Component Procedures: Power Steering Motor

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Parts and Labor (itype_189)

Labor

Operation	Qualifier Path	Skill	Std Hrs	Wty Hrs
Remove & Replace	Power Electric > Steering Gear & Linkage > Mo?	B	2.8	0.0

Power Steering Assist Motor Replacement (Article 13452)

Special Tools
GE-50576-A - Acoustic Belt Tension Tester
Equivalent regional tools: Special Tools
Removal Procedure
- Touch a metal ground point in order to remove your body's static charge before servicing any electronic component; especially after sliding across the vehicle seat.
- Do not touch exposed terminals. Terminals may connect to circuits susceptible the ESD damage.
- Do not allow tools to contact exposed terminals when servicing connectors.
- Do not remove components from their protective packaging until required to do so.
- Avoid the following actions unless required by the diagnostic procedure:
- Jumpering or grounding of the components or connectors.
- Connecting test equipment probes to components or connectors. Connect the ground lead first when using test probes.
- Ground the protective packaging of any component before opening. Do not rest solid-state components on metal workbenches, or on top of TVs, radios, or other electrical devices.
- Steering Gear » Remove — Steering Gear Replacement
- Carefully clamp the electric belt drive rack and pinion steering gear in a vise within the area indicated (a). Click for full-size image
- Clean the gear with brake clean and a soft brush to remove dirt from the repair area and dry with compressed air. Adhesives, Fluids, Lubricants, and Sealers
- Using a small flat bladed tool (1), pierce the center of the steering gear housing covers (2,3) no more than 6 mm (0.25 in) (a). Click for full-size image
- Remove and DISCARD the small (2) and large (3) steering gear housing covers.
- Use an appropriate sized open end wrench (2) to rotate the steering gear input shaft (1) and verify smooth rotation. Click for full-size image
- Visually inspect the steering gear belt through the large and small cover area while rotating the electric belt drive rack and pinion steering gear input shaft (1) to verify any damage to the belt. If there is evidence that the belt is damaged, stop the procedure and replace the electric belt drive rack and pinion steering gear.
- Disengage the connector position assurance (CPA) (1) by using a small pick or small flat bladed tool and lightly pull towards you. The CPA will stop and not pull out of the cavity when disengaged. Do NOT try to pull the CPA out further as damage will occur. If the CPA is damaged, replace the entire electric belt drive rack and pinion steering gear. Click for full-size image
- With a small flat bladed tool, depress the locking tab (1) towards the connector and lightly wiggle the connector body until disengaged. Do NOT attempt to pry anywhere else on the connector body or damage can occur. Click for full-size image
- Verify the electrical connector (1) is NOT damaged. If damage is noted, do NOT attempt to repair the electrical connector. Replace the entire electric belt drive rack and pinion steering gear. Click for full-size image
- Tape off the electrical connector to prevent debris from entering.
- Remove and DISCARD the 3 power steering assist motor bolts (1). Click for full-size image
- Prior to removal, note the orientation of the power steering assist motor to the electric belt drive rack and pinion steering gear.
- Do NOT apply pressure on or near the plastic electronic control unit (ECU).
- Carefully remove the motor (1) from the housing using an appropriate size flat bladed tool to aid in the removal, ensuring that the belt slips off easily without damage. Click for full-size image
- Inspect the belt (1) and cavity for belt debris. If the belt has signs of wear, or excessive amounts of rubber debris has been encountered, replace the electric belt drive rack and pinion steering gear. Click for full-size image
- Using low pressured compressed air blow any debris from the electric belt drive rack and pinion steering

gear belt cavity. Do NOT use any cleaning fluid within the cavity as cleaning fluid could remove the grease on the rack ball located inside the cavity.
- Place a clean lint free towel within the electric belt drive rack and pinion steering gear belt cavity.
- Using a commercially available abrasive cleaning pad with a grit ranging between 320 and 400, clean the assist motor sealing surface (2) removing all corrosion from the surface area. If the power steering assist motor sealing surface has been damaged, replace the electric belt drive rack and pinion steering gear.
- Remove the lint free towel from the electric belt drive rack and pinion steering gear belt cavity and ensure no debris or wax has entered the cavity.

Installation Procedure

- Using a small brush, apply grease to the seal groove first, then apply grease by hand to the seal.

