

How to service the wear compensator of clutch actuator?

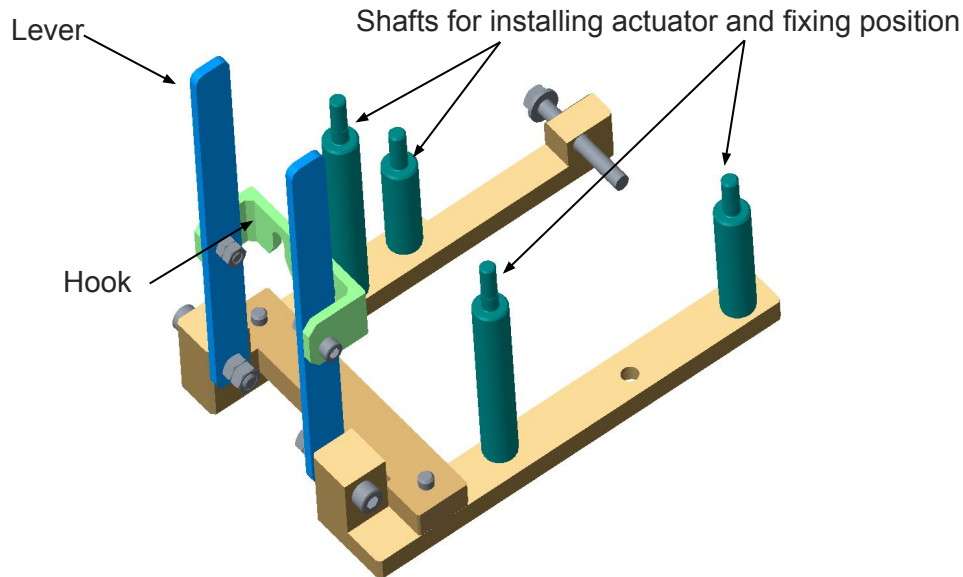
Part to be replaced			Service procedure for clutch system	How to service the wear compensator of clutch actuator?	Necessity of DCT learning
 Double clutch (D/C)	 Clutch actuator (C/A)	 Clutch engagement bearing & fork system (CES)			
Replacement	Reuse	Replacement	Removing DCT → Replacing D/C + CES	Install the DCT after initializing the output rod length of clutch actuator removed from DCT.	Required (G-SCAN)
		Reuse	Removing DCT → Replacing D/C		
	Replacement	Replacement	Removing DCT → Replacing D/C + CES + C/A	Install the DCT after initializing the output rod length of new clutch actuator.	
		Reuse	Removing DCT → Replacing D/C + C/A		
Reuse	Replacement	Replacement	Removing DCT → Replacing C/A + CES	Install the DCT after rewinding the new clutch actuator (Rewinding aims to change the output rod length of new clutch actuator to the output rod length of clutch actuator removed from DCT).	
		Reuse	- Removing DCT → Replacing C/A - Removing C/A only using an exclusive jig → Replacing C/A		
Reuse	Reuse	Replacement	Removing DCT → Replacing CES only	- Reuse the existing clutch actuator. - No adjustment of the output rod length of existing clutch actuator is required.	

How to initialize or rewind the wear compensator (**Without reassembling actuator motor**)?

※ Purpose of initializing/rewinding the wear compensator

- It is necessary to initialize/rewind the wear compensator when replacing the double clutch or clutch actuator with a new one.
- ▶ In case of the 7-speed DCT, wear compensator is included in the clutch actuator.

1. Jig and tool for wear compensator



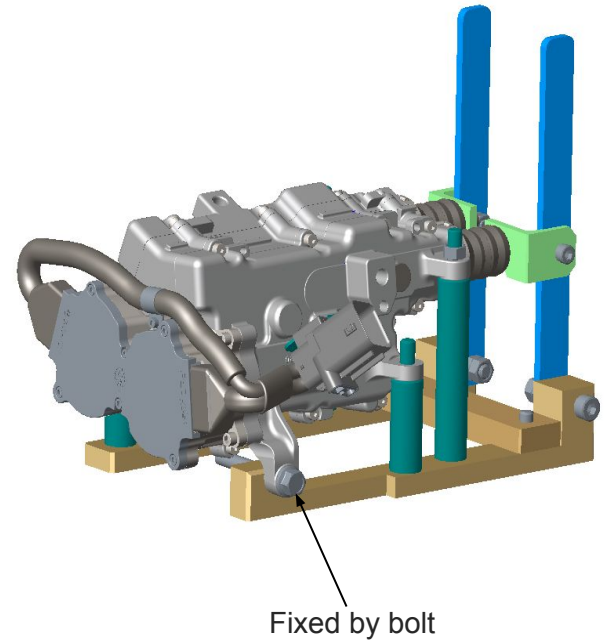
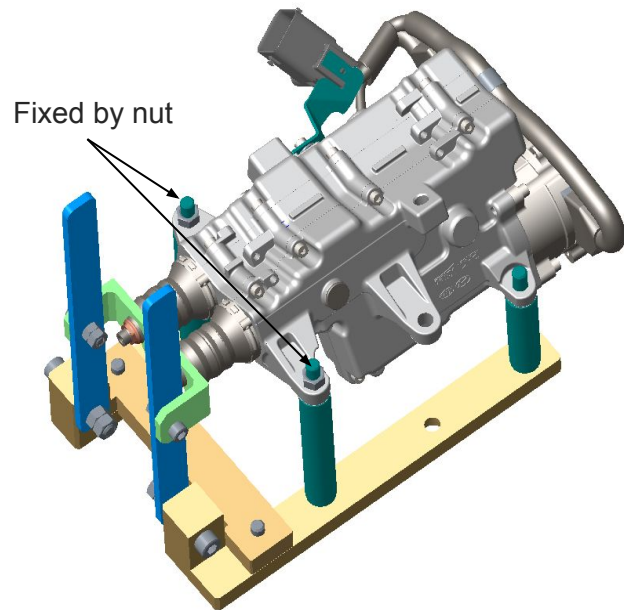
<Base jig for wear compensator>



<Tool for adjusting output rod length>

How to initialize or rewind the wear compensator?

2. Installation diagram of clutch actuator on the wear compensator jig



**Initializing method for
wear compensator of clutch actuator**

How to initialize the wear compensator (**Without reassembling actuator motor**)?

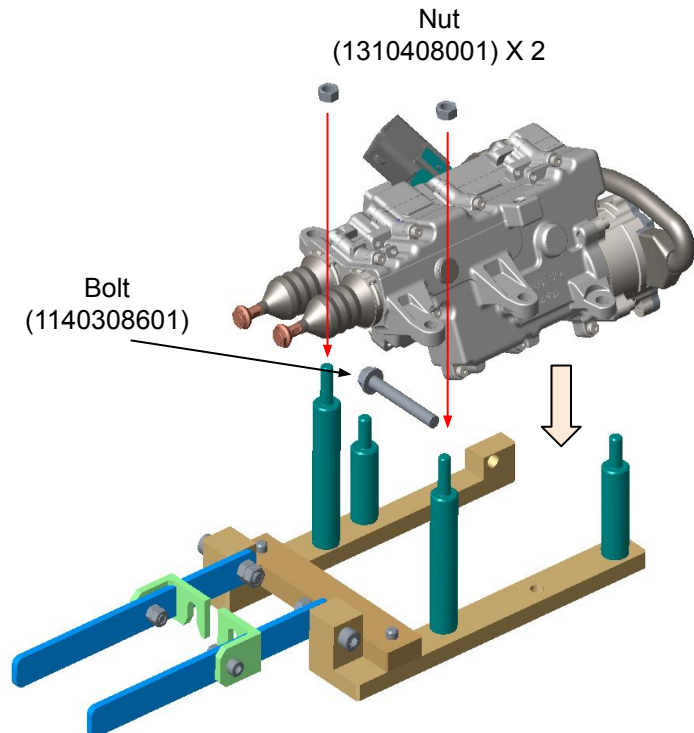
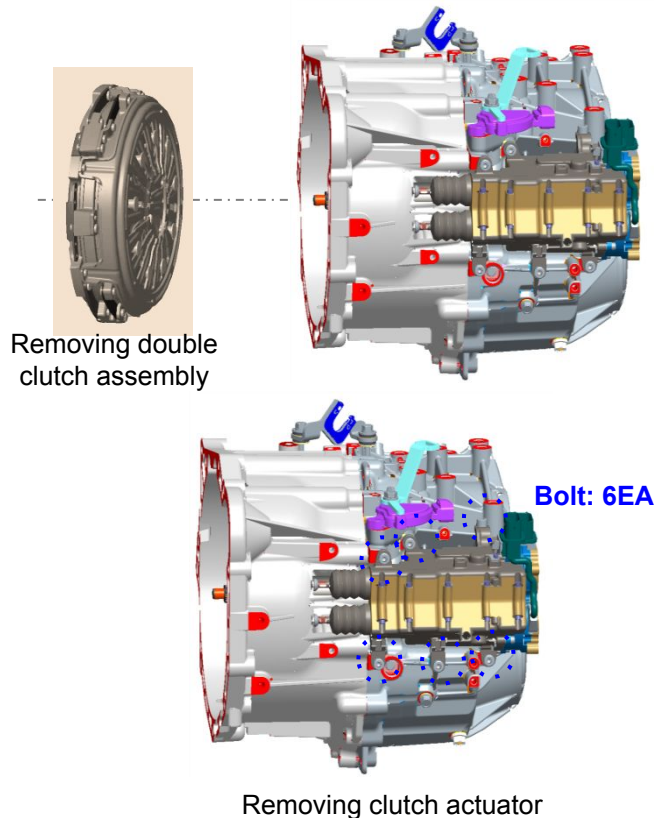
- Initializing method and order for wear compensator (In case of replacing double clutch assembly only with a new one and reusing clutch actuator)

- ① Remove the clutch actuator from DCT.

