

# **FORMULA RENAULT 2.0**

**USER MANUAL**

**D. Transmission**



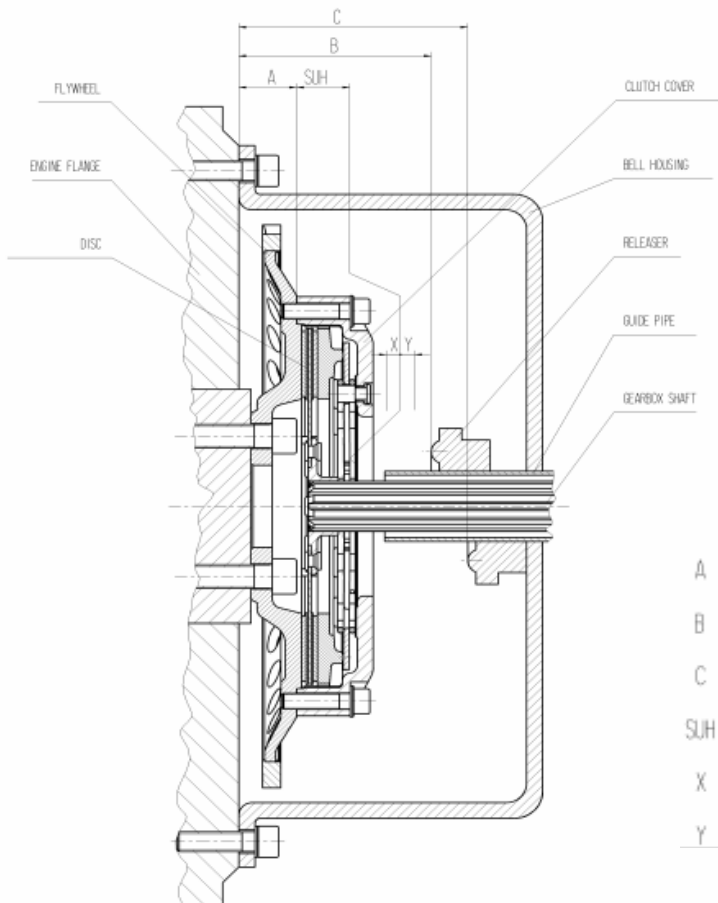
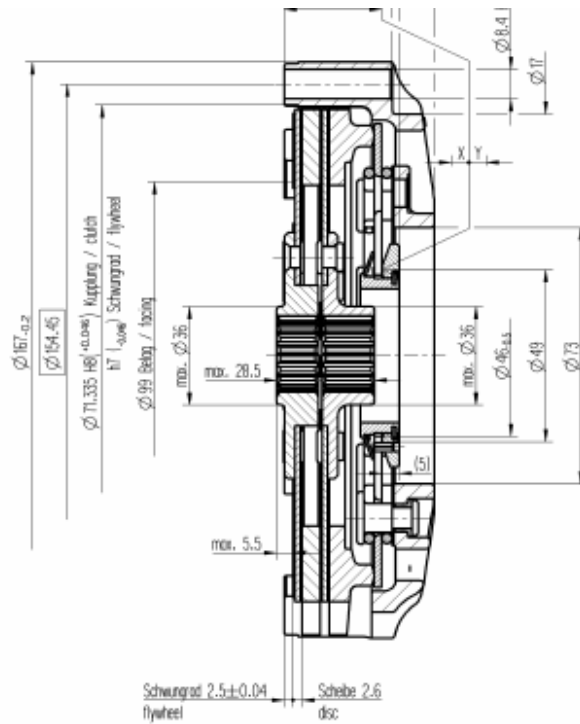
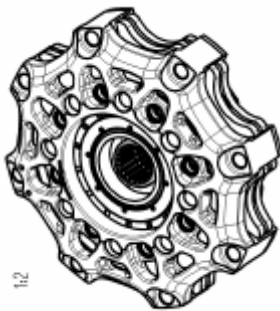
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# 1. CLUTCH

## 1.1. Description



- A = DISTANCE FROM ENGINE FLANGE TO FLYWHEEL BOLT SURFACE
- B = DISTANCE FROM ENGINE FLANGE TO POPPED-UP RELEASER POSITION
- C = DISTANCE FROM ENGINE FLANGE TO RETRACTED RELEASER POSITION
- SUH = SET UP HEIGHT
- X = RELEASE TRAVEL
- Y = WEAR TRAVEL

## 1.2. Tightening torques

	Tightening torque
Clutch screws	25 Nm

## 1.3. Installation and removal

### 1.3.1. Installation

- Lightly coat the hub splines with grease and move the clutch disc(s) on the central shaft forward and backward until the hub moves freely on the input shaft.
- Remove excessive grease.
- Important: Make sure that the clutch facings do not get in contact with grease.
- The splines of the gearbox input shaft must be engaged over the entire length of the hub.
- Observe the setting height to ensure a correct releaser position.

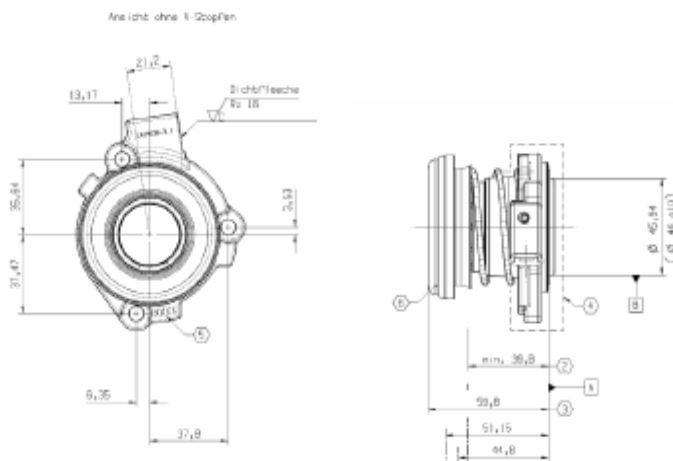
### 1.3.2. Removal

Remove the gearbox  
(see paragraph 3.2)

Remove the 8 attaching screws from  
mechanism.

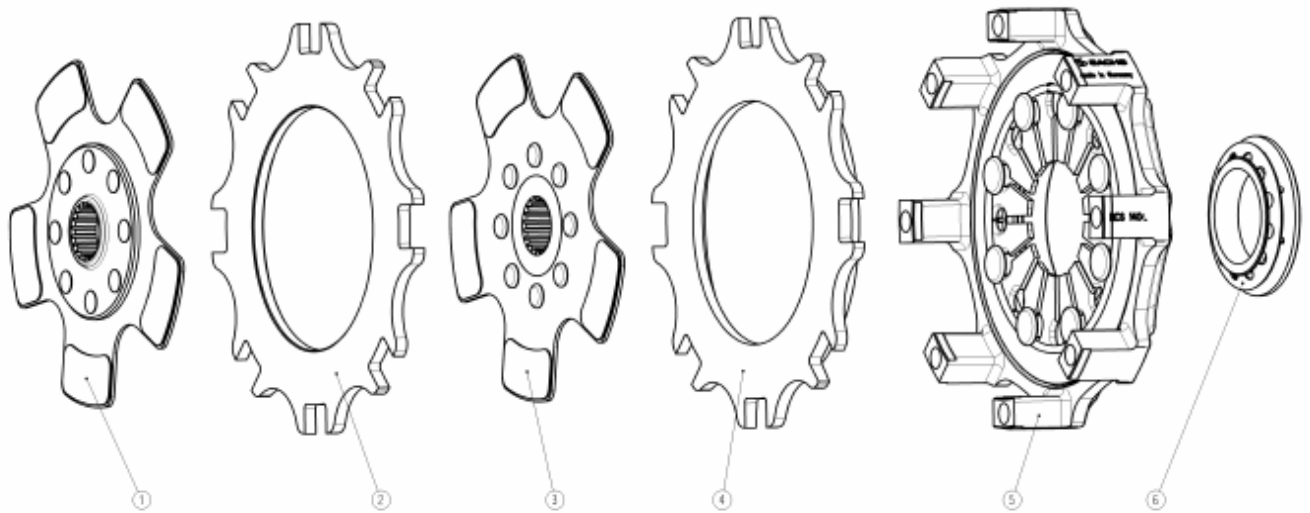


## 1.4. Releaser



## 1.5. Clutch assembly

Position	Description
1	Clutch disc assembly
2	Intermediate plate
3	Clutch disc assembly
4	Pressure plate
5	Cover assembly
6	Release ring assembly



## 1.6. Bedding in procedure

In order to bed in the clutch after you installed a new clutch or new clutch disks you have to handle the clutch carefully during the first laps and starts.

The time or the distance what we recommend to bed in the clutch should be between 80 km and 160 km. During the first engagement you have to release the clutch slowly at low RPM's. So you make sure that you don't overheat the clutch.

A good time to bed in the clutch might be during the practice sessions.

Problems that you can have, if you don't bed in the clutch properly:

- Too much wear on the disks in the beginning.
- Damage the clutch through too much heat.
- Shorten the life of the clutch.
- Losing performance of the diaphragm spring through getting too much heat into it.

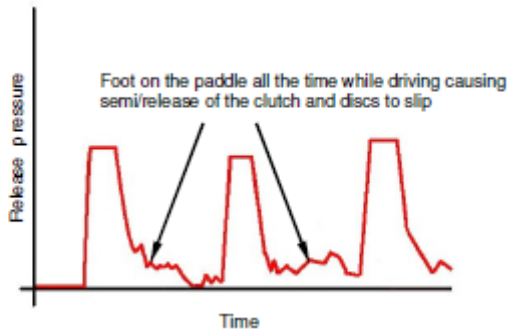
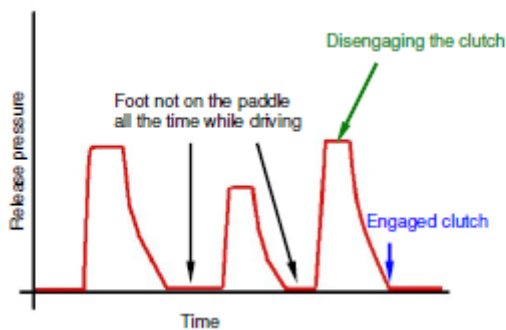
This is a result of not bedded in clutch after new installation of the unit.

Because of the disk can not transmit the whole torque in the beginning, the disk gets overheated and the clutch begins to slip causing the glaze on the surface.

=>Clutch has to be handled carefully in the beginning after new installation



### 1.7. Data sheet release pressure



### 1.8. Defects through high temperature in the clutch



These are hot spots, where the material is losing adhesion to the support plate as a result of too much heat.

This could happen:


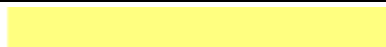









- If the driver has the foot on the clutch paddle all the time while driving.
- When the clutch slipping too long during engagement.
- Wrong releaser position.
- No bedding in procedure done.
- Torque of the engine is too high for that clutch.
- When facing material gets contaminated causing slip and overheating the clutch.

These are hot spots, on the pressure plate or the intermediate plate, as a result of too much heat buildup. For same reasons as on the disk side.



These colors on the pressure plates are an indication for extreme temperature build up in the clutch.

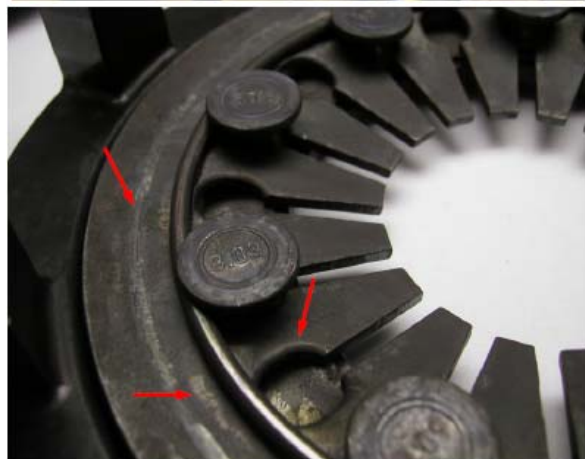


Annealing color	Temperature in °C	Description
	220	Light colored yellow
	230	Straw colored yellow
	240	Dark yellow
	250	Tawny
	260	Puce
	270	Crimson
	280	Purple
	290	Dark blue
	310	Light blue
	320	Gray colored blue
	330	Greenish gray

Defective cover through absorption of high temperature (the color of the spring as well as the rivets are in range of dark blue to light blue)



Defective cover through absorption of high temperature (the color of the spring is in range of purple to light blue = the high temperature is coming from the discs absorbed by the pressure plate than into the spring)



## 1.9. Minimum thickness of clutch discs

Clutch discs are subject to wear due to friction / abrasion. The following table shows the minimum thickness of the discs. As soon as these values are reached the disc(s) must be replaced.

