

## **Porsche 928 Odometer Gear Replacement**

http://dwaynesgarage.norcal928.org/1984%20Odometer%20Repair%20Procedure.htm Forum Post: http://forums.rennlist.com/rennforums/928-forum/520661-odometer-repair-procedure-w-pics.html Great how to repair gauges, part one and part two: http://dwaynesgarage.norcal928.org/Pod%20Removal%20and%20Instrument%20Cluster%20Repair%20I.htm http://dwaynesgarage.norcal928.org/Instrument%20Cluster%20Repair%20II.htm

Please read the first few steps carefully as these are our most common questions we receive after a client has performed a repair and the odometer still does not work.

The reason the original gear or gears have failed is that they are made of urethane and lubricated with petroleum grease. This combination breaks down the urethane into a waxy substance which flakes and breaks away. This will also leave a waxy film and deposits on the shafts, gears, housing and peg on the pods.

\* Work smart, meaning have a clean area to work and the proper tools to perform the repair. General tools that will be needed depending on the vehicle are small standard screwdriver, small Phillips screwdriver, assortment of torx drivers, diagonal cutters (dikes), 1/4" socket set are just a few of the items that may be needed.

\* No grease is needed with the new gears. Our gears are made using Celcon® which has graphite mixed into the material and does not require any additional lubricant.

\* Make sure that you have blown the speedometer and odometer assembly clean with high pressure compressed air. Even if you think that you have found all of the broken pieces you still need to perform this step.

\* Wipe the area around the gears, any shaft or shafts that the gears may ride on, the motor shaft and the peg on the pod that the small gear spins on clean, using a clean cloth and rubbing alcohol. Any residue left over from the old gears can allow the new gears to stick and not allow the odometer to work.

You'll need to remove the needle in order to remove the face plate. The Speedo needle is press fitted on a small spindle with fine gear teeth on the end. <u>**DO NOT PRY UP ON THE NEEDLE**</u> <u>**TO REMOVE!**</u> This is the trickiest part of the job. The needle is pressed onto a shaft that is extremely thin. It feels like a pretty tough metal, but you need to be careful here. Do not pull straight up. *Do not put any torque on the shaft*. Grip the speedometer needle at the center and rotate counter-clockwise, you may have to gently lift the needle above the needle stop, until it hits an internal stop. Gently continue to rotate the needle while also gently applying a small amount of upwards tension at the same time. The friction is all that is holding the needle to the shaft. Keep turning and applying a small amount of upwards tension until the needle comes off. *Do not force it.*)

## **1984 ODOMETER REPAIR PROCEDURE**

While I was driving California ('84) to Oregon a few weeks back, the Odometer stopped working about 150 miles into a 1500 mile trip. When I returned home, I bought the replacement gear and replaced the broken drive gear and put the Odometer back together. After driving the car about 1500 miles to OCIC, the odometer stopped working again. So I took it apart and inserted a washer to take up the slack between the odometer tumblers. I've put another 3000 miles on the car from Maryland back to California recently and the odometer is still going strong.

I took a couple of pictures (of course) and thought I'd share the procedure I followed with my fellow Newbie's that want to make this repair. This repair applied to the '84 MY but should apply to most if not all the mechanical odometer MY.

> Here's the tools I used to remove the pod: 13mm combination wrench 27mm socket, 6 inch extension, socket wrench 10mm socket medium Phillips 5mm Allen socket (long)

Here's the tools I used to work on the instrument cluster/odometer: medium Phillips and small Phillips screwdriver flat blade screwdriver 7mm nut driver standard pliers and needle nose pliers small, thin wire

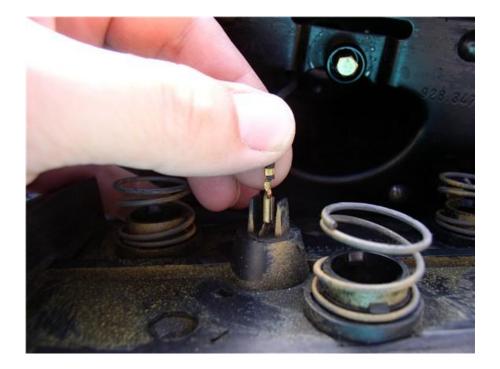
First you will need to remove the pod in order to remove the instrumentation cluster. In a previous post I included a procedure for fully disassembling the pod in order to remove it. However, in this procedure, we'll follow a shortcut to getting at the instrumentation cluster without fully disassembling and removing the pod making this procedure considerably easier. First, disconnect the negative battery terminal using the 13mm combo wrench.



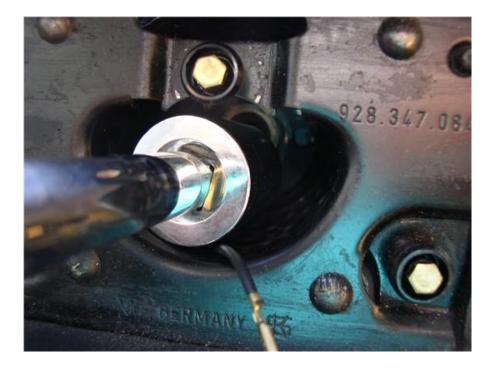
Next, remove the horn pad by gripping it on both ends with your hands and giving it a firm tug toward you. There are 3 clips that hold the horn pad to the wheel (one on top-center and 2 on the bottom half (left and right)). Use "shallow" but firm tugs. There is a horn wire connected to the back of the pad and you don't want to violently pull the pad off the wheel and damage the wire/connector.



After the horn pad is off, disconnect the horn wire.



Next, use the 27mm socket and extension to loosen and remove the nut that secures the steering wheel to the steering column. I've had good luck simply holding the steering wheel firmly with my left hand while using my right to use the wrench. It's best to NOT use the steering wheel locking mechanism to hold the steering wheel in place while you loosen the nut - the force could damage the locking mechanism. If you can't hold the steering wheel with one hand, a helper may be able to hold the steering wheel in place while you loosen the nut completely from the steering column threads. By leaving the nut on the column, it will act as a safety stop when you pull the steering wheel off the column and keep the steering wheel from hitting you in the face.



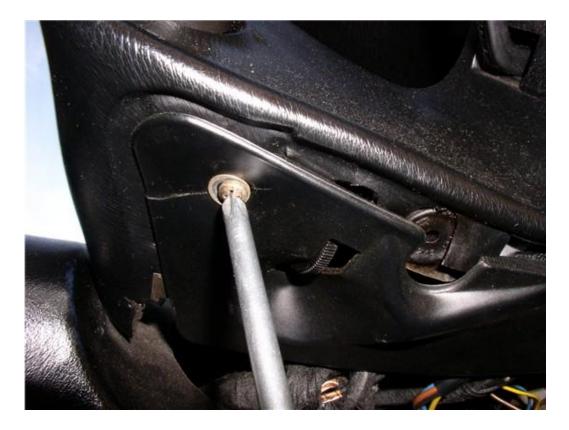
can so you can easily orient the steering wheel in the same location when putting it back on. Then give the steering wheel a good firm tug toward you to remove it. When loose, take the nut off the column and remove the wheel.



Lower the tilt wheel paddle.



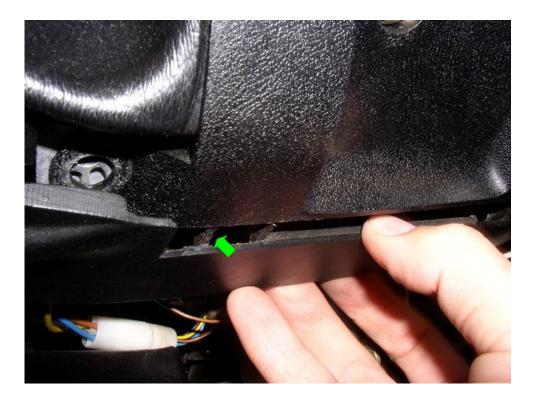
Then remove the two Phillips screws that hold the under pod cover plate in place. There's one on the left, and.....



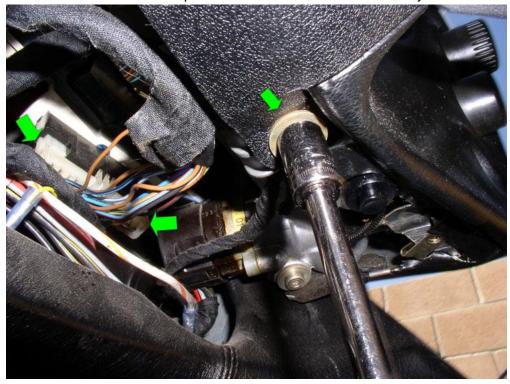
....one on the right.



The under pod cover plate is removed by sliding it toward the front of the car in order for the tab/prongs to clear. You can see the tabs indicated by the arrow in the picture below. These tabs can easily break off if forced down without pulling the plate forward.



Next, remove the two 10mm bolts that secure the signal/wiper/cruise cluster cover as indicated by the great arrow. There's one bolt on the right and one on the left of the signal/wiper/cruise cluster. By now you may also notice the electrical harness connector to the instrumentation cluster underneath (indicated by the 2 green arrows). There should be a harness connection on the left and one on the right underneath the pod. We will disconnect these shortly.



Remove the Phillips screw from the signal/wiper/cruise cluster cover and...



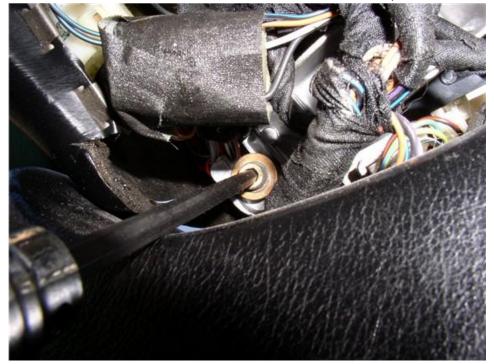
....remove the cover.



