SHIFTING TECHNOLOGY

ULTRA SHIFTER

Installation instructions

10023 Z4

BMW Z4 E85 / E86
6-speed transmission

BMW Z4

E85 / E86

WWW.CAE-RACING.DE

SAFETY FIRST!

- Raise the vehicle safely with a vehicle lift for installation. Improper lifting can cause damage to the vehicle and/or personal injury or even death!
- Please only do the installation if you have appropriate experience in the automotive sector and have the right tools! An incorrectly installed Shifter can seriously damage the transmission or make the vehicle undriveable or not shiftable and lead to serious accidents!
- If work on the electrical system is necessary, please follow the manufacturer's specifications.
- Carry out all work with care and cleanliness! For the professional assembly of a shifter is no force required. All parts are designed to fit your vehicle.
- If you are unsure, please contact your trusted workshop about the installation!

BASICALLY

- Use ethyl alcohol/brake cleaner to clean all aluminum parts.
- Occasionally lubricate all moving parts with spray grease, which has good creeping properties. Our recommendation: Würth HHS 2000 (WD-40 or similar is unsuitable because it is too thin)
- All screws and nuts that are not self-locking or are fitted with tooth lock washers glue in during assembly!

ⓘ SURFACES AND THEIR CARE

Please note that an untreated aluminum surface (ALU) is sensitive to aggressive Liquids to which i.a. Hand sweat also counts. Especially the high-strength 7075 aluminum we use has a tendency to form black spots of corrosion due to its high copper content. Under special circumstances, very salty air near the sea and coast can lead to corrosion. The surfaces should therefore be cleaned regularly and treated with care to prevent this. For this purpose, e.g. ethyl alcohol or brake cleaner. Only spray these onto a cloth and wipe the shifter with it, NEVER spray the shifter directly. If stains have already formed, they can be removed with commercially available aluminum polish, but that is also not allowed get into the movable parts of the shifter. The anodized versions of our shifters (EXS, EXGR) are more resistant to corrosion. The steel parts have to be also cared in all variants.

TIPS FOR GEAR SHIFTING

ⓘ FORCE DOESN'T MAKES YOU FASTER – IT ONLY HARMS THE TRANSMISSION

The question arises again and again: "Does a CAE shifter puts more strain on a gearbox than a standard gear lever?" The answer is clear: “No!” The things that are most stressful for a synchronizer ring in a transmission are excessive shifting forces or a wrong shift in gear. Basically, the shift travel with a CAE Shifter is significantly shorter than with the standard lever. We achieve 30 - 55 % reduction depending on the vehicle and transmission type. This can only be achieved by using the appropriate gear ratio on the shift lever. You can feel it through the precision of a CAE shifter engaging the gears is much better than with a standard gear lever designed for comfort. The force for this decreases in the same proportion - we put in the gears with significantly less load for the synchronizer rings. In addition, with a correctly adjusted CAE shifter put in the gears is very precise and shifting into the wrong gear is extremely rare. Even in motorsport, fast, precise, but still sensitive shifting leads to the goal! Everything else is pure tugging and tearing which puts a disproportionately high strain on a transmission and in the worst case causes a fatal wrong shift in gear!

THE ROTATABLE GEAR LEVER LOWER PART

ⓘ THAT SHOULD NEVER BE DISMANTLED!

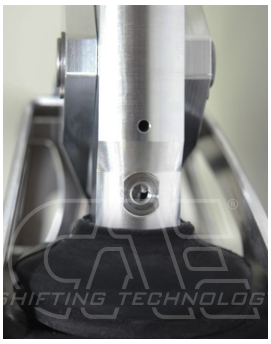
- The fixing screw engages in the groove of the lower part of the gearshift lever and fixes it axially - and it may never be tightened! The lower part of the shift lever must remain rotatable.
- **Familiarize yourself with this principle before installing the shifter!** Memorize the insertion depth of the lower part, where the fixing screw engages in the groove. The lower part of the gearshift lever must be able to turn without resistance in the gearshift lever! This is a condition for proper function.
- The basic setting for the fixing screw: screw in **carefully** until the pin tip touches the bottom of the groove. Then turn back ¼ turn. Now hold the grub screw with a 2.5 mm allen key and tighten the nut (this is the default). Make sure that the grub screw is secured with the supplied wire after assembly!
- **Regularly spray penetrating oil into the Ø 2.5 mm lubrication hole above the fixing screw! This is absolutely necessary for perfect function! Pay attention to cleanliness!**
- We recommend Würth HHS 2000 for lubrication.

DIRT, GRINDING DUST OR A LACK OF LUBRICATION IN THIS BEARING LEAD TO FAILURE OF THE SHIFTER WITHIN A VERY SHORT TIME!

THE FOLLOWING PHOTOS ILLUSTRATE THE PRINCIPLE OF THE ROTATABLE SWITCHING LEVER BASE AND SERVE ONLY FOR EXPLANATION!







ⓘ NEVER UNSCREW THIS SCREW COMPLETELY!

