

WEVO SPS

Installation instructions

REV.4

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System Overview

The WEVO SPS (Spring Plate System) is a complete kit that replaces the rear axle spring plate assembly on the 1969 through 1986 Porsche 911 chassis.

These instructions expand on the following topics;

- Introduction to WEVO SPS
- Record information prior to disassembly of existing components
- Initial inspection of your chassis for functional installation
- Measure chassis to determine spacer requirement
- Fitting the Inner Bearing Carrier
- Final assembly of WEVO SPS components
- Installation of WEVO SPS onto chassis
- Adjusting ride height with the WEVO SPS
- Maintenance of the WEVO SPS

Introduction to WEVO SPS

The WEVO SPS parts are manufactured to close tolerances – typical of machining and fabrication practices. The 911 bodyshell by comparison is made to much looser body sheet-metal pressing standards. In addition your bodyshell has potentially suffered the rigors of time, wear and tear, corrosion and accident damage. In further addition to that, it is commonly accepted that these virtually hand built cars show various indicators of that process, normally in the form of asymmetry.

The design of the components is intended to accommodate some of the more logical and frequent variations in bodyshell assembly tolerance. There are WEVO SPS spacers that are specific to two different O.E. spring plate configurations. By declaring your model year during the order process – you will have been shipped the spacers that are considered correct for your model year. Even if the suspension you are removing is from a different model year this is of no consequence – purely the build date of your chassis. The only deviation from this would be if your torsion tube were replaced at some time. Then the information on these instructions may assist in identifying the parts you require.

Damage from corrosion and accidents are almost impossible to predict and therefore should be carefully noted and evaluated during the preliminary checks. If you have doubts about the feasibility of installing the WEVO SPS in your chassis, please call us with details of the issues you consider likely to hinder installation – perhaps we can assist with advice and information collected from previous installations.

One feature of the WEVO SPS modular design is the ability to correct some of the effects of accident damage – where components are distorted, displaced or dislocated. If your car is out of specification, it will require careful measurement and customization of some small spacer parts – but the final result can be a rear suspension system that is installed correctly and performs perfectly.

Record information prior to disassembly of existing components

Before you commence you might also need to record some information from your existing configuration. If your installation is a replacement / service that will continue using the same rear torsion bars and you intend to repeat the set-up of your car at the same ride height, you will need to record the “relaxed position” of the spring plate. To do this you must remove the lower – rear, 10mm bolt and spacer from the original spring plate bearing cover. Then remove the wheel and lower damper bolt and allow the banana arm to go to the full droop position. The angle of the spring plate in this configuration is considered to be the “relaxed position”. This will be your starting angle / position as the WEVO SPS is installed.

If you are building a fully disassembled car, with new diameter torsion bars, you will need to establish the starting angle (“relaxed position”) for your spring plates to achieve the desired ride heights. This process is not covered in these instructions; you should use some of the on-line or print media resources for this procedure.

Initial inspection of your chassis for functional installation

The basic elements of the WEVO SPS are the Spring Plate, the Adjuster Arm, The Inner Bearing Carrier and Outer Bearing Carrier. The kit is supplied partially assembled. The Spring Plate and Adjuster Arm are fully assembled, lubricated and require no further attention prior to installation.

The Outer Bearing Carrier is not assembled onto the LH spring plate so that it can be used as an inspection gauge during the preliminary check of the 4 bolt mounting plane. The RHS Spring Plate, Adjuster Arm and Outer Bearing Carrier is fully assembled.

You will see that the lower, rearward, mounting position of the 4 threaded bosses is offset inwards. This position requires the longest of the four spacers. To establish that you have the correct spacers for your chassis year – refer to the chart below.

O.E. adjustable spring plates were introduced in mid-1976. If you have a 1976 chassis you must establish which configuration was O.E. for your 1976 chassis #.

Model Series	Short Spacer		Long Spacer	
	part #	length	part #	length
1969 to mid 1976	XC_099	8.0 mm	XC_100	20.0 mm
mid 1976 to 1986	XC_097	1.0 mm	XC_098	18.0 mm

Before you commence, check that the faces of these 4 threaded bosses are clean from any paint and weld splatter – which is common. Use a small file to remove any paint and weld splatter so that you can be sure to clamp the Outer Bearing Carrier directly to the ends of the threaded bosses.

Here the weld debris on the end of the threaded boss can be seen



Measure chassis to determine spacer requirement

To determine that the kit of spacers are correct for your chassis follow this procedure. Check both ends of the torsion tube, as there is often LH to RH differences in the chassis.