CAUTION

Be sure to first remove the double clutch when trying to remove the actuator. However, when using the exclusive jig for removing the actuator only, it is possible to remove the actuator directly from a vehicle.

- ② Install the clutch actuator removed from DCT on the jig.
 - Seat the 4 actuator holes on the jig and then tighten the 2 nuts and provisionally assemble 1 bolt.

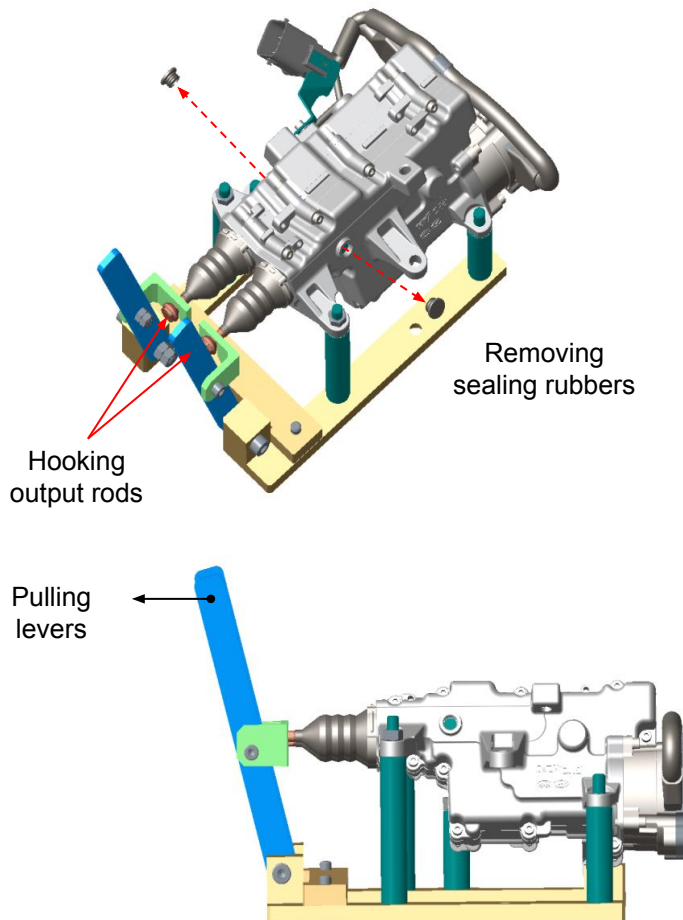


How to initialize the wear compensator (**Without reassembling actuator motor**)?

- ③ Remove the 2 sealing rubbers and then pull the levers by hooking the output rods.

CAUTION

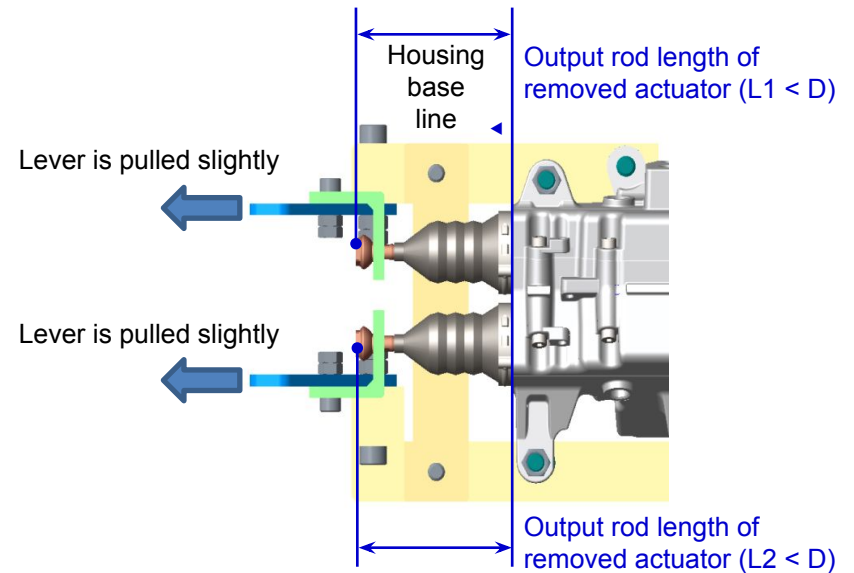
No removal of actuator motor is required.



- ④ Check the output rod length of clutch actuator removed from DCT (Measure the length, slightly pulling the lever to prevent the length from being reduced by the sealing boot).

- If the measured output rod length ($L1$, $L2$) is shorter than the specified initialization length (D), initialization of the wear compensator is necessary.

※Initialization: It aims to adjust the output rod length to the DCT specification in factory.



DCT type	Medium 7-speed DCT (D7UF1)	Small 7-speed DCT (D7GF1)	HEV 6-speed DCT (D6KF1)
Initialization length (D) [mm]	71.5~72.5	69.0~70.0	82.0~83.0

How to initialize the wear compensator (**Without reassembling actuator motor**)?

⑤ Stand the clutch actuator vertically with installed on the base jig.

- After standing the clutch actuator vertically, remove the hooks and levers from the output rod.

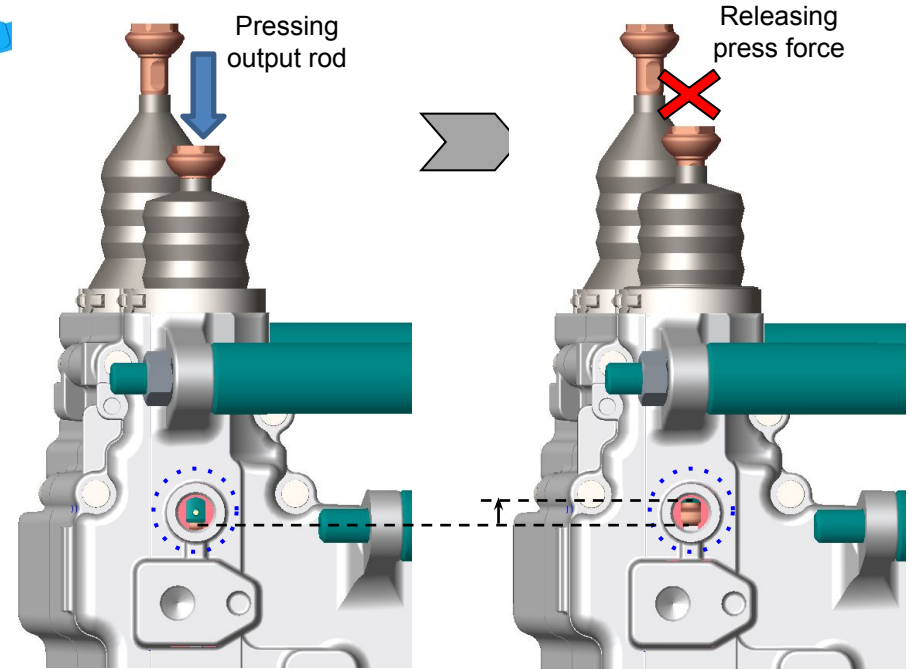
⑥ Press the end of output rod until the protrusion of wear compensator nut appears in the sealing rubber hole and then release the press force.

- Locate the nut in the hole by flashing light.
- Repeat this step when nut is not down to the hole.
- When releasing the press force, nut will move slightly upward by the sealing boot.

