ARNNWORX SPECIALTY TOOLS

Porsche 944 Turbo Throttle Body Re-seal Instructions

Introductory Notes - Carefully read the text in the following pages and become familiar with the contents before performing the throttle body overhaul. As with any rebuilding process, many judgments must be made along the way. While typical problems have been highlighted within these pages, judgments pertaining to the assembly and operation are the responsibility of the mechanic performing this work

Notes on Cleaning and Inspection - Once disassembled, place throttle body (TB) parts in cleaning solvent. Soak parts long enough to remove foreign materials. Use a stiff bristle brush. Do not use any abrasives to clean TB parts. Do not insert wire to clean out passageways. Wash off in suitable solvent. Clear out all passageways with compressed air and check to ensure thorough cleaning of obscure areas. Inspect all parts for damage and stripped threads.
CAUTION - Do not soak parts containing rubber, plastic and electrical parts in cleaning solvent.

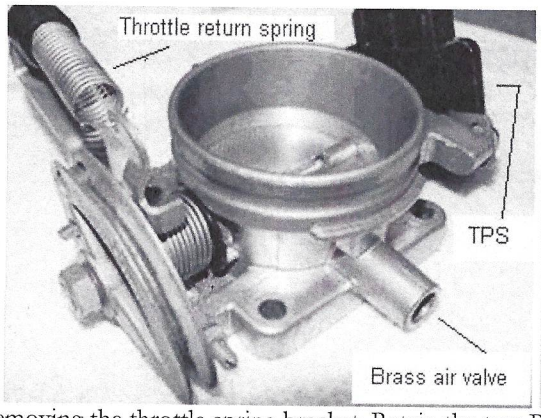
Preliminary Notes

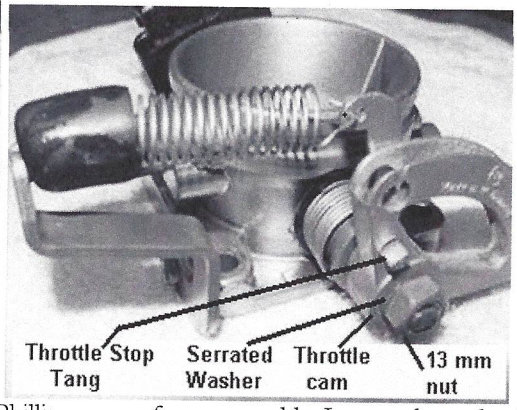
Note 1. Cover opening on intake manifold after TB is removed.
Note 2. Before removing the air valve adjustment screw, turn clockwise until lightly seated, noting the number of turns. Record this value for use during re-assembly. If not known, an initial setting of 2½ turns CCW from seated should be used.
Note 3. The idle stop screw need not be removed for this procedure.
Note 4. Procedures for adjustment of the idle stop screw and the air valve screw require detailed engine-running procedures. Please consult the Porsche workshop manual for these procedures.
Note 5. Before disassembly, pay particular attention to the torsion spring and how it is positioned. . This spring is often the point of some confusion. There are several photos of this spring within these pages to help with assembly.
Note 6. Step 8 discusses the placement of 2 shaft seals; one on the TPS side and one on the throttle cable side of the throttle body. While this arrangement has been seen many times, a few customers have reported seeing this reversed – 2 shaft seals on the throttle cable side and one shaft seal on the TPS side.

Removal of the TB from engine

Step 1. Remove the air filter box and snorkel, Air Flow Meter & Inter-cooler pipes in order to access the throttle body.
Step 2. Disconnect the Throttle Position Sensor (TPS) electrical connector and remove the 4 cap screws used to mount the TB to the intake manifold.
Step 3. Rotate the TB so that the throttle cable spring can be released from the TB and disconnect the small vacuum tube on the bottom of the TB.
Step 4. Remove the TB to the workbench.

