GruvenParts.com REINFORCED GM Power Folding Mirror Gear Replacement Instructions

Updated 12/17/2016

** PLEASE READ THE TROUBLE SHOOTING / TIPS SECTION AT THE END OF THIS DIY **

** Design has changed to remove the internal threads. You must use epoxy to attach this gear to the metal worm shaft **

If you are reading this DIY article, you are like many others who have a GM truck with power folding mirrors which no longer function due to a broken gear within the fold mechanism. This often occurs during normal operation, and especially with a light impact to the mirror housing. A broken folding mirror gear is evident when the mirror stops power folding. Sometimes you can hear the motor whirring but the mirror refuses to fold in or out. Other times, the broken gear just jams the motor and you hear nothing. You can still fold the mirror by hand. What’s happened is a gear within the assembly was made from very brittle, weak plastic. Be advised that there are MANY aftermarket replacement mirrors out on the market – READ THEIR REVIEWS. The aftermarket mirrors are very poor quality and allow the mirror itself to vibrate so badly, you cannot even see out of the mirror while driving. Not to mention the replacement mirrors will also come with the same weak spur gear that that caused this dilemma in the 1st place. The best option is to fix the OEM GM mirror with the GruvenParts.com reinforced spur gear.

www.GruvenParts.com has solved this problem entirely by manufacturing a reinforced folding mirror spur gear made from high strength plastics. This gear has a lifetime guarantee. Visit www.GruvenParts.com and click on the GM Trucks Section on the left banner to access the
product page. Our reinforced spur gear will not jeopardize the mating parts within the assembly as they are made of proper materials and very durable.

Tools Needed:

- Plastic pry wedge. I used a bicycle tire change lever in the pics shown below.
- T10 torx
- T20 torx
- Small Phillips head screw driver
- Small hammer and thin punch (can also use the Phillips screw driver)
- Vice or small arbor press
- Permatex Plastic Welder P/N 84115 (readily available at Hardware stores or on Amazon.com)
- Permatex White Lithium Grease P/N 80345 (readily available at Hardware stores or on Amazon.com)

There is NO NEED to remove the mirror from the door. This can all be done with the mirror mounted on the door.

Step 1: Plastic Shroud Removal

Fold mirror inwards and use a plastic pry tool such as plastic bicycle tire lever. Start on the inside edge as shown in the picture and gently separate the upper and lower trim shrouds as shown.
Slowly and gently work around the mirror shroud and remove both upper and lower plastic shrouds as 1 piece. You use hand force here, perhaps some gentle prying with the plastic lever.
Upper/Lower Plastic Shrouds Removed

**Step 2 – Disconnect Wiring from Mirror**

Unplug the various connectors from their electrical connections. Mirrors may have heater wires, turn signal wires, and of course the folding mirror motor wire harness. These are all unique wire harnesses that can only be plugged in 1 way. If the mirror is a heated mirror, there will be 2 small black wires that will connect to the heater element within the mirror. These wires can be plugged into either socket on the mirror heater (you can see the 2 metal mirror heater tabs just above the white connector I'm holding in the pic below.)
Step 3 – Remove Mirror Glass

The mirror glass is clipped into the mirror base in 4 places using small plastic tabs. You will need to disengage 1 or 2 of the plastic tabs. The mirror will move upward relative to the mirror bracket. A small screwdriver can be used to push the mirror tab upward. To access the mirror tabs, it is helpful to angle the mirror facing as far down as possible. See following pics.
Arrow shows 1 of the tabs, mirror installed looking fwd at back side of mirror.

Mirror removed, see 4 tabs. Any 2 must be pushed upward to release mirror from base.

Mirror mounting base, mirror is removed in this picture. View looking fwd. Arrows show the mating tabs which the mirror clips onto. When reinstalling mirror, align tabs and push mirror down onto tabs until a click is heard.
Step 4 – Removing Mirror Base

Remove (4) T10 torx screws as shown in picture. Mirror base will come off, but is still connected via the mirror adjustment wire harness. Unplug wire harness.

Unplug this connector
Step 5 – Mirror Frame Removal

Simply unsnap the mirror frame from the mirror assembly.

Mirror Frame is touched by arrow.