Removing hooks and levers after standing the clutch actuator vertically

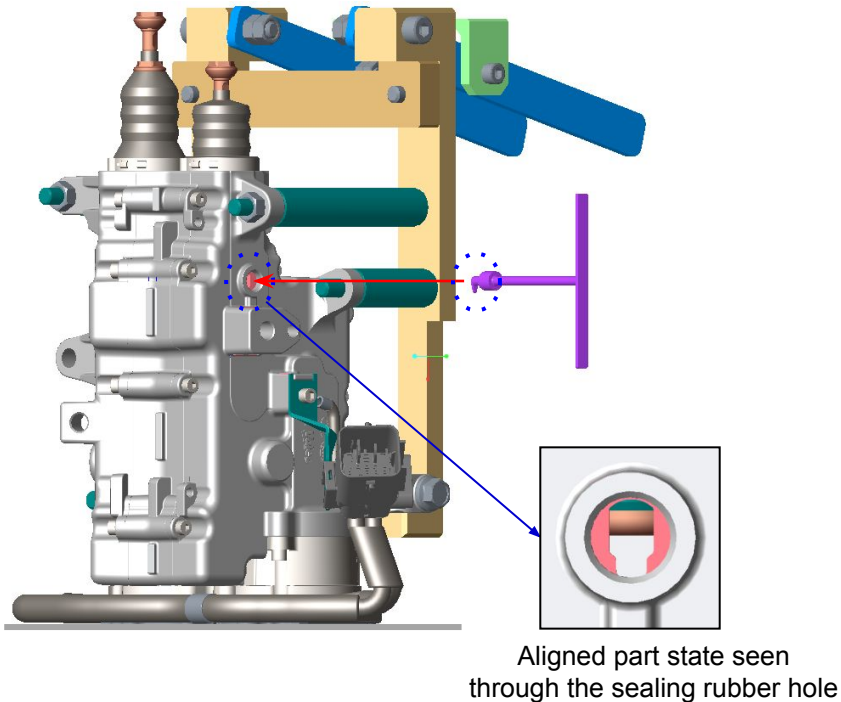
Supporting base jig on the vertical face if necessary

Pay attention to the motor connector breakage by careless handling

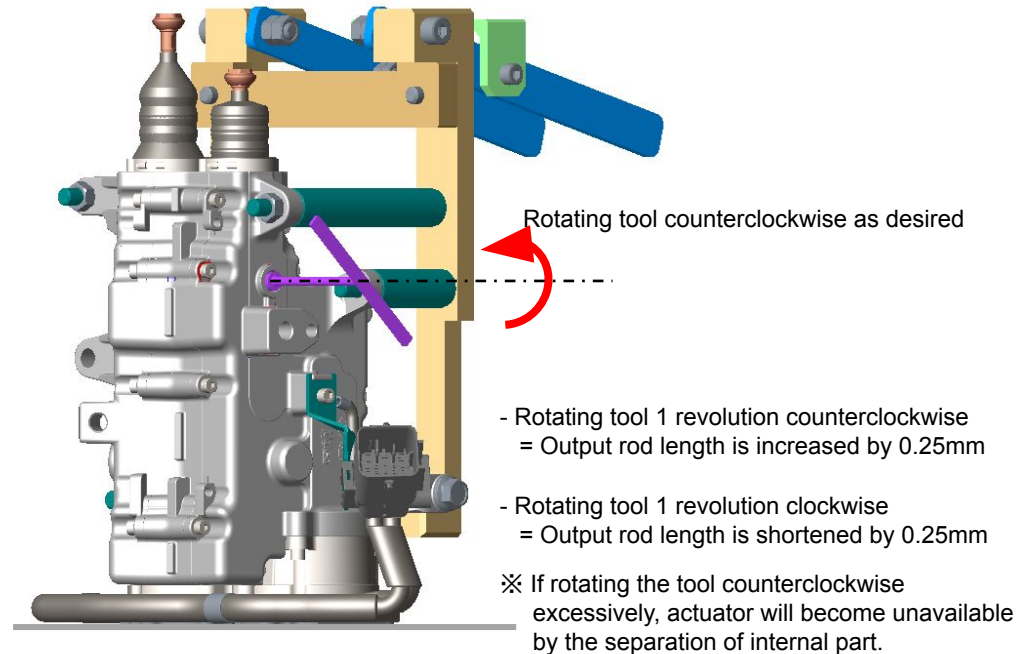


How to initialize the wear compensator (**Without reassembling actuator motor**)?

- ⑦ Insert the tool for adjusting the wear compensator into the sealing rubber hole.
- Insert the tool after aligning the end of tool with the part shape seen through the sealing rubber hole.

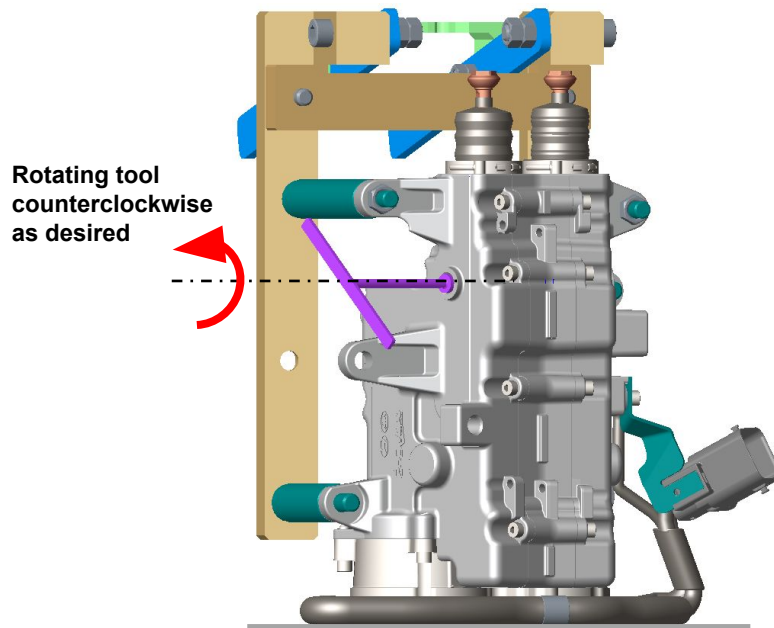


- ⑧ Rotate the tool counterclockwise as desired for increasing the output rod length (L) to the specified initialization length (D).
- Rotate the tool counterclockwise when increasing (+) the output rod length.
 - Rotate the tool clockwise when shortening (-) the output rod length.



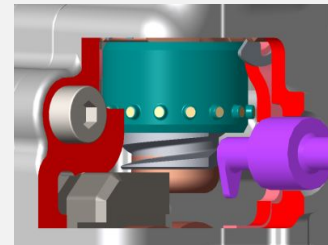
How to initialize the wear compensator (**Without reassembling actuator motor**)?

⑨ Apply the same procedure (Step ⑥, ⑦, ⑧) to the opposite output rod.



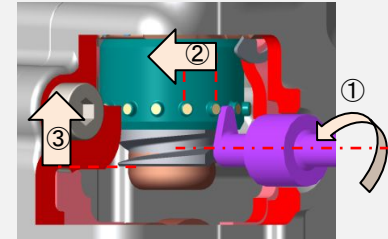
[Additional instruction] Details in internal part operation when rotating tool

1) Tool is inserted



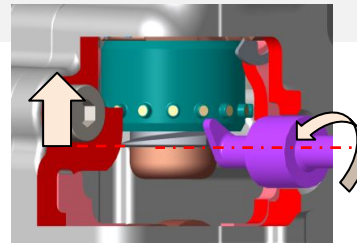
<Cross section of actuator>

2) Internal part operation when rotating tool



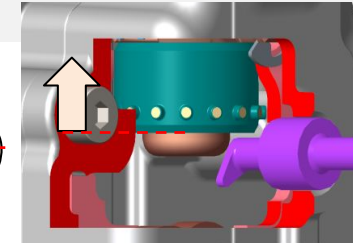
- ① When rotating tool 1 revolution counterclockwise
- ② It is rotated to left (Counterclockwise) as 1 click of nut protrusion
- ③ Output rod position is adjusted (+0.25mm/1 revolution)

3) Rotating tool as desired



Rotating tool counterclockwise as desired for initialization

4) Initialization of wear compensator is completed



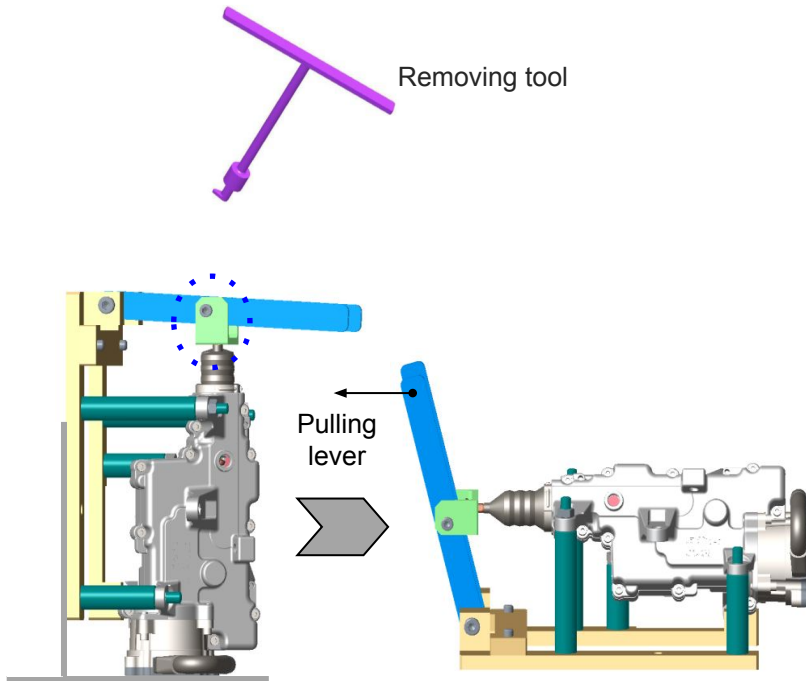
Initialization is completed (Output rod length is increased)

※ If rotating the tool counterclockwise excessively, actuator will become unavailable by the separation of internal part.