Next, remove the right Allen head bolt that secures the pod to the dash framework. It's located to the right and underneath the pod (underneath the ignition switch module). I used a 5mm Allen socket (long).



Remove the Allen bolt on the left underneath the pod.



Note that the long bolt is used on the left side and the short bolt on the right.



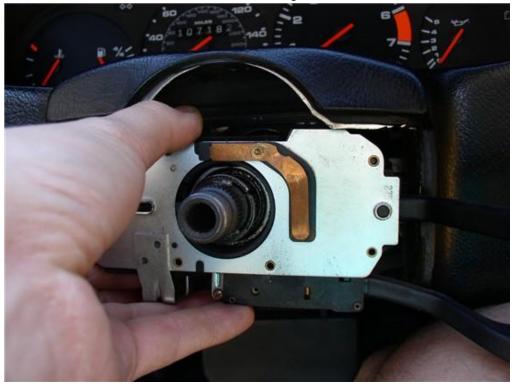
Remove the rubber grommet around the ignition switch. You can use a flat blade screwdriver to assist with the removal.



Next, we need to remove the signal/wiper/cruise cluster from the steering column. But first we need to maneuver the pod so the cluster will clear. Start by pulling the pod forward enough to clear the ignition switch. Then lift the pod slightly - enough so the signal/wiper/cruise cluster will clear the pod.



While holding the pod up with one hand, use the other to grasp the signal/wiper/cruise cluster and twist while pulling toward you. Eventually, it will begin to work free and move toward you. I noticed on my cluster that there is a place for a clamping bolt to hold it in place on the steering column. However, no bolt was in place. If yours has a clamping bolt in place, you will need to loosen it in order to move the cluster. Move the cluster forward on the column enough so you can reach behind the cluster and disconnect the two wiring harnesses.



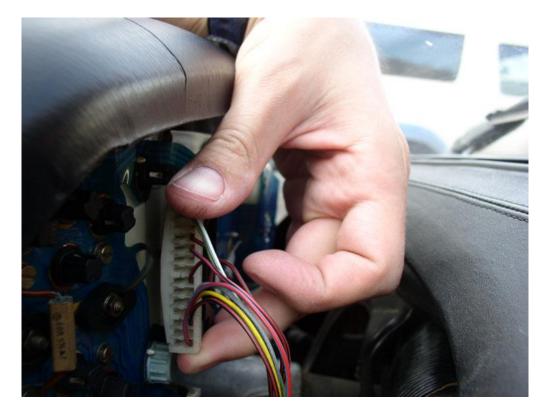
Once, you've detached the harness connectors, you will be able to remove the cluster from the steering column. The cruise wire connector (a small barrel connector) is still connected but you can leave that in place and let the cluster hang down.



Next, disconnect the instrumentation cluster wiring harness leads from underneath the pod. These were pointed out earlier with the green arrows. There's a connector on the left of the pod and one on the right. Disconnect both of these by grasping the ends of the connector and rocking the connector side to side while pulling down. You can remember the orientation by the plastic locking clips (shown on top of the harness lead in the photo).



Then, move the pod slightly forward enough to get behind it and disconnect the third and final harness lead.



Pull the pod forward enough to just clear the end of the steering column...



...and rotate the pod downward as shown in the picture.



Continue to rotate it downward until it is facedown in your lap.



Now you are ready to remove the instrumentation cluster from the pod. The left side of the cluster should be free to move upward. Begin by lifting the left side of the cluster upward as shown in the picture. You will notice there are two aluminum/rubber bushings/guides for the securing Allen head bolts attached to

the end of the instrumentation cluster. You can leave these in or take them out and put them in a safe place (remember their orientation - rubber ends to the outsider).



Next, you can simply pull the instrument cluster to the right and away from the bushing/guides as pictured. You will notice the right side bushing/guides are secured to the pod by another 5mm hex bolt. You can leave this in place as it will be easier to reassemble the cluster back into the pod.



You should now have the instrument cluster separated from the pod.



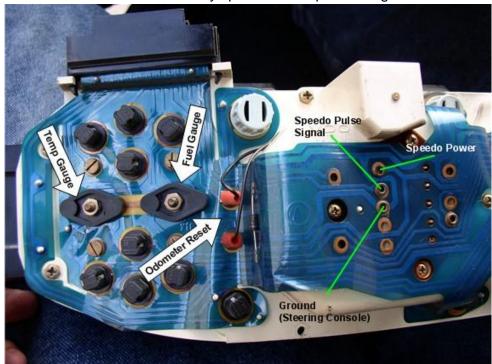
You can let the pod hang where it is or set it back up on the steering column.



On the right side of the cluster you can see the contacts/securing nuts for the alternator gauge, oil pressure gauge and tachometer as pictured.



On the left side, you can see the temperature gauge, fuel gauge; odometer reset contacts, speedometer pulse signal, power, and ground contacts. I had to clean and solder the speedometer contacts last summer when my speedometer quit working.



At this point, you have a couple of choices to proceed depending on your situation. If your only objective is to repair the odometer, you can take a shortcut to remove the Speedo/odo unit only. If you have some cleaning to do on the instrument contacts etc., you can remove the printed plastic circuit board from the instrument cluster to clean/solder and then remove the Speedo/odo unit. I've included both options in this post. First, the shortcut. In order to remove the Speedo/odo unit, you will remove the plastic front cover of the instrument cluster since the Speedo/odo unit must be removed from the front. You will remove the

Phillips screws circled in green in the picture below. I only had 6 of the screws to remove. Your cluster may have more.

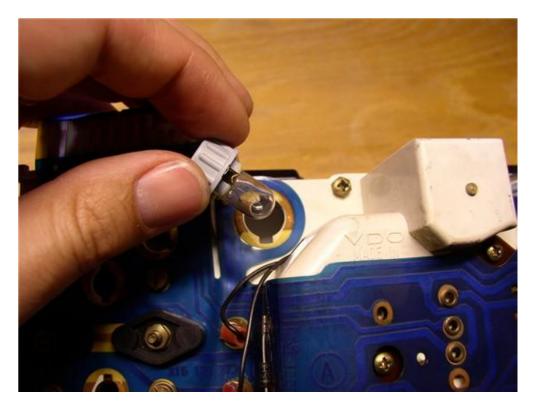
Second, the Speedo/odo unit is secured using 4 small Phillips screws circled in red in the picture below. Remove these 4 screws using the small Phillips screwdriver. Then, turn the cluster over with gauges facing up and pull the plastic face cover off. Then, pull the Speedo/odo unit upward, rocking gently side to side while pulling up. Then jump to post #13 of this thread to continue on with the repair procedure.



If you want to remove the plastic circuit board follow these steps. Remove all the small warning lights. These rotate 90 degrees counterclockwise then pull up and out.



Then, remove the larger 3 instrument board lights. These also rotate 90 degrees counterclockwise and pull up and out.



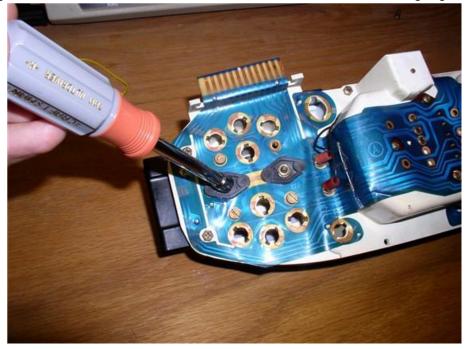
Next, using the flat blade screwdriver, remove the gauge contact screws. There are 2 per gauge for a total of 8.



You will notice a 68 ohm resistor on the contact screws for the alternator gauge. Remove this as well when you take the screws out.



Next, using the 7mm nut driver, remove the center nut at the back of each gauge as pictured.



You can then pull up on the plastic plug fitting using a pair of pliers as shown.



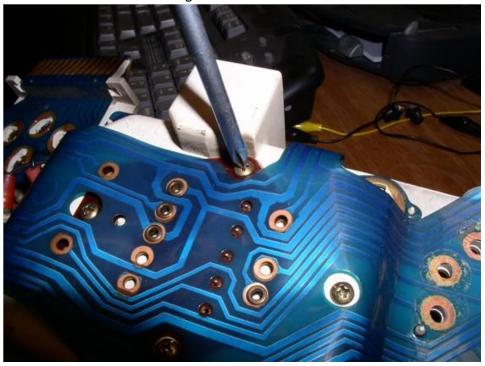
Next, use the 7mm nut driver to remove the contact nuts for the tachometer as shown.



Then, remove the two Phillips screws that secure the odometer reset wires.



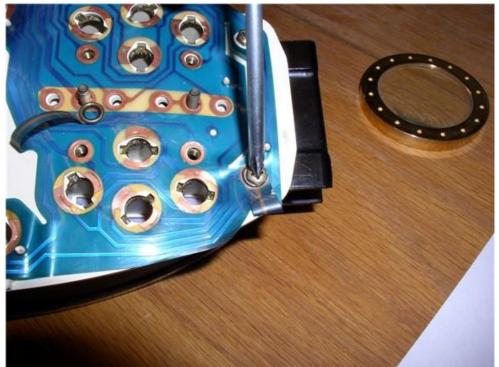
Next, you can remove the two Phillips screws that secure the Speedo hard circuit card to the instrument housing. One here as shown...



and the other one here.



There is also one Phillips screw securing the printed plastic circuit board to the instrument housing. Remove that screw as well.