By loosening (max. 2 turns) the screw on the Spring stop, the zero position of the gearbox can be determined. Please **never** completely loosen this screw as you will never get the mechanism together under the car again, only with the total loss of nerve costume!

The allen key which is provided in the shifter package is used for loosen the screw.

Note on the switch rod

- The CAE shifter for the Z4 is delivered without CAE shift rod, because the installation of the shifter is also possible with the standard shift rod (nominal length 316mm)

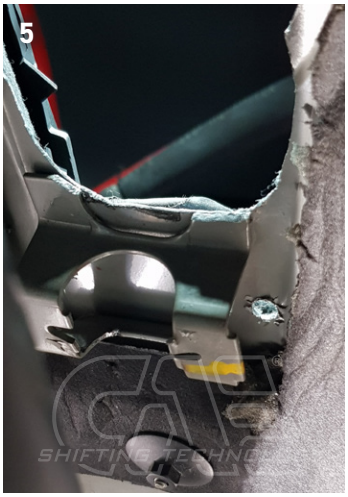
- We recommend our shift rod "XL" which is suitable for installation at the original position. (285-330mm)
- For the positioning of the shifter further back we recommend our shift rod "XXL" (325-385mm)

ⓘ **PLEASE NOTE: The cutting of the tunnel is necessary if the shifter is positioned at the rear!**

ⓘ The shifter is designed to be used with the original center console. This must be cut out so far (picture 1), until an appropriate clearance for the shifter is achieved. The extent of the machining is directly dependent on the installation position of the shifter.

Preliminary information for installation :

- For the installation of the shifter at the series position, only 4 holes must be drilled for the mounting of the shifter. If the shifter is placed further back, the center tunnel must be machined according to the photos. (Picture 2, 3)
- In addition, the rear bracket of the shifter bridge may be omitted in the center tunnel. (Picture 4, 5)
- In jedem Fall darauf achten, dass im zusammengebauten Zustand alle beweglichen Teile des Shifters in allen Endlagen (F/R & R/L) genügend Freiraum haben.



The removal

- Lift the vehicle safely on a vehicle lift. Shift the transmission to neutral.

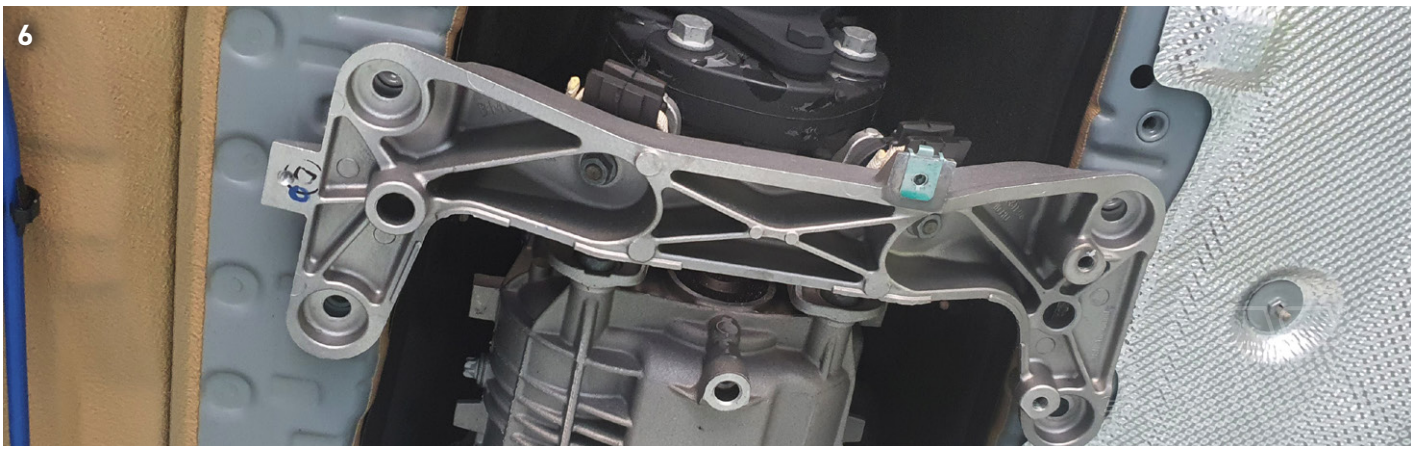
- Remove the inner part of the center console, at least the gearshift bag, its frame and ashtray, to gain access to the gearshift lever and the tunnel plate.

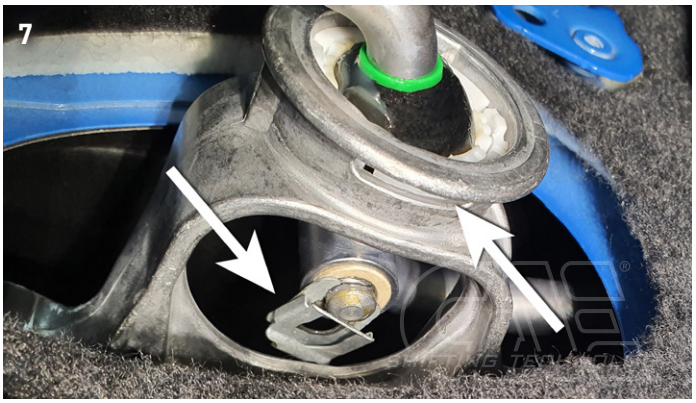
Arbeiten unter dem Auto

- If the shifter is installed with the stock shift rod, only the original shift lever and shift lever bearing must be removed, the shift rod remains in the car.

