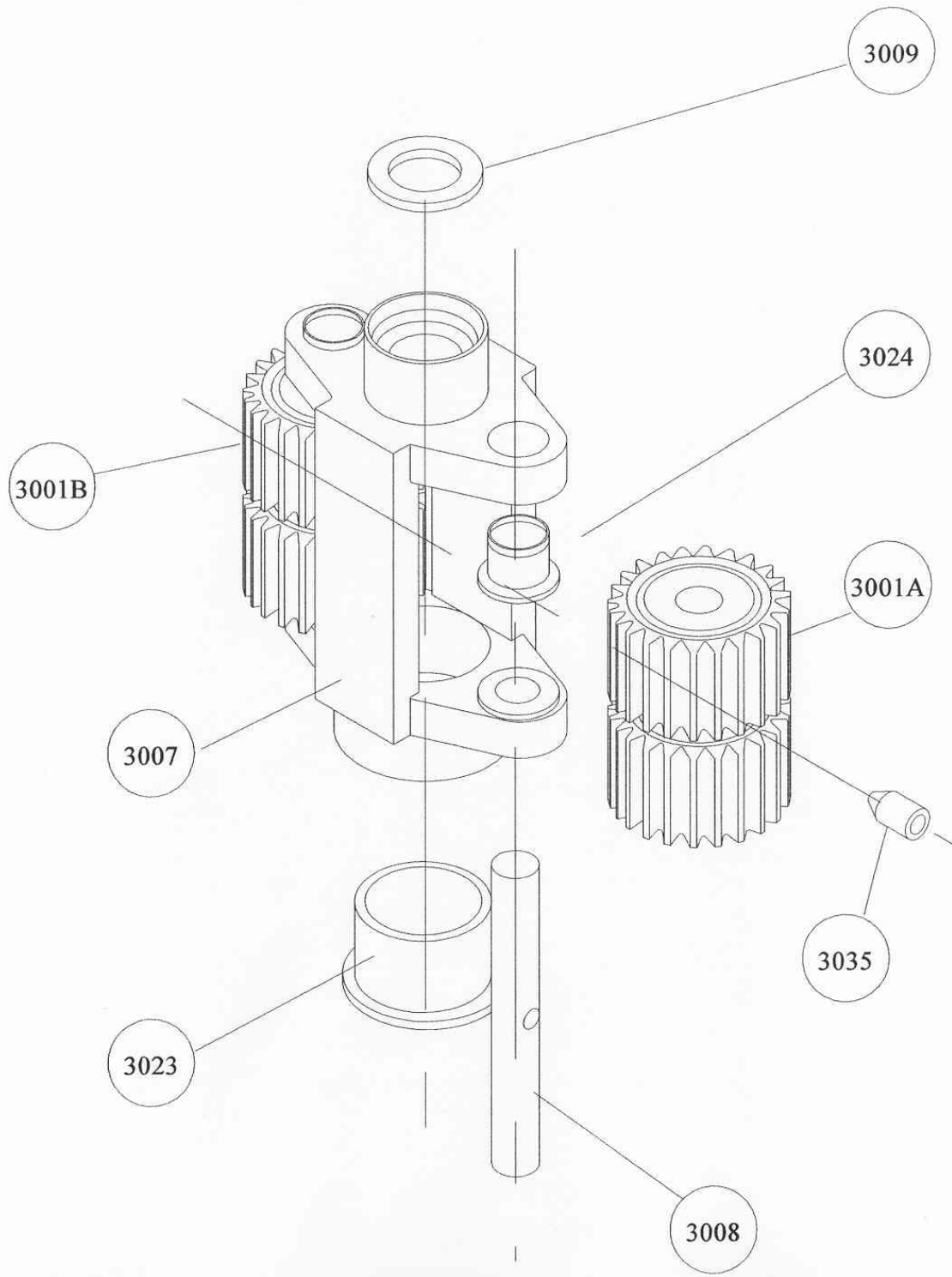
Push 4 bushings (3024) into the cartridge (3007). Locate the planet gear (3001A) between the bushings (3024) in the cartridge (3007) and slide the shaft (3008) through the bushings (3024) and planet gear (3001A) so that the tapped hole in the shaft (3008) and the counter sunk hole in the planet gear (3001A) align. Secure the assembly with the set screw (3035).