At this point, the printed plastic circuit board can be removed for cleaning or additional inspection. Start at one end and gently pull the printed plastic material up around the small plastic locating posts that hold

it in place.



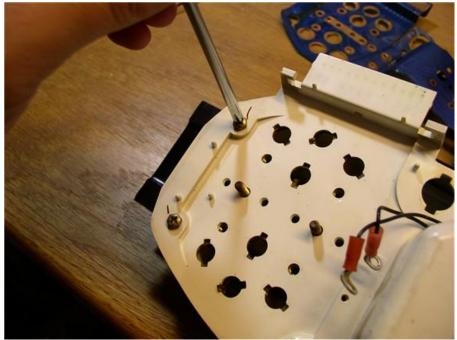
When you get to the Speedo/odo unit (the hard circuit card), you can gently pry the hard card up with a flat blade screwdriver as shown.



Continue removing the plastic material from the locating posts and the plastic circuit board will be removed. You can work on it separately, if needed.



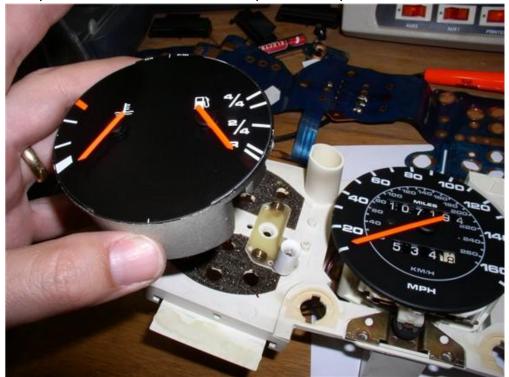
To continue on with removing the Speedo/odo unit, remove the Phillips screws that secure the instrument cluster face plate to the instrument housing.



After removing all of the face plate screws, turn the instrument cluster over so gauges are facing up and lift off the face plate. The gauges should be exposed as shown.



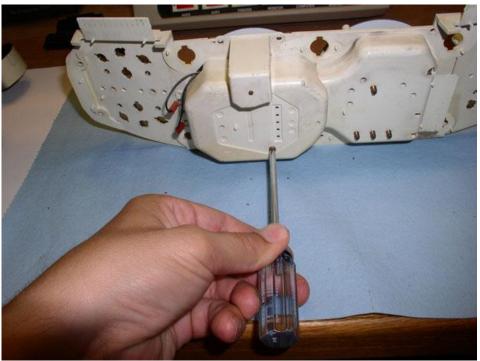
You should be able to remove the temp/fuel gauge and the alternator/oil pressure gauge by simply lifting up on them as shown. You can inspect/clean/repair these, if needed.



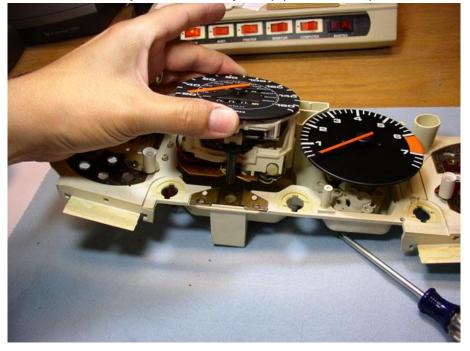
Now turn the instrument cluster on the side as shown and remove the two small Phillips screws that secure the Speedo/odo unit to the instrument housing.



Second screw.



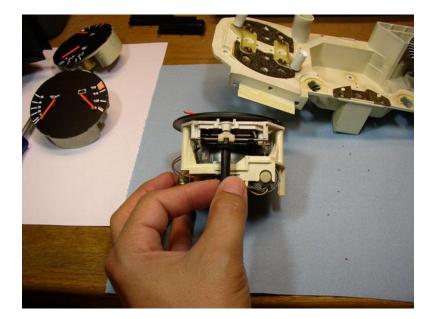
After the screws are removed, you can carefully lift up/pull out the Speedo/odo unit as shown.



Inspect the unit for any obvious issues/damage. This inspection will also give you an idea what it should look like when you put it back in.



The odometer reset works on an electro magnet mechanism. You can pull down on the cylinder as shown and it will manually reset the odometer.



The odometer gear pointed at by the screwdriver is the one that failed. The gear has a set of outer teeth that interlock with the worm gear of the drive motor as shown. The inner teeth, interlock with the next gear wheel. Because the first gear is prone to becoming brittle with age, when it encounters resistance (such as the odometer tumblers locking due to excessive gap between the tumblers), it can strip the inner gear teeth off. Such as the case with mine.



In order to replace the failed gear, I disassembled the Speedo/odo unit. First, you'll need to remove the face plate in order to get at the housing screws. Before removing the face plate and needle, make special note of where the speedometer needle is oriented on the face plate. At rest, my needle lined up

directly over the first line/mark of the speedometer facing. You'll want to re-install the needle later in the exact same position. You can remove the two small face plate screws as shown.



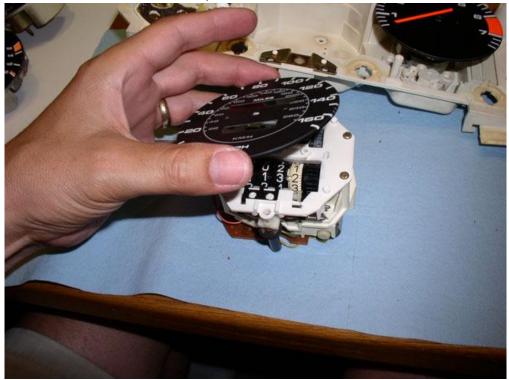
You'll need to remove the needle in order to remove the face plate. The Speedo needle is press fitted on a small spindle with fine gear teeth on the end. It needs to be pried off carefully. You can use a flat blade screwdriver for this. Make sure you place a cloth or towel under the screwdriver to protect the finish on the Speedo face plate. I applied a constant force with the screwdriver with one hand while grasping the black center plastic needle hub with the other hand and gently rocked it back and forth until it began to move free. Do not try to lift up the needle by the orange part. It is very easily bent.

**DO NOT PRY UP ON THE NEEDLE TO REMOVE!** This is the trickiest part of the job. The needle is pressed onto a shaft that is extremely thin. It feels like a pretty tough metal, but you need to be careful here. Do not pull straight up. Do not put any torque on the shaft. Grip the speedometer needle at the center and rotate counter-clockwise, you may have to gently lift the needle above the needle stop, until it hits an internal stop. Gently continue to rotate the needle while also gently applying a small amount of upwards tension at the same time. The friction is all that is holding the needle to the shaft. Keep turning and applying a small amount of upwards tension until the needle comes off. Do not force it.

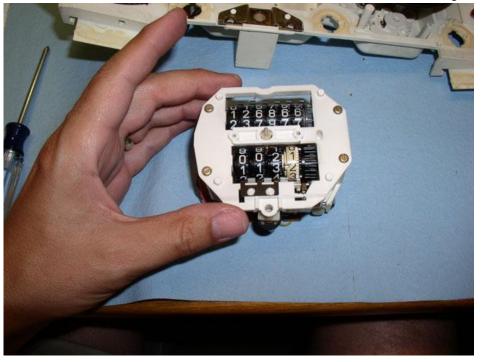
Once the needle is free, remove it and set it aside.



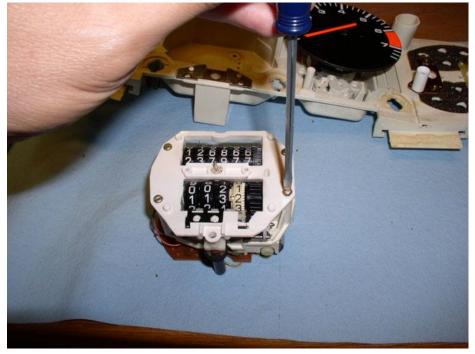
Now the face plate will come off as shown.



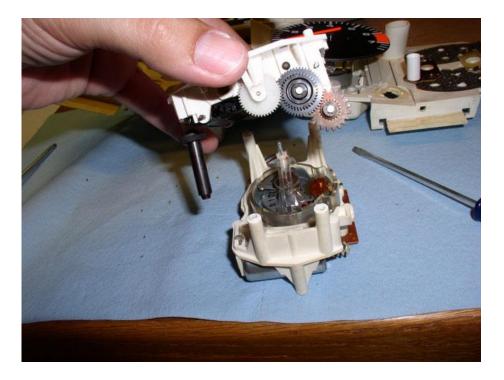
There are 4 small flat blade screws that hold the two halves of the unit together.



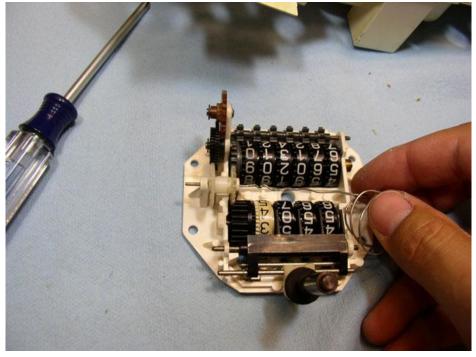
Remove the 4 screws in order to separate the mechanical half with tumblers from the electronics half.



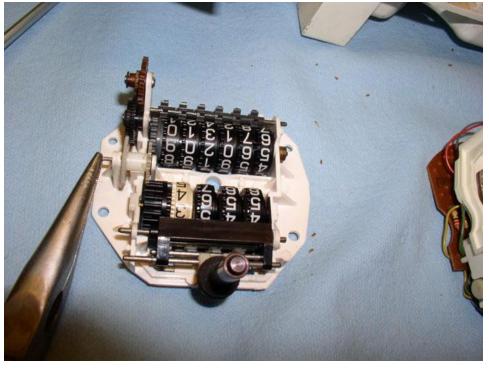
After the screws are removed, carefully separate the two halves by lifting up on the odo tumblers section as shown.