Disassembly of the Throttle Body

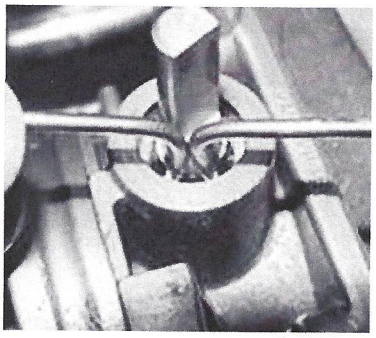


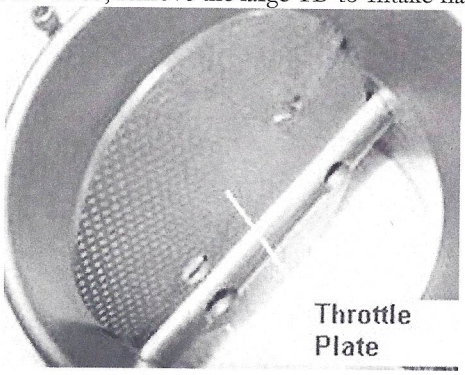


1. Begin by removing the throttle spring bracket. Retain the two Phillips screws for re-assembly. Inspect the each of the two contact points of the throttle spring - they are known to break which can result in open-throttle condition. Also, pay special

attention to the positioning of the torsion spring that is wound around the throttle shaft. This spring is often the source of questions and assembly error.

2. Carefully remove the 2 Phillips screws that secure the Throttle Position Sensor (TPS) and separate the TPS from the TB. Remove the TPS O-ring and replace it with one from the kit. Also, remove the large TB-to-Intake flange O-ring.

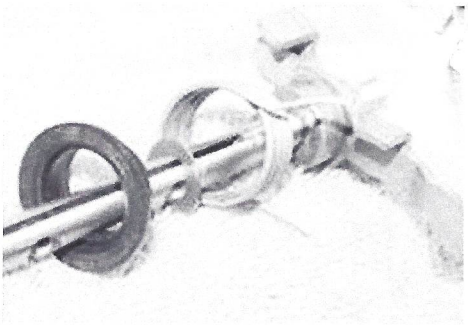




3. Remove the shaft snap-ring using small picks or other pointed tools . Next is a thin washer (beneath the snap-ring), clean and retain this washer for re-installation.

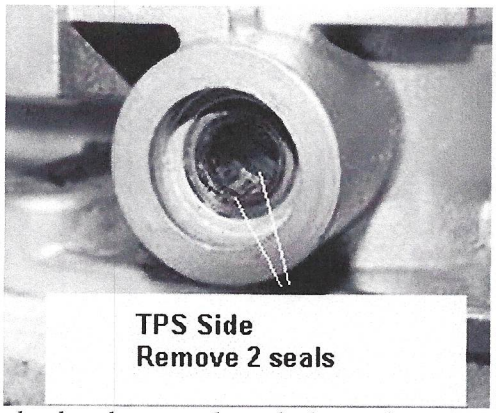
4. Using a felt tip pen or an awl, make an indexing mark on the throttle plate, this mark will help to re-orient the plate during assembly. Remove the oval head screws and with the shaft rotated to wide-open-throttle (WOT) position, remove the throttle plate. These screws can be stubborn due to the end of the screw being deformed; a rotary file or Dremal tool may helpful. Inspect the shaft for any burrs and, if found, use a rotary file or Emory cloth to smooth the shaft. This will make the shaft easier to extract.

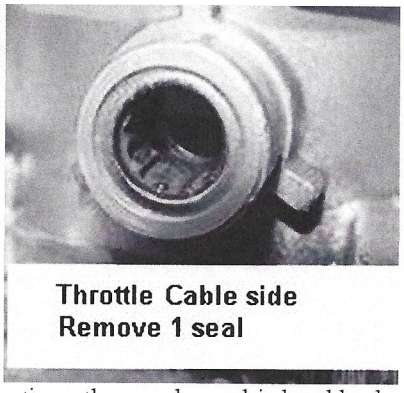
5. Remove the 13mm nut, serrated washer and throttle cable cam.



6. Carefully remove the shaft from the TB casting, ensure the thin washer is not lost. The photo above shows the correct orientation of parts. Refer to this photo to ensure correct orientation during re-assembly.

7 Note: Before removing the brass air valve adjustment screw, turn clockwise until lightly seated, noting the number of turns. Record this value, as a reference for use during assembly. If not known, an initial setting of 2½ turn CCW from seated should be used. Remove the brass air valve. Remove the air valve o-ring from the brass air valve and clean the air-valve. Place the new o-ring on the valve and re-install or set it aside for re-assembly. Note: the replacement o-ring for the air valve is the smallest o-ring in the kit.

