

Frankenstein Motorworks EB60/EB62 reverse detent installation guide

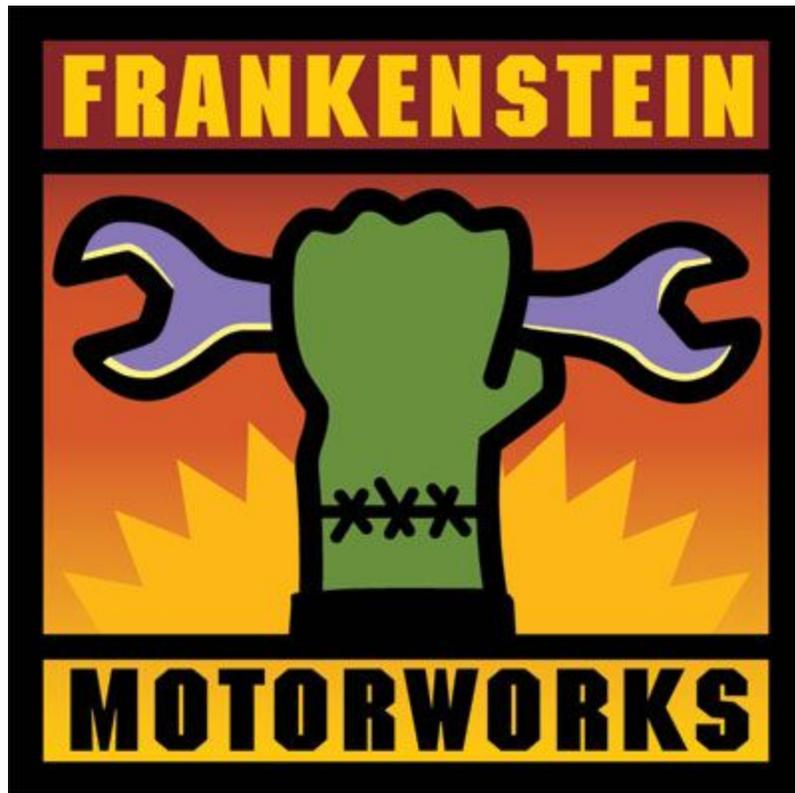


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Introduction

This document covers installing the reverse detent into an EB60/EB62 transmission. Adding this in adds a detent on the 1-2 shift rail to allow differentiating between 1st and reverse more easily.

We will be installing the new cross gate cam on the left of the picture into the EB60 transmission shown here. Note that all the brackets and accessories have been removed before starting.



Parts, supplies and tools needed to do this work:

- 6mm allen wrench
- 10mm allen wrench
- 12mm 6pt socket
- 5mm punch
- Small Hammer
- Small magnet on a stick
- E-Clip removal tool (2 flat blade screwdrivers and a bit of patience also works)
- Gasket scraping tool
- RTV gasket
- Two scraps of wood (to avoid scratching trans face and damaging right side output shaft seal).

**If there are any issues or clarifications needed please do not hesitate to contact me:
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Step 1: Remove reverse shaft retention bolt.

The bolt circled in red in this picture needs to be removed:



Note that this bolt has a crush washer on it, this bolt needs to go back in the same location on reassembly.

Step 2: Remove detents from shift shafts.

The bolts circled in red need to be removed with a 10mm allen key, they contain a spring and a lock ball pin. These springs are not the same, the spring with higher strength goes in the position nearest the three blue detents. The bolts circled in blue need to be removed with a 6mm allen key, they contain a light spring and a ball bearings.