- Remove the underbody panel. Loosen the transmission bridge and slightly unhook the engine, this does not need to be supported, nevertheless work carefully. (Picture 6) Loosen the front heat protection plate and push it backwards over the exhaust until access to the gearshift is given.
  The propshaft does not have to be loosened!

- Completely remove the original gearshift incl. gearshift lever bearing. First remove the rear bolt of the gearshift rod from the gearshift lever by pulling the safety clip off the bolt (Picture 7, 8).





- To pull the shift lever out of the bearing, use a screwdriver to press in the tabs of the plastic ball the openings and push in the tabs of the plastic ball mount. (Picture 9) Remove the shift lever by pulling it upwards.

- The aluminum shift lever bearing (Picture 10, 11) is secured on the gearbox side with two bolt clamps which are clipped onto the gearbox housing. Press up the clips with a long screwdriver and pull out the bolts from the side.

- Then unscrew the rear body mount (Fig. 11) and thread the shift lever bearing down out of the tunnel. To do this, twist and turn the part accordingly to get it past the propshaft (it really fits!).

- Loosen the spring stop under the gearshift bracket until the spring is ineffective.

- Place the shifter with the cover plate (without bellows) on the center tunnel and temporarily insert the shift rod into the eye of the lower part of the shift lever. (standard rod)

- Now, with the shifter in place, first tighten the spring stop again.

- Align shift lever centrally in the sheet metal collar, shift lever is vertical.

- Mark and drill fixing holes Ø 6.5mm.

The following steps are only required if the CAE shift rod is installed:

- Completely remove the original shift rod. To do this, press the retaining clips off the 10 mm bolts of the shift rod and remove the shift rod from the side (Picture 12 - 16).

- Then press off the retaining ring from the transmission connecting piece and then press the 6 mm bolt out of the transmission connection. Due to the tightness above the transmission in the center tunnel, patience is required here!

The foam insert, dowel pin and circlip from the original adapter are still used! (Picture17) and are converted into the CAE adapter.