Friction facing	discs	Thickness of the new driven plates	Thickness of the replace driven plates
sintered	2	0.10 "/2.6 mm	0.08"/2.0 mm

## 2. GEARBOX

### 2.1. Presentation and characteristics

The sequential gearbox of type SADEV SL80-13 FORMULA RENAULT 2.0 2010, is composed of 7 front gears and one reverse gear. Its weight is approximately 43 kg.

It is equipped with a self-locking differential with friction discs and pressing plates with ramps.

The gearbox of the Formula Renault 2.0 2010 offers a unique set of ratios, except for the 7<sup>th</sup> gear (2 ratios available).

- Ratios

	1st	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>	6 <sup>th</sup>	7 <sup>th</sup> STD	7 <sup>th</sup> Long
Primary shaft	12	12	14	16	16	26	24	21
Secondary shaft	32	24	23	22	19	28	24	20

- Reverse ratio

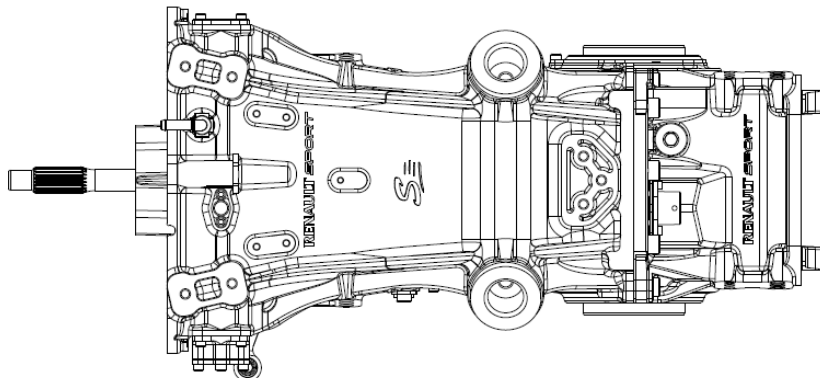
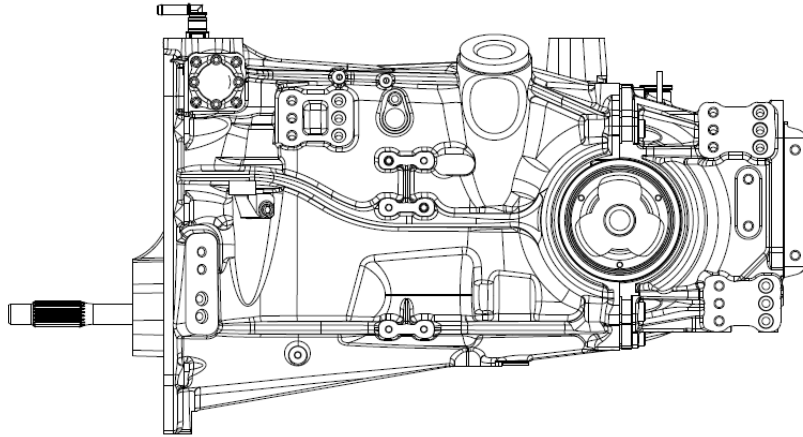
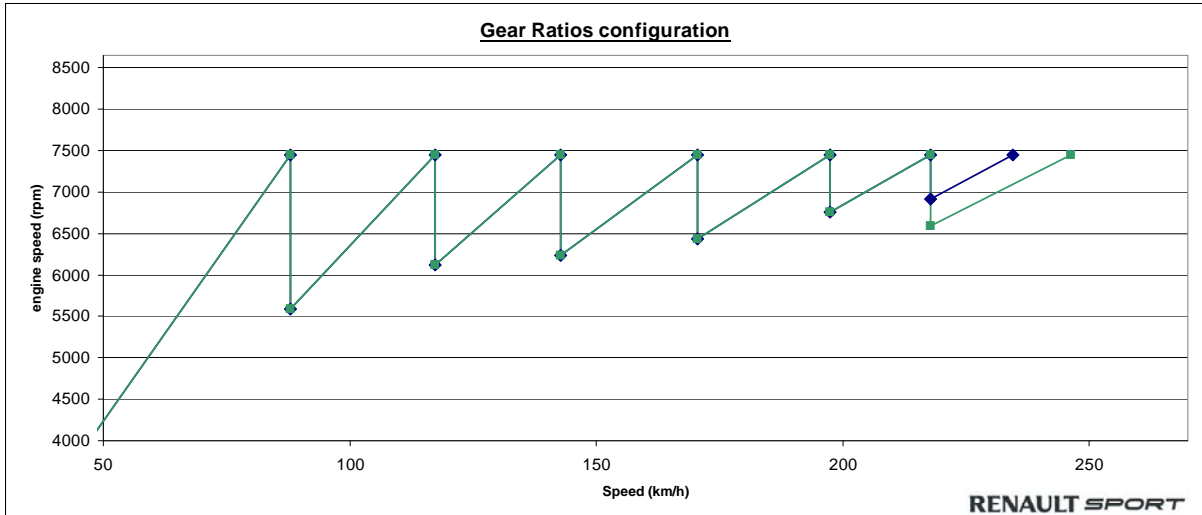
Reverse gear	
Primary shaft	12
Reverse gear	16
Secondary shaft	32

- Final drives

Final drives	
Secondary shaft	9
Crown wheel	30

- Gear ratio configurations

Gear	Ratio	Shift RPM	Speed	RPM	Rev Drop	Ratio
1st	12/32	7450	89.7			0.375
2 <sup>nd</sup>	12/24	7450	119.6	5588	1863	0.500
3rd	14/23	7450	145.7	6120	1330	0.609
4th	16/22	7450	174.0	6235	1215	0.727
5th	16/19	7450	201.5	6434	1016	0.842
6th	26/28	7450	222.2	6756	694	0.929
7th STD	24/24	7450	239.3	6918	532	1.000
7th Long	21/20	7450	251.3	6588	862	1.050



## 2.2. Differential technical data

The differential is self-locking with triple friction discs and pressing plates with ramps acting for driving or braking condition. A unique couple of ramps is available for the Formula Renault 2.0 2010.

Pressing plates	
Ramps	References
70/65° (acceleration/braking)	F1910321

The preload of the differential must be adjusted from 0.5 to 3 DaN.m maximum (at delivery SADEV set the differential to 2.5m.kg  $\pm$ 0.5). To reach the required preload, 3 different Belleville washers and 2 washer races are available.

Washer travelling	Part number
0,8mm	F1910313
1mm	F1910314

Washer race	Part number
4.2mm	F1910307-42
4.3mm	F1910307-43
4.4mm	F1910307-44

**Note :** Preload decreases from approximately 15% after a 60 kilometers running-in.

**Note :** The cold measured preload (workshop) is approximately 15% higher than that measured hot.

**Note:** The preload on the LSD is measured with a torque wrench: The gearbox is in neutral, one wheel is blocked and measurement taken on the other wheel.

## 2.3. Barrel position potentiometer

This information enables the computer to display the number of gear on the dashboard. It is really important to set it accurately because all the gearshift system depends directly on this sensor.



### Rotary potentiometer

The settings recorded in the car ECU must be verified for each gear position when a gearbox is refitted to the car. This will ensure that the dash display reads correctly for each gear selected.

Gear	Reverse	Neutral	1st	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>	6 <sup>th</sup>	7 <sup>th</sup>
Reading	0.386	0.910	1.470	1.990	2.540	3.080	3.630	4.180	4.720

## 2.4. Lubrication

Oil capacity : 1.5 L

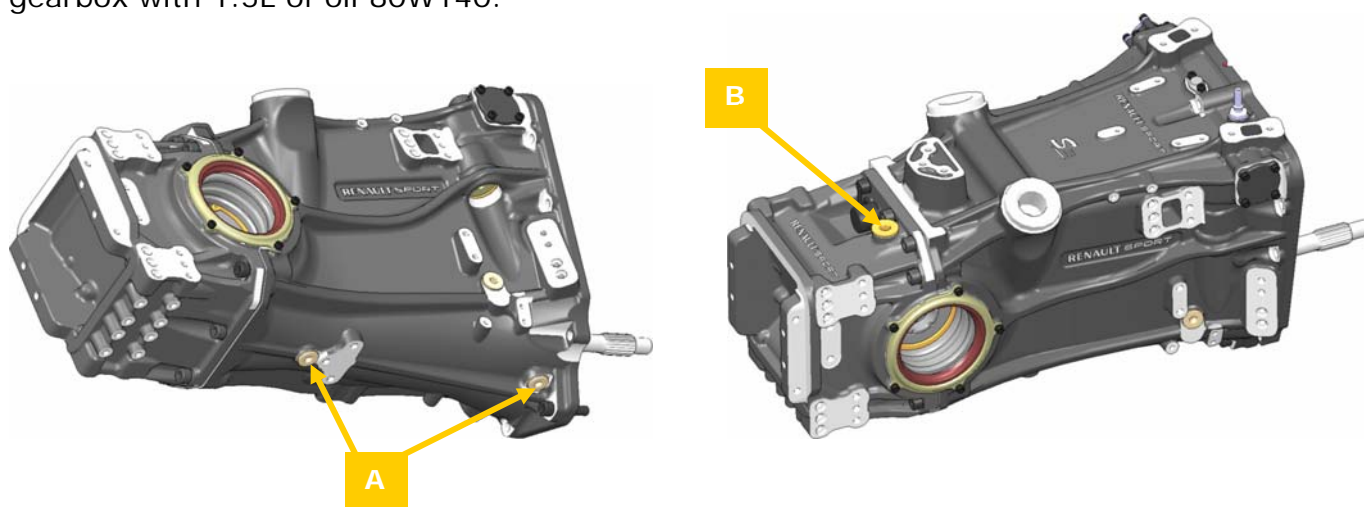
Supplier: ELF HTX 755

1 <sup>st</sup> drain	Drain frequency	Viscosity
After a 50 km running-in	Each meeting	80W140

### Oil drain and filling:

The drain can be done by removing the 2 plugs (A). Let the oil flow, and remove the metal accumulated on the plugs.

The oil filling can be made by removing the plug on the top surface (B). Fill the gearbox with 1.5L of oil 80W140.



### PARTICULAR PRECAUTIONS

It is not advised to use additives in the oil; the resulting consequences are not in any circumstances covered by SADEV.

The only oil allowed in the gearbox of the Formula Renault 2.0 2010 is: ELF HTX755.

### STORAGE AND USE

Be particularly careful with any bottles which are open when used:

- Close the bottle again properly after use to prevent the introduction of water or dirt.
- Store bottles horizontally, protected from severe weather.
- Do not store bottles close to a washing station.
- Do not decant the oil into larger containers.

### WASHING UNDER PRESSURE

When the gearbox is removed, seal all openings correctly to prevent the ingress of water into the gearbox

### 3. ASSEMBLY AND DISASSEMBLY


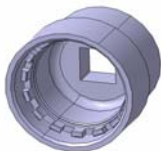
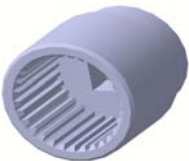

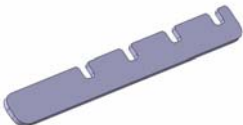

#### 3.1 Assembly information

##### 3.1.1. Glue component

Glue components and tightening torques are shown in the 3D exploded view (paragraph 4).

**WARNING:** Glue components have been chosen during tests sessions. Only 'Loctite' brand components must be used. Consequences of false glue component choice can't be ensured by Sadev.

##### 3.1.2. Specific tool

	Ref. SADEV	FOUT1910007	Anti-splay plate
	Ref. SADEV	FOUT1910110	Special tool for primary shaft nut
	Ref. SADEV	FOUT9003021	Special tool for secondary shaft nut
	Ref SADEV	FOUT1910100	Clutch centring shaft
	Ref SADEV	FOUT1910400	Fork positioning comb
	Ref SADEV	FOUT1910000	Gearbox mounting plate
	Ref SADEV	FOUT1910301	Preload adjustment tool assembly

### 3.1.3. Information about disassembly

Excepting the adjustment of preload of the differential which can be done directly on the car, all the other rebuild procedures need the gearbox to be in Neutral, drained (see *paragraph 2.4.*), disassembled from the car and of the oil catch tank, gearshift actuator, its powerbox and the slave cylinder must be removed.