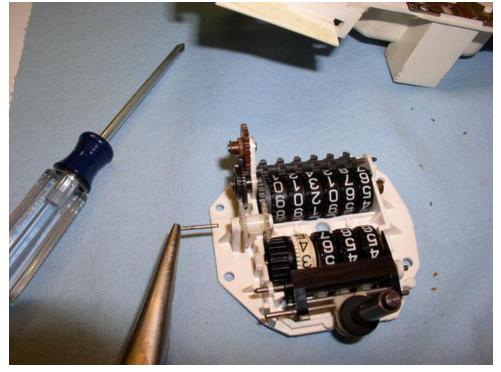
I needed to remove two gears in order to get at the failed gear. To remove the drum gear, I used a small thin wire to "push out" the gear pin holding the gear in place.



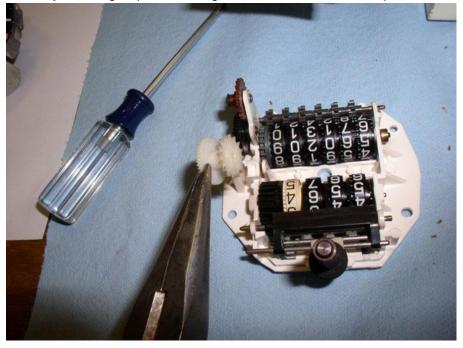
Once the gear pin is partially out, grasp it with some needle nose pliers...



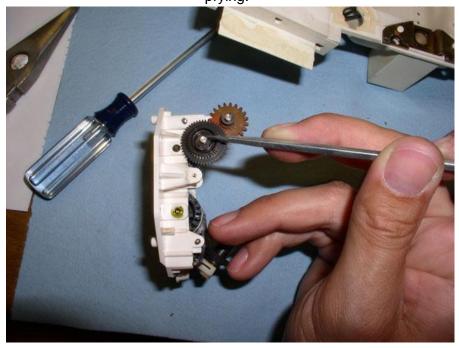
...and remove it. Set is aside on a clean paper towel or other organized parts collection area.



After the pin is removed, you can grasp the drum gear with the needle nose pliers as shown and remove.



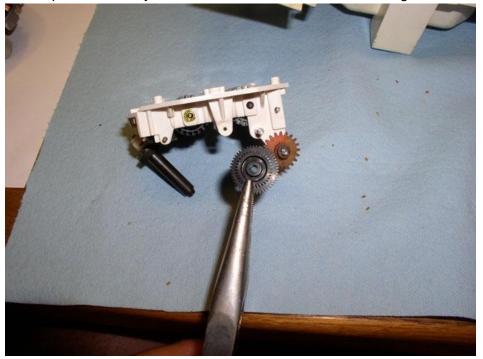
Next, you will need to remove the black intermediate gear. This gear and the first gear are held in place by a very small circlip. I used a small flat blade screwdriver to pry off the clip. Be very careful when prying the clip off as it can fly off and get lost. To prevent loss of the clip, I cupped my hand over the gear while prying.



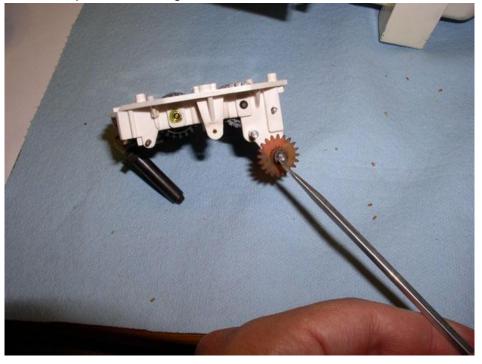
Here's a pic of the clip when removed. Be careful to not lose.



After the clip is removed, you can remove the black intermediate gear as shown.



Next, remove the circlip from the first gear wheel in the same manner as the intermediate gear.



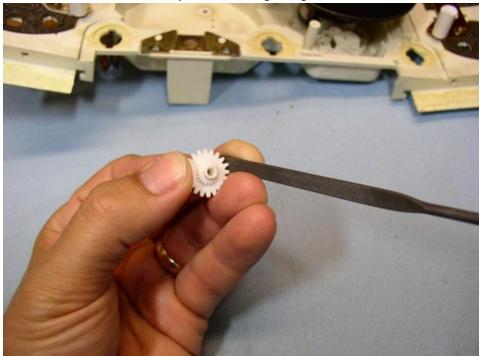
Then remove the gear. Unfortunately, my gear was so brittle; it broke while I was removing the clip.



Here's the old gear compared to the new (white) gear I purchased from Rennbay.

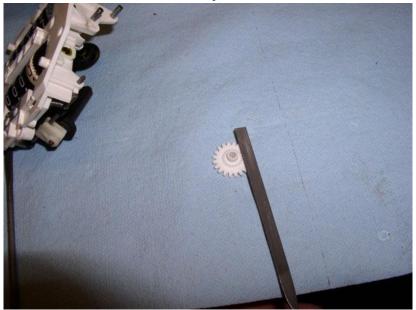


The new gear had some plastic "flash" left over from the molding process on one of the outer gear teeth. Use a small file to file down/remove any flash or rough edges left over from the molding process.

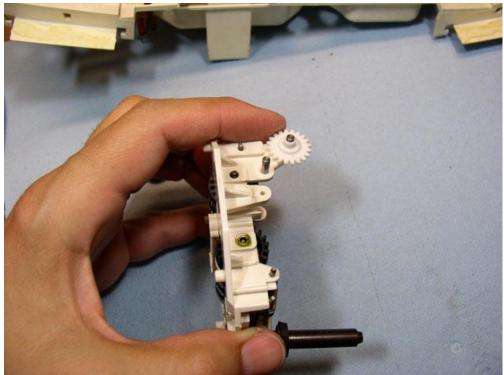


The new gear also had 3 small raised "knots" on the flat surface that mated with the intermediate gear. I assume these were also remnants from the molding process. It is very important these protrusions be filed down level with the flat surface of the gear. If not, they will catch on the intermediate gear and hang (i.e., stop the odometer from working again). **Gears from Odometer Gears do not have this flashing** 

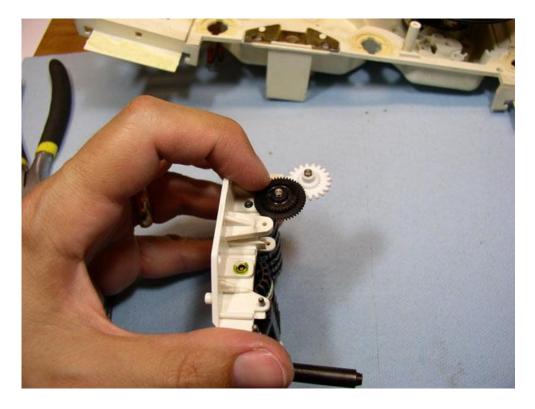
## and are ready to install!



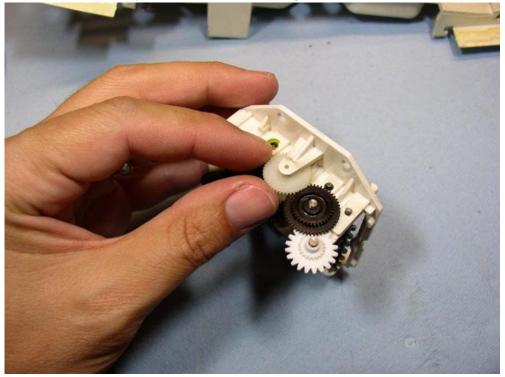
Once you are satisfied all surfaces are flat and smooth, place the gear on the odometer and spin with your finger checking for smooth operation. Now is an excellent time to also look for and clean any debris remaining from the old torn up gear. If there are small pieces of debris from the old gear falling apart left in the odometer tumblers or any of the gears, they can lock up the odometer. Inspect all gears, housing and tumblers for old gear debris while re-assembling the unit. We'll be inspecting the tumblers later when we remove them.



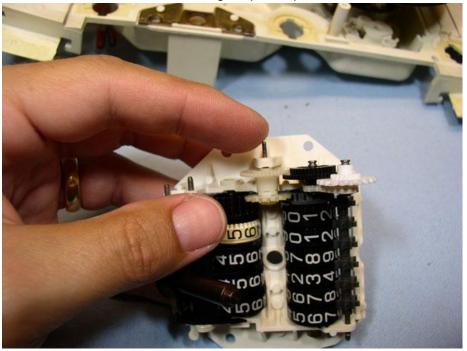
Next, set the black intermediate gear in place and again check for smooth operation. It took me two or three attempts at filing the "knots" off in order to get it perfectly smooth enough to pass this test.



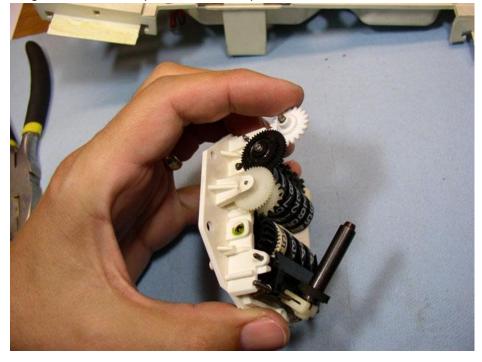
Then, you can insert the drum gear as shown.....



