



[www.OdometerGears.com](http://www.OdometerGears.com)

## BMW 6 Series (E24) Instrument Cluster Light Upgrade Odometer Gear Replacement

<http://www.z3bimmer.com/OffTopic/E24Bimmer/OdoGear/>

**Cost:** \$25 (plus shipping) each gear, \$3.00 for the bulbs

**Pros:** Fairly easy repair, Working odometer, Easier to see instruments

**Cons:** Delicate job, Working odometer (for areas where insurance cost is based in part on mileage)

**Time:** ~3 hours

### Supplemental Information for vehicles with airbags (included at end of instructions)

<http://forums.bimmerforums.com/forum/showthread.php?t=1842173>

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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.

\* For VDO and MotoMeter units: the E1 gear is the gear that attaches to the stepper motor that drives the odometer. The original gear material would not allow the gear to hold firmly to the shaft and turn the odometer. This is why they molded the gear around the brass bushing. You need to remove this bushing in order to install the new gear. **(You are going to deform the bushing so that it can be removed. Wear safety glasses because the bushing can break and fly off)** With side cutters (dikes, wire cutters), squeeze brass fitting where small gear was across the diameter with a firm handshake grip. Then turn the shaft two clicks and repeat with a firm handshake grip. Put the tool down and remove the brass bushing with fingers. If it does not remove with your fingers, repeat using the side cutters until it comes off. **DO NOT USE ANY TOOLS** to pull the brass bushing off as this could damage the motor.

\* 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.

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A very common problem in the BMW 635CSi is the breaking of the plastic gears in the instrument cluster. The most likely culprit of this would be gears made of a material not able to hold up to the temperature changes the poorly- insulated instrument pod might be subjected. After 15 plus years, the gears can become brittle. A trip meter and the odometer which has ceased recording mileage is a symptom of broken odometer gears. Most owners report their odometer fails after they reset the trip meter - particularly if the car is moving. Both of these

actions - and in particular the latter - put a greater amount of stress on the gears than any other time, thus causing the brittle gears to break.

After determining which gear I needed, I ordered the replacement gear from <http://members.ispwest.com/jkcaplan/gearwebpage/gear.html> (please tell them Z3Bimmer.com sent you). They have reproduced gears made from a stronger, more heat tolerant resin material. The gears are produced using molds cast from OEM gears. I only ordered the one smaller gear (called E1). One of these days I may buy and replace the other 2 gears just so I won't have to worry about them breaking.

These procedures are based on my 1985 635CSiA with an **M** style steering wheel and no airbag. I don't have enough experience with other years and variations of the 635 to determine how many variances you might experience applying these procedures to your car.

If you have the original dim 3w instrument cluster light bulbs, replacing them with a set of 5w bulb will make the instruments much easier to read at night. I used a pair of Sylvania 2825 European Lamps. I understand the Sylvania 168 will also work.

Some say it isn't necessary to remove the steering wheel. I did it simply because without an airbag, it is very easy to do and gets it out of your way. If you decide not to remove the steering wheel, simply skip this and the next step.

Using a bladed screwdriver





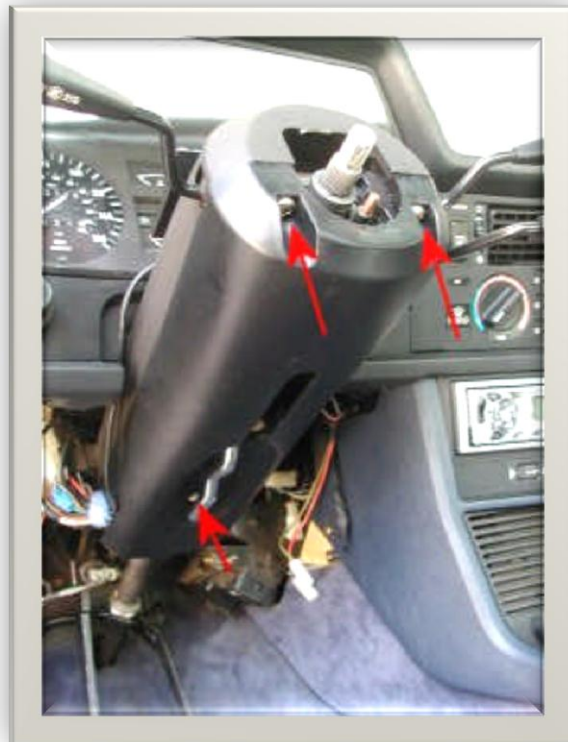
Using a 22mm socket with a 3 inch or more extension, remove the steering wheel nut. Before removing the steering wheel, note the V shaped mark etched on the spindle, and the line etched on the steering wheel adjacent to the hole. These are the reference points for properly installing the steering wheel. Remove the nut and the steering wheel from the spindle.



Remove 4 screws to remove the knee panel.



Remove the connectors and vacuum hose from the knee panel mounted equipment. Note where they came from...or take pictures beforehand.