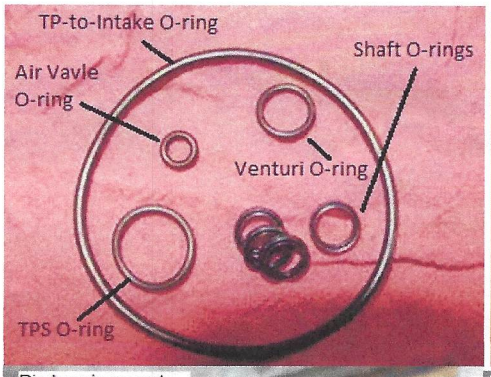




8. Use small picks to hook and remove the seals shown above. Many times these seals are dried and broken into small pieces. Inspect & clean this area well as any remaining residue will affect seating of the new o-ring. Note: A small number of throttle bodies were manufactured with the reverse configuration (1 seal on the cable-side and 2 on the TPS-side). Make note of how the original seals are placed as a reference for re-assembly.

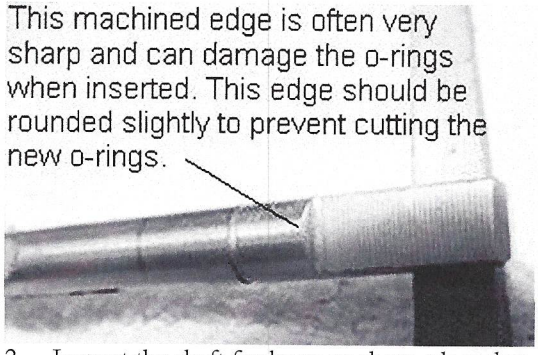
Re-assembly of the Throttle Body

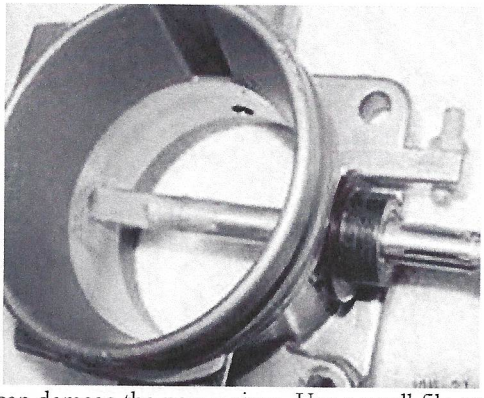
Note: begin re-assembly only after parts have been cleaned and inspected.



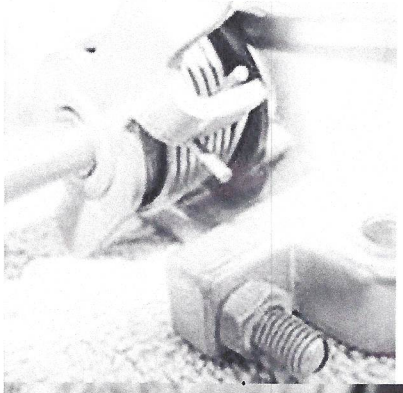
1. Use the image above to identity the various o-rings needed. **Note: this kit now includes two sets of shaft seals (these are packaged with a zip-tie or tie-wrap to help identify them). The "track" seals may require a**

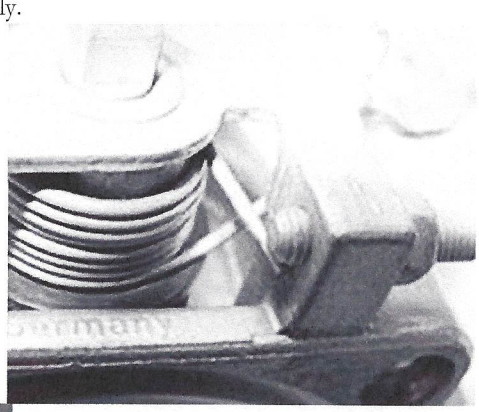
break-in period of a few hours, during which occasional high idle symptoms have been seen. The "street" seals eliminate this problem but do not provide the same sealing performance. Choose the seal best for your application. Insert new, shaft o-rings into positions where the bearing seals were removed. Be sure each o-ring is fully seated. Installation hint: a common pencil stub can be helpful positioning the shaft o-ring, see the sequence of images above.