Repeat this procedure for planet gear (3001B) and shaft (3008). Note that the planet gear (3001A) is identified with an end groove and the planet gear (3001B) has no groove, it is essential that this combination of gears be fitted. Push the bushing (3023) into the cartridge (3007) and fit the washer (3009) if it had previously been removed. This washer (3009) is retained using Loctite 270.

Check for freedom of rotation of the assembly.



## SECTION F GEAR CARTRIDGE ASSEMBLY



## **SECTION G - MAIN BODY ASSEMBLY**

### **DISMANTLING:**

Fit the side plate tools (3000/T2) to each side of the main body (3016) and when in position, secure lightly in soft vice jaws.

Using the special tool (3000/T1) locate in the acceptance holes within the spider (3004). Unscrew counter-clockwise, at this stage it is not necessary to unscrew the unit more than 2 turns.

Invert the assembly and secure the special tool (3000/T1) in the vice and rotate the main body (3016) to remove.

Seal inserts (3025) maybe removed from the main body (3016) if their ceramic coating is damaged.

## **SECTION G - MAIN BODY ASSEMBLY**

### **RE-ASSEMBLY:**

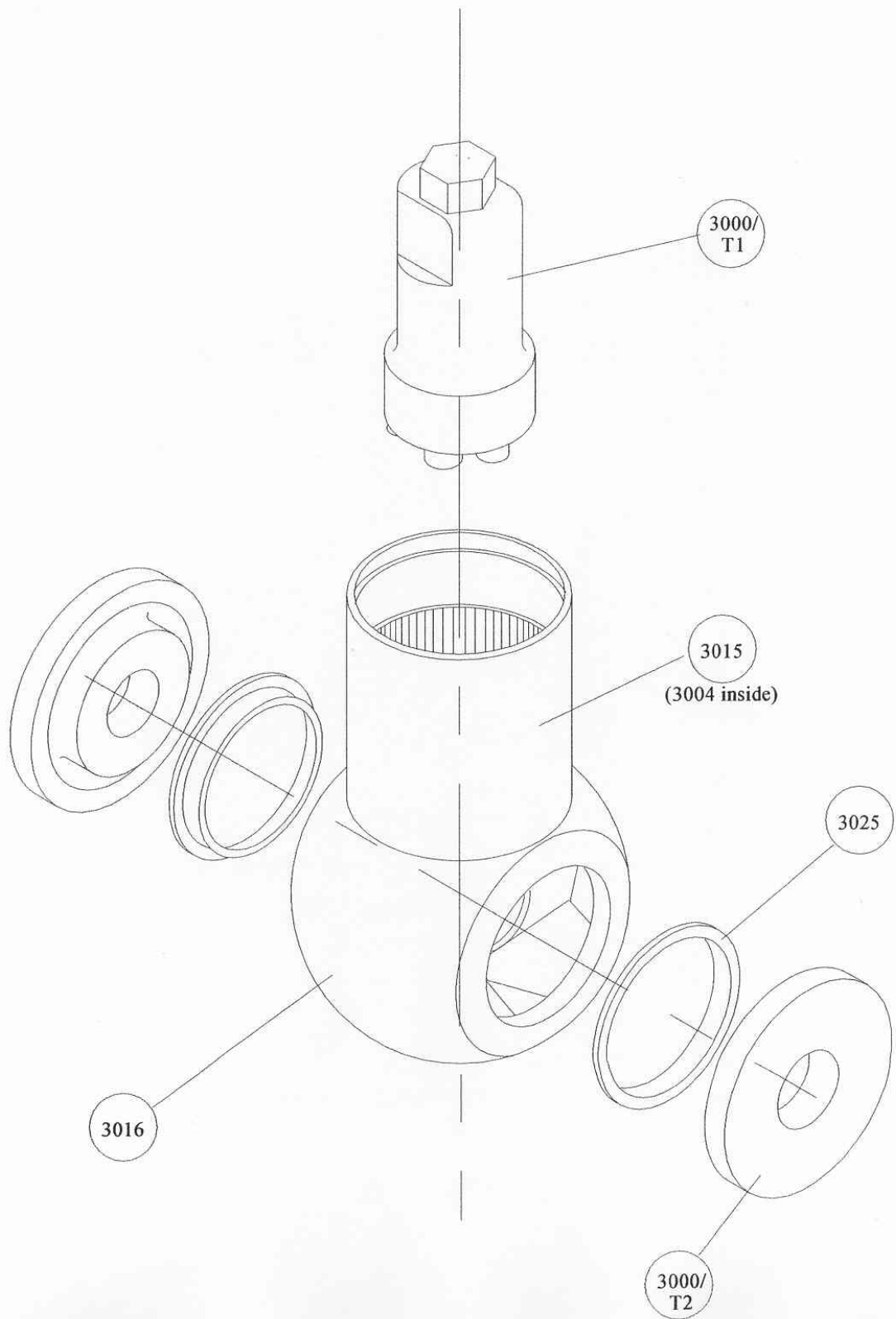
Fit seal insert (3025) into the main body (3016) securing with Loctite 270.