Mirror Frame unsnapped from mirror assembly. It can be set aside at this point.
Step 6 : Remove Mirror Skeleton

The mirror skeleton is held in with 3 push pins as shown in picture. Push pins can be gently tapped out to remove using a small punch or phillips head screw driver and gentle hammer taps.
Mirror Skeleton removed, set it aside for now.

**Step 7 – Remove Motor Assembly**

The motor assembly is attached to the mirror housing with (4) T20 torx screws. Remove all 4 torx screws and feed wiring harness through center of the motor assembly. This is the housing we’re after.
Motor Assembly removed.

**Step 8 – Open Motor Assembly**

Place the motor assembly in a vice with the circular base facing up as shown in the pics. You will need to pry the case halves outward a bit to disengage the snap fit. There are 4 areas
where the case halves are snap fit together as shown in the pictures. You can use gentle taps from hammer to force the metal case halves outward.

(4) Arrows show the locations of the snap fits. Flat head screw driver is inserted between the case halves, forcing outer half outward. Gently tap flat head screw driver downward to force case walls outward. Pry center portion upwards to separate.
Case halves separated. Note motor on bottom right. Motor can be gently pulled straight up to disengage from the motor assembly.

**Step 9 – Open Motor Bracket**

In order to open the motor bracket, place it in an arbor press (or vice) as shown. Use a suitable socket or collar to push down on the spring retaining ring. With the spring compressed, rotate the socket or collar approximately 1/6 turn and slowly release compression on the spring. This will align the male tabs in the shaft with the female indents on the retaining ring, and allow the ring to come off the shaft. Release compression slowly, this is a pretty heavy spring. You might need to “help” the retaining color to rotate while compressed, if its being stubborn. Just use a pair of channel locks or large pliers to grip the spring, and rotate while slightly compressed.
Arrow showing the retaining ring sitting just above the spring. You need to compress this and rotate the socket or collar about 1/6 turn either direction to disengage the retaining ring. Release compression slowly as the spring is heavy. You can also do this by hand with a deep well socket, by pressing down firmly on the spring then rotating. Use eye protection and be careful, the spring is heavy.

**Step 10 – Remove / Replace Worm Gear**

Remove retaining ring, spring, lower spring perch. Then remove the black plastic motor housing and flip over to see the discrepant worm gear that GM never wanted you to find. Gently pop this worm/spur gear out using a small flat head screw driver. Retain the brass bushings on either end.
Discrepant gear shown. Note the plastic spur gear over-molded onto the metal worm gear. This is what has likely broken if you hear the motor whirring but nothing happens.
Step 11 – Prepare Worm Shaft for Installation of GruvenParts.com Reinforced Spur Gear

Remove the OEM spur gear, and any remnants still stuck onto worm gear shaft. It should just pull right off. You can use a box cutter or other sharp blade if needed, you won’t hurt the underlying steel worm shaft. Gear pictured below was tested approximately 5,000 open/close cycles.
Step 12 – Install GruvenParts.com Reinforced Spur Gear onto Worm Shaft

First, test fit the new gear dry. Then, apply generous coat of Permatex Plastic Welder P/N 84115 to the underlying steel worm gear teeth. Make sure to fully coat the grooves where the new gear will reside. Mix epoxy per manufacturers instructions. Install GruvenParts.com Reinforced spur gear onto worm shaft by threading it on, similar to installing a nut onto a bolt. There are no longer any internal spirals on the replacement gear, but it still helps to thread it on. Thread spur gear onto shaft such that it aligns with the mating brass motor gear. This is going to be somewhere around 0.250”-0.300” of shaft protruding beyond face of gear. Do not thread the new gear too far as it could break the face of the gear off. If it bottoms out, don’t force it farther. The epoxy will do all the work holding the new gear onto shaft, so it doesn’t need to be tight on the shaft. You may need to slowly rotate the gear back and forth a few times while threading it on. This is normal, and you can even hold the steel worm section in a vice or pliers while you thread the reinforced spur gear on by hand. DO NOT use pliers or anything that can damage the spur gear teeth as they are very small. They are sufficient to do the task, but they are not meant to come into contact with pliers or hardened steel tooling. Take your time here and work the spur gear onto the worm shaft fully. Wipe off any excess epoxy and allow to fully cure for 30 minutes. Once epoxy has fully cured, reinstall the motor and ensure motor brass worm gear teeth make proper contact with reinforced spur gear. You may need to adjust the brass bushings that the shaft rides on to ensure the gear stays centered in the motor slot. You can reposition those brass bushings slightly to ensure the shaft doesn’t have much play. Plug in motor connection and operate motor back and forth several times to ensure everything is aligned properly before reassembling – you will need to hold the motor in place if running it without the metal cover installed.
Note in this picture, the spur gear is not fully threaded onto the shaft. There should be ~0.250-0.300” of shaft protruding on right end from gear face (no threads visible under gear). Wipe off excess epoxy before it dries.