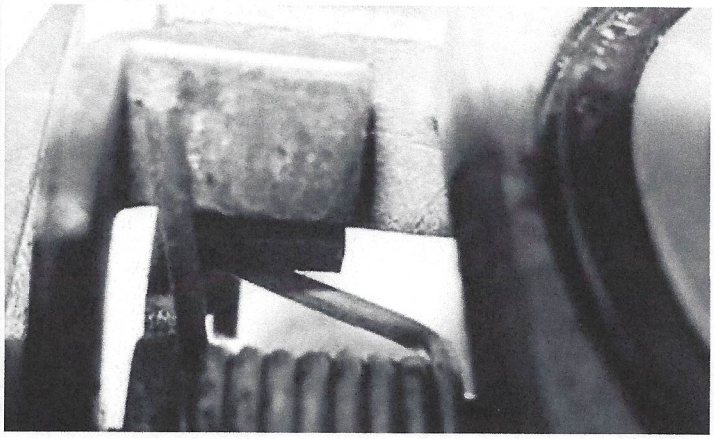


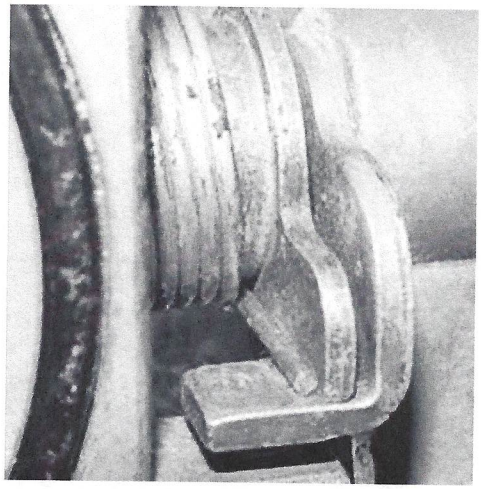


2. Inspect the shaft for burrs or sharp edges that can damage the new o-rings. Use a small file or emery cloth to dull the machined edge of the shaft (see photo). Ensure that the spring is properly oriented on the shaft and the thin washer is in place on the shaft (see photo in disassembly steps). Apply a liberal coating of automotive grease to the shaft, this will help prevent cuts or damage to the new o-rings when the shaft is inserted into the bore.
3. Gently insert the shaft into the TB casting as shown above. Use a gentle rocking motion and steady pressure to avoid damaging the o-rings. When done the shaft should have only a small amount of rotating drag. If significant drag is apparent, then remove and inspect the o-rings for damage. One "spare" shaft o-ring is included with each kit. Once the end of the shaft is through one side of the TB, recoat the end of the shaft with grease. Note: A small amount of WD-40 or thin machine oil applied to the throttle shaft/bore area can help the seals to seat and may be needed to allow the shaft to rotate freely.



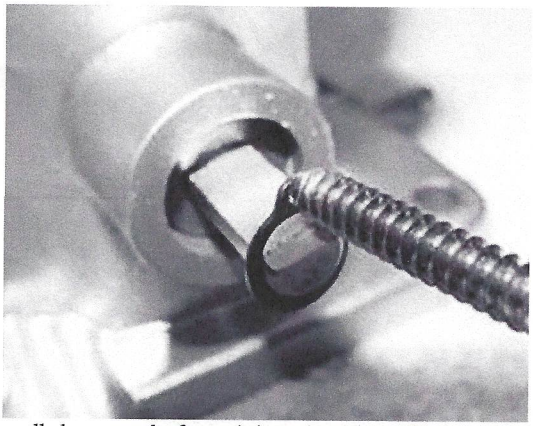






Before going further, study the sequential photos above – use these photos as a guide for getting the spring properly located. In the first photo, note how the spring is "hooked" over either side of the throttle stop lever. Continue pushing the shaft into the TB casting. As the shaft is pressed in, simply lift the end of the spring up onto the flange next to the throttle stop screw. Using a small screwdriver, the ends of the torsion spring can then be moved into the locations shown above. Both ends of the spring must be in this configuration. Remove excess grease from all exposed areas.

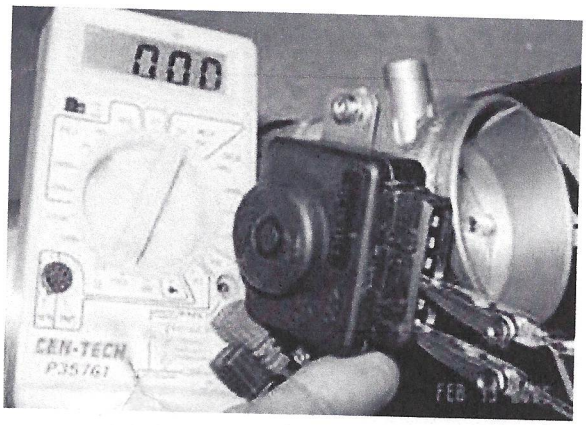
4. Insert the throttle plate; be sure to position this piece correctly. To know the correct orientation of the throttle plate, observe the index mark made during disassembly. Also, a beveled edge will exist at points where the plate contacts the throat of the TB casting. The angle of this bevel indicates how the plate was originally installed and can help you to know it is correctly oriented. Ensure that the plate is centered and fits well within the bore of the TB. A poor fit here will result in a fast or unstable idle. Install each of the 2 screws. Check for smooth operation and seating of the plate when placed in the idle position. Note: A small amount of WD-40 or thin machine oil applied to the throttle shaft/bore area can help the seals to seat and may be needed to allow the shaft to rotate freely.