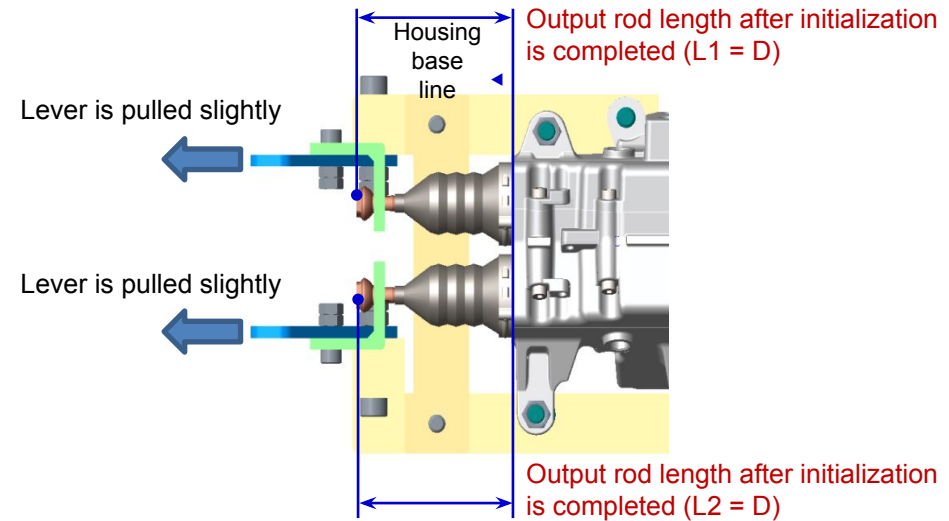
※ In case of the 'rewinding' which shortens the output rod length, it shortens the output rod length by rotating the tool clockwise and internal part operates in the opposite direction against ①, ②, ③.

How to initialize the wear compensator (**Without reassembling actuator motor**)?

- ⑩ Remove the tool from the actuator. Hang the hooks on the output rods and then lay the clutch actuator so that base jig is contacted with the floor.



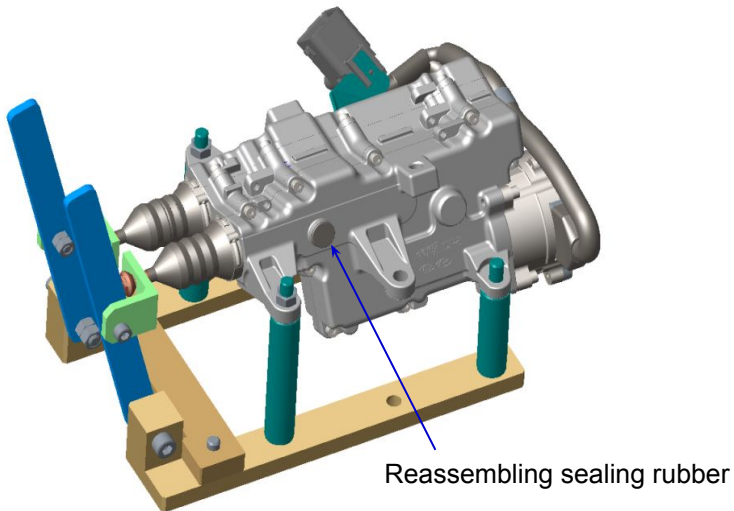
- ⑪ Check the output rod length of actuator whose initialization is completed (Measure the length, slightly pulling the lever so that the length is not reduced by the sealing boot).
- Check that the measured output rod length (L1, L2) meets the specified initialization length (D).



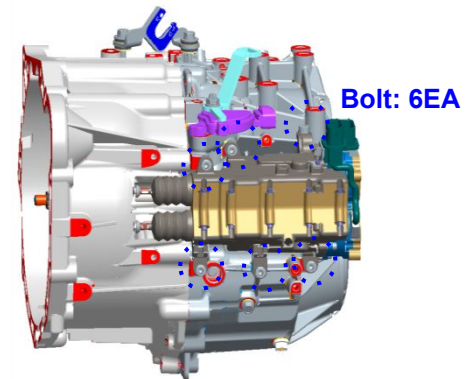
DCT type	Medium 7-speed DCT (D7UF1)	Small 7-speed DCT (D7GF1)	HEV 6-speed DCT (D6KF1)
Initialization length (D) [mm]	71.5~72.5	69.0~70.0	82.0~83.0

How to initialize the wear compensator (**Without reassembling actuator motor**)?

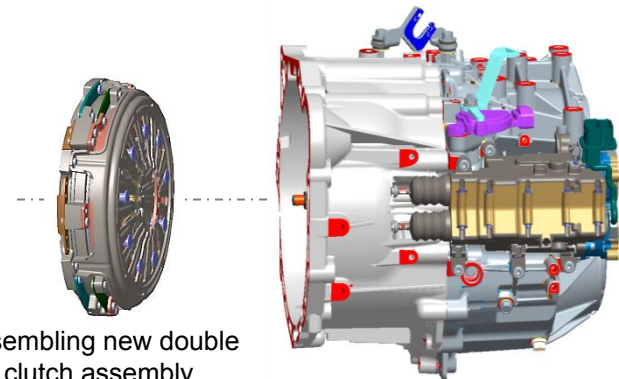
- ⑫ Reassemble the sealing rubber and then remove the clutch actuator from the base jig.



- ⑬ Reinstall the clutch actuator to DCT and then assemble the new double clutch.
- Initialization of the wear compensator is completed.
 - Reinstall the DCT to a vehicle and then carry out the manual DCT learning using G-Scan or GDS-Mobile.



Reinstalling clutch actuator



[Additional instruction]

■ Calculation of the number of turns for wear compensator tool

- Calculating formula for the number of turns and rotating direction (+/-)
: (Length after adjustment - Length before adjustment)/Length change per 1 revolution

[When initializing wear compensator]

= (Specified initialization length **D** of clutch actuator - Rod length **L** of removed clutch actuator)/0.25mm

- ※ Rotate tool counterclockwise to increase (+) the rod length.
Rotate tool clockwise to shorten (-) the rod length.

[Initialization case of output rod length]

- 1) Actually measured output rod length (L1, L2) of removed actuator

Rod length for odd gear L1 = 70.0

Rod length for even gear L2 = 68.0

- 2) Specified initialization length (D) of output rod

D = 71.5~72.5 mm (Medium 7-speed DCT)

- 3) It is necessary to initialize the output rod length of removed actuator because measured rod length (L1, L2) is shorter than the specified initialization length (D).

- L1 (70.0) < D (72.0)

- L2 (68.0) < D (72.0)

└ Middle value of specified
initialization length (D)

- 4) The number of turns for wear compensator tool

$(D-L1)/0.25=(72.0-70.0)/0.25 = +2.0/0.25 = +8$ revolutions

$(D-L2)/0.25=(72.0-68.0)/0.25 = +4.0/0.25 = +16$ revolutions

Rewinding method for wear compensator of clutch actuator

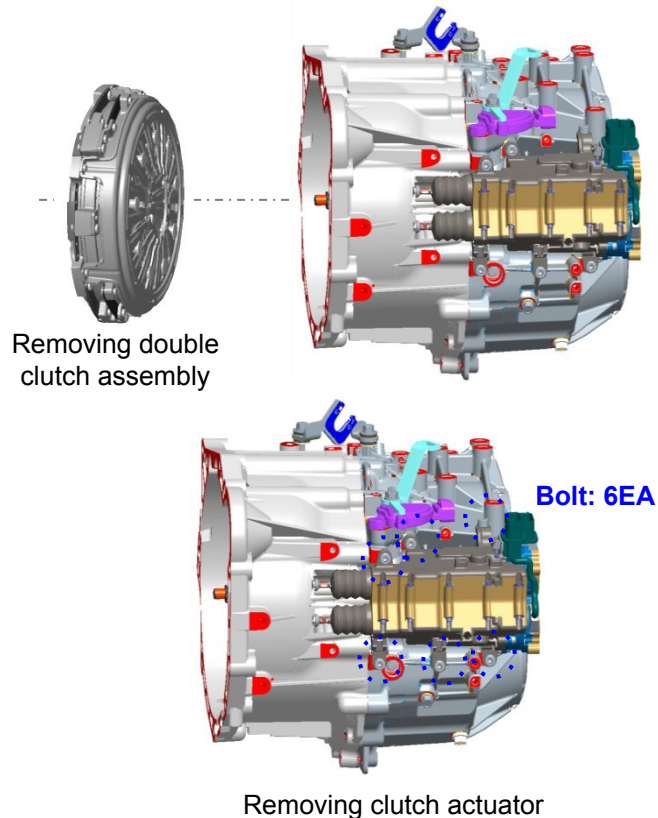
How to rewind the wear compensator (**Without reassembling actuator motor**)?