## 3.2. Removal of the gearbox

- remove diffuser
- remove the exhaust intermediate line and the silencer
- remove the external battery cable from the starter



- remove inferior diffuser supports
- remove the starter rear strap from the gearbox but not from the starter, then remove the starter.

Not to  
unscrew



- unplug the power box, and disconnect the power box ground

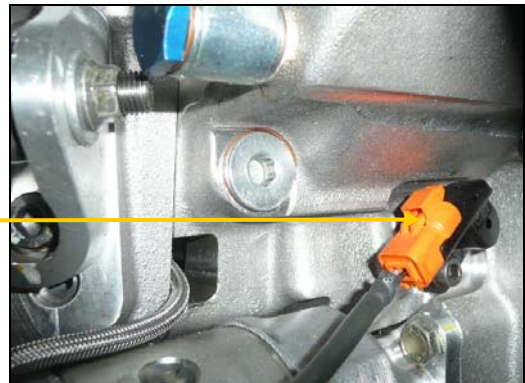




- remove the 7 screws and the nut : one nut above, one screw below, 3 screws on the left side and 3 screws on the right side.



1



- disconnect RPM sensor (1), push rod, gearbox potentiometers (2), gearbox breather (3)
- disconnect the rain light.

2



3



### 3.3. Assembly of ratios

#### 3.3.1. Removing/Installing the input shaft (optional)

The input shaft can be removed with an inertia extractor screwed inside the M8 thread of the front face of the shaft.

Clean, degrease and check the state of the shaft (splines, contact surface with crankshaft bearing), change if damaged.

Change the circular wire circlips.

Put some copper assembly paste on the splines, fit the input shaft inside the primary shaft with a mallet until the circlips is in place.

#### 3.3.2. Removing the gears

Remove the front closing plate of the gearbox (1) (9 bolts M8) and install the anti-splay plate (FOUT1910007).

Remove the fork shaft, and swing the forks to release their pins from the tracks of the barrel, engage manually (without removing dog rings) 1<sup>st</sup> gear, then 2<sup>nd</sup> gear.

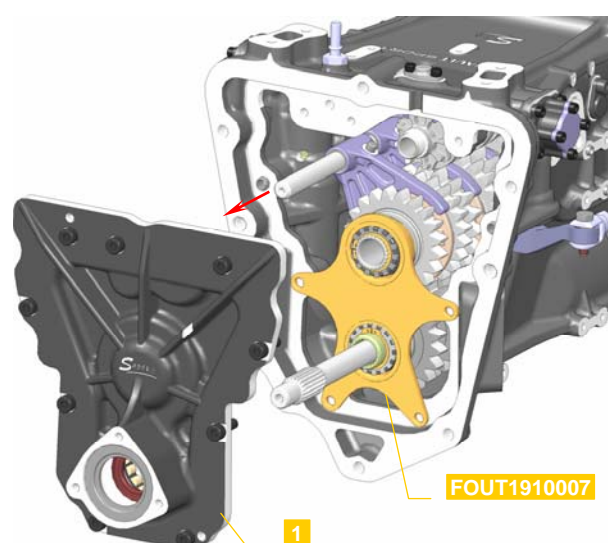
Remove the circlips and the nut locking washers of the primary and secondary shafts and unscrew the nuts:

- using the tool FOUT1910110 for the nut of the primary shaft
- using the tool FOUT9003021 for the nut of the secondary shaft
- 

Remove the anti-splay plate, and then remove the gears noting the installation direction for each one and all the parts mounted on the shafts. Degrease and check the state of the parts, and change them if they are damaged or having a significant wear.

***NOTE :*** Take care to note the direction and the order of installation of each part. Do not invert the gears so as to ensure their initial rotation direction and to prevent from risks of breaking teeth.

***NOTE :*** There is no need to disassemble all the ratios in order to shift from the "standard" 7<sup>th</sup> ratio configuration (24x24) to the "long" 7<sup>th</sup> ratio configuration (21/20): the 7<sup>th</sup> gear is the first accessible when the gearbox is opened.



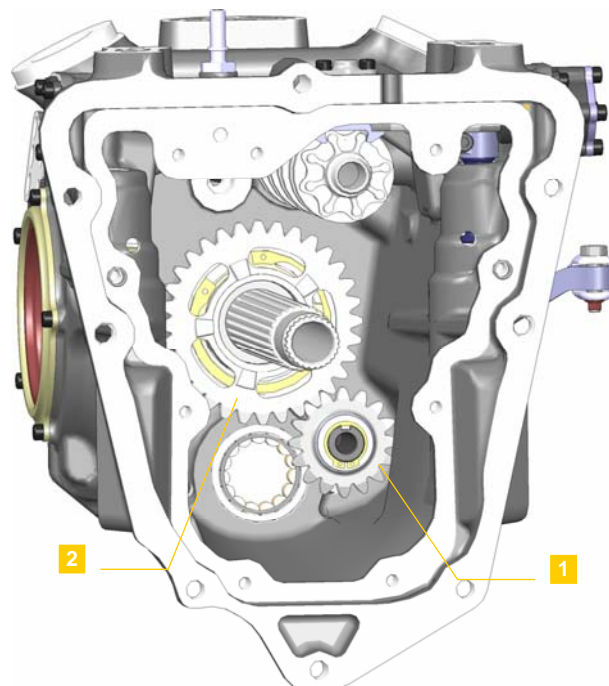
### 3.3.3. Disassembly/assembly of gear (optional)

#### Reverse transfer pinion (1):

- Forward gears must be removed.
- Remove the circlips, the ergot spacer and the reverse transfer pinion.
- Degrease the parts, check their states and replace them in case of damage or excessive wear or play.
- To change the roller needle bearing: press remove it. Clean and degrease the internal diameter of the transfer pinion and the external diameter of the new roller needle bearing.
- Put some Loctite603 on the external diameter of the bearing, and press fit it inside the transfer pinion, taking care not to damage it.
- Lubricate the bearing with gearbox oil and refit the parts and the circlips on the reverse axle.

#### Reverse gear wheel (2):

- Put a tong through the pockets of the wheels and remove the circlips. The reverse gear wheel and its anti-rotation fork can be removed.
- Degrease the parts, check their state and replace them if necessary.
- Install the roller needle bearing of the reverse gear wheel on the secondary shaft (if it has been removed).
- Reinstall the anti-rotation fork in the groove of the reverse gear wheel, and hold the circlips between them. Push the anti-rotation fork inside the pocket made in the housing and release the circlips inside the groove made in the housing.



### 3.3.4. Assembly of the gears

- Reinstall the gears respecting the direction of rotation and the order noted during the disassembly.
- Lubricate the roller needle bearings with gearbox oil.
- Engage manually (with dog ring) 1<sup>st</sup> gear, then 2<sup>nd</sup> gear.
- Install the anti-splay plate (FOUT1910007).
- Put some copper assembly paste on the threads of the nuts and tighten them at 18DaN.m.
  - using the tool FOUT1910110 for the nut of the primary shaft
  - using the tool FOUT9003021 for the nut of the secondary shaft
- Refit the nut locking washers and their circlips. (Screwing a little more the nuts may be necessary in order to assemble the washers well).
- With the fork positioning comb FOUT1910400, install the forks by putting their pins inside the tracks of the barrel.
- Lubricate the fork axle with and, pass through the forks and place it in the dedicated hole made in the main housing.
- Engage all the gears in order to check the selection is working well and forks do not overdo on the wheels. *(If this is the case, disassemble the gears and change the gear centring shim: put a thicker one if 1<sup>st</sup>, 3<sup>rd</sup>, 5<sup>th</sup> or 7<sup>th</sup> is concerned, put a thinner one if R, 2<sup>nd</sup>, 4<sup>th</sup> or 6<sup>th</sup> is concerned. Reassemble the gears and check again if the selection is working well.)*
- Remove the anti-splay plate.
- Change the O-ring seal of the front closing plate (if it has not been done).
- Clean the contact surfaces of the main housing and of the front closing plate, the bolts and the threads.
- Assemble a first time the front closing plate on the main housing, without gluing the bolts, and measure the play of the primary shaft with a dial indicator.
  - If the play is not between 0 and 0.3mm, reduce it by changing the shim between the outside race of the bearing and the front closing plate wall. (see §3.7.1)
  - If the play is between 0 and 0.3mm: remove the front closing, and re-assemble it on the main housing taking care to tighten the 9 M8 bolts with Loctite 243 at 2.5DaN.m.

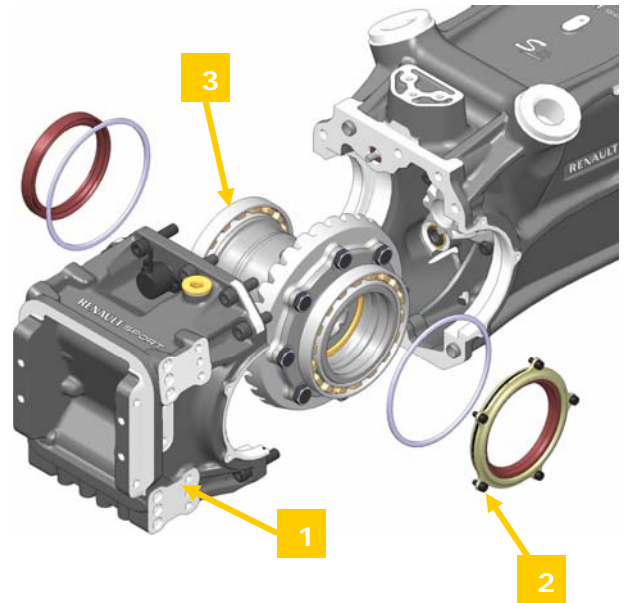
## 3.4. Differential

**NOTE :** The preload adjustment tool FOUT1910301 is a kit including several parts, to use together or not according to the operation to undertake:

- FOUT9004604 Right half shaft
- FOUT9004605 Left half shaft
- FOUT1910300 Adapter for differential lid
- FOUT1910001 Compression washer (with a M6x70 bolt).

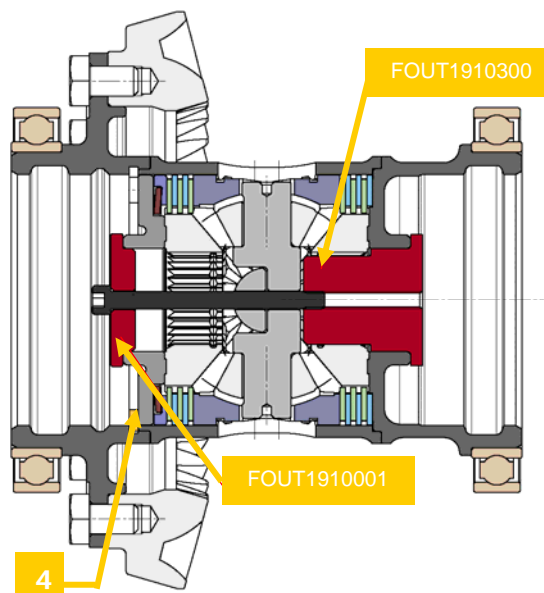
### 3.4.1. Disassembly of the differential

Remove the seal plate (2) (5 M5 bolts)  
 Remove the differential cap (1) (9 M10 bolt)  
 Remove the remaining lip seal and differential case (3).



### 3.4.2. Disassembly/assembly of the components of the differential

- With the adapter (FOUT1910300) and the compression washer (FOUT1910001), compress the differential.
- Remove the circlips situated in front of the differential lid and remove the adapter and the compression washer (FOUT1910300 & FOUT1910001).
- Remove one by one all the components inside the differential noting their direction and the order in which they are assembled.
- Clean and degrease the parts, check their wear and replace them if necessary.
- Lubricate with gearbox oil and put one by one the component inside the differential case, respecting the direction and the order noted during the disassembly.
- Compress the differential using the tools FOUT1910300 and FOUT1910001 and put the circlips inside the dedicated groove of the differential case.



- Measure the preload at room temperature (if it is measured at working temperature, it will be lower by 15%):
- Put the right half shaft (FOUT9004604) in a bench.
- Put the differential on the shaft.
- With the left half shaft (FOUT9004606) and a torque wrench, measure the preload of the differential.
- If the preload of the differential is not between 0.5 and 3DaN.m, open the differential as indicated previously and adjust the preload by changing the Belleville washer or the race, until getting into the allowed range of preload values.