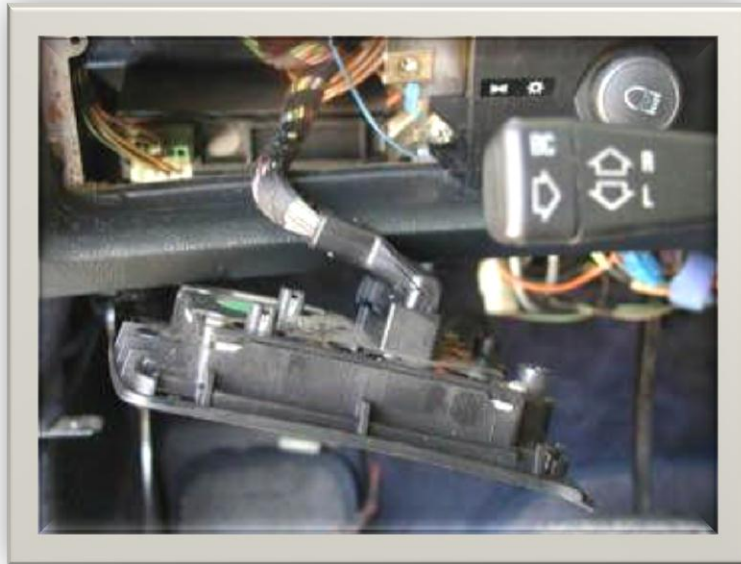
Loosen the steering column lever to gain access to and remove 3 screws holding the bottom steering column cover.



Using a thin bladed screw driver, carefully pry the bottom of the check panel cover out. The check panel cover is held in place with 2 tabs at the top. Do not try to pry the cover off from the top.



Remove 3 screws holding the check panel module in place.



Carefully pull the module out so that the connector to the cable bundle at the back of the check panel module is accessible. Carefully disconnect the wire bundle connector and set the check panel module aside in a safe place.



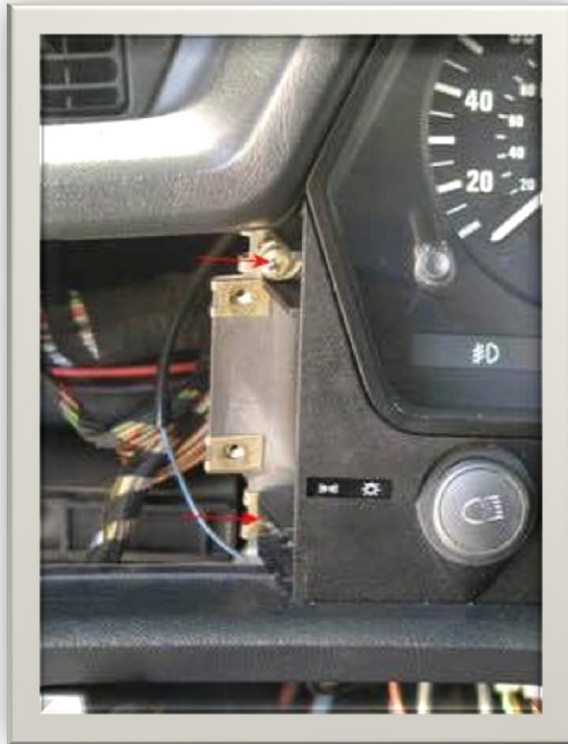
Use a 13mm socket wrench to remove 2 bolts on either side of the steering column. These hold the steering column in place. When removing the second bolt, support the steering column and gently lower it until it rests in place.



Using a thin bladed screw driver, carefully pry loose the molding to the right of the instrument cluster.



Remove the 2 right side instrument cluster mounting screws.



Remove the 2 left side instrument cluster mounting screws.