- ▣ Rewinding method and order for wear compensator (In case of reusing double clutch assembly and replacing clutch actuator only with a new one)

- ① Remove the clutch actuator from DCT.

CAUTION

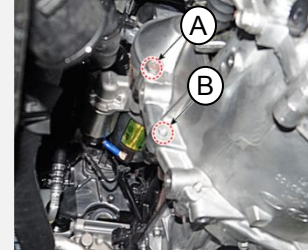
Be sure to first remove the double clutch when trying to remove the actuator. However, when using the exclusive jig for removing the actuator only, it is possible to remove the actuator directly from a vehicle.



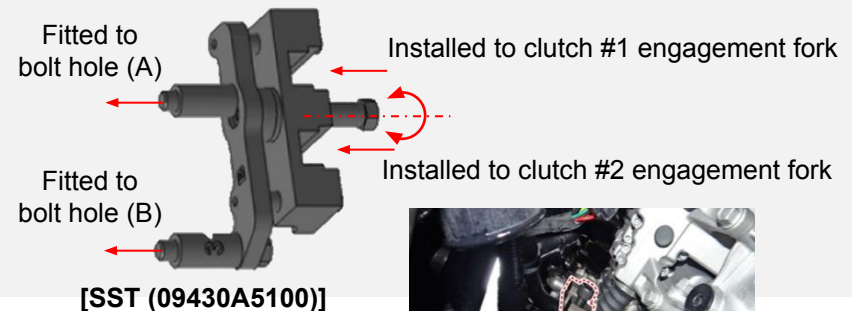
[Use of the exclusive jig for removing the clutch actuator only]

- 1) Loosen the engine starter mounting bolt (A) and DCT mounting bolt (B).

□ Tightening torque: (A) 5.0~6.5 kgf.m, (B) 4.3~5.5 kgf.m



- 2) Remove the clutch actuator after releasing the force applied to the end of output rod by moving the clutch engagement fork using the SST.

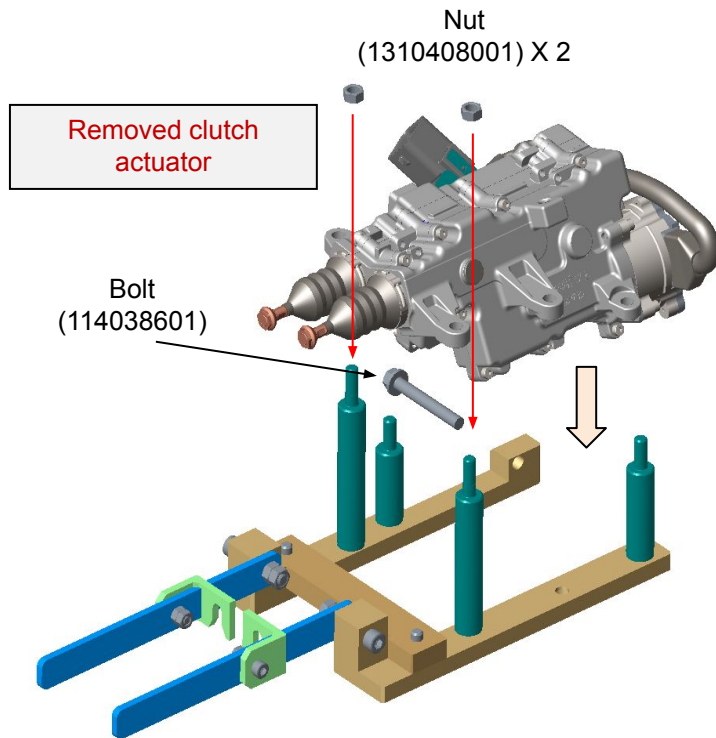


How to rewind the wear compensator (**Without reassembling actuator motor**)?

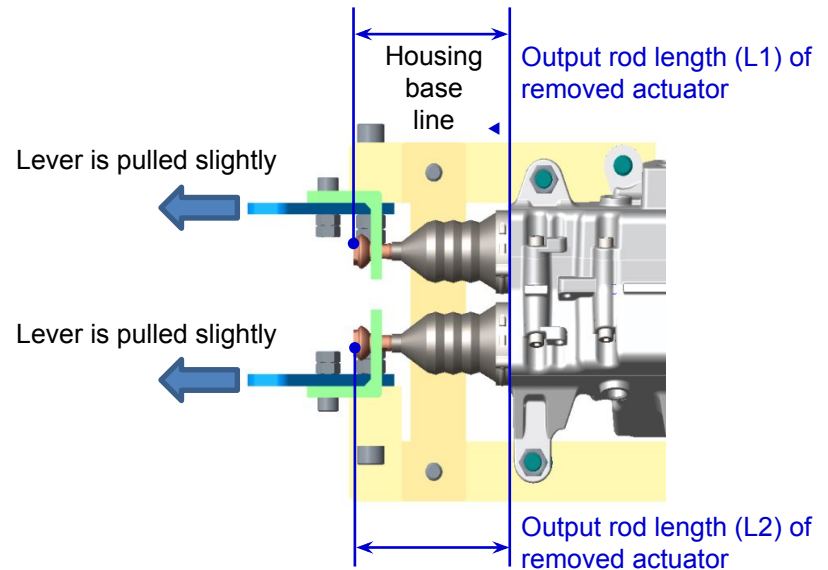
- ② Install the clutch actuator removed from DCT on the jig.
- Seat the 4 actuator holes on the jig and then tighten the 2 nuts and provisionally assemble 1 bolt.

CAUTION

No removal of actuator motor is required.

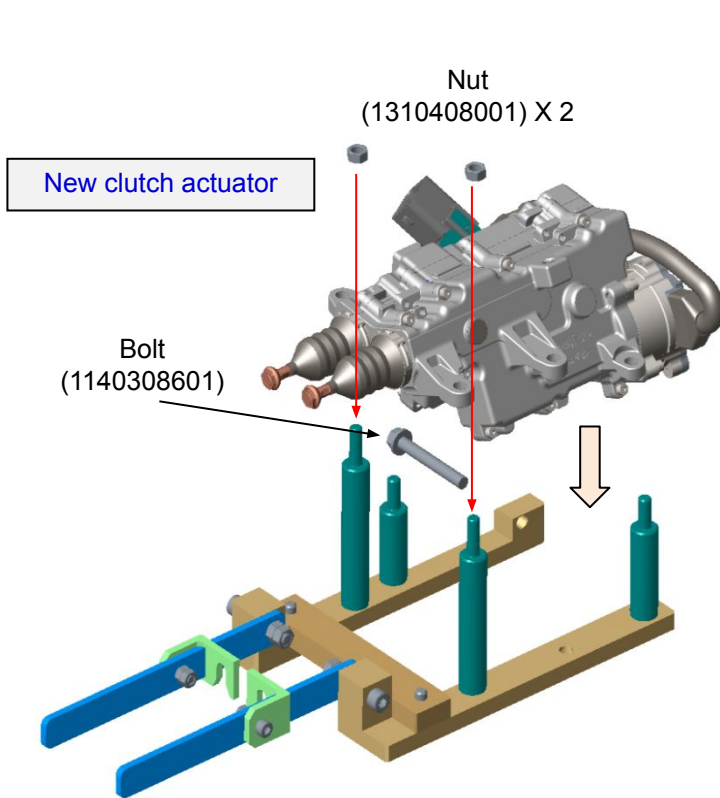


- ③ Check the output rod length of clutch actuator removed from DCT
(Measure the length, slightly pulling the lever to prevent the length from being reduced by the sealing boot).
- Record the measured output rod length (L1, L2) and then remove the actuator from base jig.