***NOTE:*** Use a Belleville washer with a greater clearance or a thicker race in order to increase the preload. Use a Belleville washer with a smaller clearance or a thinner race in order to increase the preload.

***NOTE:*** If it is not possible to get into the needed preload values, change the friction and/or the flywheel discs.

***NOTE:*** The preload of a differential using new discs and/or a new Belleville washer decrease by around 15% after a 50 km running-in.

### 3.4.3. Assembly of the differential into the housing

- Clean the bolts, the threads, and the external faces of the differential case in contact with other parts.
- Replace the lip seals, and the O-ring seal of the seal plate.
- Replace the O-ring seals of the differential housing cap.
- Fit the left lip seal and the differential case inside the differential housing cap.
- Fit the whole assembly on the main housing.
- Tighten the 9 M10 bolts glued with Loctite 243, at 5.5DaN.m. The 2 M10x40 bolts must be screwed in the 2 holes corresponding to those of the 2 centring bushes.
- Assemble the seal plate equipped with a new seal. Tighten carefully the 5 M5 bolts.



### 3.4.4. Differential preload adjustment on the car.

Remove the whole right transmission shaft.

Measure the preload at room temperature (if it is measured at working temperature, it will be lower by 15%) taking care to:

- Lift up the rear left wheel from the ground.
- use the left half shaft (FOUT900460), which exceptionally will be used as a right shaft, and a torque wrench to measure the preload.

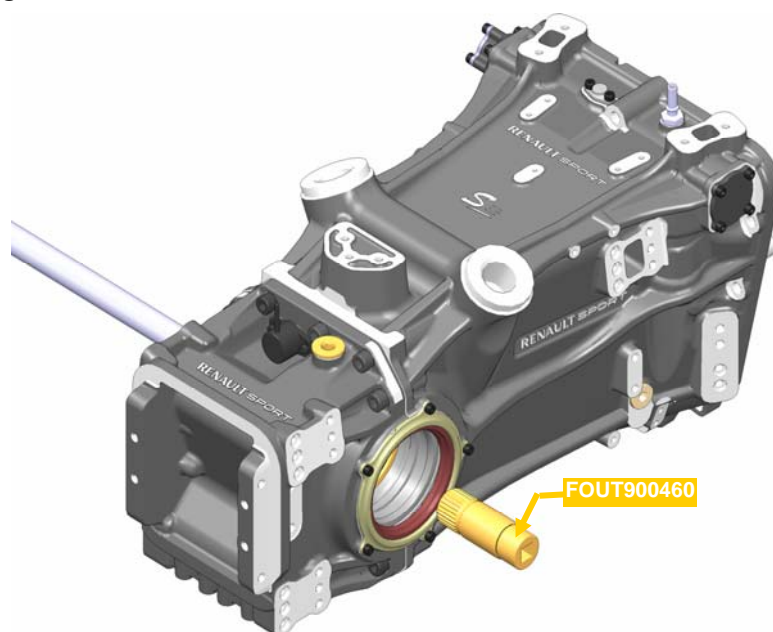
If the preload of the differential is not between 0.5 and 3DaN.m:

- Remove the seal plate (5 M5 bolts), and compress the differential with the compression washer FOUT1910001 (which tighten the left short flange) in order to remove the circlips, and remove the tool.
- Replace the Belleville washer and/or the Belleville washer race, and put one by one all the element inside the differential case taking care to respect their direction and order.
- Measure the preload.
- If the preload of the differential is not between 0.5 and 3DaN.m, open the differential as indicated previously and adjust the preload until getting into the allowed range of preload values.

***NOTE :*** Use a Belleville washer with a greater clearance or a thicker race in order to increase the preload. Use a Belleville washer with a smaller clearance or a thinner race in order to decrease the preload.

***NOTE :*** If it would be not possible to get into the needed preload values, change the friction and/or the flywheel discs.

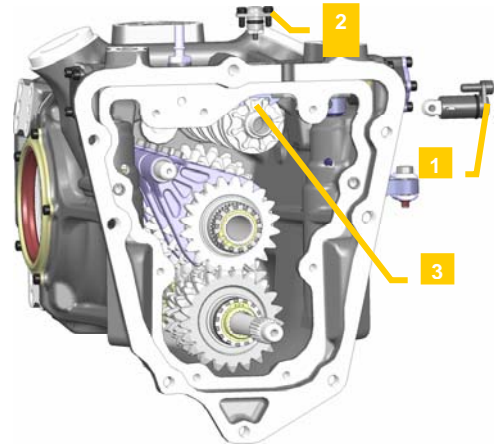
***NOTE :*** The preload of a differential using new discs and/or a new Belleville washer decrease by around 15% after a 50 km running-in.  
Assemble the right transmission shaft on the car.



### 3.5. Selection

#### 3.5.1. Disassembly of the barrel

- Remove the front closing plate (9 M8 bolts).
- Remove the fork axle, and extract the forks' pins from the tracks of the barrel.
- Remove the indexor (1) (1 M7 bolt), and the dual pin rock pusher (2) (2 M5 bolts).
- Lift the dual pin rock pusher (3) with a screwdriver, and remove the barrel.

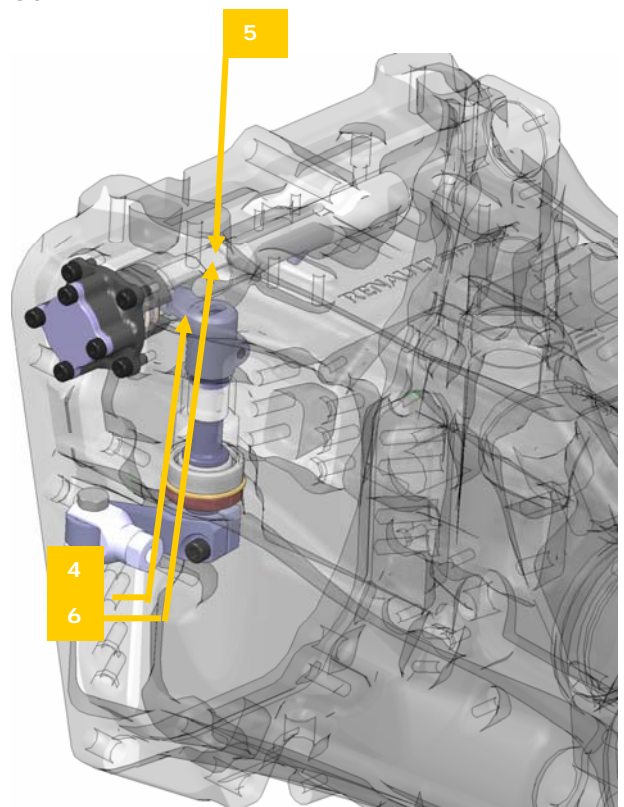


#### 3.5.2. Disassembly of the selector axle

- Remove the lower rocker (4) (1 M6 bolt), and the lip seal inside the selection well (the lip seal need to be destroyed).
- Unscrew the upper rocker M6 bolt (5), remove the Ø35 circlips (6), and remove the vertical selection shaft.
- Get back the upper rocker.
- Remove the left selection block (4 M5 bolt) and the complete selector axle taking care to put the dual pin rock inside its groove (it can get slightly stuck).
- Disassemble the selector axle from its block.

#### 3.5.3. Assembly of the selection components

- Clean and degrease the parts, check their wear and replace them if necessary.
- Change the O-ring seals of the left selector block.
- Assemble the selector axle (tighten the selector axle bolt glued with Loctite 243, at 2.2DaN.m).
- Reassemble the left selection block equipped with the complete selector axle taking care to put the dual pin rock inside its groove (it can get slightly stuck). Put some Loctite 222 on the 4 M5 bolts of the left selection bolts and screw it on the main housing.
- Place the upper rocker and insert the vertical selection shaft equipped with its bearing inside it.





**NOTE :** The upper rocker and the shaft have a oblong groove and a oblong pin, check they are well engage.

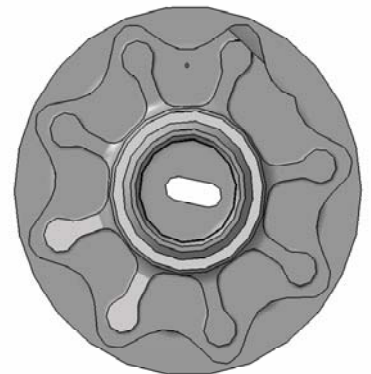
- Refit the circlips inside the corresponding groove in the selection well of the main housing, and place a new lip seal.
- Put some Loctite 270 on the upper rocker M6 bolt and tighten it to 1.6DaN.m, taking care that the rocker do not force inside the selector axle groove.
- Engage the lower rocker into the vertical selection shaft. Put some Loctite 243 on the lower rocker M6 bolt and tighten it to 1.2DaN.m.
- Check by moving the lower rocker that the whole vertical selection assembly is working well.

### 3.5.4. Assembly of the barrel

- Lift the barrel with a screwdriver and insert the barrel in its seating inside the main housing.

**NOTE :** *The potentiometer shaft and the barrel are indexed ; check they are aligned together, and do not force.*

- Change the o-ring seal of the indexor, refit the indexor on the main housing and screw its M7 bolt.
- Change the o-ring seal of the dual pins rock pusher, refit the dual pins rock pusher and screw its 2 M5 bolts.
- Turn by hand or with the lower selection rocker, the barrel in order to reach the Neutral position (marking must be at top position).
- Using the fork positioning comb (FOUT1910400), engage the forks' pins inside the tracks of the barrel, lubricate with gearbox oil and refit the fork axle.
- Clean the contact surfaces of the main housing and of the front closing plate, the bolts and the threads.
- Change the o-ring seal of the front closing plate (if it has not been done), screw the plate with its 9 M8 bolts glued with Loctite 243, and tighten to 2.5DaN.m.



## **3.6. Conical final drive replacement**

### 3.6.1. Secondary shaft

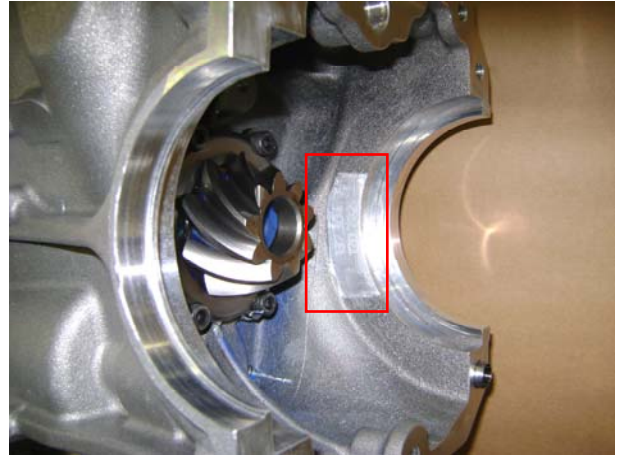
- Remove all the gears (refer to §3.3.2.) and the differential (refer to §3.4.1.)
- Remove the 6 M8 bolts (1).
- Using a mallet, remove the secondary shaft and the o-ring seal (2).
- In the main housing, clean the threads used for the bearing retainer plates and the seating of the bearings of the secondary shafts.

In the main housing, two dimensions are marked (as shown on the picture), note the smallest (usually around 137.25): this is dimension "A".

On a surface plate, pile both new bearings, and note the combined height: this is dimension "B".

The thickness "C" of the secondary shaft shim (3) is calculated as follows:

$$A - 99.64 - B = C$$



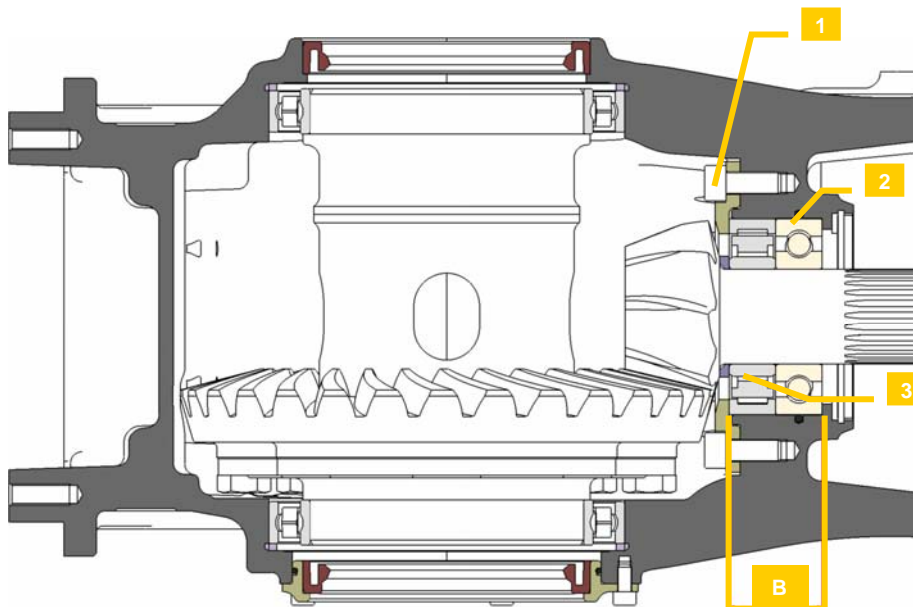
On the shaft:

- assemble the shim being the closest to the calculated thickness « C ».
- press fit the inner race of the NU207 bearing.
- Place the NU207 flange behind the final drive pinion.
- Fit the external race of the NU207 bearing on the shaft
- press fit the QJ207 4-point contact bearing.