Adhesives, Fluids, Lubricants, and Sealers

- Install seal to groove and re-apply grease lightly into the seal area. Do not allow grease to come in contact with belt gear. If so, spray brake clean onto towel and wipe off grease.
- Align the appropriate power steering assist motor threaded holes indicated by the arrows when installing the power steering assist motor (1). Click for full-size image
- Orient the power steering assist motor (1) to the electric belt drive rack and pinion steering gear as noted during the removal process. Click for full-size image
- Install the power steering assist motor (1) to the electric belt drive rack and pinion steering gear housing, ensure that the belt slips onto the motor gear easily.
- Install by hand 3 NEW power steering assist motor bolts (1). Click for full-size image
- Pre-tighten the 3 power steering assist motor bolts (1) to a first pass of 3Nm (27 lb in) . Do NOT overtighten.
- Using an appropriate sized flat bladed tool, apply light pressure upwards on the power assist motor (3) while rotating the steering gear input shaft (1) with an appropriate sized open end wrench (2). Verify smooth rotation and that the steering gear belt is correctly seated within the gears. Click for full-size image
- Place the frequency microphone (2) in the smaller cover hole and place the body of the GE-50576-A - Acoustic Belt Tension Tester (1) on a flat surface or secure it to the steering gear housing and position the microphone (2) of the tester 6 mm (0.25 in) from the steering gear belt. Do NOT allow the microphone (2) to touch the belt or an inaccurate reading will occur. It is acceptable to allow the sides of the microphone (2) to touch the aluminum housing. Click for full-size image
- Adjust the electric belt drive rack and pinion steering gear belt until an average frequency reading between 340 - 420 Hz is achieved. Click for full-size image
- Do NOT apply pressure on or near the plastic electronic control unit (ECU) (2).
- Use a flat bladed tool (3) to apply pressure upwards to the power steering assist motor (1) which will tighten the electric belt drive rack and pinion steering gear belt increasing the frequency reading.
- Releasing the applied pressure on the power steering assist motor (1) will loosen the tension on the electric belt drive rack and pinion steering gear belt decreasing the frequency reading.
- If the GE-50576-A - Acoustic Belt Tension Tester does NOT register a reading, lessen the applied pressure as the frequency is to high for a reading.
- It is advisable to apply pressure to a lower frequency around 300 to 320 Hz before tightening the motor fasteners.
- Using a small allen wrench (1), pluck the electric belt drive rack and pinion steering gear belt (2) three times to get an average belt tension measurement. Click for full-size image
- Ensure you grab the edge of the electric belt drive rack and pinion steering gear belt.
- The electric belt drive rack and pinion steering gear belt (2) will make a small ping noise when strummed correctly.
- Once a frequency reading between 340 - 420 Hz is achieved, tighten the 3 power steering assist motor bolts (1) to second pass of 6Nm (53 lb in) . Do NOT overtighten. Click for full-size image
- Use an appropriate sized open end wrench (2) to rotate the steering gear input shaft (1) and verify smooth rotation. Ensure the belt is still seated within the gears. Click for full-size image
- Repeat steps 11- 13 verifying the frequency reading is still between 340 - 420 Hz .
- Once the correct frequency is verified, tighten the 3 power steering assist motor bolts (1) in sequence shown to: Click for full-size image
- Third Pass: 10Nm (89 lb in)
- Final Pass: 55 - 60 degrees
- Verify the frequency reading is still within specifications.
- Install NEW small (1) and large (2) steering gear housing covers: Click for full-size image
- Using an appropriately sized tool matching the diameter of the cover being installed, gently tap the cover into position within the steering gear assembly.
- Carefully tap the edge of the covers into position ensuring they are fully seated on the internal shoulder.

- Apply wax to the power steering assist motor (1) as shown including the gear housing, small and large covers, power steering assist motor bolts, and motor interface. Adhesives, Fluids, Lubricants, and Sealers Click for full-size image
- Remove the tape from the electrical connector (1) that was applied during removal. Click for full-size image
- Connect the electrical connector (1) to the power steering assist motor until the lock engages fully.
- Pull back lightly on the electrical connector (1) to ensure the lock is engaged.
- Engage the connector position assurance (CPA) (1). Click for full-size image
- Steering Gear » Install — Steering Gear Replacement
- Program the power steering control module . Power Steering Control Module Programming and Setup
- Raise the vehicle until the wheels are off the ground. Lifting and Jacking the Vehicle
- Start engine and verify no diagnostic trouble codes (DTC) are present. If DTC are present, correct the issue before proceeding. Diagnostic Trouble Code (DTC) List - Vehicle
- Rotate steering wheel to the left until the lock position and hold tightly for 4 seconds.
- Rotate steering wheel to the right until the lock position and hold tightly for 4 seconds.
- Repeat steps 27 and 28.
- Lower the vehicle.
- In an area of adequate size and free of heavy traffic or pedestrians, drive the vehicle 16 - 24 km/h (10 - 15 miles MPH) turning the steering wheel right and left from the lock to lock positions.
- Ensure the steering wheel turns easily and smoothly without binding or noises.