Using the outer bearing carrier that has not been assembled - install all 4 spacers by inserting the short end of the spacer into the body of the Outer Bearing Carrier. These should fit without any force.

As an initial rough check – hold the bearing carrier up into position – if there is a significant error – the Outer Bearing Carrier will rock on a diagonal as only 2 points are in contact. If you have this condition you should remove the long spacer and repeat the check. The three other bosses are supposed to be on a single flat plane, the fact that you are checking a tripod mounting means you are guaranteed to have all three positions make contact – but be vigilant for anything that appears skewed, bent or misplaced. Use three of the shorter M10 bolts supplied to snug the Outer Bearing Carrier to the chassis.

If the three bolts will not easily align with the threaded bosses, this is an indication that the threaded bosses are not straight, or at least one of them is bent out of the correct hole spacing pattern. The bosses can be straightened by using a long M10 bolt screwed into the boss and a wrench to lever the boss in the direction required to straighten it. Be vigilant for cracks around the base of the boss, these are not uncommon, particularly when the bosses have been pushed out of pattern. If you discover cracks at this stage it is best to straighten all the bosses and re-weld the base of the bosses to eliminate the cracks.

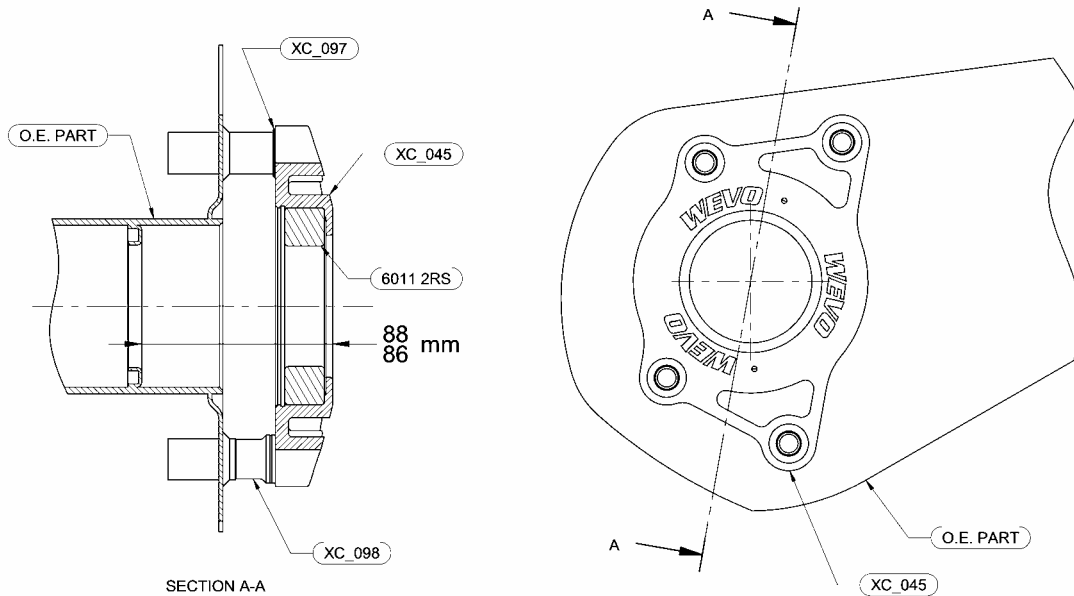
Measure the gap between the lower, rearward boss and the main inner face of the Outer Bearing Carrier. Compare the gap you have measured to the dimensions provided in the spacer table above. Determine the error – either too long, or too short?

Review the general angle / position of the Outer Bearing Carrier. The design intent from Porsche is that this plate be arranged vertical and parallel to car centerline. Although there are many visual spoilers preventing this from being obvious, make an effort to establish whether or not you believe this is true when mounted as the paragraph above. We have learned that some cars will be damaged in such a manner that the Outer Bearing Carrier will mount flat against the threaded bosses – yet be skewed relative to the normal axis of the car. For the SPS kit to perform as designed, the spring plates have to be mounted so they are parallel to the centerline of the car. If the mounting surface for the Outer Bearing Carrier can not provide this – the plates may be splayed outward and this will cause the spring plates to have too much deflection when they are attached to the Banana Arm.

As a generalization, the error – if any – is likely to be on the long spacer – as variations of this part exist in the O.E. part number system. Also as a generalization – it is likely that the spacer is too short – a condition that can be remedied with shims and therefore without delaying the installation of your WEVO SPS.