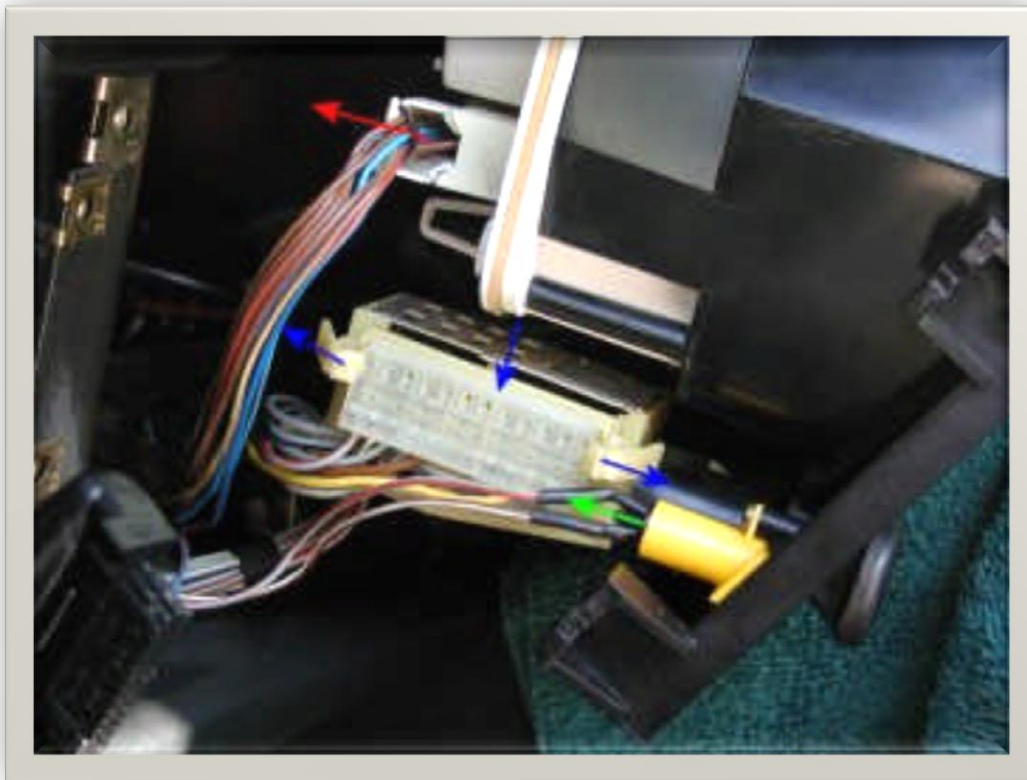


Place a thick towel or other padded covering over the top of the steering column. Gently pull the instrument cluster out to lay face down on the top of the steering column.





Remove the fog light switch light bulb by pulling the bulb straight out of the yellow holder.



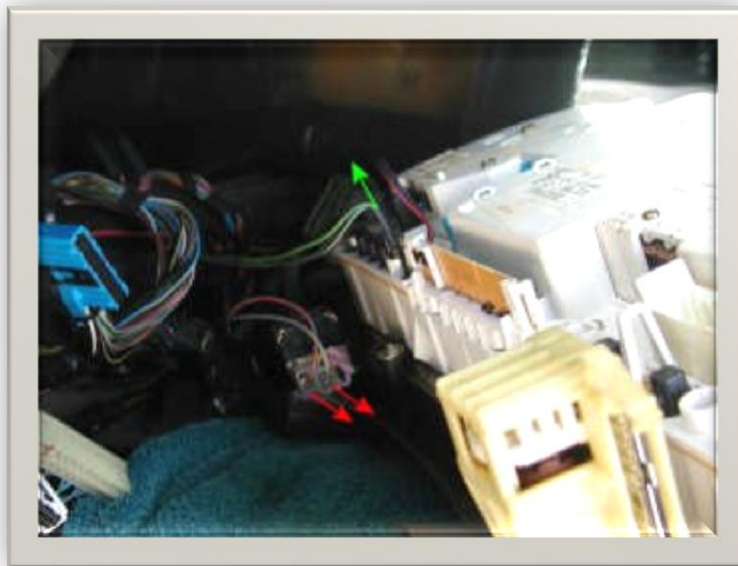
Remove the head light switch light bulb by pulling the bulb straight out of the yellow holder (green arrow).

While spreading the 2 locking tabs, disconnect the headlight wire bundle connector (blue arrow). Be careful to pull the connector straight out and to not break the connector.

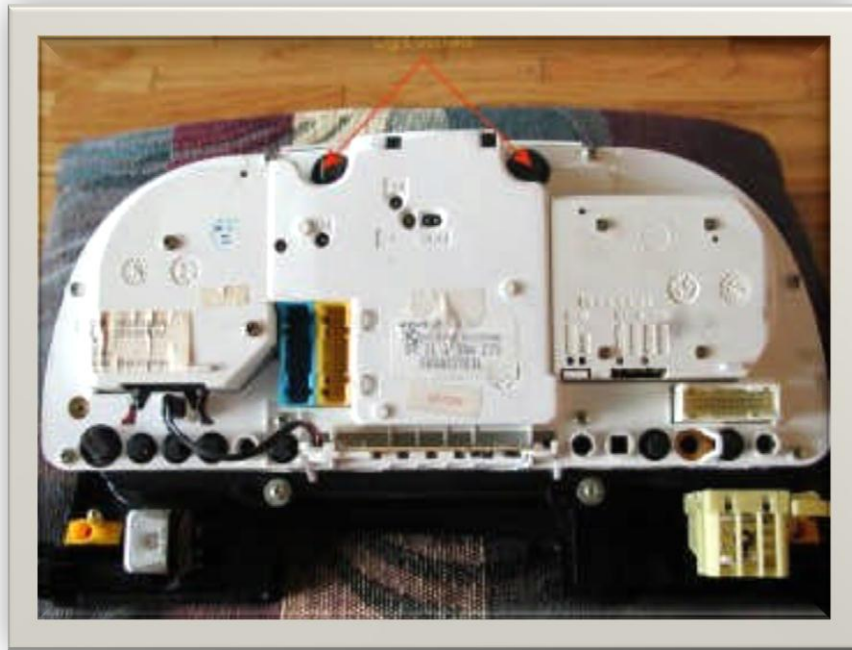
Disconnect the speedometer wire bundle (red arrow). Be careful to pull the connector straight out and to not break the connector.