THE ADJUSTABLE CAE SHIFT ROD

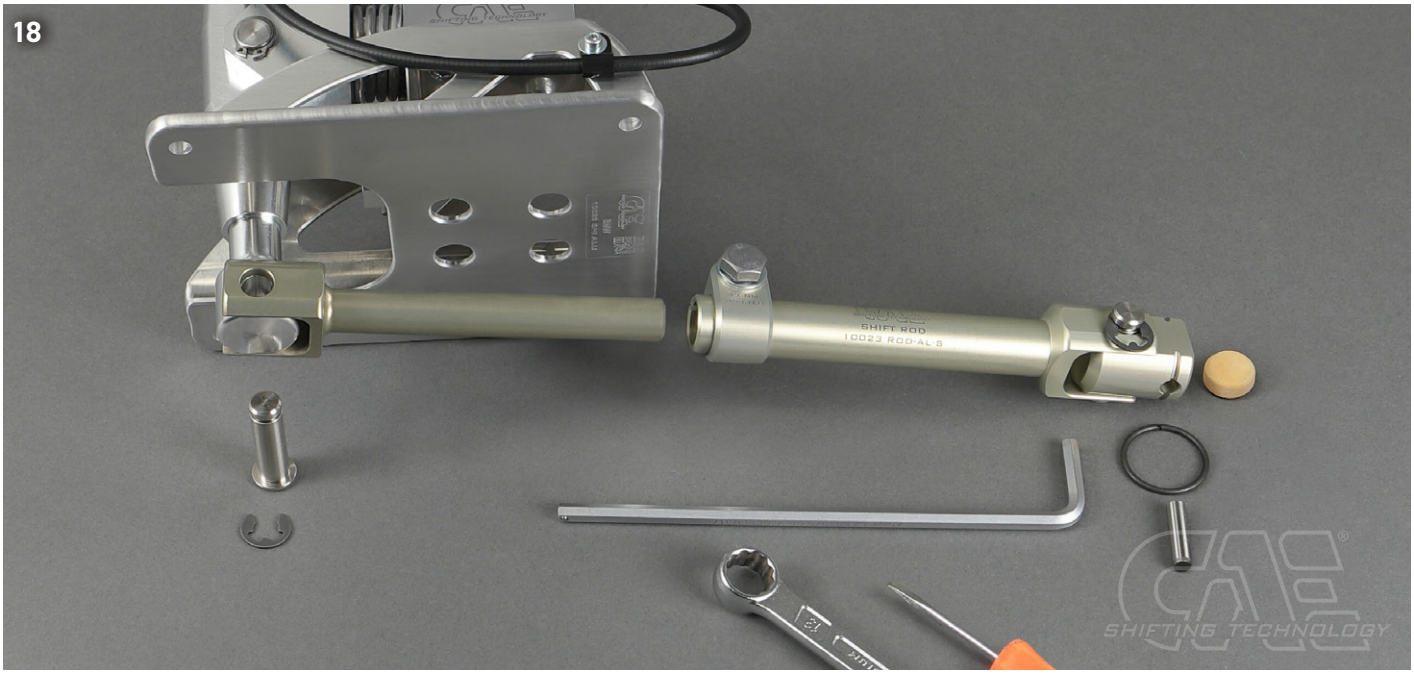
ⓘ CAE shift rod

- Never use force to assemble our shift rods.
- Please carry out all work with extreme care and cleanliness!
- Never spray the moving connections/joints directly with brake cleaner or similar degreaser. This removes the grease layer in the joints and leads directly to seizure of the components.
- For cleaning and maintenance, use only a soft cloth and some thin spray oil, such as Würth Multi or WD-40.
- The CAE Rods are designed to fit our shifters, they are designed 100% backlash-free and all dimensions are designed as a fit. This makes it difficult to turn the adapter as well as the lower part of the shifter by hand when mounted. The 10 mm fitting bolts are firmly seated in each case in the fork and the adapter and the shift lever base rotate only on the bolts.
- During assembly, absolute cleanliness must be ensured! Dirt in the bearing points leads directly to seizure of the components.
- For proper function and long service life, the hinge pins and the contact surfaces must be well greased. This should be repeated once a year.

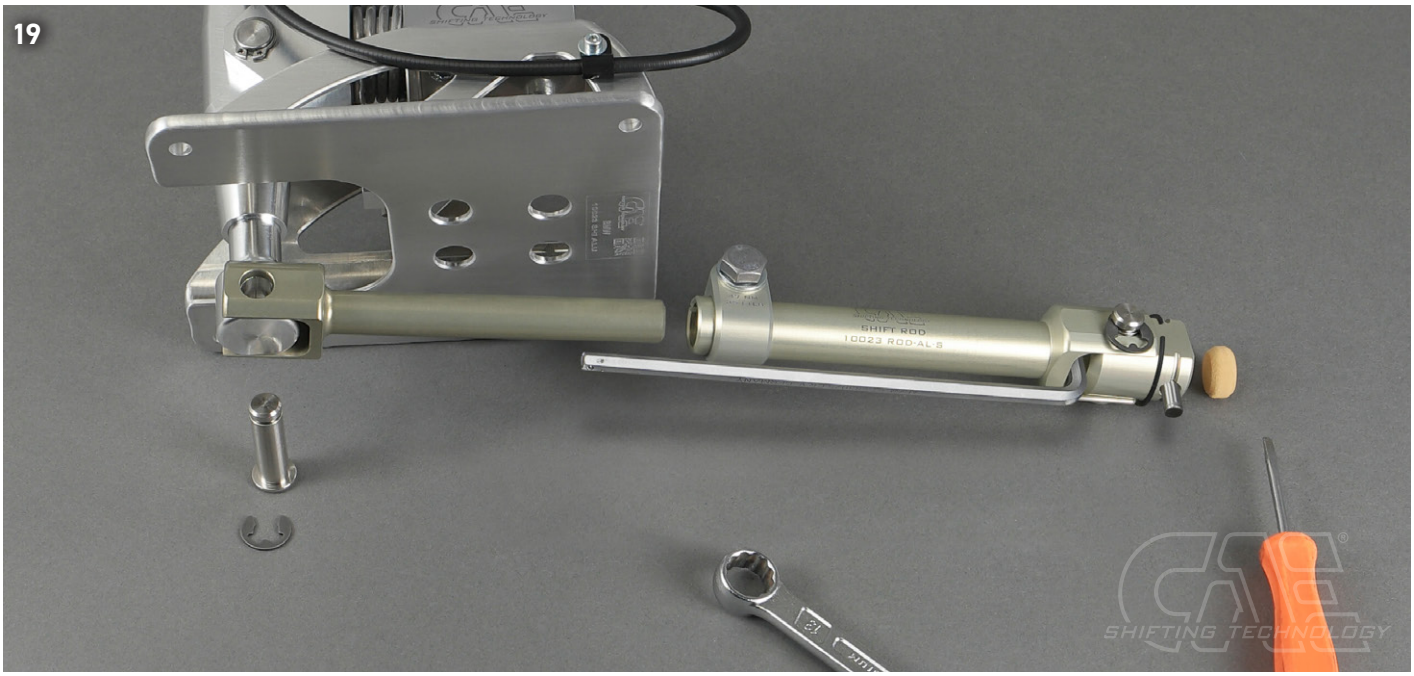
ⓘ **CAUTION:** D-40 or multi-oil are unsuitable for lubricating the ROD joints and the shifter!
We recommend Würth HHS 2000 for this purpose.

- Please carry out all work on the fitting surfaces/bores with extreme care!
The clamping connection of the length adjustment must be kept absolutely dry and free of grease!