With the Outer Bearing Carrier clamped in place by three M10 bolts, take a measurement from the outside face of the bearing carrier to the ring that is down inside the end of the torsion tube. If this dimension is between 86 mm and 88 mm – you can proceed with the installation of the WEVO SPS.

This illustration shows an assembly using the parts common for the later series chassis that had O.E. adjustable spring plates. Use the table to identify part #'s and dimensions of the spacers for your series car.



If this dimension is shorter than 86 mm – you may encounter difficulty with the installation of the WEVO SPS and it will not function as designed. If the dimension you have measured is less than 86 mm, then please re-check your measurements – both LH and RH and then call Windrush to discuss the dimensions of your chassis.

A pilot delivery of kits to 12 cars identified that this is one of the most variable areas of the 911 rear suspension. The condition and position of the 4 threaded bosses might be completely abstract when considered in the context of these instructions. Of the 12 pilot delivery cars all exhibited some degree of asymmetry from LH to RH side. Many had accident damaged that resulted in the threaded bosses being skewed off axis, many had cracks around the bosses and one was so difficult to assess that the bodyshop completing the installation elected to remove some damaged bosses. In that extreme case they used the XC_045 as a fixture to hold the bosses while they were re-welded.

You will find that skewed bosses can be straightened by using a long, high quality M10 bolt as a lever. Check for cracks after any efforts to re-aligned the bosses.

Fitting the Inner Bearing Carrier

The Inner Bearing Carrier is shipped not fully assembled – this is to allow you to work on the black anodized aluminum part (XC_049) with files, sander, etc, that will introduce grit and filings. Once the fine fitting of the part is complete – it needs to be cleaned thoroughly prior to assembly of the bearing, seal and o-ring.

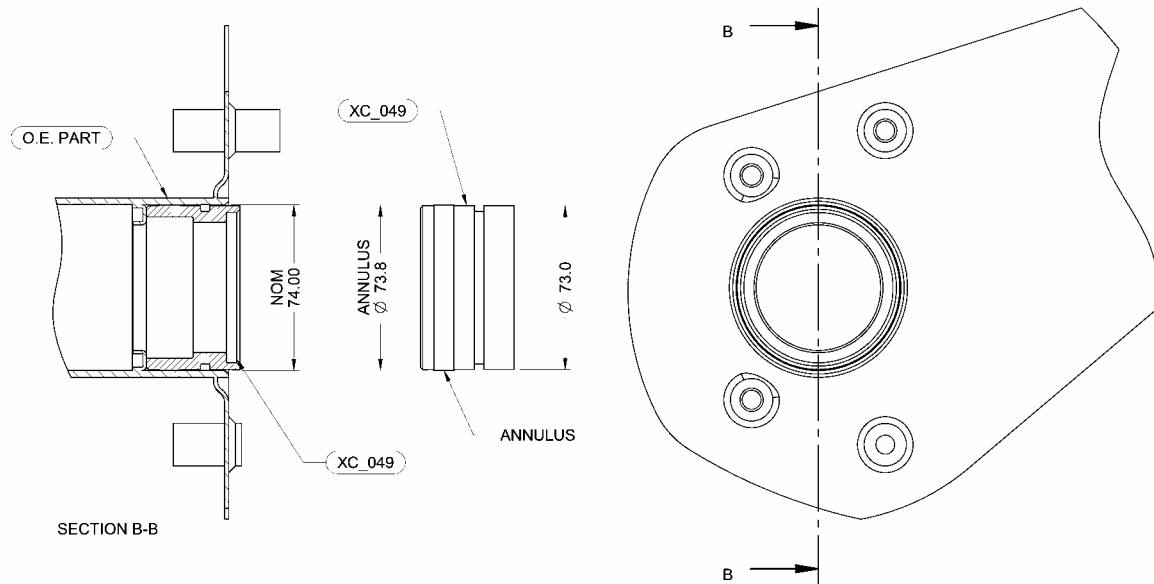
DO NOT commence by assembling the Inner Bearing Carrier with its three other parts.

Begin by cleaning rust, paint and debris out of the end of the Torsion tube. Also check if any weld or small beads of weld splatter from the joint between the inner fender and the Torsion tube is violating the diameter of the Torsion tube. We have seen this on some cars. If this is the case – use appropriate tools to detail the area and be certain that the Ø 74 mm is clear for the insertion of the Inner Bearing Carrier.

The image below shows a Torsion tube end in good condition. In this instance, just some paint and sealer needs to be removed from the inside diameter of the Torsion tube for it to be perfectly clean. Often corrosion and paint will need to be cleaned from this diameter.