In the main housing:

- Put the shaft inside the housing and use a mallet to set it in place.
- Put some Loctite 207 on the M8 bolts delivered with the new final drive and tighten them to 2.5DaN.m.

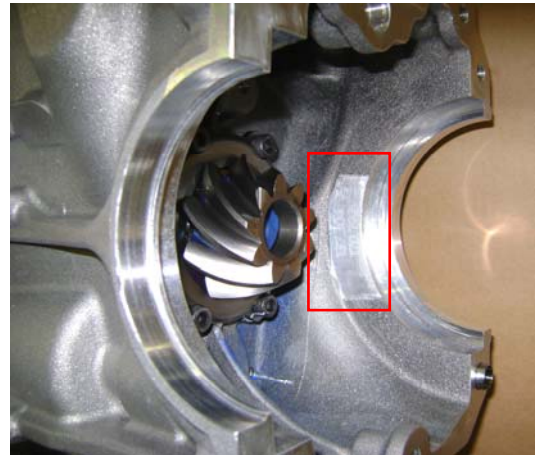
Refit the gears (refer to §6-2-4). Do not close the gearbox, do not fit the nut locking washer and the circlips immediately.



### 3.6.2. Crown

**NOTE:** In the described procedure, the differential case is supposed to be empty.

- Press remove both bearings on the differential case (1): it can damage them.
- Unscrew and remove the 8 M10 bolts of the crown with an impact wrench.
- Remove the crown from the differential.
- Degrease the differential case, and check it carefully (bearing contact patch, splines, etc). Change it if excessive wear or damage is observed.
- Degrease the new crown.
- Fit the new crown on the differential case. Put some Loctite 648 on new 8 M10 bolts and tighten them to 9DaN.m.
- Press fit the bearings (changed if damaged during disassembly) on the differential case and take care to position them on the dedicated surfaces of the case.



In the main housing, 2 dimensions are marked (as indicated on picture), note the highest (around 170). This is dimension « X ».

Measure the highest distance between the external races of the bearings assembled on the differential case and note it: this is dimension "Y".  
The combined thickness of both crown positioning shims (2) is calculated as follows:

$$X+0.1-Y=Z$$

The first attempt to set the crown position can be done with identical shims which thickness will be the closest to:  $Z/2$ .

- Fit inside the main housing: the differential case and the 2 crown positioning shims. The shims must be put between the main housing and each of the 2 bearings (refer to following view).
- Change the o-ring seals of the differential housing cap.
- Fit the differential cap on the main housing and screw the bolts without gluing.

**NOTE:** *The total thickness of both crown positioning shims must always be as close as possible of the calculated dimension Z.*

Measure the play between the teeth of the final drive pinion and crown. Make the measure on the front face of (5 to 8) crenellations of the secondary shaft locking nut (5 to 8). The mean value must be included between 0.02mm and 0.1mm.

- If the mean value is lower than 0.02mm: substitute the crown side shim (2a) by the next thinner shim available, and substitute the opposite shim by the next thicker shim available (2b).

- If the mean value is higher than 0.1mm: substitute the crown side shim (2a) by the next thicker shim available, and substitute the opposite shim by the next thinner shim available (2b).

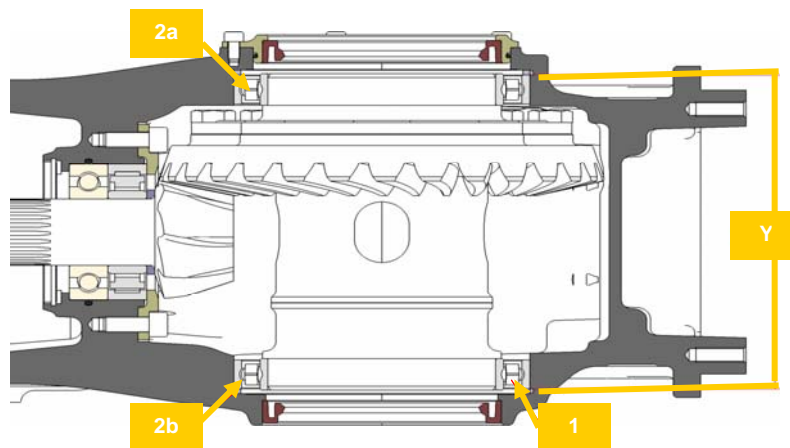
Repeat the procedure until getting into the allowed play interval.

Unscrew and remove the 9M10 bolts differential cap, glue them with Loctite 243, and tighten them at 5.5DaN.m.

The 2 M10x40 bolts must be screwed in the 2 holes corresponding to those of the 2 centring bushes.

Change the o-ring seal of the seal plate.

Fit the seal plate on the gearbox housings.



## 3.7. Bearings

### 3.7.1. Front closing plate bearings<sup>1</sup>

Remove the front closing plate of the gearbox (9 bolts M8).

Remove the slave cylinder back spacer (1) and the lip seal (2).

Remove the rollers of the bearings.

Fit a bearing extractor:

- FACOM U49P9 for the bearing of the primary shaft;

- SAM EX 137.60: for the bearing of the secondary shaft;

- FACOM U49P5 for the bearing of the barrel;

Remove each of the bearings with an inertia extractor. They are glued so heat them before removing.

Clean and check the condition of every bearing seating,

Degrease, the new bearings.

Coat the external races:

- with Loctite 518 and press fit the primary and secondary shaft bearings

- with Loctite 603 and press fit the barrel bearing.

Lubricate the bearings with some gearbox oil.

Refit a new lip seal and the slave cylinder back spacer.

Change the O-ring seal of the front closing plate and re-assemble the plate on the main housing (tighten the 9 M8 bolts with Loctite 243 at 2.5DaN.m)

### 3.7.2. Main housing bearings

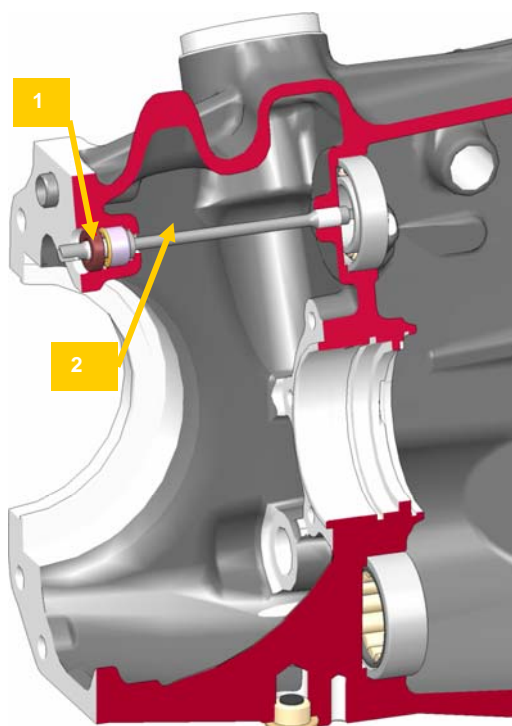
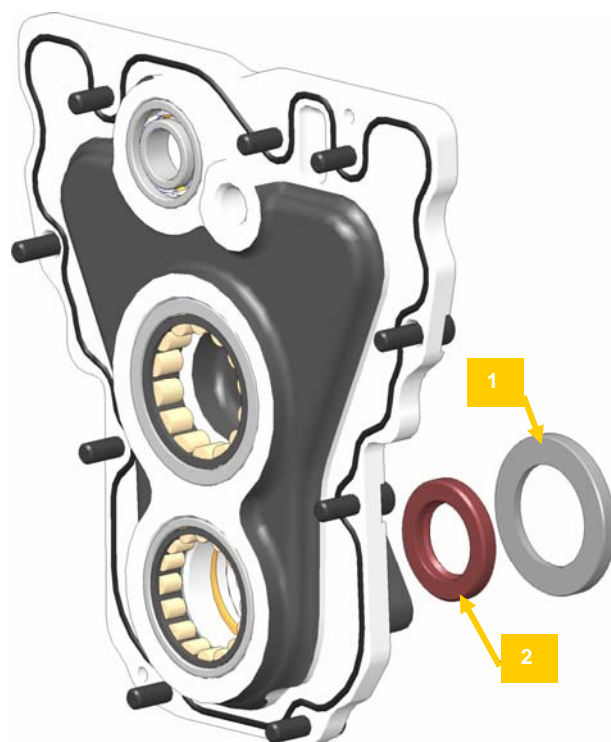
Remove the gears, reverse gear included (refer to §3.3.2), the differential (refer to §3.4.1), the barrel, the selector axle (refer to §3.5.1) and the primary and secondary shafts (refer to §3.6.1.)

Remove lip seal (1), the circlips and the potentiometer shaft (2).

Remove the rollers of the bearings.

Fit a bearing extractor:

- FACOM U49P9 for the bearing of the primary shaft;



- FACOM U49P6 for the bearing of the barrel;

Remove each of the bearings with an inertia extractor. They are glued so heat them before removing.

Clean and degrease the contact surfaces of the main housing with the bearings and check their states.

Degrease the new bearings.

Coat the external races:

- with Loctite 518 and press fit the primary shaft bearing
- with Loctite 603 and press fit the barrel bearing.

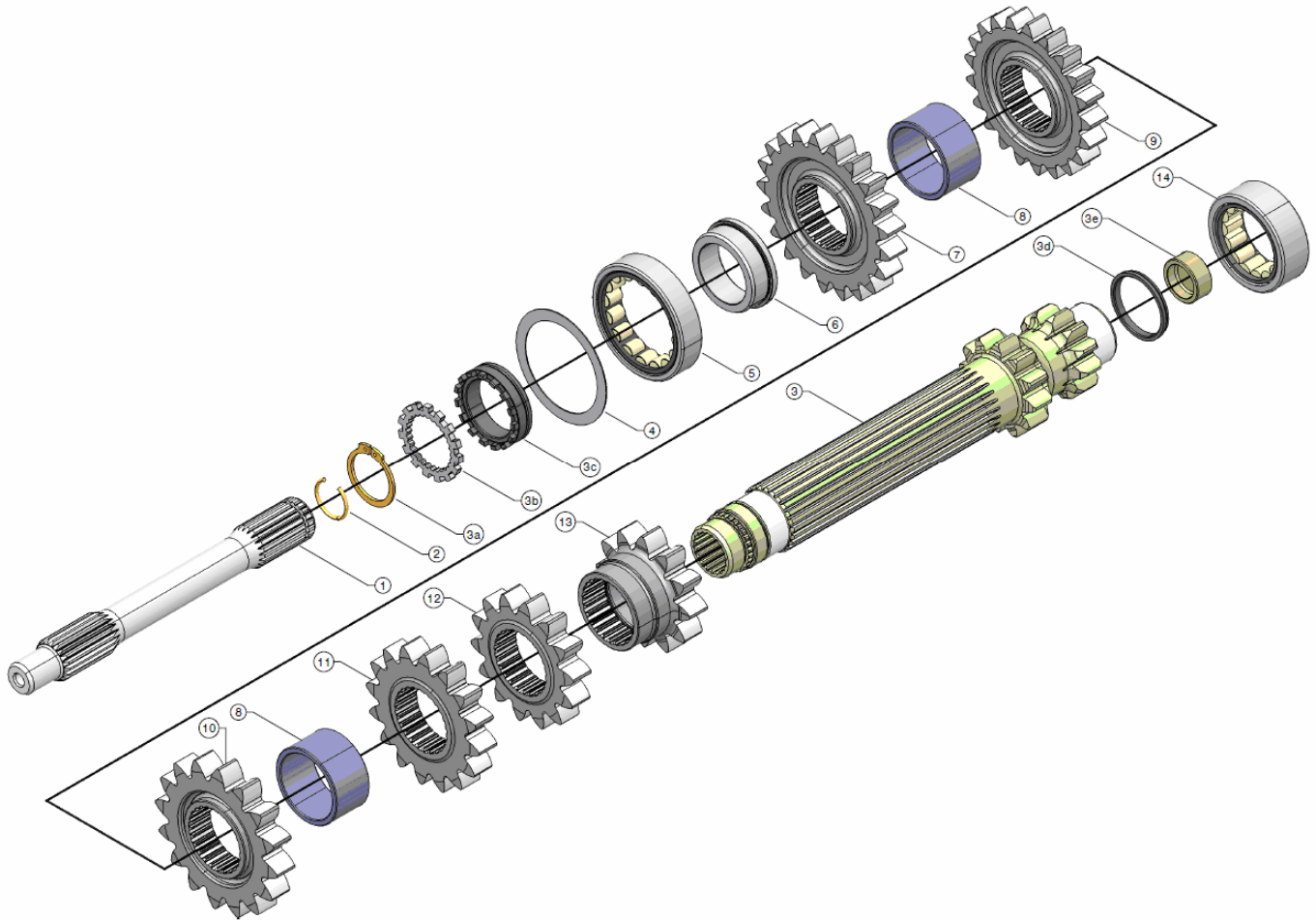
Lubricate the bearings with some gearbox oil.