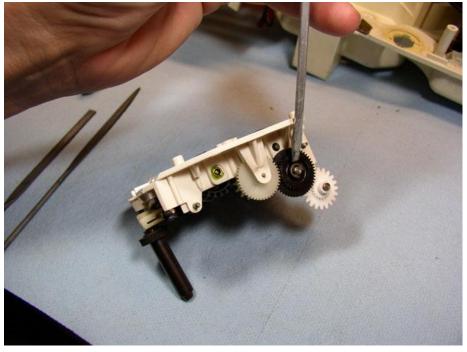
....and insert the drum gear pin as pictured below.



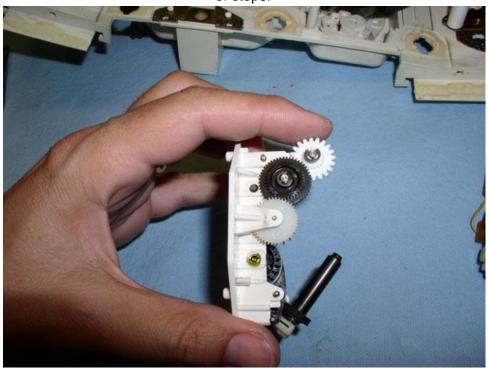
Now, check again for smooth operation. At this point, the odo tumblers should move as well.



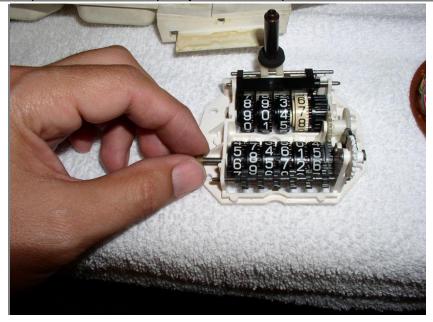
Re-install the small circlips on the intermediate gear and the first gear.



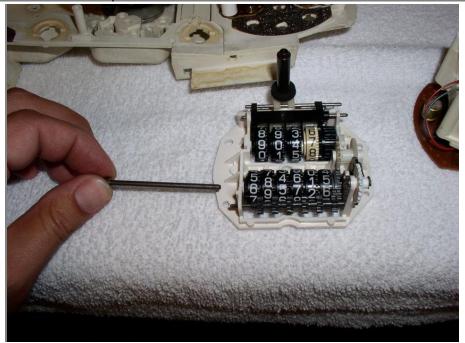
And check again for smooth operation. It was at this point I noticed that there was significant gap between my odo tumblers and if two tumblers were pushed apart, the gap was sufficient to "lock up" the odometer and prevent it from moving. The total gap between my tumblers appeared to be just less than 1mm. Therefore, I would guess that if the total gap is more than 0.5mm, it is probably enough to cause the odometer to lock up under the right conditions. We'll look at removing the "gap" in the next set of steps.



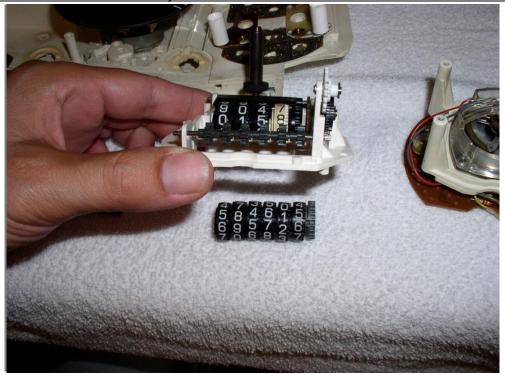
In these next steps, we'll be taking out the odo tumblers to insert a small washer to take out the gap/slack between the tumblers. This is also an excellent time to correct/add any missing miles that resulted from the car being driven with the odometer not working. Fortunately, I had a good idea of exactly how many miles were missing due to the failed odometer. First, we need to remove the tumblers. Grasp the tumbler shaft/pin by the end and pull outward as shown.



Fully remove the shaft/pin while the tumblers are face down on the table as shown.



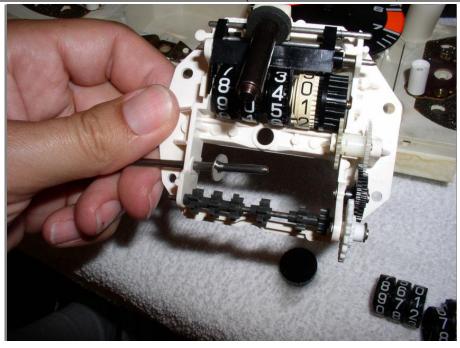
Then lift the odometer assembly and the tumblers should remain on the table as shown.



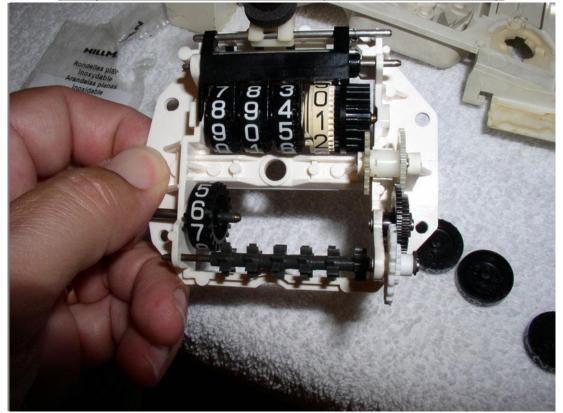
Since I didn't know exactly how much of a gap I needed to address, I purchased a few different types of small thin washers expecting one would be about right. These washers seemed to work the best. They are #6 washers from Lowe's and measure approx. 0.89mm thick. You won't know exactly what size washer will work until you test fit the washer on the odo tumbler shaft with the tumblers assembled. We'll



Place the washer on the end of the odo tumbler shaft (the end where the 100,000 tumbler is) as shown.

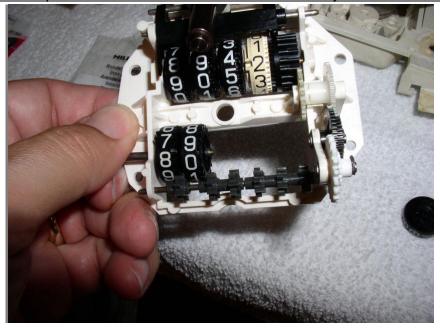


Then place the first tumbler on the shaft (the 100,000 value tumbler).

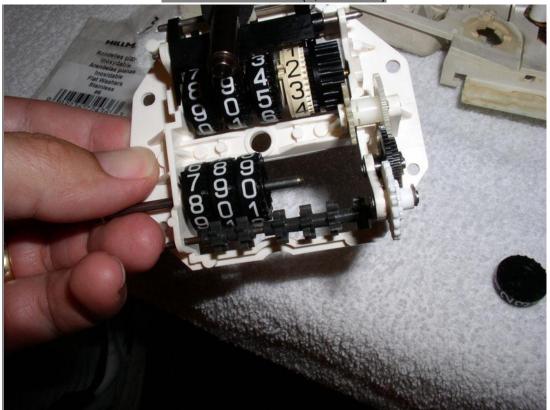


Followed by the next tumbler (10,000 value). You will notice the string of gears below the tumblers in the picture below. These gears are positioned between each of the tumblers and are designed to turn the next higher tumbler when adjacent tumbler transitions from "9" to "0". It is important that these

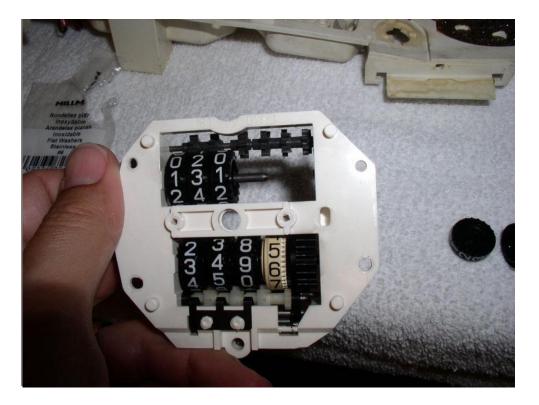
"transition" gears are positioned between each of the tumblers as you add tumblers on the shaft.



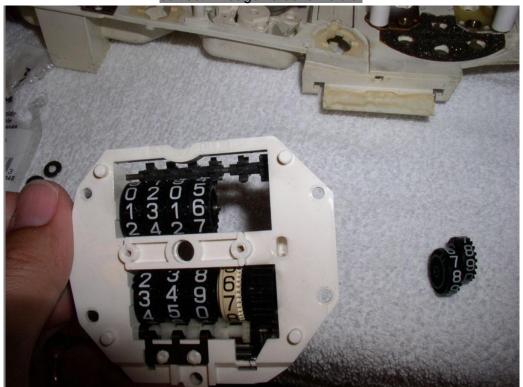
Add the next tumbler (1,000 value)



At this point, you can turn the assembly over and begin setting the mileage to the correct amount (accounting for missing mileage). This is easily done by simply rotating the third tumbler forward or backward until the highest three tumblers are set to the right mileage.

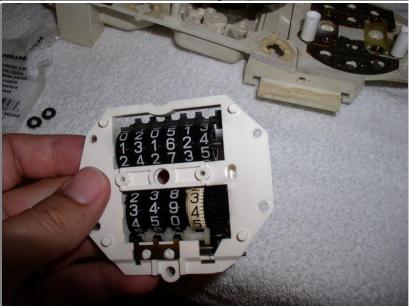


Add the next tumbler (100's) ensuring the transition gear is properly positioned between tumblers and the correct mileage value is visible.