18


SHIFT ROD
10023 ROD-AL-S
SHIFTING TECHNOLOGY

19


SHIFT ROD
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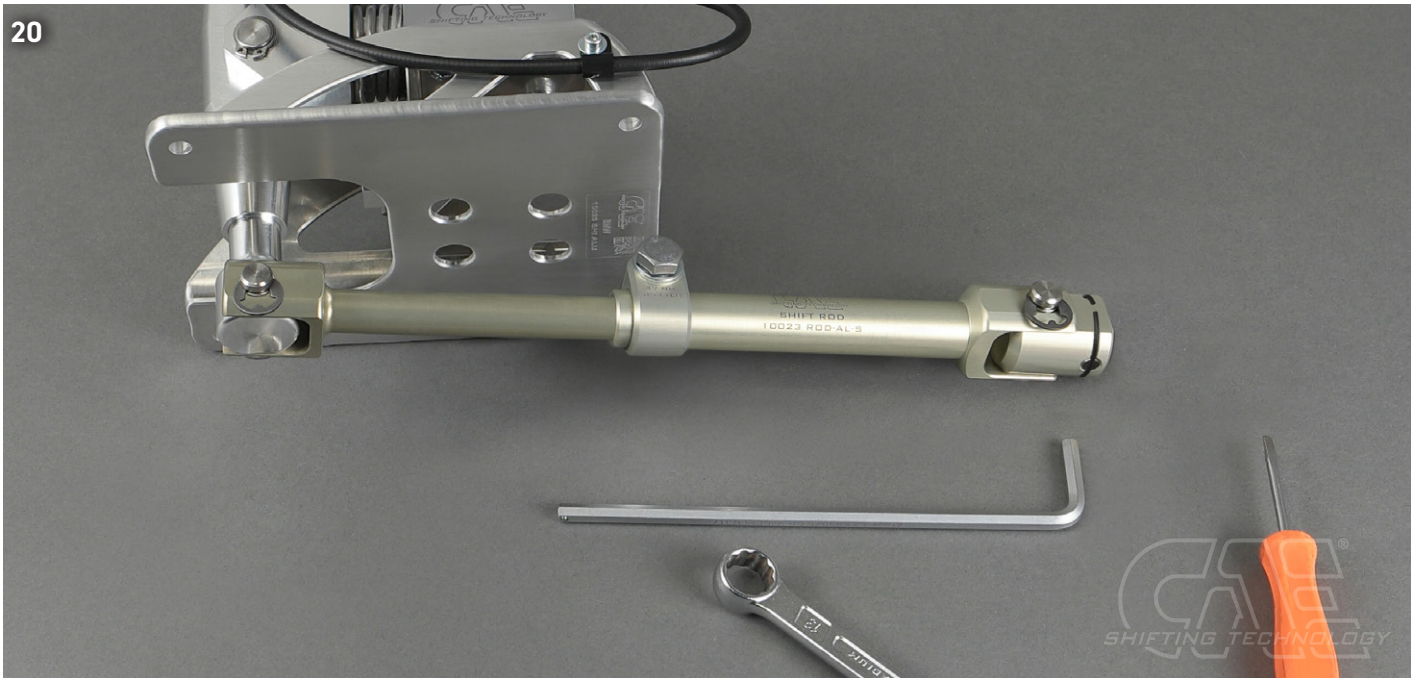

SHIFT ROD
10023 ROD-AL-S
SHIFTING TECHNOLOGY

- Disassemble the CAE shift rod into its 2 halves (Picture 18, 19 on page 5), using an SW 13 mm to loosen the clamping screw.

- Slide the original circlip over the groove into the "parking position" of the adapter so that it can be pushed back into the groove when installed. Also take the foam insert from the original adapter and grease everything well. The foam insert serves as a grease reservoir and creates counterpressure so that the bolt does not vibrate (Picture 15, 16, 17 on page 3).

- Slide the shaft lock ring into the groove of the 10 mm bolt ▶**„Click!“**

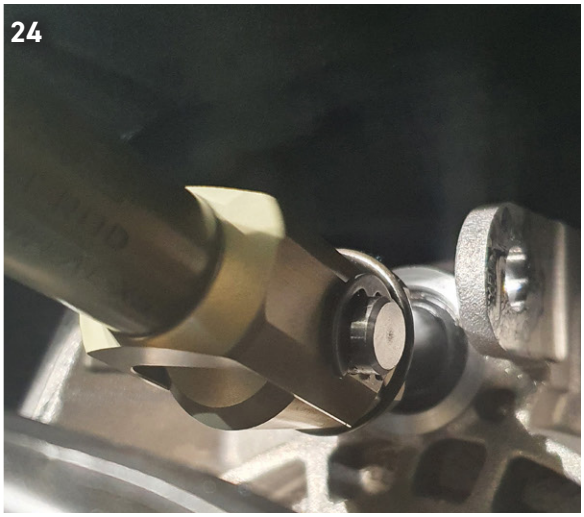
- Mount the shift rod half prepared in this way to the gearbox using the gearbox adapter.