Refit the potentiometer shaft, the new circlips and the new lip seal.

Refit the secondary shaft (refer to §3.6.1.), the gears (refer to §3.3.4), the differential (refer to §3.4.3.), the barrel and the selector axle (refer to §3.5.4.).

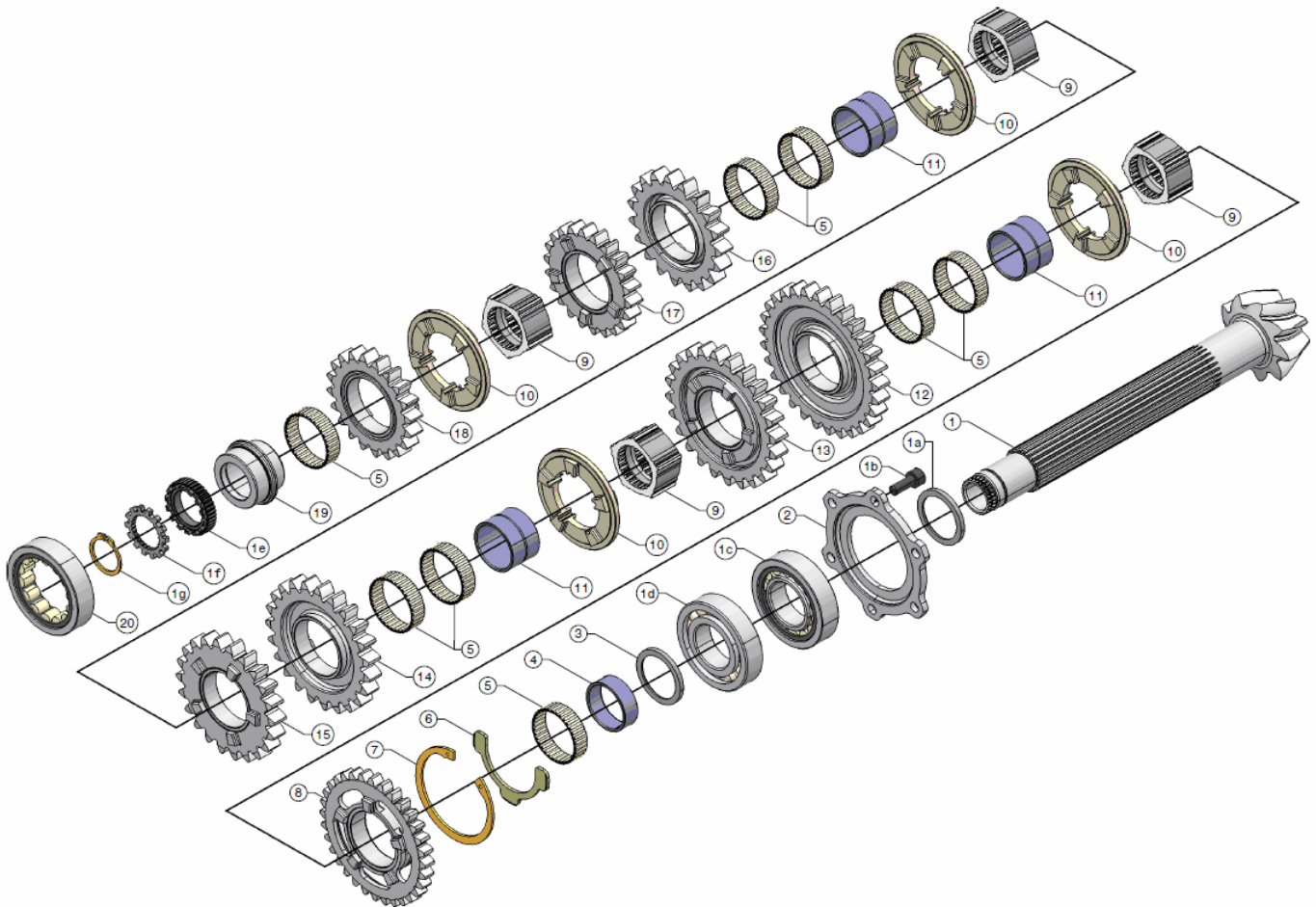
## 4. EXPLODED VIEWS

### 4.1. Primary geartrain



Item	Ref.	Description	Qty.	Glu	Torque (daN.m)
1	F1910109	Input shaft	1		
2	9908008	RB20 ring	1		
	<b>J801910P01605F</b>	<b>1st gear pair (12x32)</b>	<b>1</b>		
	0601005	a Ø28 circlip	1		
	F1910107	b Nut stopping washer	1		
	F1910108	c Nut	1		18
	F9024005	d NU2205 bearing stop	1		
	F1910105	e Primary shaft plug	1	648	
4	0599032	61x49x0.5 shim	1		
5	0103012	NU1007 ECP bearing	1	518	
6	F1910103	NU1007 bearing inner race	1		
	C8013P2424605F	7th gear pair (24x24)			
	C8013P2120605F	7th gear pair (21x20)	1		1st fitting
8	F1910102	Gear spacer	2		
9	C8013P2628605F	6th gear pair (26x28)	1		
10	C8013P1619605F	5th gear pair (16x19)	1		
11	C8013P1622605F	4th gear pair (16x22)	1		
12	C8013P1423605F	3rd gear pair (14x23)	1		
13	I8013P1224605F	2nd gear pair (12x24)	1		
14	0103049	NU2205 bearing	1	518	

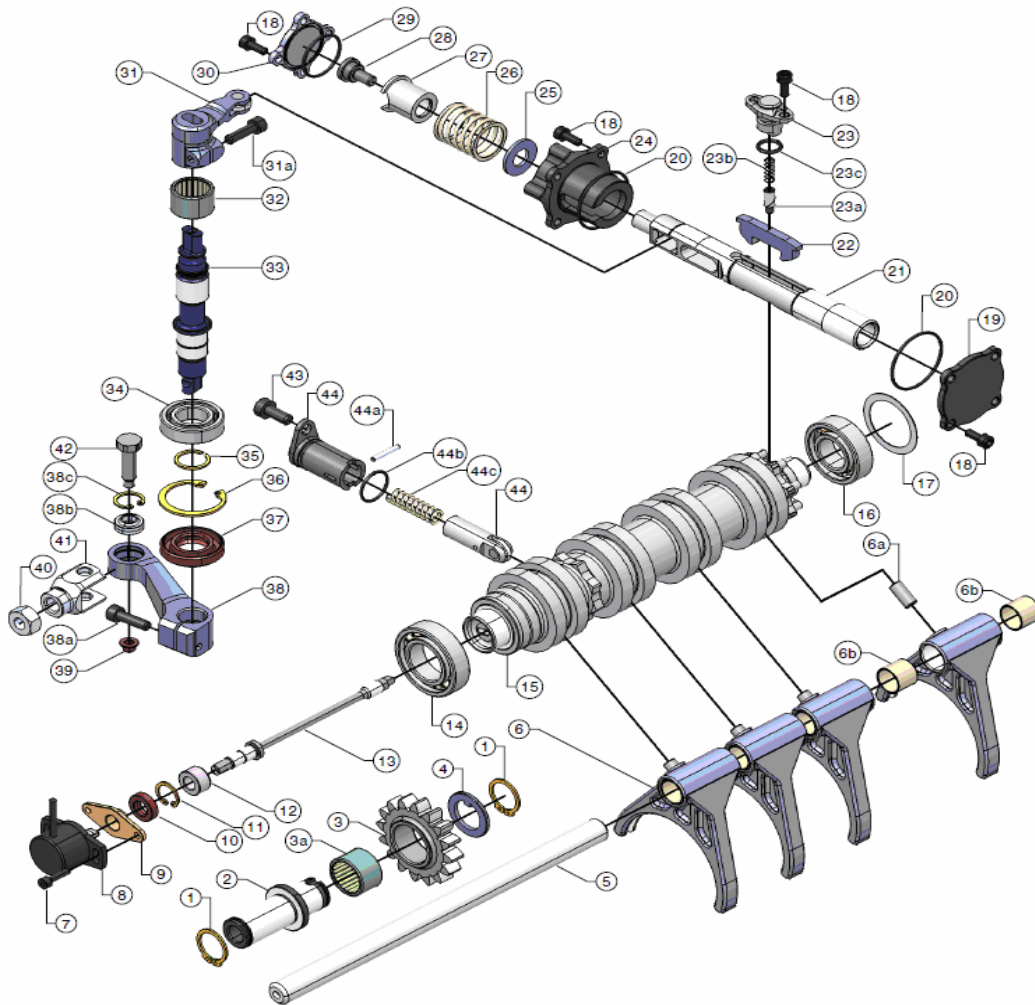
## 4.2. Secondary geartrain



Item	Ref.	Description	Qty.	Glu	Torque (daN.m)
	<b>CPL9301910011</b>	<b>9x30 final drive</b>	<b>1</b>		
1	F19102051	a Shaft advance shim set	1		
	0301077	b M8x20 c12.9 CHc bolt	6	270	2.5
	0103024	c NU207 ECP bearing	1		
	0101116	d QJ207 C2 bearing	1		
	F1910210	e Nut	1		18
	F1910211	f Nut stopping washer	1		
	0601005	g Ø28mm circlip	1		
2	F1910203	NU207 bearing plate	1		
3	F19102121	Gears shim set	1		
4	F1910206	K40x45x13 bearing inner race	1		
5	0105066	K40x45x13 bearing	8		
6	F1910207	Rotation stopping fork	1		
7	F1910208	Grinded Ø75mm circlip	1		
8	F1910250	Reverse gear pignon	1		
9	F1910202	Dogring hub	4		
10	F1910201	Dogring	4		
11	F1910204	Gear bearing inner race	3		
	<b>J801910P01605F</b>	<b>1st gear pair (12x32)</b>	<b>1</b>		
	F1910251	1st gear pignon (12x32)	1		
13	I8013P1224605F	2nd gear pair (12x24)	1		
14	C8013P1423605F	3rd gear pair (14x23)	1		
15	C8013P1622605F	4th gear pair (16x22)	1		
16	C8013P1619605F	5th gear pair (16x19)	1		
17	C8013P2628605F	6th gear pair (26x28)	1		
18	C8013P2424605F	7th gear pair (24x24)	1		first fitting
	C8013P2120605F	7th gear pair (21x20)			
19	F1910209	NU207 bearing inner race	1		