Assembly is the reverse of removal. Use Permatex White Lithium grease P/N 80345 on all the moving parts of the mechanism when reassembling.
** TROUBLE SHOOTING / TIPS SECTION **

1. When fitting the GruvenParts gear onto the metal worm shaft, make sure the threads on the metal worm shaft are free of any debris and remnants from the old gear. Try to thread the Gruvenparts gear on as true as possible to the worm shaft. This may require backing up and going foward several times. You can hold the metal shaft with channel locks, and use a towel or something to protect your fingers while turning the Gruvenparts gear onto the worm shaft (DON’T GRAB THE GRUVEN GEAR WITH ANYTHING METAL).

2. Do not epoxy the gear in place at 1st. Do a trial run with just the motor and gear installed and ensure it doesn’t bind up. If it does bind up, see below. Once you have it running properly, measure the amount of shaft protruding from the Gruven gear, then remove the gear, epoxy, reinstall, and ensure its placed back in the same positon as measured previously.

3. Even when you are careful, the GruvenParts gear will not be 100% true with the worm shaft. This is normal, it can wobble slightly as it turns. If the wobble is too pronounced though, it may cause the gear to bind with the motor gear due to tight mesh between the Gruvenparts gear and the motor gear. If this binding occurs, you can break in the new gear by running it with only the motor/worm gear assy within the black plastic frame. To do this, apply +12v dc to motor (doesn’t matter which direction). See if it will spin freely (note you will need to restrain the motor when running like this - you can use tape, or zip ties to prevent motor from moving away from the black plastic frame it sits in). If the motor will still not move the gear when run like this, remove the motor and see if shaft with the new gear spins free.

If there is any binding in the new gear shaft, resolve the binding. Make sure the new gear shaft isn’t poking too far out on 1 side or the other past the brass bushings because it will hit the metal case that goes around it. That will jam the whole mechanism. If you need to, trim a bit of the shaft off so it doesn’t protrude past the brass bushings on either end. Use a dremel tool or similar for this, wear eye protection. It’s a hardened steel shaft, so sparks will be flying as you trim the ends off.

You may also need to grind a bit of the black plastic frame away if the new gear is contacting it. Its Ok to do that, just remove whats necessary here, usually directly under the gear. Again – eye protection when using any power tools.

Once you ensure the gear shaft is free to spin and not poking out past brass bushings on both ends, reinstall motor, see if you can get it to spin with 12v DC applied to motor.
If it still won’t spin, you can remove the brass bushing farthest from motor. Restrain that end of shaft manually by using a small flat head screw driver, like a jewelers screw driver. Apply +12v DC to motor again and get the shaft spinning. Slowly work the spinning gear shaft back towards the motor, where it would reside if the brass bushing was installed. This is a gentle break in, and will mesh the new gear to the motor gear. Run it a few minutes in both directions like this, then reinstall the brass bushing, and run motor a few more minutes. Make sure it can spin both directions freely with no binding. Note if you can physically stop the motor by itself from spinning by grabbing with a cloth, your motor has lost most of its torque and may just not be sufficient to drive the unit. We do sell new, high torque motors which resolve this. This is not a bad time to change out the motor if it has more than 1,000 cycles on it.

Also, make sure the Gruven gear stays centered in motor gear opening. For some reason, GM has designed this unit to allow axial play in the new gear shaft. This axial play can allow the Gruven gear to become misaligned with the motor gear. You can remove this axial play with a thin washer placed between the brass bushing and the worm gear at the end farthest from the motor. Note that if you do add a washer here, you may need to trim the end of the shaft on the opposite end, if it protrudes too far from the plastic housing (past its brass bushing). See this discussion above about why the shaft should not protrude past the brass bushings.

4. If all else fails, email us – paul@gruvenparts.com and we will help. We stand behind everything we sell. We realize this process seems difficult, due to the poor design of the OEM mechanism which we’re designing a fix for.