Fit the side plate tools (3000/T2) to each side of the main body (3016) and when in position, secure lightly in soft vice jaws.

Using the special tool (3000/T1) locate it in the acceptance holes within the spider (3004).

Screw the special tool (3000/T1) clockwise and tighten to 60 Nm torque.

## SECTION G MAIN BODY ASSEMBLY



## **SECTION H - SPIDER ASSEMBLY**

### **DISASSEMBLY:**

Remove the seal (3026) from the main body (3016) by cutting it free.

Seal Insert (3025) may be removed if showing signs of wear to the ceramic coating.

With the special tool (3000/T1) still held in the vice lift the body shell (3015) carefully off the thrust bearing assembly (3012/1, 3012/2 & 3036) and spider (3004). Bushing (3020) can now be removed by pulling it from spider (3004).

Note:

Entry pipe bevel (3003) is an integral part of the body shell (3015) and cannot be removed.

## **SECTION H - SPIDER ASSEMBLY**

### **RE-ASSEMBLY: -**

Push bushing (3020) into spider (3004). Place the special tool (3000/T1) with it's hex nut facing down into a soft jaw vice and slide the spider (3004) over it, locating on the retaining spigots.

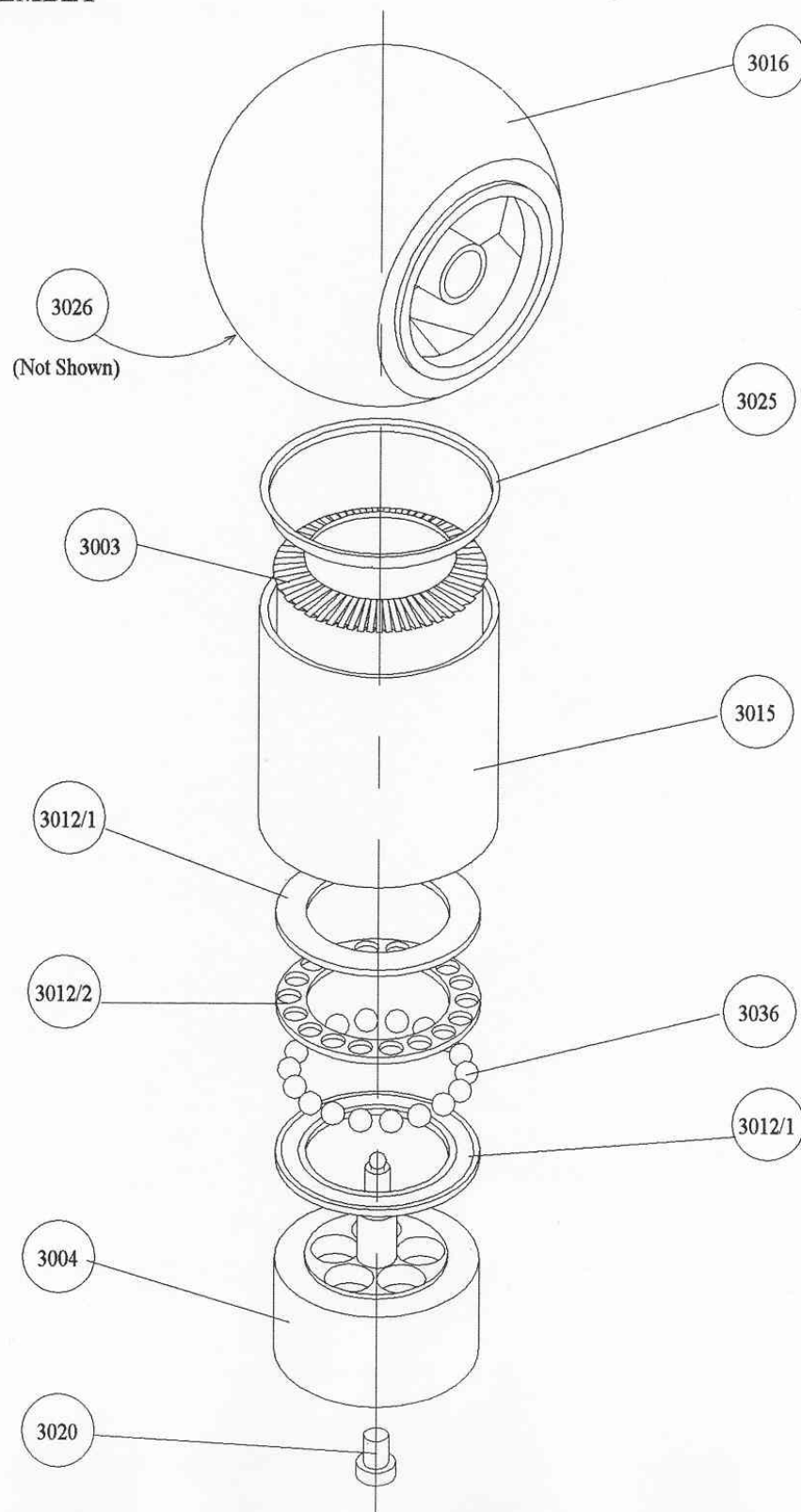
Place the thrust bearing assembly (3012/1, 3012/2 & 3036) onto the locating diameter ensuring that it lays flat and square on the mounting.

Slide the body shell (3015) over the thrust bearing assembly (3012). Check for alignment by spinning the body shell (3015) in the inverted assembled position.