ⓘ **We recommend inserting a 5 mm Allen key (as shown in Picture 19 on page 5) between the adapter and the fork to prevent the adapter from tilting and to be able to align the shift rod in the center tunnel and press in the dowel pin.**

ⓘ **CAUTION: The ear of the clamp points upwards! Otherwise it may touch the propshaft!**

- Place the shift rod half on the transmission shift shaft and align the adapter (Picture 21, 22, 23, 24). Press/knock in the 6 mm fitting bolt! It sits tightly in the adapter!

- Then push the retaining ring into the groove from the park position ▶**„Click!“**



- Mount the fork of the other half of the shift rod on the lower part of the shifter (Picture 25, 26).
  Grease the pin and fork well - our recommendation: Würth HHS 2000.

- Carefully tap the bolt into the fork with a plastic or aluminum hammer.
  Make sure that the hole in the lower part of the shift lever is aligned with the holes in the fork.

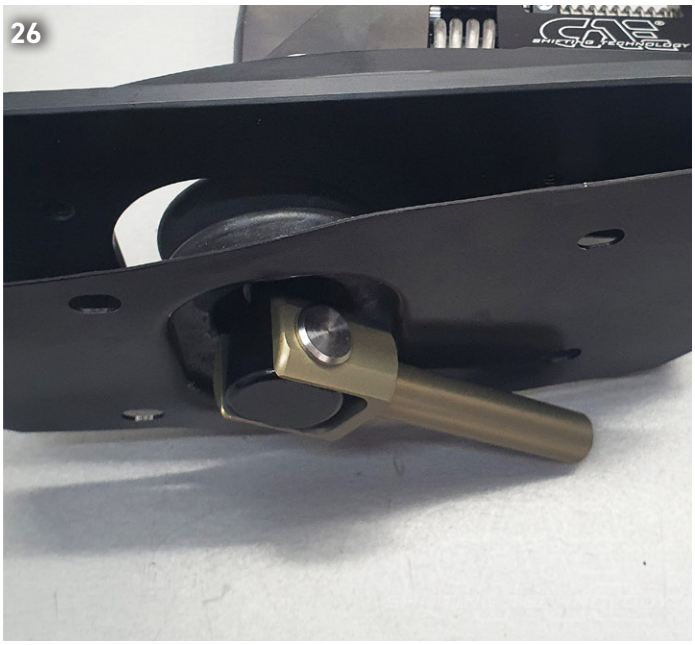
ⓘ **We recommend using a second plastic hammer or a plastic pad as a counter support!**
It is essential to work carefully! Do not damage the holes in the fork and the lower part of the shift lever!

- Push the shaft lock ring into the groove of the 10 mm bolt ▶**„Click!“**

- Later on, when installing the shifter, the shift rod halves (as shown in Picture 20 on page 5) are are brought together. This must be done absolutely **free of grease**, so that after tightening the clamp the set length of the shift rod the set length of the shift rod can no longer change!

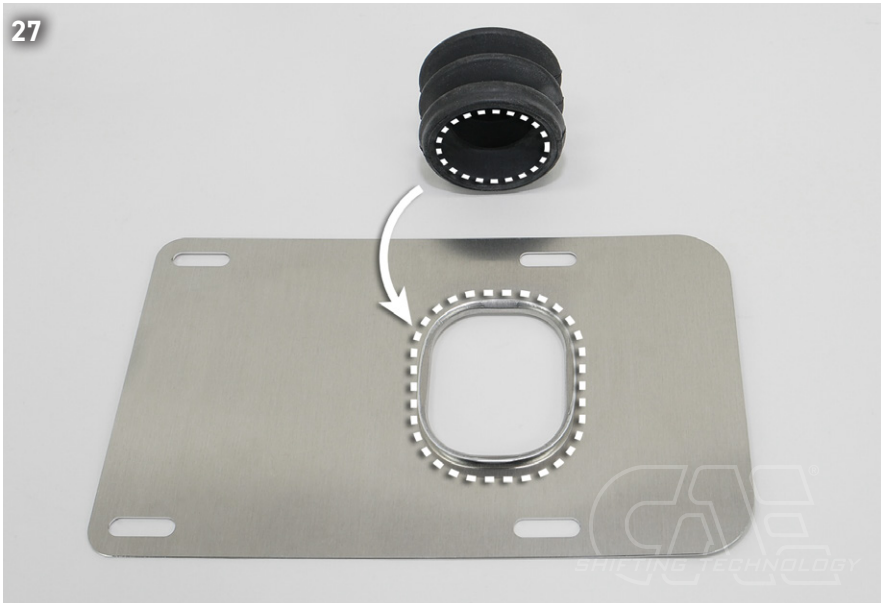
25

26



- Mount the rubber bellows on the cover plate (please degrease first!) (Picture. 27, 28, 29). Mount the plate incl. rubber bellows on the shifter (as shown in Fig. 25). The upper bead of the rubber bellows must fit into the circumferential groove on the shifter. If necessary, use a few drops of brake cleaner as a lubricant.