The section of Torsion tube outboard of the collar - about 35mm inside, is the area in consideration. This will be the final location of the Inner Bearing Carrier – per this illustration.



The main diameter of the Inner Bearing Carrier is $\varnothing 73$ mm. This is slightly smaller than the design dimension of the end portion of the Torsion Tube – being $\varnothing 74$ mm.

You will see that the Inner Bearing Carrier (XC_049) has an annulus about 10 mm wide, towards one end. This annulus has a \varnothing of almost 74 mm. You should find that at this stage, your Inner Bearing Carrier can be inserted into the Torsion tube until you reach the narrow annulus mentioned above. For reference, as it is finally situated, the Inner Bearing Carrier is installed with the lip seal outwards, the needle roller bearing inwards – meaning the fitting annulus is towards the inside end of the XC_049.

A small amount of material is likely to be removed from annulus, remove material discreetly until this is a close tolerance fit to the end of the Torsion tube. Care with this work will result in the highest performance of your WEVO SPS.

The end of the Torsion tube might not be round, especially if there is wear or corrosion in this area. Mark the Inner Bearing Carrier and the Torsion tube so that the two parts can be indexed. The repeated trial of fitting should proceed with the parts always clocked against the index mark.

Here the fitted Inner Bearing Carrier is shown already fitted (current version part is black anodized) - with telltale index marks used to indicate the clocked working position.



Use felt marker pen to color the annulus section, that way you should see witness marks where the high points are making contact with the Torsion tube. By repeating this process – clocking the Inner Bearing Carrier carefully each time - will eliminate the high points that are preventing the Inner Bearing Carrier from reaching the final position in the end of the Torsion tube.



The 73 mm Ø main section of the Inner Bearing Carrier is a good reference diameter. If this will fit into the end of your Torsion Tube, you know that at most – you have 0.4mm of material to remove from the annulus before the whole diameter would be the same. The aluminum is clear anodized and it might take a little effort to cut into the anodizing with a file, or sander, but once you are through the anodizing into virgin metal, material will be removed quickly – so proceed with care.

Once you have worked the close fit of the Inner Bearing Carrier so that it will slide all the way in to the abutment caused by the collar, the task is complete.

The Inner Bearing Carrier should now be cleaned thoroughly.

The Needle Roller bearing and the Lip seal both need to be installed in the Inner Bearing Carrier. Both are a light press fit.

The ends of the needle roller shell are slightly asymmetric. One end of the shell has text engraved on it – the other is plain. The side with the text should be inserted into the housing first. This offers a “land” on the end of the shell to allow it to be removed in the future should the need arise.

The end of the needle roller shell with the text engraved TLA 5520 Z should be pressed into the XC_049 housing – this end first



The installation of the Needle Roller can be performed a number of ways. One easy way is to pre-heat your oven to 200 - 225°F (no more). Place the Inner Bearing Carriers in the oven. Allow them to heat soak for 15 minutes, then remove them and you will be able to gently tap the Needle Roller into position – use a soft face hammer, flat piece of wood, or mallet and do not use excessive force.

When the part is cool, fit the Lip Seal the lip seal should sit just below the chamfer when fully home. Be careful to tap the seal into the housing with gentle blows, the ring of the seal is thin and relatively fragile – careless damage during installation is the greatest risk.

*The Inner Bearing Carrier with Needle Roller and Lip Seal installed will look like this.
(Note current version Inner Bearing Carrier is black anodized)*



Once the needle roller and the lip seal are installed, the Inner Bearing carrier is ready for installation. Use synthetic grease to lubricate the end of the Torsion tube – this is for two purposes, to prevent rust forming on any freshly exposed steel and to allow the O-ring to slide into position without tearing.

Install the O-ring in the groove in the Inner Bearing Carrier.

The O-ring will have a significant interference with the inside diameter of the Torsion tube, so do not fit the O-ring and experiment with the fit, all test fitting should be done with the O-ring removed, as subsequent removal of the Inner Bearing Carrier will require some care and patience, once the O-ring is installed.

Lubricate the Needle Roller with the same grease. Pack this bearing with grease in a manner that ensures that grease has been forced into the cavity between the case, the needles and the cage.

Once you are satisfied that all preparation is complete, Clock the rotations of the parts and slide the Inner Bearing Carrier into position, it is likely to require gentle blows with a soft face hammer or mallet to set it into position. Ensure that it is driven home to the same position as during the test fittings.