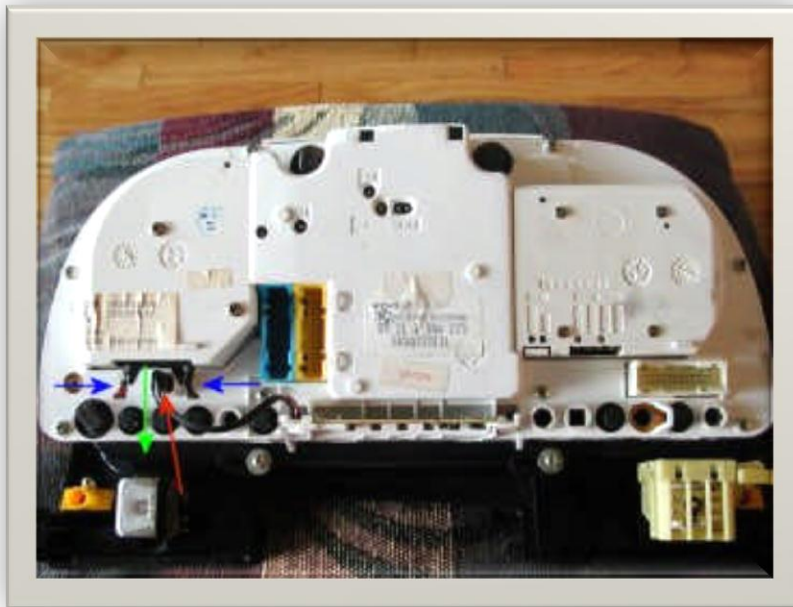
Disconnect the odometer wires (red arrows), the main SI board bundle connector (blue arrow), and the Gas/Temp gauge bundle connectors (green arrow). Connectors should be disconnected in the direction of the arrows. Be careful to pull the connector straight out and to not break the connector.



Disconnect the fog light switch wires (red arrows) and the Anti-Lock instrument bulb (green arrow). Be careful to pull the connector straight out and to not break the connector. After these connectors are disconnected, the instrument cluster will be freed.

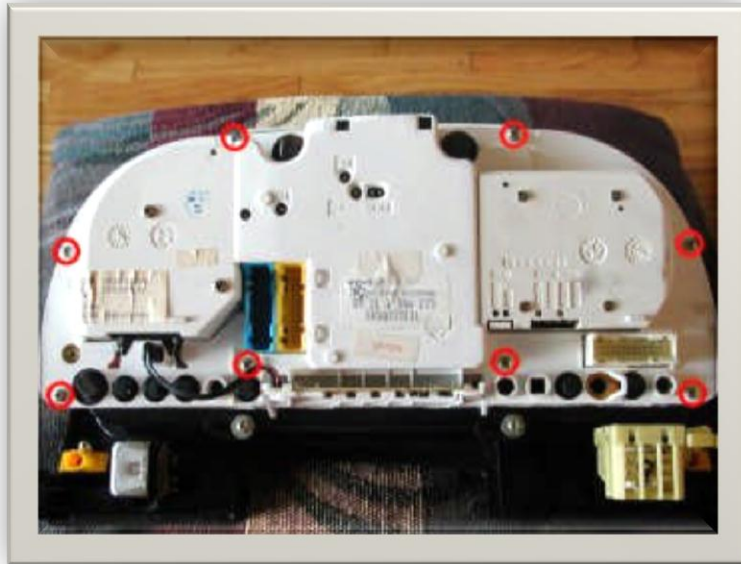


Lay the instrument cluster face down on a soft, well padded surface. A throw pillow works nicely. If you are changing the instrument cluster light bulbs, this is the time to do it. Remove the two bulb sockets by turning the socket left 90 degrees to unlock it. You can use a 5/6 open end wrench to turn the socket. Simply slide the old bulb out of the socket and replace with the new one. Lock the bulb and socket back in place. I also took this opportunity to remove the other bulbs (along the bottom of the cluster) and clean them. Over the years, they had accumulated a layer of dirt. After cleaning the bulbs, they too were noticeably brighter.



If you will be removing the tachometer for some reason, you will need to: Remove the real-time mileage gauge wire (red arrow)  
Press the tachometer locking tabs in the direction of the blue arrows, and remove the locking key by pulling in the direction of the green arrow.



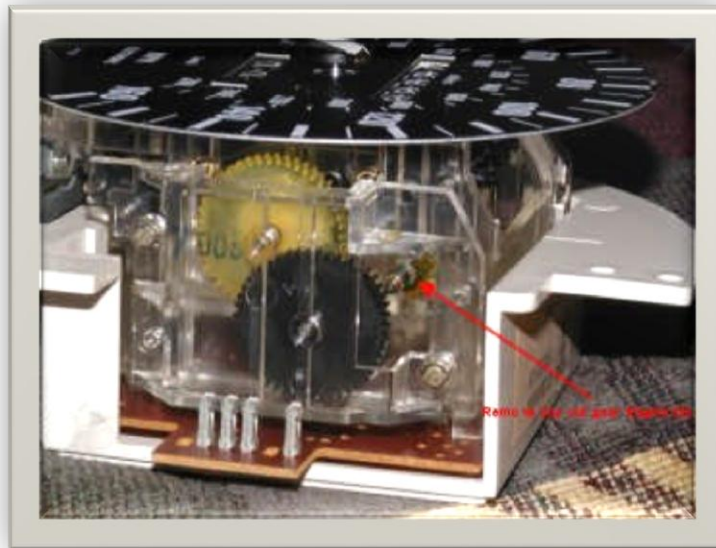


Remove the 8 instrument cluster screws. Gently pull the instrument cluster electronics straight up and out of the body. Set the body and the pillow aside.



Lay the cluster assembly face up on a sturdy surface. The speedometer is attached to the circuit board by a pin connector on the circuit board. At the points indicated, gently rock, lift and disconnect the speedometer from the circuit board. Be especially careful not to touch and damage the instrument needles. They are easily bent. Set the remainder of the instrument assembly aside where it cannot get damaged.