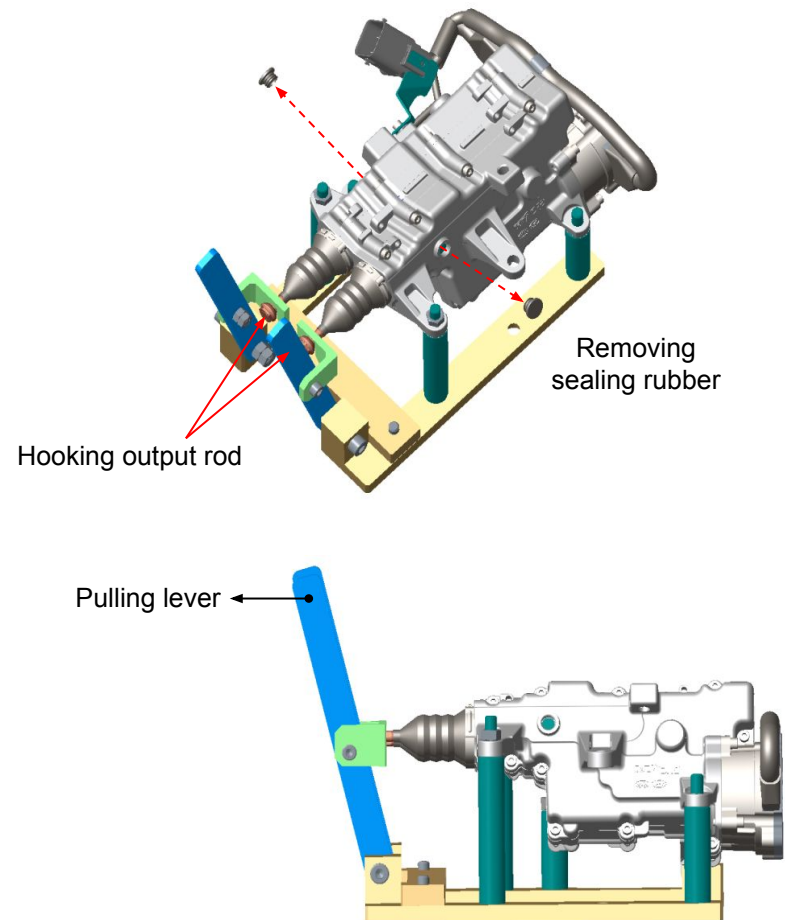


How to rewind the wear compensator (**Without reassembling actuator motor**)?

- ④ Install the new clutch actuator on the jig.
- Seat the 4 actuator holes on the jig and then tighten the 2 nuts and provisionally assemble 1 bolt.

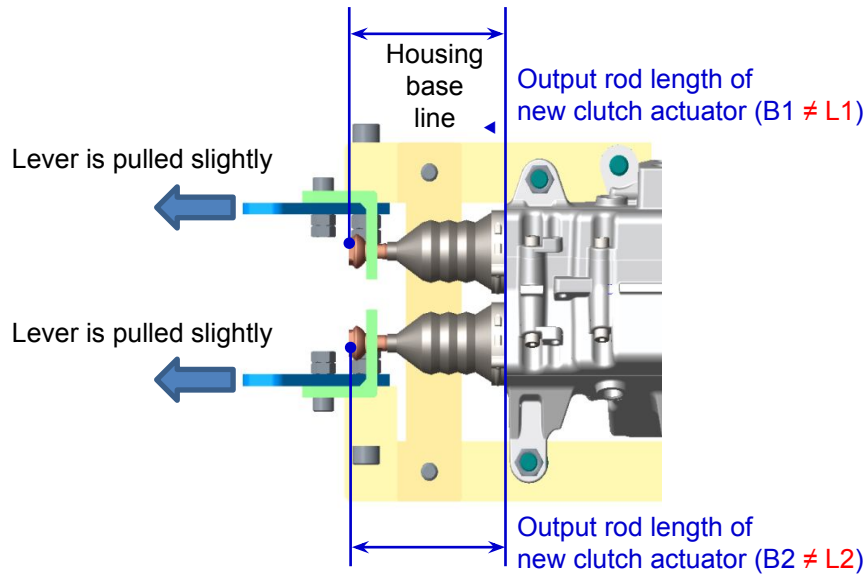


- ⑤ Remove the 2 sealing rubbers and then pull the levers by hooking the output rods.

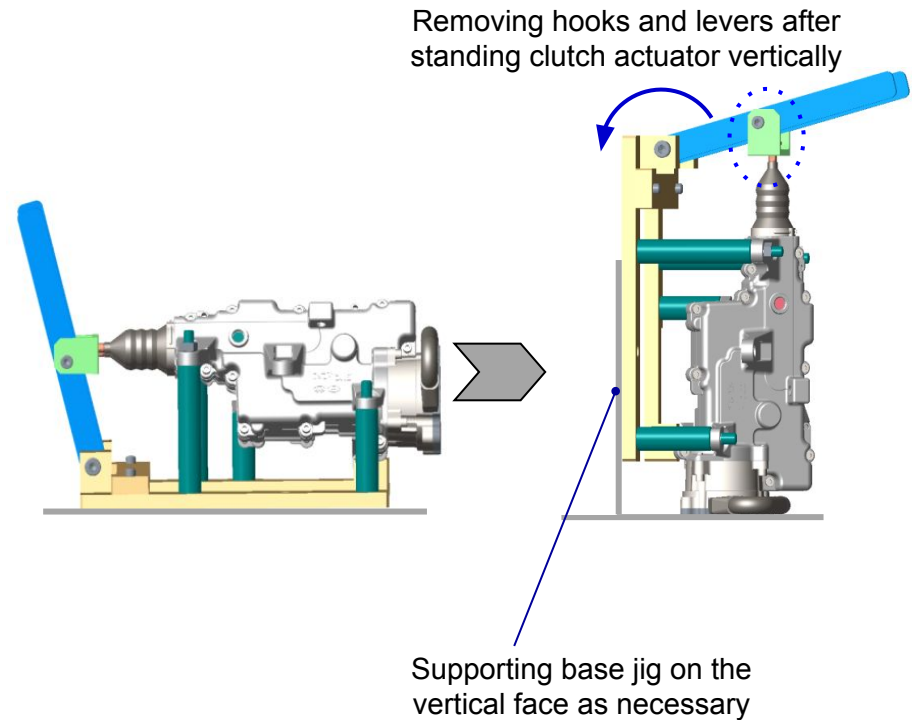


How to rewind the wear compensator (**Without reassembling actuator motor**)?

- ⑥ Check the output rod length of new clutch actuator
(Measure the length, slightly pulling the lever to prevent the length from being reduced by the sealing boot).
- Record the measured output rod length (B1, B2).



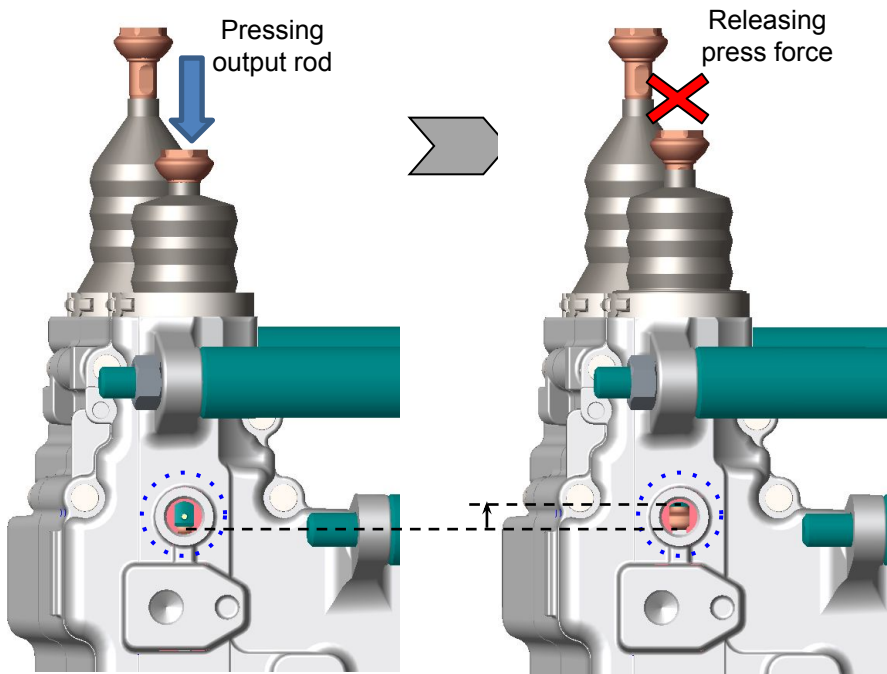
- ⑦ Stand the clutch actuator vertically with installed to the base jig.
- After standing the clutch actuator vertically, remove the hooks and levers from the output rods.