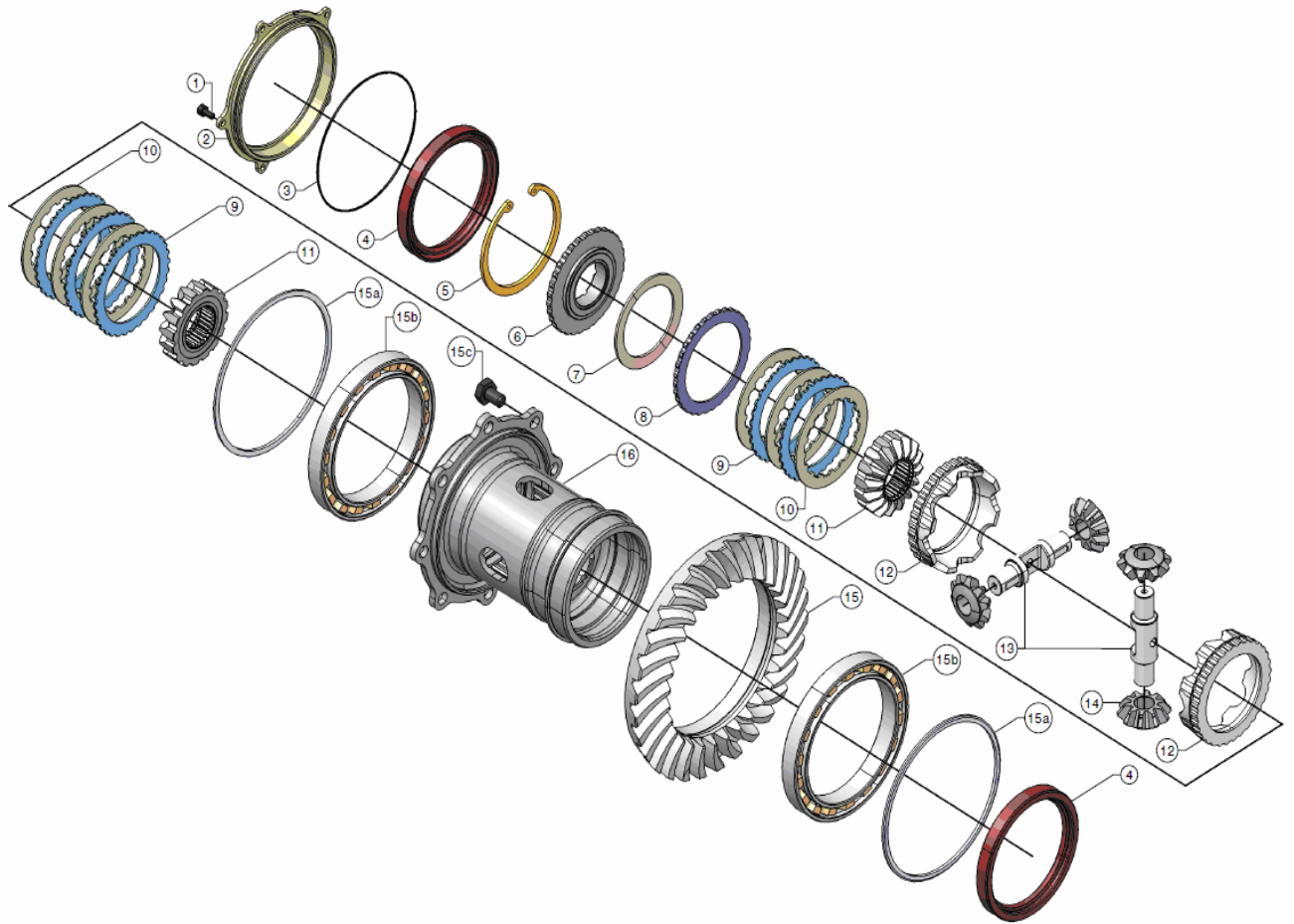
### 4.3. Selector



Item	Ref.	Description	Qty.	Glu	Torque (daN.m)
1	0601001	Ø20 circlip	2		
2	F1910419	Reverse gear axle	1		
3	<b>F19102591</b>	<b>Complete reverse gear pignon</b>	<b>1</b>		
	0106021	a HK2016 bearing	1	603	
4	F1910420	Reverse gear washer	1		
5	F1910408	Froks axle	1		
6	<b>F19104171</b>	<b>Complete fork</b>	<b>4</b>		
	F0077120	a Fork pin	1	648	
	1202021	b PAP1515 P10 bushing	2	648	
7	0301148	M4x16 cl.8.8 Bichro CHc bolt	2		
8	7711166101	Potentiometer	1		
9	F1910412	Potentiometer plate	1		
10	0203017	Ø8x18x5 lip seal	1		
11	0602045	Ø16 circlip	1		
12	F1910411	Potentiometre axle bushing	1		
13	F1910410	Potentiometre axle	1		
14	0101050	6005 bearing	1	603	
15	F1910427	Barrel	1		
16	0101004	6004 bearing	1	603	
17	0599037	0.1mm barrel shim	1		
18	0301138	M5x12 ZN cl.10.9 CHc bolt	14		
19	F1910407	Right side closing plate	1		
20	0201105	Ø2x38 O'ring	2		
21	F1910403	Selector axle	1		
22	F1910404	Dual pin rock	1		
	<b>F14044031</b>	<b>Dual pin rock pusher kit</b>	<b>1</b>		
23	F0059027	a Dual pin rock pusher	1		
	0801026	b Dual pin rock spring	1		
	0201017	c Ø10x2.5 O'ring	1		

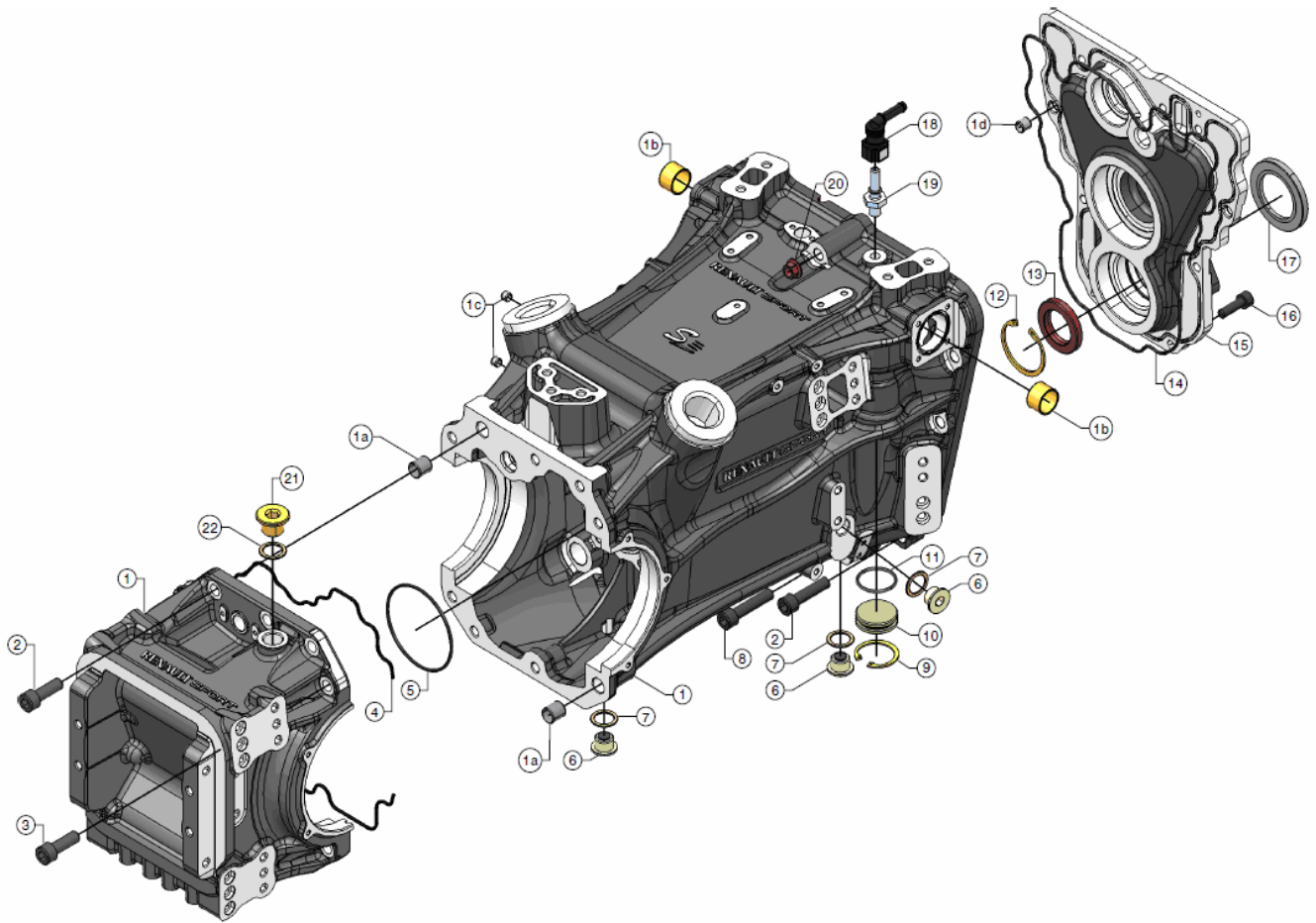
24	F1910405	Selector closing bloc	1		
25	F0059049	Selector washer	1		
26	0801027	Selector spring	1		
27	F0059022	Selector bushing	1		
28	F0059021	Selector bolt	1	243	2.2
29	0201021	Ø2x26 O'ring	1		
30	F1910406	Left side closing plate	1		
31	<b>F19104301</b>	<b>Complete upper rocker</b>	<b>1</b>		
	0301007	a M6x20 cl.10.9 CHc bolt	1	270	1.6
	0106001	HK1816 bearing	1	603	
32	Part included in <b>F19100021 Complete main housing</b>				
33	F1910429	Rocker axle	1		
34	0101071	6003 bearing	1		
35	9907010	SW17 seeger ring	1		
36	0602015	Ø35 circlip	1		
37	0205103	Ø17xØ35x7 lip seal	1		
	<b>F19104311</b>	<b>Complete lower rocker</b>	<b>1</b>		
	0301276	a M6x25 cl.8.8 Zn CHc bolt	1	243	1.2
	0901004	b Ø8 ball	1		
	9907058	c SB16 seeger ring	1		
39	0499010	M6 simmonds nut	1		
40	0403031	M10x100 Zn H nut	1		
41	F1910426	Actuator axle fork	1		
42	F1910425	Axle bolt	1		
43	0301373	M7x16 cl10.9 Zn CHc bolt	1		
	<b>F90030404</b>	<b>Indexor kit</b>	<b>1</b>		
44	0701069	a Ø2.5x18 dowel pin	1		
	0201020	b Ø16x2 O'ring	1		

## 4.4. Differential



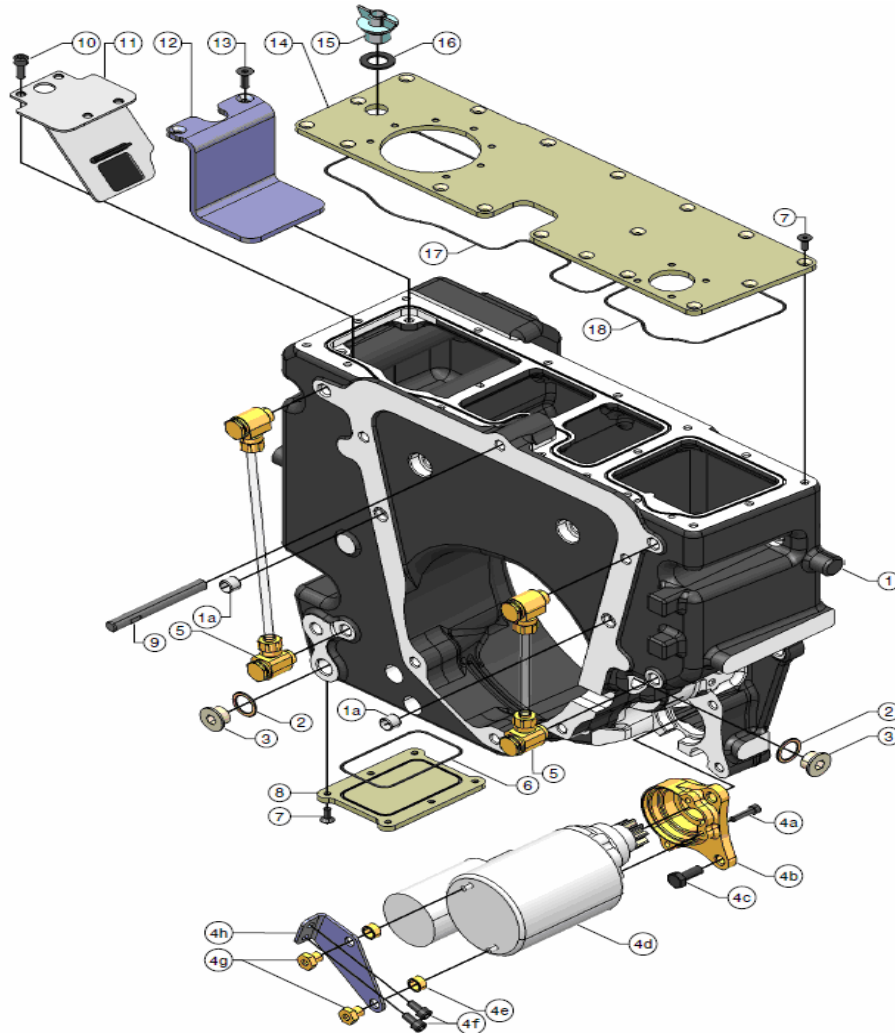
Item	Ref.	Description	Qty.	Glu	Torque (daN.m)
1	0301394	M5x10 c18.8 ZN CHc bolt	5		
2	F1910311	Seal plate	1		
3	0201166	Ø109x2 O'ring	1		
4	0204041	Ø85xØ105x12 lip seal	2		
5	0602025	Ø85 circlip	1		
6	F1910305	Differential cover plate	1		
7	F1910313	Belleville washer (F=0.8)	1	Mix parts to obtain 2.5daN.m±0.5 preload	
	F1910314	Belleville washer (F=1)			
8	F1910307-4.2	4,2mm thick Belleville washer	1		
	F1910307-4.3	4,3mm thick Belleville washer			
	F1910307-4.4	4,4mm thick Belleville washer			
9	F1910309	1.75mm thick core disc	5		
10	F1910308	1.75mm thick friction disc	6		
11	F1910310	Sun gear	2		
12	F19103211	Differential plate set (70°/65°)	1		
13	F1910306	Planet gear axle	2		
14	F0085908	Planet gear	4		
	<b>CPL9301910011</b>	<b>Complete 9x30 final drive</b>	<b>1</b>		
15	F19103201	a Tooth clearance shim set	1		
	0101054	b AB 12458 S03 bearing	2		
	0305098	c M10x100 lg.16 cl 12.9 H bolt	8	648	9
16	F1910300	Differential case	1		