Inspect the gears on the right side of the speedometer. It is advisable to replace the first three gears as they will all fail.

\*First remove the clear cover

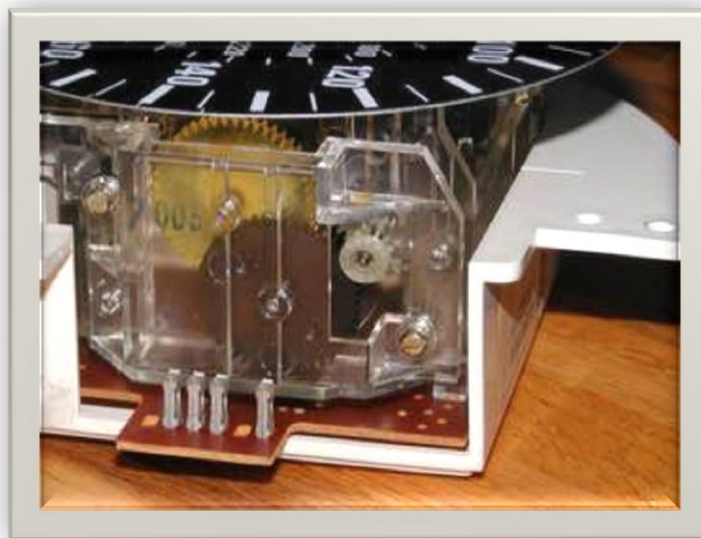
\*Remove all of the gears

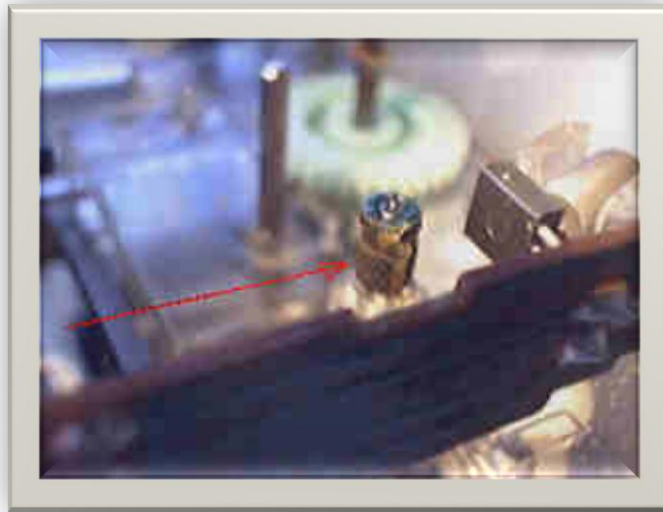
\*Pull the two shafts out with pliers that the larger gears were on

!!!!Do **NOT** try and remove the shaft that the twelve tooth drive gear is located on as this will damage the motor!!!!

\*First remove and put aside the four rubber spacers that are on the rear of the speedometer circuit board. Blow everything out with high pressure compressed air. You cannot use too much pressure. Use the air throughout the unit. Any small pieces of the old gear can disable the odometer as the motor is not very strong. After using the compressed air inspect the unit for any stray pieces.

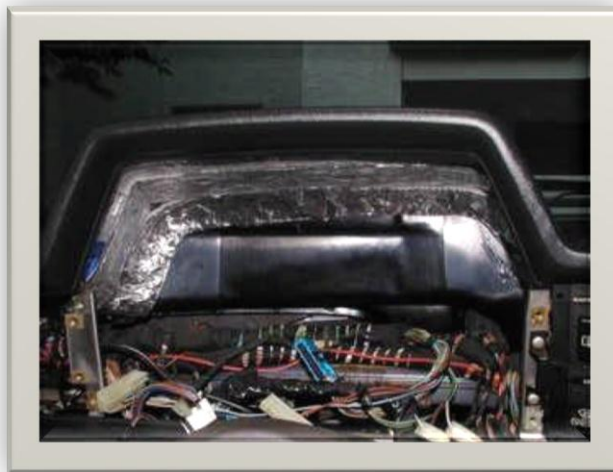
\*Wipe clean all areas where the gears sit: plastic cover, housing, metal shafts, plastic original gear that is not replaced. Any residue that is left from the old gears and grease can cause the new gears to stick and not work properly.





### Brass gear that needs to be removed and discarded

\* (You are going to deform the bushing so that it can be removed. **Wear safety glasses because the bushing can break and fly off**) with side cutters (dikes, wire cutters), squeeze brass fitting where small gear was, across the diameter with a firm handshake grip. Then turn the shaft two clicks and repeat with a firm handshake grip. Put the tool down and remove the brass bushing with fingers. If it does not remove with your fingers, repeat using the side cutters until it comes off. **DO NOT USE ANY TOOLS** to pull the brass bushing off as this could damage the motor. You do not need this bushing with the new gear. Press the new gear on starting with the larger side of the hole in the middle of the new gear using your fingers, Hold the motor side cover while pressing on the new gear. Only press the new gear on to where the top of the shaft and the top of the gear meet. There should be a small amount of up and down movement of the shaft, this has to be there.