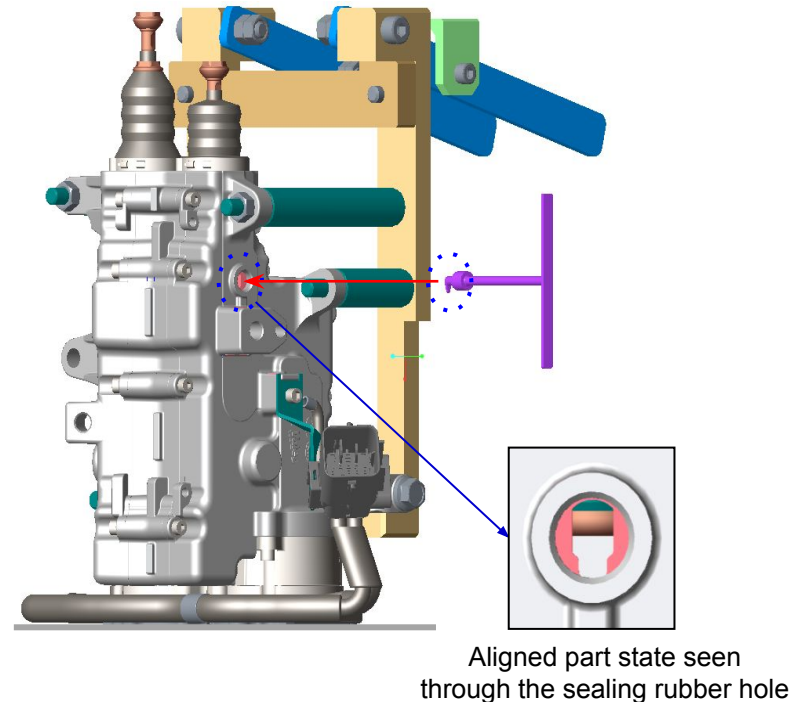
DCT type	Medium 7-speed DCT (D7UF1)	Small 7-speed DCT (D7GF1)	HEV 6-speed DCT (D6KF1)
Rod length (B) [mm] of new clutch actuator	Record the actually measured output rod length of new clutch actuator		

How to rewind the wear compensator (**Without reassembling actuator motor**)?

- ⑧ Press the end of output rod until the protrusion of wear compensator nut appears in the sealing rubber hole and then release the press force.
- Locate the nut inside of the hole by flashing light.
 - Repeat this step when nut is not down to the hole.
 - When releasing the press force, nut will move slightly upward by the sealing boot.



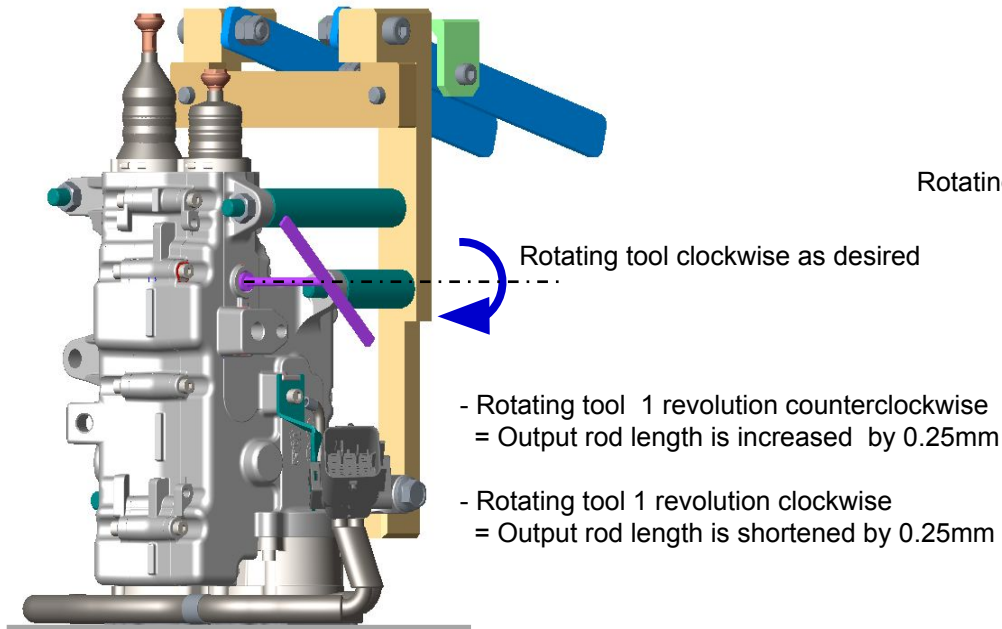
- ⑨ Insert the tool for adjusting the wear compensator into the sealing rubber hole.
- Insert the tool after aligning the end of tool with the part shape seen through the sealing rubber hole.



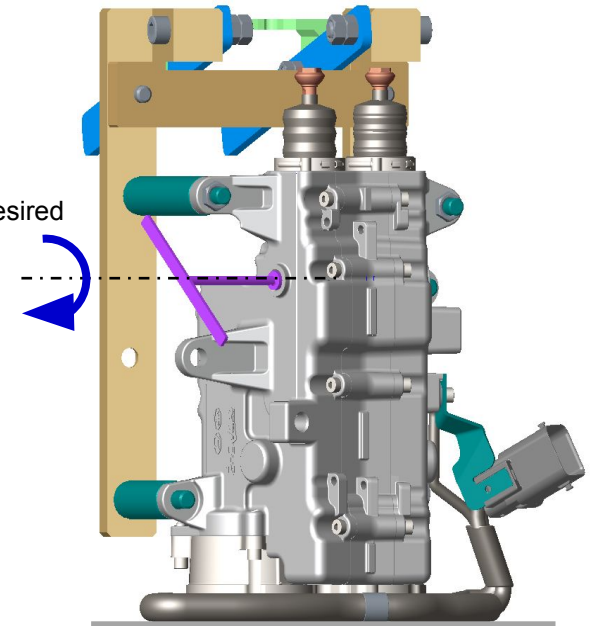
How to rewind the wear compensator (**Without reassembling actuator motor**)?

- ⑩ Rotate the tool clockwise as desired for shortening the output rod length (B) to the previous output rod length (L).
- Rotate the tool counterclockwise when increasing (+) the output rod length.
 - Rotate the tool clockwise when shortening (-) the output rod length.

- ⑪ Apply the same procedure (Step ⑧, ⑨, ⑩) to the opposite output rod.

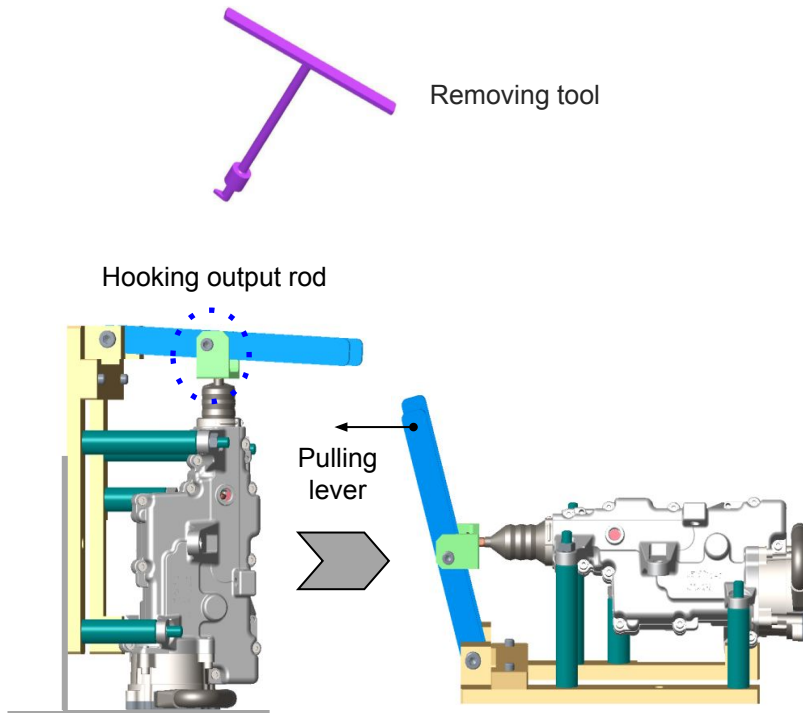


Rotating tool clockwise as desired

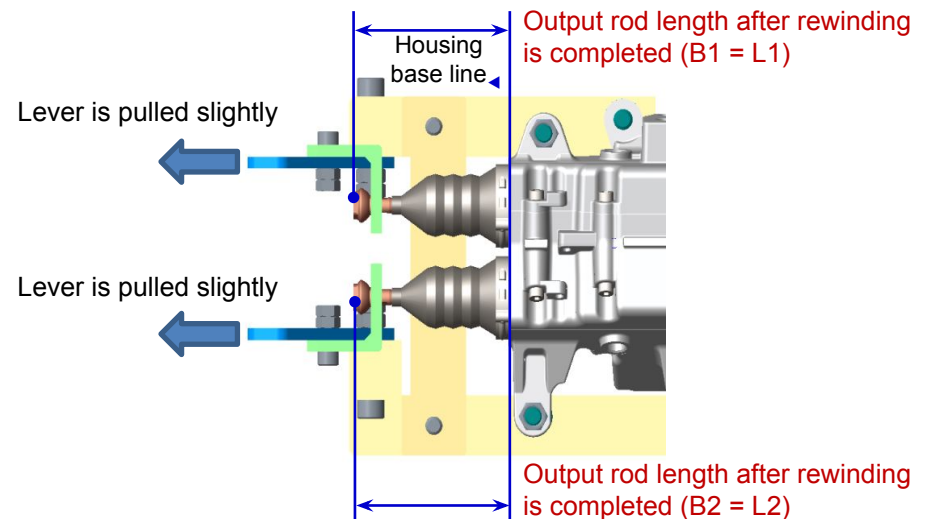


How to rewind the wear compensator (**Without reassembling actuator motor**)?