Add the last two tumblers (10's and 1's) ensuring the transition gear is properly aligned and mileage is correct. At this point, make sure the numbers on the tumblers align. While I was assembling the tumblers, it was possible to assemble the tumbler so that it was sort of half-way transitioned to the next number. To keep the tumblers from spinning while assembling, I used one hand to hold the tumblers in

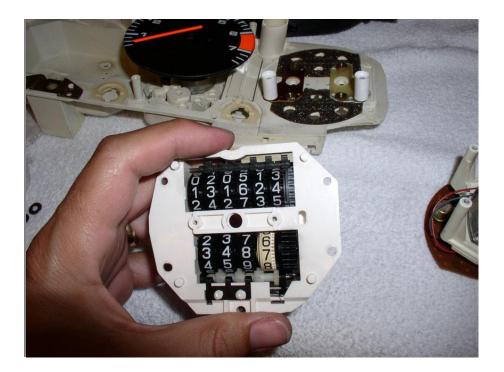
place (once the numbers were aligned) while I added tumblers.



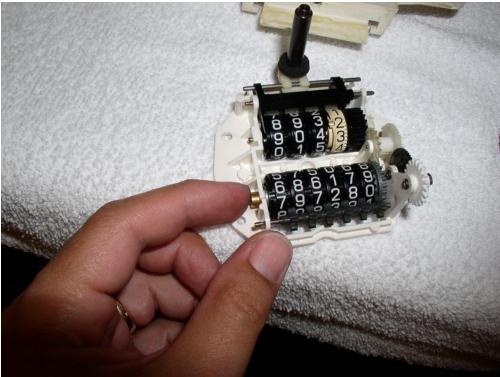
After the tumblers are in and aligned, slide the tumbler drive gear between the last tumbler and the odometer housing as shown. It's at this point you will discover whether the washer added is too big or not. If you have to force the drive gear into place, it's probably too tight and you should try a thinner washer. The goal is to have no slack between the tumblers but at the same time allow the tumblers to spin freely without force.



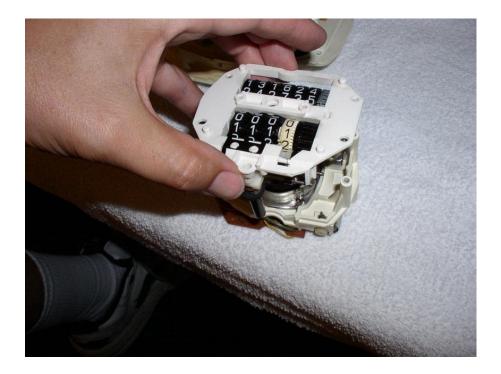
If the driver gear slides into place without significant force, the washer is about the right size. Double check to ensure the numbers on the tumblers are aligned as shown.



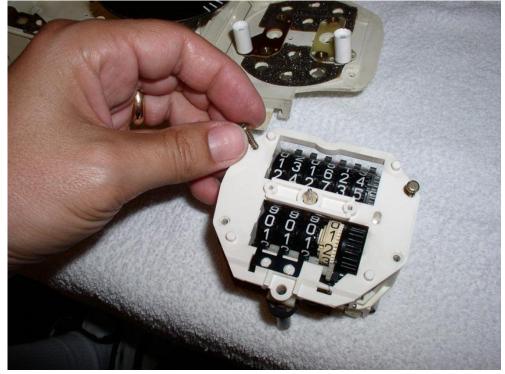
Next, re-insert the odo tumbler shaft/pin and press it all the way in flush as shown. You will have to maneuver the far end of the shaft to line up with the hole in the housing in order to get the shaft in all the way. At this point, you can test the whole operation by turning the new odometer gear we replaced earlier. By turning this gear, you should see both the trip meter and odometer tumblers move. Ensure the gear and tumblers operate smoothly and without force (i.e., you should not be encountering any significant resistance). I manually ran it forward about 100 miles and back again.



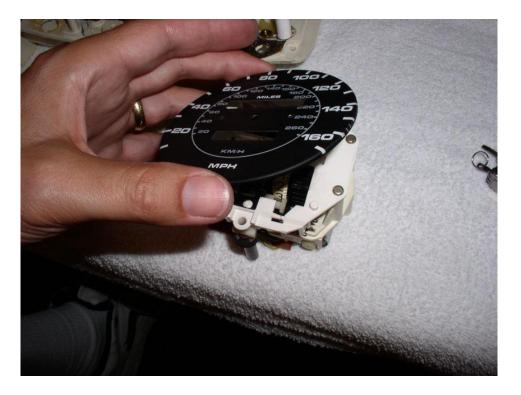
Now you can reassemble the odo tumbler portion of the unit and the electronic portion together. Carefully lower the tumbler portion onto the electronic portion as shown.



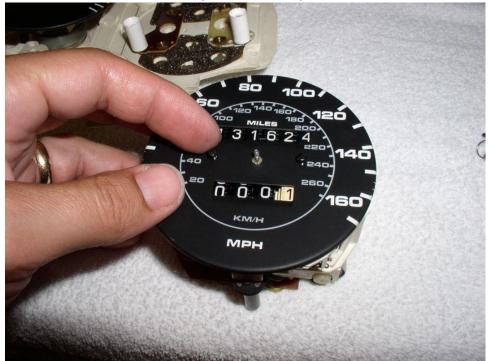
Insert the 4 screws and tighten them down. With the screws tightened down, you can spin the worm gear on the odometer motor and verify everything still moves as it should (I manually ran it up a couple of miles and back again by moving the worm gear with my finger). Everything checked out.



Next, replace the Speedo face plate oriented as shown.



Insert the 2 securing screws and tighten them down.



Next, grasp the Speedo needle by the black plastic center hub and line it up over the same position on the face plate when it was removed earlier. My needle was lined up directly over the first tick mark on the face plate. Then, gently press down evenly on the needle hub but don't use excessive force - the Speedo shaft that the needle hub rests on can easily bend. Once the needle hub is started on the shaft, I spin the

needle to ensure it is installed level on the Speedo shaft. In order to get it to fully seat on the speed shaft and be straight, I would gently rock and press down on the black needle hub until I had it just right. Spin the needle over the full range of motion to check for proper operation.



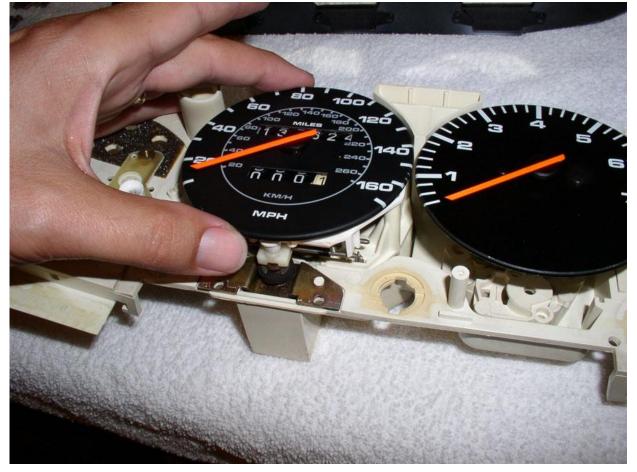
When finished, it looked just like it did before disassembly.



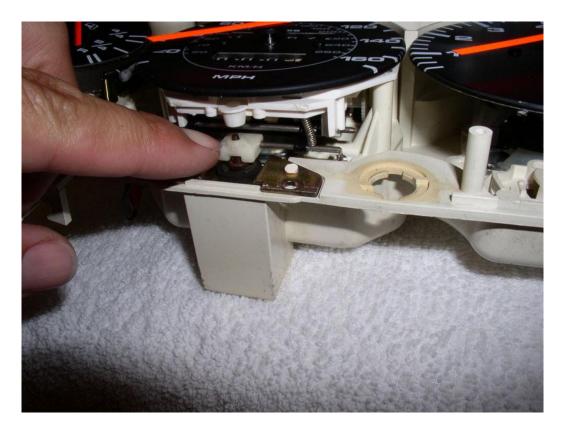
Now you can re-insert the Speedo/odo unit back into the instrument housing. Line up the odometer reset magnetic cylinder so that it falls into its housing as pictured below.



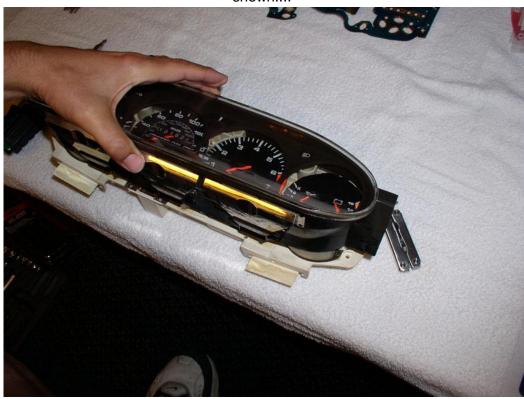
Lower the unit into the housing until it is fully seated as shown.



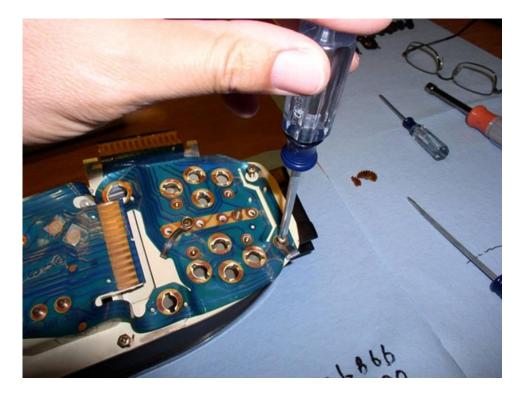
Check for proper operation of the odometer reset mechanism by pressing down on the lever arm as shown and the trip tumblers should reset to all "0"s. The reset mechanism should operate smoothly.