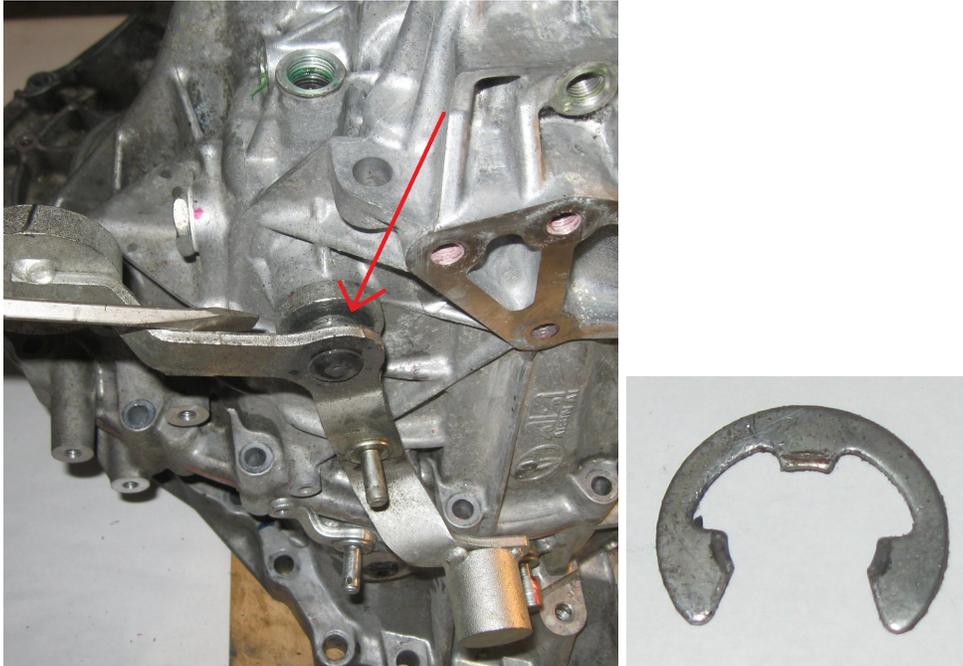
Remove all the parts mentioned above, it should look like this:



Step 4: Remove e-clip from gate selection lever.

The gate selection lever needs to be released to allow transmission disassembly. Removing this does not remove the lever, it simply allows it to sink into the case deep enough to disengage it.

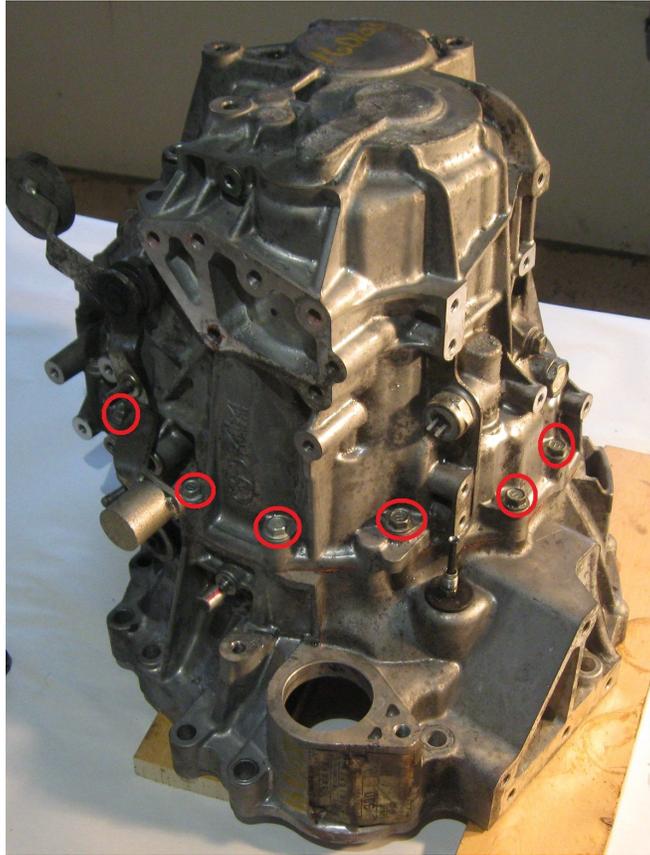
The e-clip is located where the red arrow points and looks as follows:



Once that is removed push the shaft into the transmission to collapse the space that was maintained by this e-clip.