Final assembly of WEVO SPS components

Once the disassembled LHS parts have been used for the preliminary checks, the final assembly of the LHS can be completed to match the RHS that was fully assembled when you received the kit.

To achieve this the Outer Bearing Carrier - with the Ball bearing installed, has to be fitted to the adjuster arm. Once fitted, a Spiralox retaining ring retains the ball bearing and Outer Bearing Carrier.

There is a modest interference fit between the inner race of the ball bearing and the location diameter of the adjuster arm. Start by lubricating the bearing mount surface of the adjuster arm with some light oil, WD40, or thin smear of grease.

The Outer Bearing Carrier and bearing should be placed in a pre-heated oven at no more than 225°F. Allow the parts to heat sink for 15 minutes. The inner race of the ball bearing will now slide, perhaps with some light assistance from a plastic hammer, all the way down to the abutment on the adjuster arm. It will be obvious when the bearing is all the way on, as the retaining ring groove will become visible at the edge of the bearing.

If you have experience and the correct tools, this installation can also be achieved with a press. Always lubricate the parts before pressing them together.

Once the Outer Bearing Carrier is installed, add the Spiralox retaining ring that was packaged with the LHS Outer Bearing Carrier. The Outer Bearing Carrier is not handed.

You will now have the WEVO SPS in the complete sub-assembled condition, with the Inner Bearing Carriers installed in the chassis. You are ready for final fitting with the torsion bars.

Installation of WEVO SPS onto chassis

Before you install the torsion bars check the installation of the WEVO SPS without the torsion bars. This will allow you to move the spring plates through the full range of travel and ensure they move without friction or binding as the 4 mount bolts are torqued down. This movement becomes practically impossible once the torsion bar is installed, as any movement is an effort to twist the torsion bar – just as the torsion bar deflects under the full weight of the car.

Apply synthetic grease to the inner race of the needle roller bearing and in the area where the lip seal will contact the spring plate. In general ensure that this area is all well lubricated with grease.

With the spacers correctly located in the Outer Bearing Carrier – offer the whole assembly up and into the chassis and install the four M10 mounting bolts. If your kit included two longer M10 bolts, these are for the two lower – rearward threaded bosses that also have the longer spacers.

Run the bolts into the threads to the snug position and review the installation to see that all four spacers are in contact with the ends of the threaded bosses. This can be checked with a thin feeler gauge.

Assuming you do not find any anomalies when reviewing the fit of the Outer Bearing Carrier against the threaded bosses, you can torque the bolts to 30 ft/lbs. and check that the Spring Plate moves with virtually no resistance.

If there is any appreciable friction, notchiness or resistance, you will need to investigate. If the inboard face of the Spring Plate is making contact with the Inner Bearing Carrier or the lip seal, this can cause friction. Any likelihood of contact in this area should have been discovered in the section titled *“Measure chassis to determine spacer requirement”* on

page 3. If you have friction at this stage where you did not during the preliminary inspections, try to investigate what is the source and call Windrush for advice.

The kit includes 2 sizes of shims, 0.25mm and 1.0mm that will be used to adjust for minor irregularities. The shims should be placed between the end of the threaded bosses and the spacers on the XC_045 bearing carrier. Shims might be required to re-establish the flat plane for the XC_045 bearing carrier to be mounted against. Be prepared to move the shim between the 4 threaded bosses until you achieve a fit that neither distorts the bearing carrier (XC_045) or creates friction in the bearings as the four M10 bolts are tightened. Make a note of the pattern of the shims and the thickness in each location and be sure to re-create this shim package during final installation.

The shims should also be used to ensure that the spring plates are parallel to the car centerline when the Outer Bearing Carrier is installed. Placing a 1mm shim placed on each of either pair of the front or rear bosses will move the banana arm end of the spring plate by about 7mm. Therefore when using the shim to correct for a flat mounting plane, also be aware of how the shim will affect the parallelism of the spring plate to the car centerline.

Always attempt to complete the installation with the minimum stack of shim material on all the threaded bosses. The ideal installation would require no shims.

Assuming the Spring Plate moves freely in the manner it was designed and is parallel to the car centerline, you can remove the parts and prepare to install the torsion bars. Always lubricate the internal spline on the Adjustment Arm and the external spline on the torsion bar to ensure that this joint will not be assembled dry. Grease in this joint will resist the pervasion of water and dirt.