5. Place the shaft washer back into position and install the new shaft retaining clip. The clip can be difficult to work with and the proper tool is not available to many mechanics. This simple trick might help - this sheet-metal screw is wedged into the clip's tang just enough to open the clip. Once opened, it can be slipped over the end of the shaft. The screw can then be removed and the clip can be worked into position. Ensure the clip seats in its groove.
6. The throttle cable cam should now be re-installed. Ensure that the throttle stop tang engages the cam. The serrated washer and shaft nut can also be installed and tightened. Do not over-tighten the nut or the shaft will be twisted (damaged) - approximately 6 inch-pounds is sufficient.

7. Now that the throttle cable cam is secured, check again that the throttle plate moves freely and returns to its seated (idle) position. If needed, re-adjust the throttle plate position. To ensure the shaft screws do not come loose, use either thread locker or the end of each shaft screw can be peened. To do this, mount a #2 Phillips screwdriver in a vise with the tip protruding upward. Position the TB in such away that the throttle plate screw is squarely engaged by the tip of the screwdriver and the screwdriver is supporting the TB. This is critical because the shaft is delicate and can be easily damaged. While holding the TB in this position, place flat tip drift onto the opposite end of the screw and peen with a small hammer. Small hammering motions are best applied along the outside diameter of the screw. Only a small deformity of the screw is needed. When done correctly, this process will distort the end of the screw and prevent it from vibrating loose. Inspect and repeat the process on the other throttle plate screw. See photos above.

8. Thread the brass air valve back into position. Tighten the air valve until it is lightly seated and turn counter-clockwise by the number of turns noted during disassembly.



9. Reinstall the throttle cable spring & spring bracket.

10. Ensure the TPS o-ring is in place on the TPS and position the TPS on the TB casting. Position the TPS as pictured above. Secure it loosely using the 2 stainless steel hex cap-screws and washers. You will notice the TPS can be rotated through a range of about 3 degrees. The TPS must be correctly positioned within this range. To do this, first with the throttle plate closed (idle position), rotate the TPS CCW to its stop. Tighten the TPS screws while holding it against the stop. Use a multimeter to confirm that continuity exists between pins 4 and 6. Also verify that continuity does not exist between those pins when the throttle plate is opened (all positions except idle). Minor adjustments may be needed to the TPS position to achieve these continuity readings.

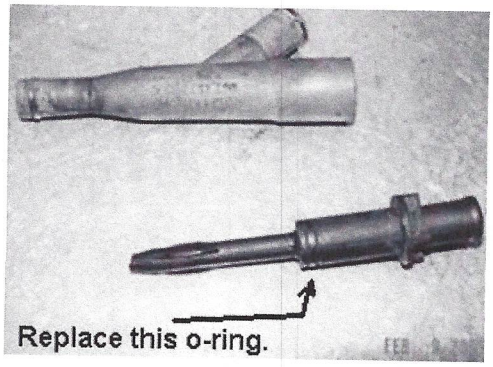
Installation of the TB

1. Place the new TB-to-Intake o-ring on the TB casting. Inspect this vacuum hose closely; it is a likely point for oil saturation.

2. Position the TB so that the throttle cable can be re-attached to the throttle cam. Once attached, secure the TB to the intake manifold using the 4 stainless steel cap screws and washers. Tighten these in an x-pattern. Install the intercooler tubes, AFM and air filter box. Inspect the throttle cable through all positions of operation closely. Broken cable strands can cause sticking throttle conditions.

Venturi

Included in this kit is an o-ring for the venturi. The venturi is a small, y-shaped device and is located under the intake manifold. It is not available on all models of the 944 Turbo. It is located near the Idle Servo Valve and can be seen through the runners of the intake. With the intake removed, the venturi can be removed from its connecting hoses and then be separated into its two parts. Once separated, the o-ring can simply be replaced and the parts re-assembled.


Replace this o-ring.