Next, if you DID NOT remove the plastic printed circuit board on the back of the instrument cluster earlier, you only need to replace the plastic instrument face cover over the instrument gauges as shown....



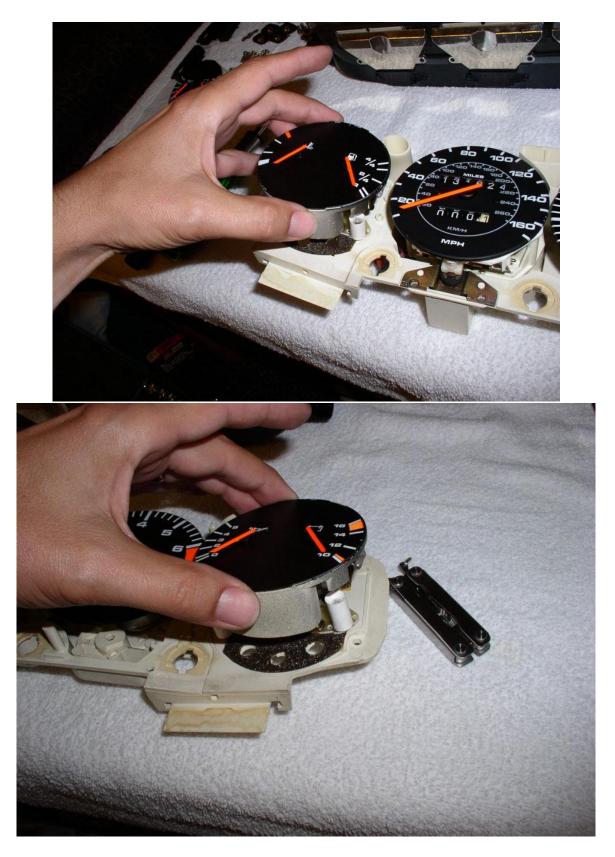
Then turn over the instrument cluster and secure the face plate to the cluster housing using the perimeter screws as shown.



And finally, secure the Speedo/odo unit to the cluster housing using the 4 small Phillips screws as shown and the instrument cluster is ready to go back into the pod/car.



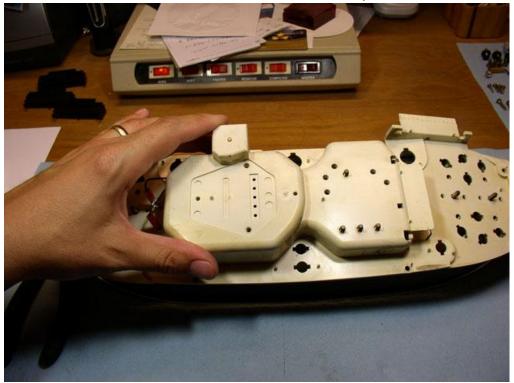
However, if you did remove the plastic circuit board, you'll need to reassemble the cluster as follows: First, place the temperature/fuel gauge and oil pressure/alternator gauge back into the instrument cluster as pictured.



Then set the plastic cover plate over the instrumentation gauges as shown.



Turn the instrument cluster face down as pictured.



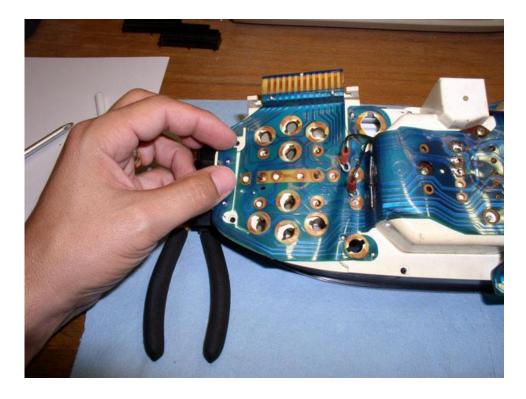
Begin re-attaching the plastic circuit board to the back of the cluster housing. Start by lining up the Speedo hard circuit board pins (4 of them) with the holes in the back of the cluster housing as shown below. Then press the hard circuit card down so it is flush with the back of the cluster housing.



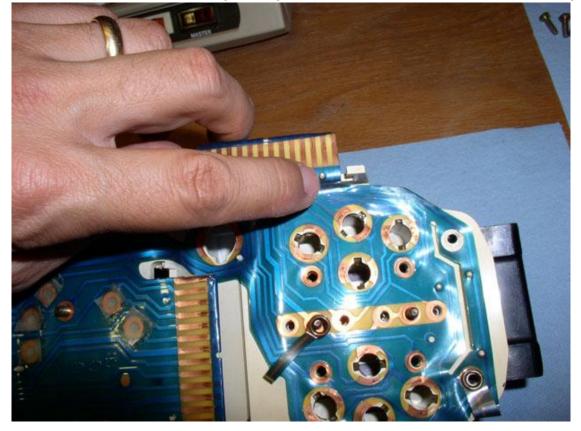
Secure the hard circuit card for the Speedo to the cluster housing using the 2 small Phillips screws as shown.



Next, begin lining up the small holes in the plastic circuit board with the guide pins in the back of the cluster housing. Press the plastic material over the guide pins.



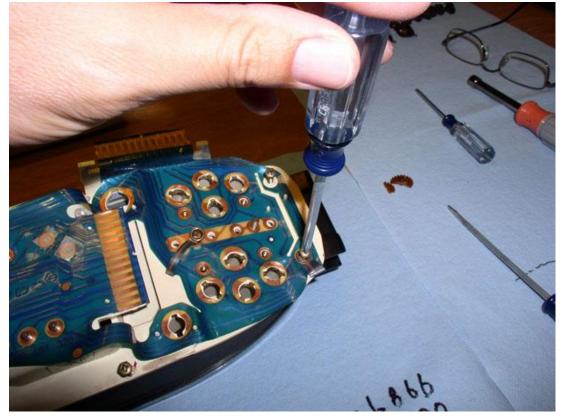
Secure all the plastic material using these guide pins over the back of the cluster housing.



Install and tighten the tachometer contact nuts using the 7mm nut driver



then secure the instrument face plate to the cluster housing using the perimeter screws as shown. In the one corner, don't forget to include the lapped plastic connector under the screw as pictured below.



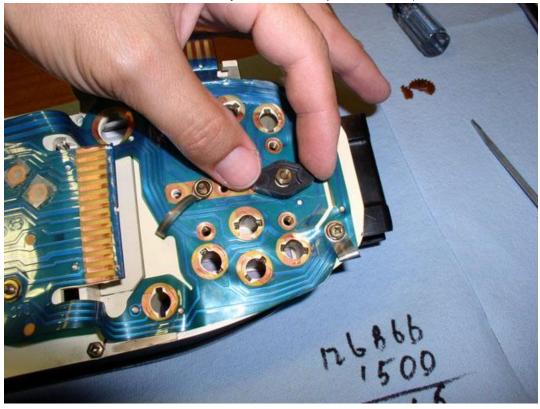
Next, finish attaching the Speedo unit to the cluster housing using the small Phillips screws



then re-attach the odometer reset contact leads using the 2 Phillips screws.



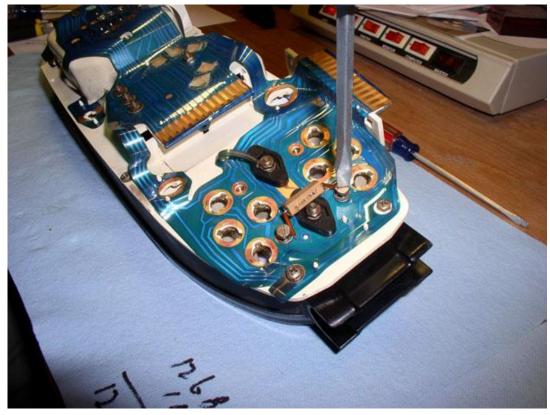
Next, install the gauge pins and 7mm nuts on all four of the gauges as shown. Remember the oil pressure gauge also has a lapped plastic connector to be located under the 7mm nut (you can see it located next to my thumb in the picture below).



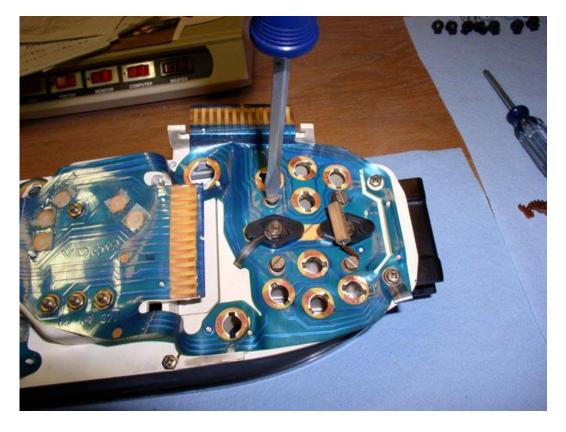
Tighten down the pins with the 7mm nut driver.



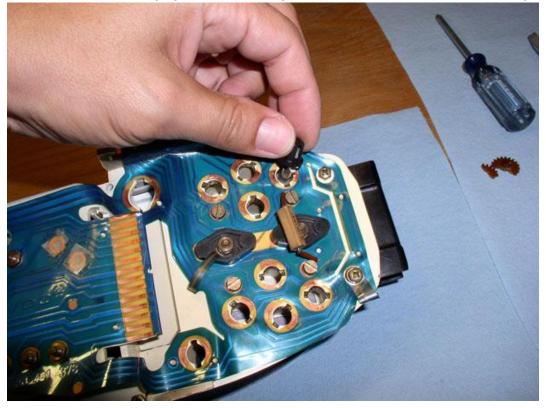
Next, install the 68 ohm resistor over the alternator contact screws and secure it with the two flat blade screws.