It is good practice to check that the torsion bar spline can be installed smoothly into the adjuster arm before you are handling all the parts up in your fender wells. Sometimes you will need to drive the splined end of the torsion bar into the Adjuster Arm using a plastic hammer, or steel hammer – with the parts protected with wood blocks. Small amounts of broaching burr and plating material can be in the spline from manufacture and processing. Having verified the fit with the parts lubricated and pre-assembled away from the car, your final installation work in the fender well will proceed more smoothly.

The torsion bars should be installed in the chassis and trial fitting completed to determine the correct clocking of the inner and outer splines should be performed and ID marks made on the parts if necessary. Always follow the instructions for installing torsion bars marked LH or RH. Follow any instructions from the manufacturer of the torsion bars, or the original factory manual for any advice regarding installation of the torsion bars.

Set your torsion bars to achieve the “relaxed position” discussed on page 2.

Given the multiple trial fittings probable prior to this final installation, ensure that all debris is cleared from the inner bearing race for the needle roller bearing. Ensure that adequate grease is added to the inner race and that the needle roller bearing itself is adequately lubricated.

Install the WEVO SPS and slide the assembly over the spline of the torsion bar.

Install the three M10 bolts with M10 Schnorr washers in the positions of the short spacers. You will probably find that the fourth bolt position is blocked by the spring plate in the “relaxed position”. Be certain the fourth spacer is installed in position, as it is captured by the shoulder and counterbore into the Outer Bearing Carrier.

Apply Blue Loctite (242) or similar to the M10 threads and torque these 3 fasteners to 34 ft/lbs.

The torsion bars should be centralized in the chassis by using a soft punch to move them left or right as required until a cotter pin can be passed through the cross drilling in the end of the Adjuster Arm spline. This will prevent the torsion bars from moving from their central anchor point in the middle of the torsion tube in your chassis.

When the lower damper bolt is installed and the damper open length is managing the full droop condition of the suspension, you will find that the fourth hole in the Outer Bearing cover is open and you can install the M10 bolt (and M10 Schnorr washer). Apply Blue Loctite (242) or similar and torque to 34 ft/lbs.

With the installation and tightening of the final bolt, the installation is complete.

Adjusting ride height with the WEVO SPS

The ride height adjustment on the WEVO SPS is made using the M12 x 1.75 mm pitch set screw in the anchor block of the spring plate. A locking set screw is positioned perpendicular (facing forwards) to the adjustment screw. This locking set screw requires a 4mm Allen key to loosen and tighten. The tip of the locking set screw is fitted with a nylon button that will prevent damage to the threads of the adjustment screw and prevent the both the adjustment screw and locking set screw from coming loose. If you fully remove the M8 locking set-screw for any reason, be careful not to lose the nylon tip – as this can remain partially engaged in the M12 x 1.75 adjustment screw and tip of the M8 set screw will look as if a component is missing from the hollow feature in the end.

The adjustment screw should not be moved beyond the position where 18mm is exposed on the upper side - projecting towards the Adjustment arm. If your ride height requires more thread to be exposed you should re-index the torsion bar to reduce the exposed thread to less than 18mm.

Ride height adjustments are made with a 6mm Allen key, the locking set screw requires a 4mm Allen key.

Maintenance of the WEVO SPS

The WEVO SPS is manufactured from fine materials. With the exception of the Ball Bearing in the Outer Bearing Carrier, all materials have protective coatings to prevent corrosion.

The Ball Bearing in the Outer Bearing Carrier is fully sealed and pre-lubricated. The whole system will endure the normal rigors of road use in any weather and car washing and cleaning procedures.

Care should be used when pressure washing the fender wells of the car, as the high pressure of the washing jet can breach the bearing seal and allow water to remain trapped inside the bearing. This potential problem is true for all sealed bearings including the transmission seals and wheel bearing seals on your car.

The lip seal also protects the needle roller bearing that is installed in the Inner Bearing Carrier.

The assembly care of precision components and lubrication performed during the installation of your WEVO SPS should be sufficient for 10's of thousands of miles. This is a high performance upgrade to your car and perhaps you are now using your car for more high performance activities? Care should be taken to routinely inspect all critical elements of your car when high performance or competition driving activities are undertaken.

In particular, periodically check the torque of the four (per side) M10 bolts that mount the Outer Bearing Carrier. If these move when checked to the 34 ft/lbs. they were originally tightened to, then extra care should be taken with the application of Blue Loctite (242) and re-set the bolts with new Schnorr washers. Shorten you inspection interval and advise Windrush of your findings.

Future documentation should be available with exploded diagrams showing individual parts and procedure to replace the parts should the need arise.

END.