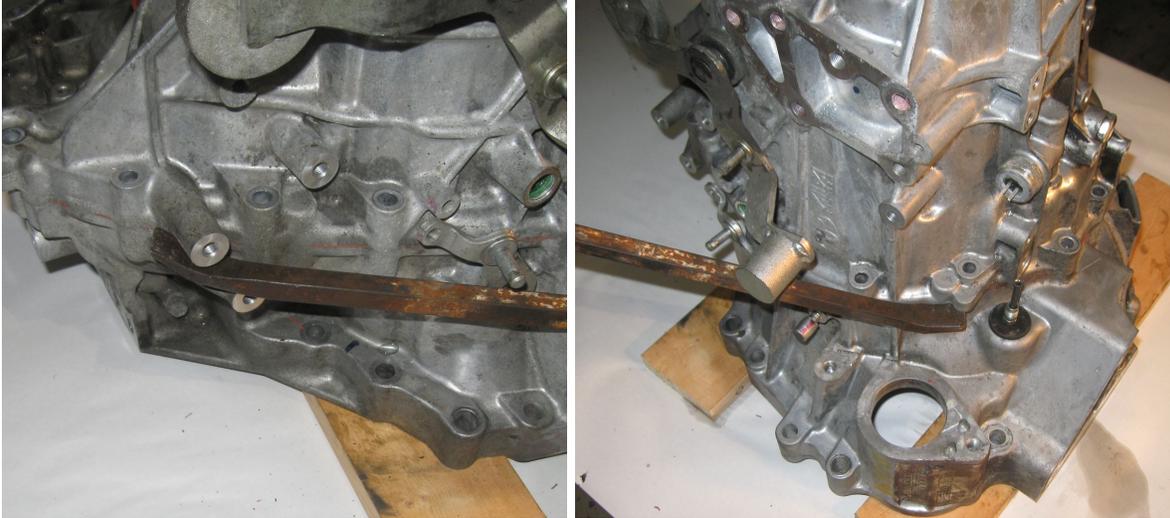
Step 5: Remove all case interface bolts.

There are 17 bolts, all accessible from the top of the transmission that hold the two halves together, remove all 17 of these. The picture shows some of them circled in red, they go all around the transmission.



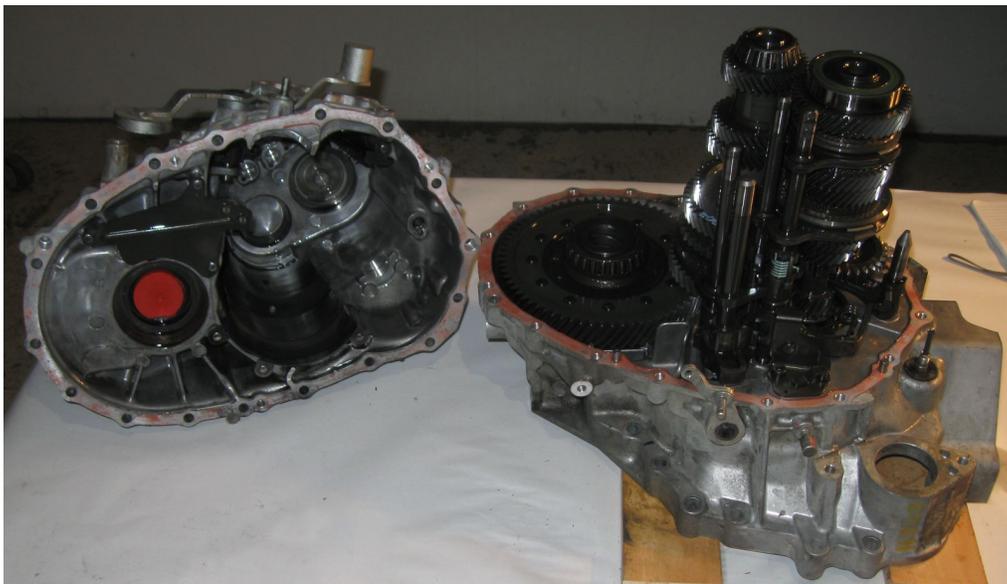
Step 6: Split the case.

There are two good points to break the seal on the transmission without damaging the mating surfaces:



Applying gentle force at these two locations should allow the seal to be broken on the case. If there is resistance make sure you verify that all 17 case bolts have been removed.

Once the case is split, make sure the gate selection lever is still pushed in and the top half of the case should just come off. You may need to jiggle it as you lift up to get everything to separate cleanly.



Note that the input shaft (on left in picture) has an end bearing shim that normally stays in the top half of the case. If it did not stay with the top half of the case please put it back in that part of the case.