27



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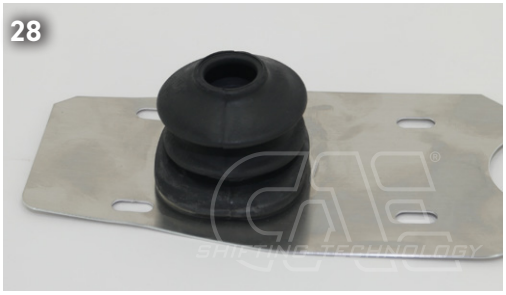


29

Installing the shifter

- Loosen the spring stop (Picture 30) under the switch bracket until the spring is ineffective.

ⓘ **Never unscrew the screw of the spring stop completely!**

- Place the shifter with cover plate and bellows on the center tunnel and temporarily insert the shift rod into the eye of the lower part of the shift lever.
(Series shift rod only)

ⓘ **CAE shift rod : Insert shift rod parts into each other**

- Now, with the shifter in place, first tighten the spring stop again.

- Align shift lever centrally in cover plate. (Picture 31, 32) Shift lever is straight or slightly tilted back. Align the shifter accordingly.

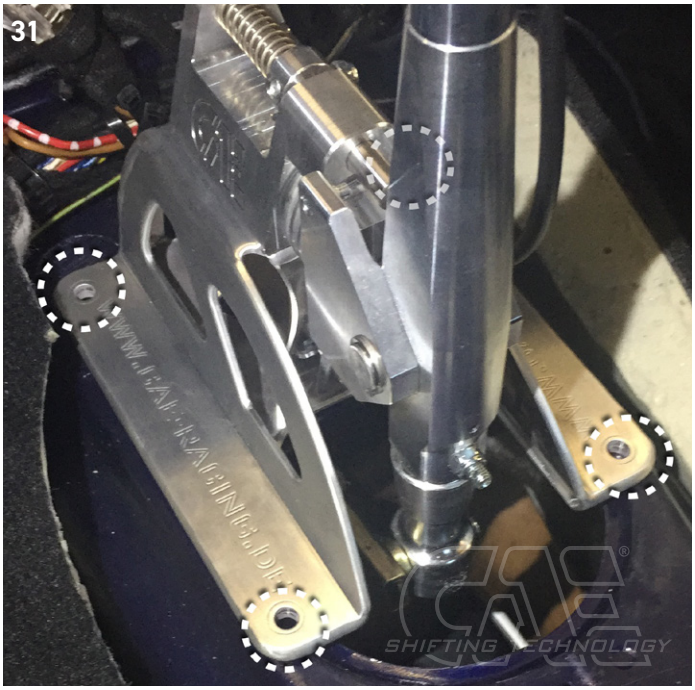
- Now mark the Ø 6.5 mm fastening holes.
Remove the shifter again and drill the holes.

- Before final assembly, apply foam rubber or body sealant under the cover plate of the shift unit (Picture 33) to ensure gas tightness.

- Finally mount the shifter with 4 screws and the sealing plate.

30

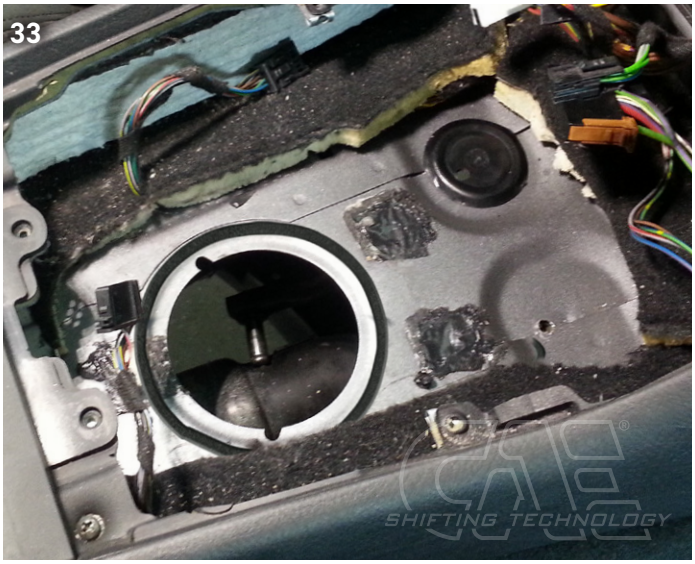
31



SAMPLE PICTURES:

32

33



Adjusting the shifting travel of the 6-speed transmission

- Align the shift rod to the shifter very precisely in length and angle and tighten the clamp screw to 47 Nm. Several attempts are probably necessary here to find the perfect position. (Not applicable for series shift rod)

- Execute a collision check on the lower part of the shifter/shifter rod in all gears! There must always be sufficient clearance between the components of the shifter and the propshaft!

- The lower part of the shift lever must be centered in the opening of the cover plate. (see also Picture 32) Please check from below!

- The center position spring in the shifter must be synchronized with the spring in the gearbox. To do this, shift the gearbox to gear level 3/4. This is the zero position of the transmission. To do this, simply move the shift lever forwards or backwards.

!

CHECK: With 3rd and 4th gear engaged, the lateral leeway on the shift lever must be the same. If this is not the case, the spring stop must be readjusted. (0.5 mm is already a lot here). This is the basic adjustment of the shifter and should be done very precisely.