Install the remaining gauge contact screws - 2 flat blade screws per gauge.



Re-install the small warning lights. Insert the light fixture and rotate clockwise 90 degrees.



Next, install the instrument cluster lighting bulbs (3 of them). Insert the bulbs and rotate clockwise 90 degrees.



Finally, re-install the harness connector locking covers (3 of them). Ensure the locking prongs are engaged with the cluster housing as shown.



Now the instrument cluster is ready to be installed in the pod/car.

## **INSTALLING THE CLUSTER BACK INTO THE POD**

To re-install the instrument cluster back into the pod is basically the reverse procedure of taking it out. I've included the pics here for reference. First, lift up the left side of the cluster while inserting the right side into the pod - there is a molded receiver that fits over the Allen head bolt guide bushings (see pic below).



Next, ensure the left side Allen bolt guide bushings are installed in the instrument cluster housing receiver....



Then, lower the left side of the cluster into the pod cavity as shown.



While holding the cluster in place with one hand, rotate the pod forward.....



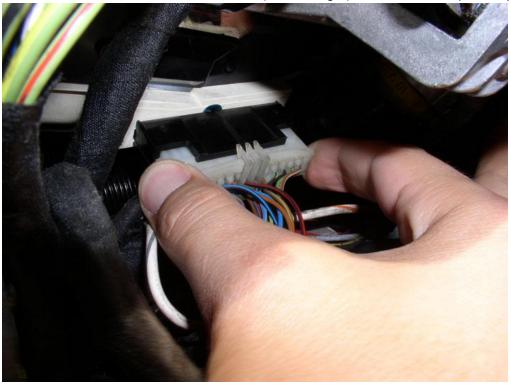
....and up over the steering column as shown.



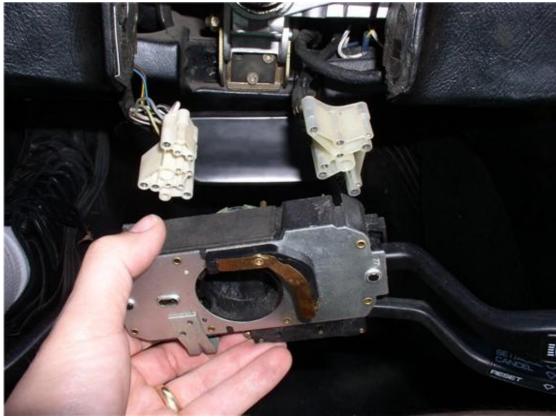
Then, before setting the pod in place, re-attach the rear wiring harness to the cluster connector. Push the harness into the connector until is locks into place. Then push the pod back into place against the dash.



Next, connect the two lower harness connectors (left and right) underneath the pod as pictured.



Then install the signal/wiper/cruise cluster by slipping it on over the steering column and pushing it far enough down the column that you can connect the two keyed harness connectors.



Lifting up the pod slightly, continue pushing/walking the signal/wiper/cruise cluster down the steering column until it clears the portion of the pod that fits over the cluster.



Then, lower the pod and line up the ignition switch hole with the ignition switch and push the pod back over the ignition switch.



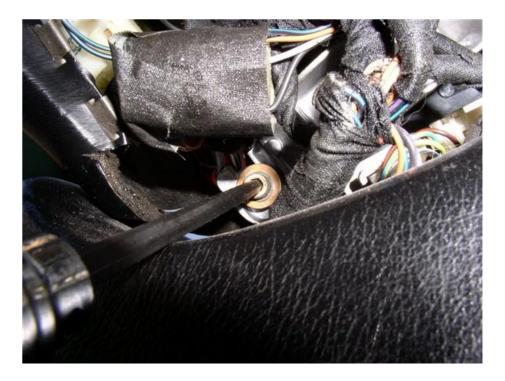
Next, install the ignition switch grommet.



Recall that the long Allen bolt secures the left side of the pod and the shorter bolt secures the right.



Install the left side Allen bolt as shown. You may have to slightly maneuver the pod to line up the bolt guide bushings with the metal flange on the dash framing.



Next, install the right side Allen bolt in the same manner.

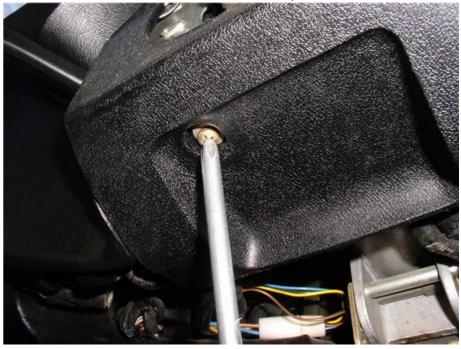


Next, you will need to locate the final resting position of the signal/wiper/cruise cluster so that the horn contact does not have too much pressure but also makes light contact. Place the steering wheel back onto the steering column and seat it all the way down. Then inspect the horn contact on the wheel making contact with the spring contact on the cluster. The steering wheel horn contact should just barely make contact with the spring contact on the cluster. You can watch for it as you slide the wheel on to the

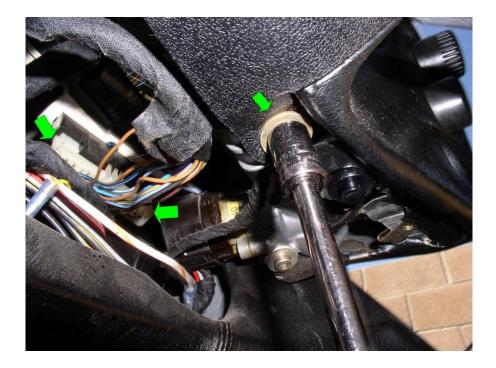
steering column. Move the signal/wiper/cruise cluster up or down the column to get the right contact. Too heavy of a contact will result in a scraping sound when turning the steering wheel and no contact will result in the horn not working. After you've finally positioned the cluster, remove the steering wheel. If your signal/wiper/cruise cluster had a clamping bolt on it, now's the time to tighten the bolt down to secure the cluster to the steering column. Mine did have the clamp but no bolt. Then attach the lower cluster cover as shown.



Secure the cover with the Phillips screw.....



...and the two 10mm bolts.



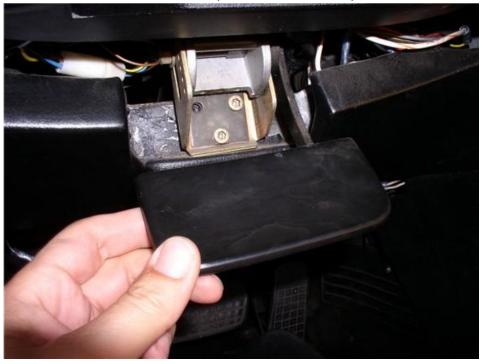
Next, position the lower plastic pod cover plate by inserting the prongs first then sliding the cover forward to lock it into place.



Then secure the cover plate with the two Phillips screws - one at each end.



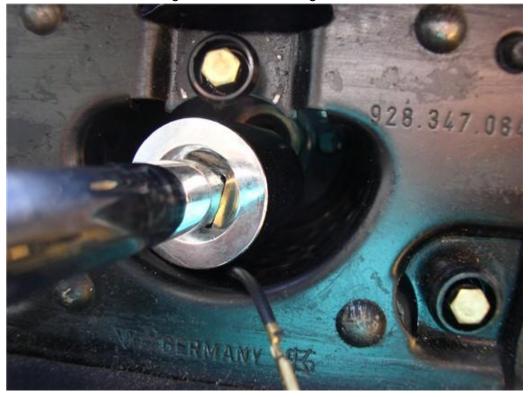
Raise the tilt wheel paddle and lock it in place.



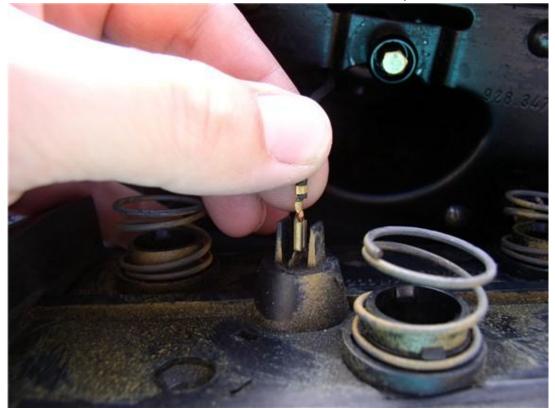
Next, you'll attach the steering wheel. According to Technical Bulletin #9205 titled "Noise When Turning Steering Wheel", do not apply any lubricant to the horn contact ring or the spring contact strip on the cruise/signal/wiper cluster. Position the steering wheel in the same orientation as you removed it. In this case, perfectly straight.



Place the washer and nut on the steering column threads and tighten the nut with the 27mm socket and ratchet using the 6" extension. Tighten to 36 Ft-lb's.



Attach the horn electrical lead to the back of the horn pad as shown.



Position the horn pad so the horn pad contacts with springs ling up with the contact tabs on the steering wheel. Then press the horn pad into place until you hear/feel the tabs lock. There are three tabs so you'll want to make sure all three are locked and the pad is level with the steering wheel.



Finally, you will reconnect the negative battery cable using the 13mm combo wrench. After connecting the battery, test the horn for proper operation.



Next, you can start the car and take it for a test spin and try out the newly repaired odometer! If everything checks out, you're done! CONGRATULATIONS!!

Please feel free to comment and recommend improvements to this post as I (and the community) welcome shortcuts and improvements on this procedure. THANKS for reading!