Reassemble and reinstall the instrument cluster in reverse order of disassembly. One of the reasons for the breaking of the odometer gears is in part because of the material of the gears, but also because the dash under which the instrument cluster is mounted is not isolated at all. Exposure to sun and cold contributes to making the gears brittle. Before remounting my cluster, I lined the underneath of the dash with insulation material to help protect the instrument cluster from the Sandy Eggo heat.

## E24 odometer gear replacement - airbag car DIY

<http://forums.bimmerforums.com/forum/showthread.php?t=1842173>

Thank you: Jim S

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The odometer gears in my 1988 broke. I used the E24-specific electric speedometer DIY at <http://www.odometergears.com> to identify and order replacement parts (gears E1, E2 & E3). However, the DIY directions for 1984-1989 cars depict an earlier, non-airbag model.

This thread is based on the differences found in my car. I have not covered removal of the airbag because that part was removed from my car by a prior owner, who installed a non-airbag steering wheel. The instructions are intended to supplement those provided at [www.odometergears.com](http://www.odometergears.com). I attribute the differences I describe to changes made to accommodate airbags in MY 1988 and 1989. Although odometer disassembly is necessary in order to determine the specific gears to order, Odometer Gears provided prompt shipping and quick delivery.

### Supplemental information

The cabin temperature sensor vacuum hose and the chime attach to a separate panel instead of to the rear of the knee panel. After removing the four screws along the lower front edge of the knee panel, remove an additional four screws from the second panel, which is the upper item shown in the following photo. This secondary panel is located under the dash and parallel to the floor. Detach the hose and electrical connector from the left side and set the panel aside.



The knee panel (pictured from the rear in the next photo) is held in place by four friction-fit screws. These screws fit into the panel



pictured below, which shows only the three screw holes to the left of the steering column.





Free the knee panel by pulling it straight toward the rear of the car. Disconnect the wires to the breaker switch and set the knee panel aside.

Remove the bolts holding the steel reinforcement panel (the lower item in the first photograph) and set the panel aside. This provides access to remove the two bolts holding the steering column. Lower the steering column. I supported the column but that did not seem necessary. In contrast to the original instructions, there is no need to remove any of the trim from the bottom of the steering column.

After removing the check panel on the left and cover on the right, remove the four screws to free the instrument cluster. Cover the steering column with a towel or soft cloth. Wiggle the cluster toward the rear of the car and tilt the top slightly toward you. This provides access to remove the connectors from the rear of the cluster. Although several connectors are color coded, I labeled them to aid reassembly. Gently use a smaller screwdriver to pry straight up and release the black plastic clips on the two main connectors (photo below), then pull those connectors straight out.



The biggest challenge was finding adequate working room to remove (by pulling straight toward the left of the car) the two female spade connectors on the rear of the fog light switch. I ultimately cut the zip tie (the blue arrow in the following photo) on the wiring bundle, releasing 1.5 inches of connector wiring (see yellow arrow), and then replaced the zip tie.