If previously removed, fit new seal insert (3025) into main body (3016) apply Loctite 270 before fitting. Fit seal (3026) into main body (3016) ensuring that the seal lip is outer most.

Apply Loctite 270 to the M12 thread of the spider (3004) and screw on the main body (3016) until it abuts firmly to the shoulder of the spider (3004) and torque to 60 Nm.

## SECTION H SPIDER ASSEMBLY



## GENERAL MAINTENANCE

After use always flush the HydroWhirl Orbitor with clean fresh water to remove any debris or cleaning solution used.

The HydroWhirl Orbitor requires **NO** lubrication program.

After 500 hours use the HydroWhirl Orbitor should be stripped and inspected for wear around the seals and bearings.

## TROUBLESHOOTING

### Slowing Down or Stopping of Rotation

**1. Insufficient water supply and/or pressure:**

Check the efficiency of the supply pump and valves. Check the supply line filter for blockage.

**2. Nozzles are blocked:**

Remove and clean the nozzles and install a finer mesh filter in the supply line.

**3. Turbine or Stator is blocked:**

Remove the debris as necessary.

**4. Failure of the Planet Gears:**

Remove the debris as necessary; replace the gears if damaged.

**5. Failure of the Bevel Gears:**

Remove the debris as necessary.

**6. Failure of the Bearing:**

Remove the debris as necessary; replace the bearing assembly if damaged.

### Poor Wash Result

1. Nozzles are blocked or damaged - remove the obstructions and clean the nozzles. Replace the nozzles and/or stream straighteners if damaged.