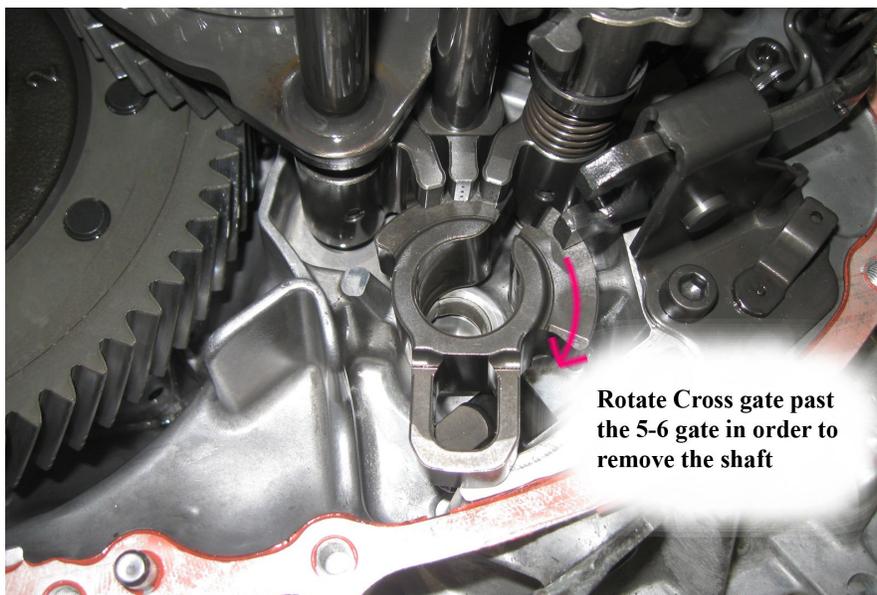
Step 7: Remove shift and select lever shaft.

In this step we have to remove the shaft that contains the part we are trying to replace, the shaft in question is highlighted in green:



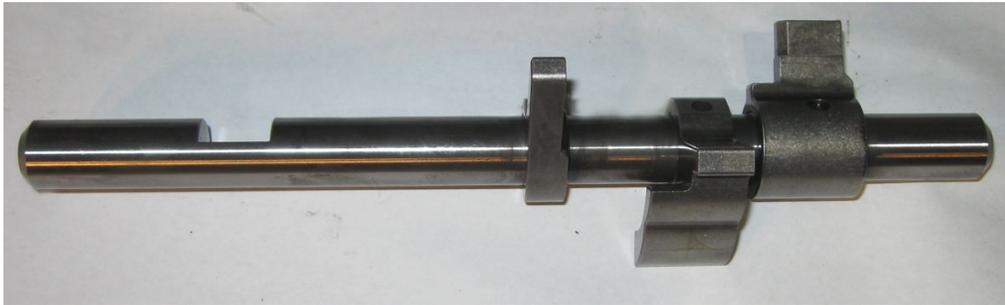
To remove this shaft you need to rotate it clockwise as far as it will go, it will be necessary to lift the shaft slightly while trying to rotate the shaft in order to align all the gates. Once the end is reached it should be possible to jiggle it and lift it away from the rest of the mechanism.

These parts will remain behind after the shaft is removed, you can also see how things need to be rotated in order to remove them:



Step 8: Make changes to shift and select lever shaft.

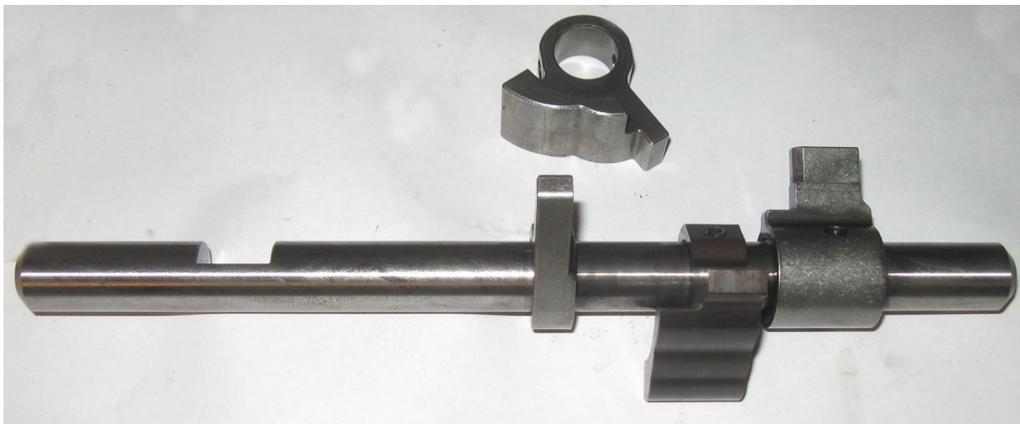
The cam that needs to be swapped out is in the middle of the shaft that has been removed, note the orientation of parts before removing them. The bracket on the left has a notch cut out on the side towards the cam, the tab on it also points in a similar direction to the reverse engagement tab that protrudes from the cam. It may be useful to use a marker to mark the orientation of the parts before disassembly or simply refer back to this picture:



The parts are retained to the shaft with a roll pin, using a punch and a hammer remove the bracket to the left as well as the old cross gate cam.