- ⑫ Remove the tool from the actuator. Hang the hooks on the output rods and then lay the clutch actuator so that base jig is contacted with the floor.

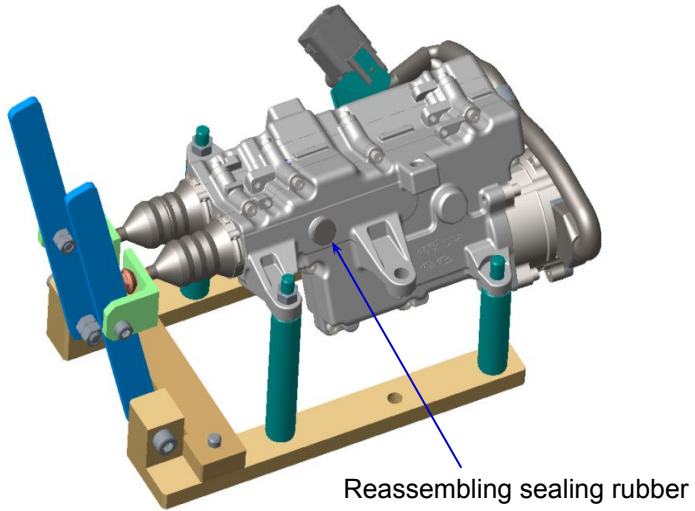


- ⑬ Check the output rod length of new actuator whose rewinding is completed (Measure the length, slightly pulling the lever to prevent the length from being reduced by the sealing boot).
- Check that the measured output rod length (B1, B2) is identical to the output rod length (L1, L2) of previous clutch actuator.

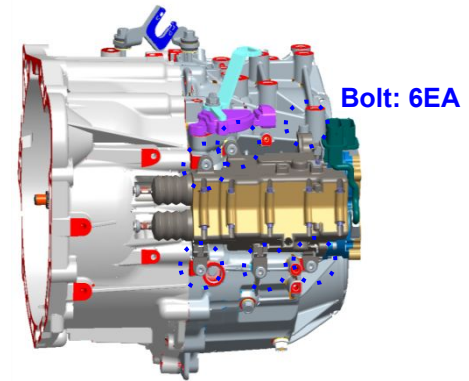


How to rewind the wear compensator (**Without reassembling actuator motor**)?

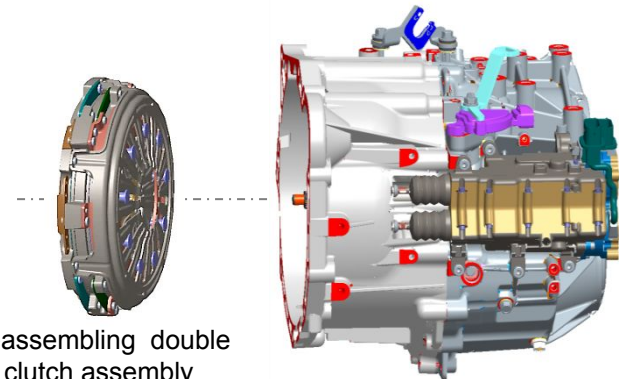
- ⑭ Reassemble the sealing rubber and then remove the new clutch actuator from the base jig.



- ⑮ Install the new clutch actuator to DCT and then reassemble the double clutch.
- Rewinding wear compensator is completed
 - Reinstall the DCT to a vehicle and then carry out the manual DCT learning using G-Scan or GDS-Mobile



Installing new clutch actuator



Additional instruction

■ Calculation of the number of turns for wear compensator tool

- Calculating formula for the number of turns and rotating direction (+/-)
: (Length after adjustment - Length before adjustment)/Length change per 1 revolution

[When rewinding wear compensator]

= (Rod length of removed clutch actuator **L** - Rod length **B** of new clutch actuator)/0.25mm

- ※ Rotate tool counterclockwise to increase (+) the rod length.
Rotate tool clockwise to shorten (-) the rod length.

[Rewinding case of output rod length]

- 1) Actually measured output rod length (L1, L2) of removed clutch actuator
Rod length for odd gear L1 = 70.0
Rod length for even gear L2 = 68.0
- 2) Actually measured output rod length (B1, B2) of new clutch actuator
B1 = B2 = 73.0 mm (Medium 7-speed DCT)
- 3) It is necessary to rewind the output rod length of new clutch actuator because the rod length (B1, B2) is different to the rod length (L1, L2).
 - L1 (70.0) ≠ B1 (73.0)
 - L2 (68.0) ≠ B2 (73.0)
- 4) The number of turns for wear compensator tool
 $(L1-B1)/0.25=(70.0-73.0)/0.25 = -3.0/0.25= -12$ revolutions
 $(L2-B2)/0.25=(68.0-73.0)/0.25 = -5.0/0.25= -20$ revolutions

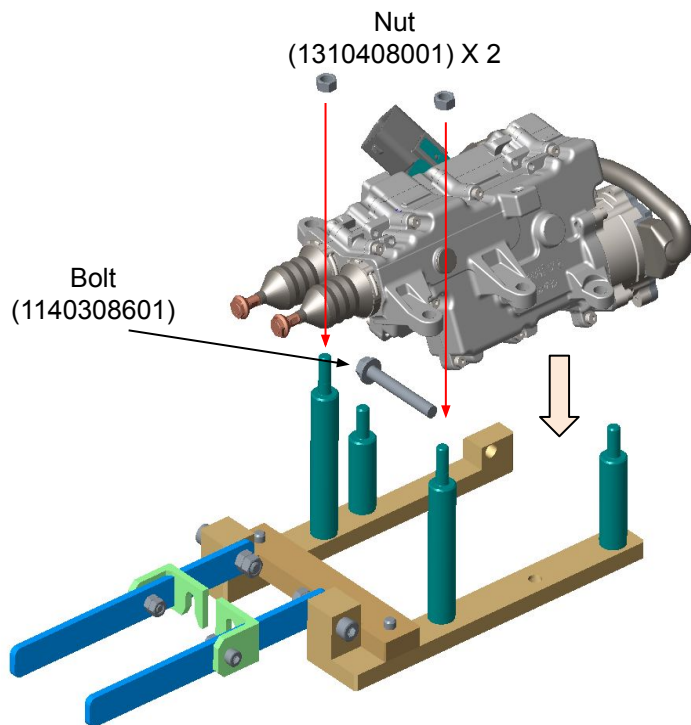
**Servicing method for
wear compensator of clutch actuator
when it reaches operating limit**

How to service the wear compensator of clutch actuator when it reaches operating limit?

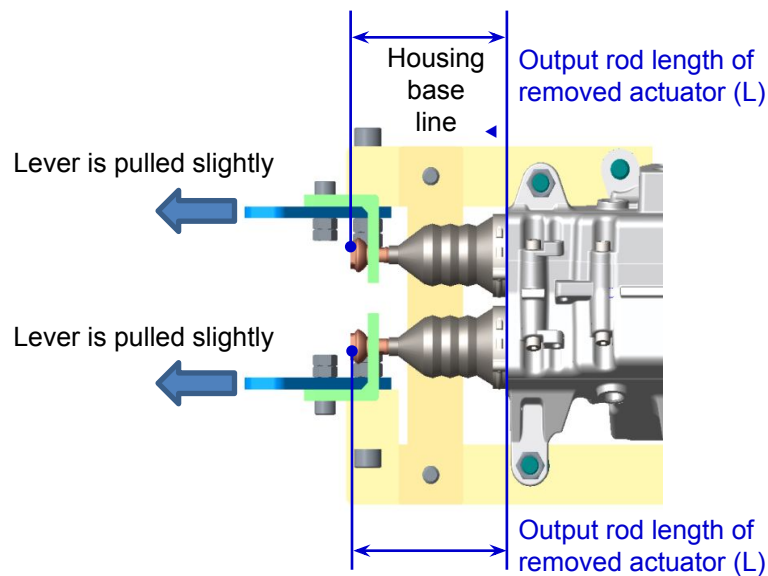
- ① Install the clutch actuator removed from DCT on the jig.
- Seat the 4 actuator holes on the jig and then tighten the 2 nuts and provisionally assemble 1 bolt.

CAUTION

No removal of actuator motor is required.



- ② Check the output rod length of clutch actuator removed from DCT (Measure the length, slightly pulling the lever to prevent the length from being reduced by the sealing boot).
- If the measured output rod length (L) is below the operating limit (E), replace the double clutch assembly, clutch actuator and engagement bearing at the same time.



DCT type	Medium 7-speed DCT (D7UF1)	Small 7-speed DCT (D7GF1)	HEV 6-speed DCT (D6KF1)
Operating limit (E) [mm]	Below 46	Below 43	Below 57