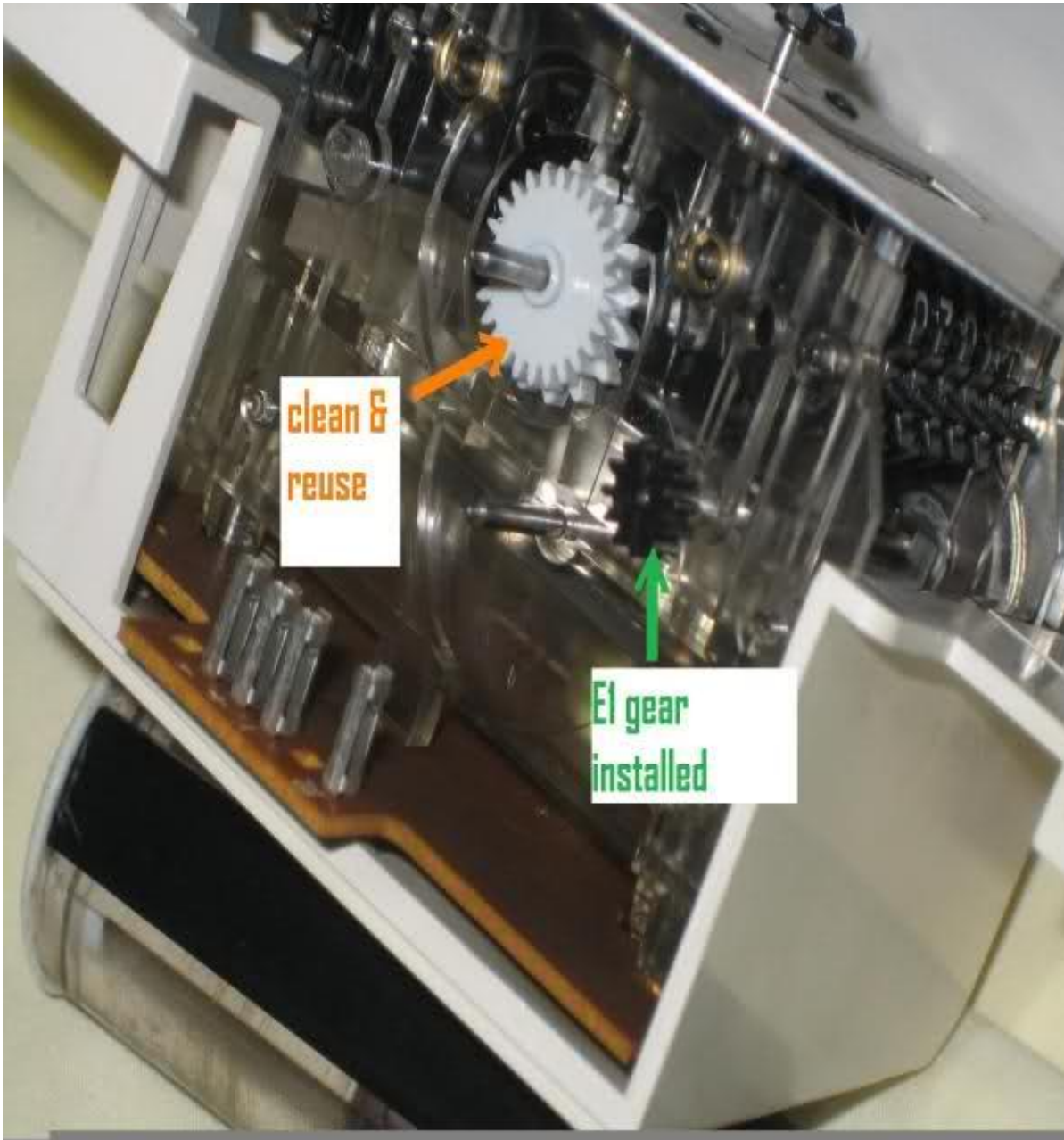


After removing the speedometer unit and gear cover panel, I retrieved all the visible pieces. Although all broken pieces were accounted for (see photo below), I blew out the unit with compressed air.



The following photo shows the innermost gear that must be cleaned (with rubbing alcohol) and reused. It also shows the new E1 gear installed after the press-fit brass bushing used with the old E1 gear had been removed. It wasn't necessary to cut the bushing, only deform it with side cutters and slip it off the shaft.

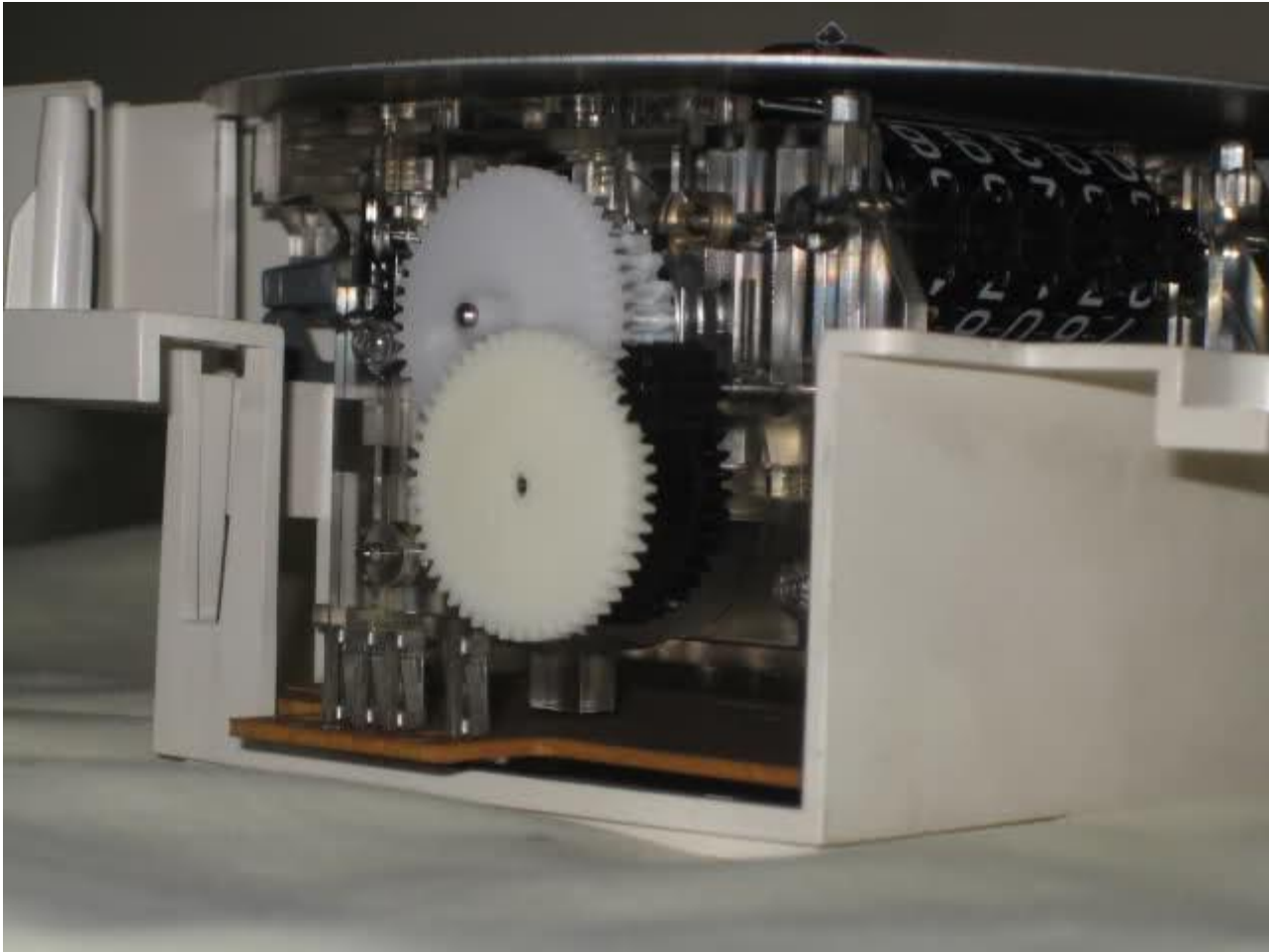




The photo below shows the other gear that must be cleaned and reused.