The new cam can then be reinstalled as well as replacing the left bracket back on. Simply gently hammer the roll pins back in place to lock everything back to the shaft.

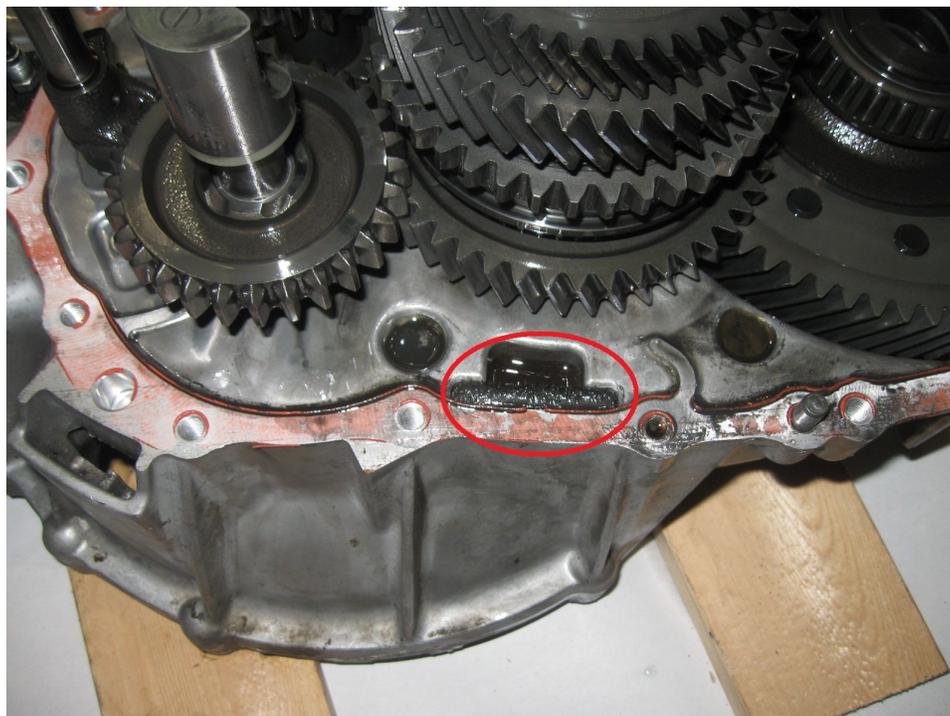


Step 9: Optional work.

At this point all the removal and modifications are done but if the donor transmission is an EB62 this is the perfect time to swap out to the EB60 shift levers. This is also a right point to switch the 5th and/or 6th gear ratios to the EB62 ratios if the donor was an EB60 and the higher gear ratios are desired.