The shift lever is thereby laterally straight or minimally tilted to the right!

The perfectly adjusted center position is a combination of shift rod and spring stop.

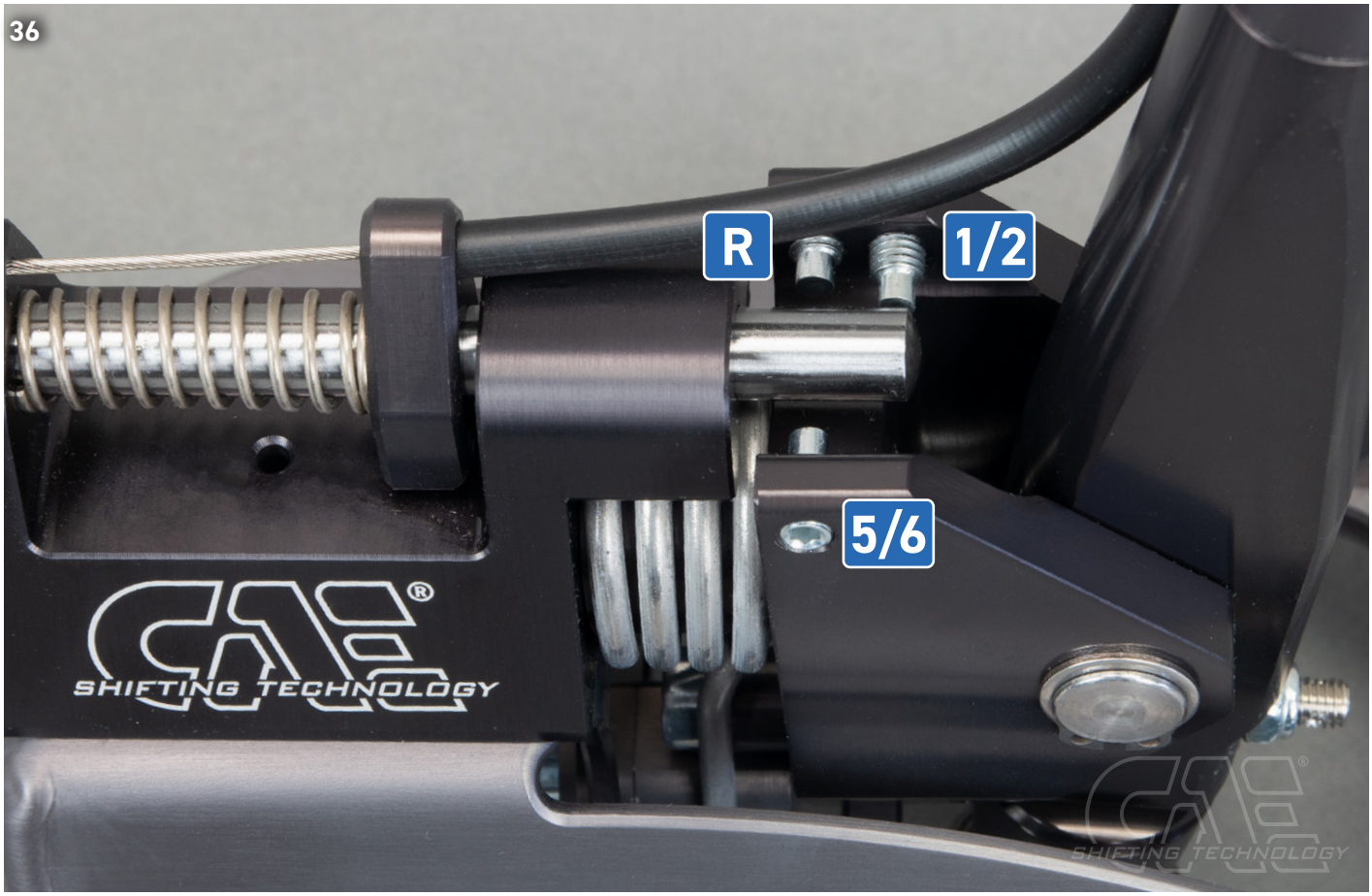
- Shift the gearbox to gear level 1/2 using the shift lever and screw in the stop screw, until 1st and 2nd gear can be shifted cleanly. (Picture 36)

- Now shift the gear unit to gear level 5/6 using the shift lever and screw in the stop screw until these gears can also be engaged cleanly. (Picture 36)

- Actuate reverse gear locking pin via pull and shift transmission into reverse gear. Screw in stop screw until reverse gear can be engaged. (Picture 36) Here, the spring pressure lock in the transmission must also be overcome.

ⓘ **PLEASE NOTE: For gears 1/2 and 5/6, the grub screw must not touch the locking bolt when the gear is engaged! Approx. 0.3 mm space is okay!**

36



FINALLY! Check all functions and settings during the test drive and readjust if necessary!

Incorrect or inaccurate settings can cause damage to the gear box and consequential damage!

CAE wishes you a good trip.

SHIFTING TECHNOLOGY

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