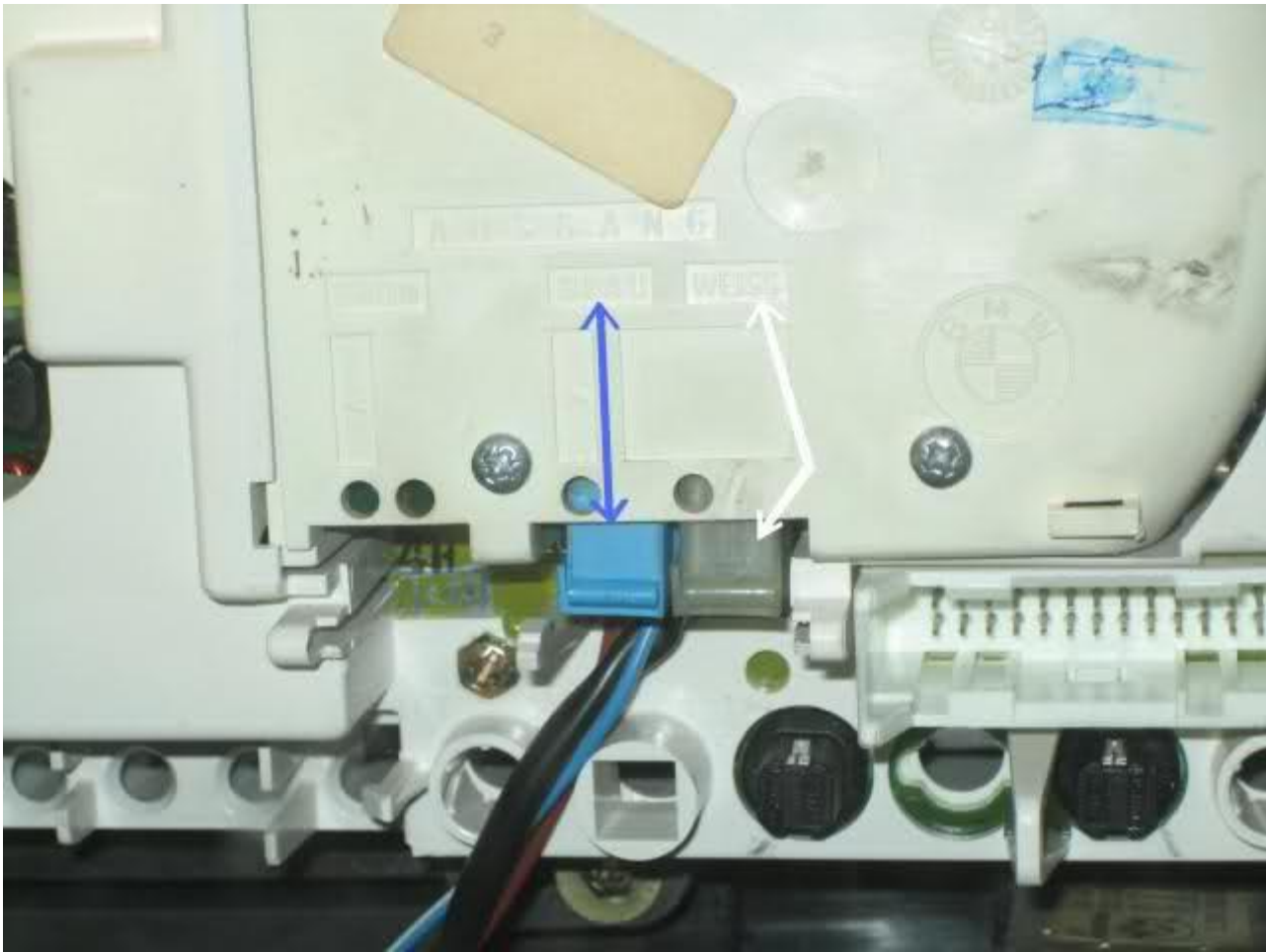
The following photo shows the new gears installed, just before replacing the clear plastic cover.



The only reassembly uncertainty was fitting the two small connectors for the odometer wires. They are color coded (blau/blue and weiss/white) and the color is also marked on the back of the cluster. See the following two photos.







The old light bulbs were dirty. Although they were easy to clean, I took the opportunity to install all new Osram/Sylvania/Hella bulbs in the cluster. These are #2721 (two 1.2W wedge base headlight and fog light switch bulbs), #2721MF (eleven 1.2W bulbs soldered into a bayonet-type black base) and #2825 (two 5W wedge base bulbs above the tachometer and speedometer, replacing the original 3W bulbs). When the car was started after reassembly, some bulbs remained illuminated. After starting the car a second time, all bulb functions had returned to normal.

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Last edited by JimPA; 05-28-2012 at 11:38 AM..