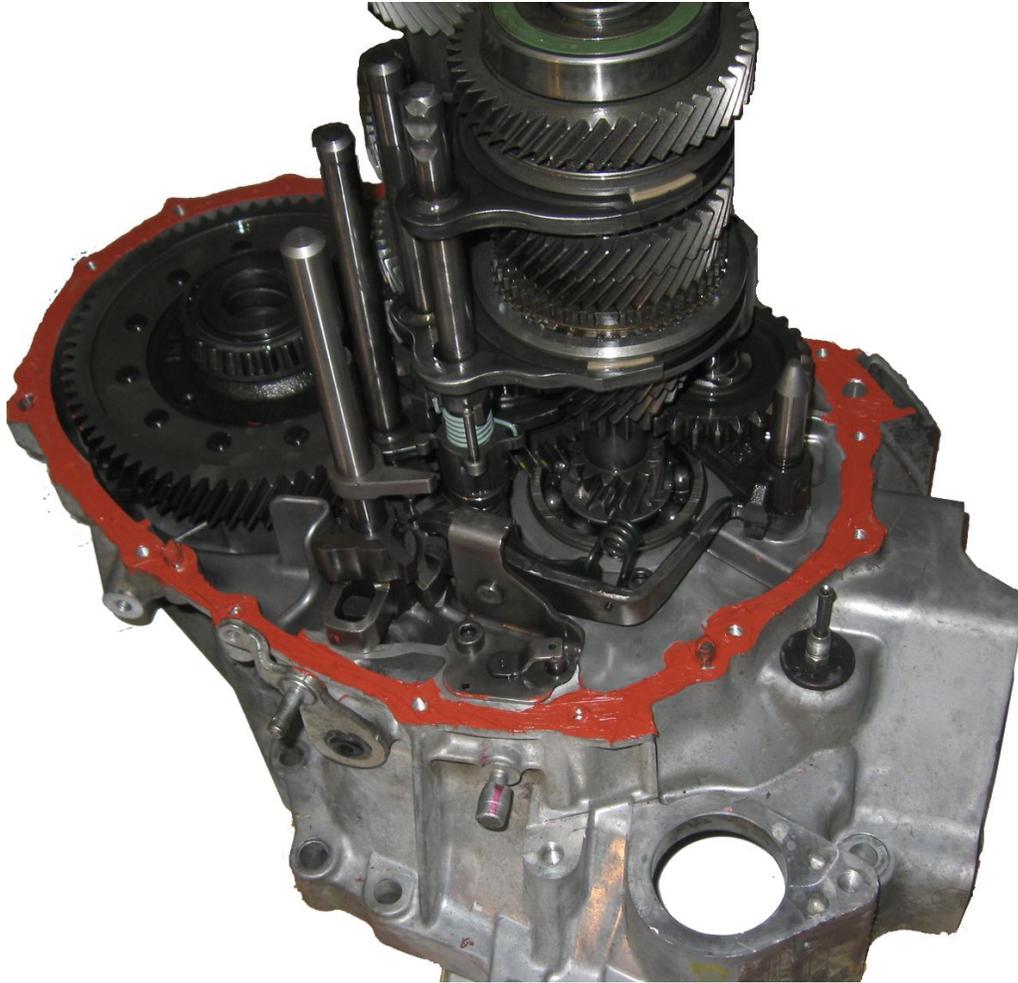
Step 10: Remove swarf from magnet.

It is advisable for transmission longevity to clean the magnet while we are in here, the magnet is located in the area circled in red, it simply lifts up for cleaning:



Step 11: Prepare for reassembly.

- Reinsert the shift and select lever shaft and rotate it counterclockwise slightly to place the actuator in any of the three gates.
- Clean up the old gasket material from both mating faces
- Spread new RTV sealant around sealing perimeter of bottom half of the case.
- Align reverse shaft bolt hold with case opening



Step 12: Reassemble case.

The case can be slipped back onto the transmission, taking care that the cross gate selection lever is fully pushed into the case. The transmission will generally not slide together but some gentle jiggling without downward pressure will allow everything to align and the case to fall together. There should be no downward pressure other than gravity needed

Once the case halves are together the reverse shaft screw needs to be installed (circled in red), this bolt can be tricky and may require the case to be separated again in order to rotate it to the correct position. It can also be useful to use a different bolt with the same thread and sanding a taper on the end of the screw to help alignment. This bolt gets torqued to 22lb*ft/30Nm

Next the 17 case bolts need to be tightened. Some are circled in blue in the picture below but they go all around the case. These bolts get torqued to 22lb*ft./30Nm



Step 13: Gate select shaft e-clip installation.

The e-clip that was removed from the transmission needs to be reinstalled. Start by pulling shaft outwards to expose e-clip groove. If the shaft does not move freely outwards it may need to be rotated slowly back in forth until it finds its home.



Step 14: Install all detents

Start with the three detents circled in blue, these take a ball bearing, the lightest three springs and the caps with the 6mm allen keys. These caps get torqued to 16lb*ft/22Nm. Next place a lock ball pin in each red location. Place the heavier spring on the location that is nearest the three smaller detents circled in blue and the lighter spring on the location towards the bottom (as it sits in these pictures). Torque these caps to 18lb*ft/25Nm



Step 15: Verify shift pattern.

It should now be possible to shift through all the gears and verify that the shift mechanism works as necessary.