## 4.5. Housings



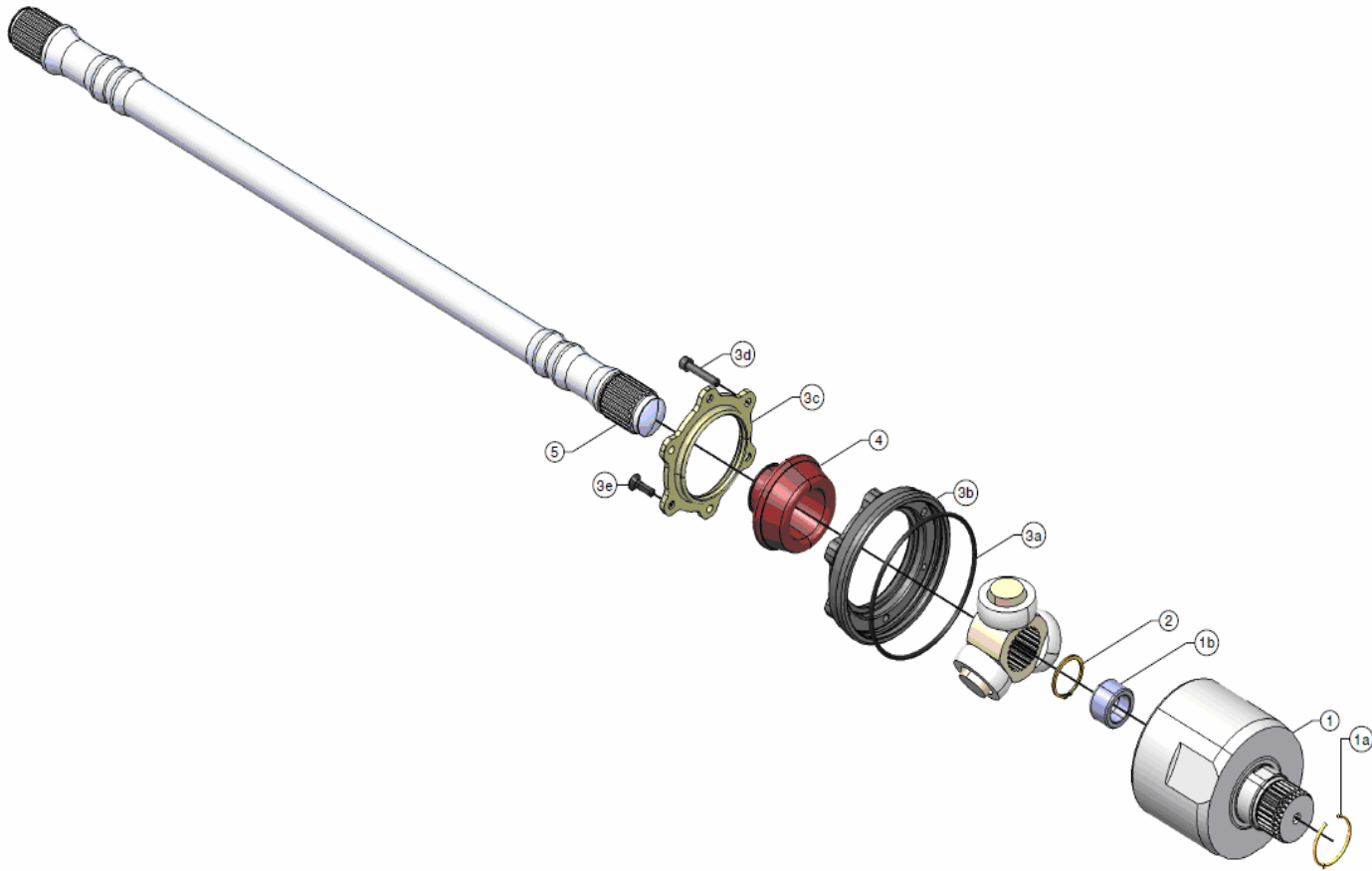
Item	Ref.	Description	Qty.	Glu	Torque (daN.m)
	<b>F19100021</b>	<b>Complete main housing</b>	<b>1</b>		
1	F1404429	a Ø8xØ6x6 pin	2	648	
	1202004	b PAP 2015 P10 bushing	2	648	
	F1501110	c Ø14xØ12x15 pin	2	648	
	F0059035	d Ø8xØ10x10 pin	2	648	
2	F1910022	Machined M10x30 bolt	2		
	0301526	M10x40 cl.12.9 ZN CHc bolt	8	243	5.5
3	0301525	M10x30 cl.12.9 ZN CHc bolt	5	243	5.5
4	0201100-280	Ø3 seal wire (lg.280mm)	2		
5	0202018	Ø3x72 O'ring	1		
6	F1402058	Drain plug	3		
7	77 03 062 062	Drain plug seal	3		
8	0301424	M10x45 cl.12.9 ZN CHc bolt	1	243	5.5
9	0602015	Ø35 circlip	1		
10	F1910010	Selector plug	1		
11	0201104	Ø3x29 O'ring	1		
12	0602043	Ø47 circlip	1		
13	0204042	Ø28x47x7 lip seal	1		
14	0201245	Ø3x305 O'ring	1		
15	F1910008	Gearbox closing plate	1		
16	F1910020	Machined M8x25 bolt	2		
	0301532	M8x25 cl.12.9 ZN CHc bolt	7	243	2.5
17	F1910018	Slave cylinder spacer	1		
18	F9022106	M10x100 venting fitting	1	577	
19	9999683	Quick release venting fitting	1		
20	0499005	M10x125 simmonds nut	1		
21	77 03 075 076	Filling plug	1		
22	77 03 062 014	Filling plug seal	1		

## 4.6. Oil tank



Item	Ref.	Description	Qty.	Glu	Torque (daN.m)
1	<b>F1910001</b>	<b>Complete oil tank</b>	<b>1</b>		
	F9003102	a Ø10xØ12x10 pin	2	648	
2	77 03 062 062	Drain plug seal	2		
3	F1402058	Drain plug	2		
	<b>F19108031</b>	<b>Complete starter</b>	<b>1</b>		
	0301327	a M5x20 cl.8,8 ZN CHc bolt	3	243	0.5
	F1910803	b Starter strap	1		
	0305061	c M8x20 cl.10,9 bichro H bolt	2	243	2.5
	F1910809	d Starter	1		
	F1910805	e Starter plate washer	2		
	0301540	f M6x12 cl.10,9 ZN CHc bolt	2	243	1.6
	F0085981	g Starter nut	2	270	
	F1910804	h Starter plate	1		
5	77 11 166 138	Oil level kit	1		
6	0201145	Ø2x74 O'ring	1		
7	0303045	M5x12 cl.10,9 ZN FHc bolt	24		
8	F1910012	Lower closing plate	1		
9	F1910017	M10x125/1g90/M10x150 stud	1	648	
10	0301291	M6x16 cl.8,8 CHc bolt	4	243	1.6
11	<b>F1910025</b>	<b>Intermediate filtration plate</b>	<b>1</b>		
	5299001	Anti-backlash rubber	1		
12	F1910021	Upper filtration plate	1		
13	0303038	M6x16 cl.10,9 FHc bolt	2	243	1.5
14	F1910011	Upper closing plate	1		
15	77 030 751 80	Filling plug	1		
16	82 002 013 81	Filling plug seal	1		
17	0201244	Ø2x230 O'ring	1		
18	0201155	Ø2x113 O'ring	1		

## 4.7. Drive shaft



Item	Ref.	Description	Qty.	Glu	Torque (daN.m)
1	<b>F19107001</b>	<b>Complete flange</b>	<b>1</b>		
	9908014	a RB28 ring	1		
	F1910706	b Drive shaft stop	1		
2	0601023	Ø24 circlip	1		
3	<b>F19107051</b>	<b>Complete seal mounting</b>	<b>1</b>		
	0201106	a Ø86x3 O'ring	1		
	F1910705	b Seal mounting	1		
	F1910702	c Seal mounting plate	1		
	0301490	d M5x25 cl.8,8 ZN CHc bolt	3		
	0303062	e M5x16 cl.10,9 ZN FHc bolt	3		
4	77 11 154 167	Seal	1		
5	F1910701	Drive shaft	1		

## 5. MAINTENANCE

### 5.1. Service planning

The service planning of the gearbox of the Formula Renault 2.0 2010 is based on the experience of SADEV and on the results of the development campaign of the SL80-13 gearbox. Lifespan of the parts and the information given about service planning can be updated in the near future:

PARTS	ACTION	FREQUENCY
Gearbox Rebuilt kit	Disassembly / Assembly check up Replace old parts	After every race week-end As indicated below for every kit
Input shaft	Replace	Half of a championship.
Primary shaft bearings	Replace	End of a championship or damaged
Secondary shaft bearings	Replace	End of a championship or damaged
Differential case bearings	Replace	End of a championship or damaged
Selection bearings	Replace	If damaged
Reverse transfer pinion bearing	Replace	End of a championship or damaged
Friction/Flywheel discs Belleville race	Replace if thickness of the component is reduced by more than 0.05mm	-
Rockers	Replace if marked surfaces	-
Selector axle	Check if contact patch with dual pin rock is marked	Half of a championship.
Forks pins	Replace if marked	
Planetary and satellites gears	Check	After each disassembly
	Replace	If pitting or marked
All safety fixing components - Differential crown bolts. - Primary/secondary shaft nuts.	Replace	If damages
O-ring and lip seals	Replace	Depends on the rebuilt kit
Glued components	Put glue on the indicated components in the rebuild manual.	After each disassembly
Conical final drive	Check	After each disassembly
	Replace	If pitting or marked (lifespan expected 5000-7000km)
Gears	Check teeth and dogs	After each disassembly
	Replace	(lifespan expected 5000-7000km)
Differential preload	Adjust	If not between 0.5-3m.kg measured at room temperature

SADEV propose to the customer 3 kits:

KIT	MAINTENANCE	FREQUENCY
REVSL801301	To check primary/secondary shafts	2000km
REVSL801302	To check selection and replace differential lip seals (included also the parts of the REVSL801301 kit)	Half of a championship
RLTSL801301	To replace bearings and springs of primary/secondary shafts; reverse gear, differential, selection	End of a championship

## 5.2. Expertise of the gearbox

The Formula Renault 2.0 2010 gearbox is F3 2011 homologated.

In case of:

- a crash,
- a teeth failure (especially of the final drive),

the structure and the attach points linking the housings and the rear crashbox can be damaged (cracked, punched and bent areas).

- an extended exposure to the fire generates damages to the material structure of the casings reducing significantly its strength.

After such kinds of events, the gearbox housings must be presented to the Renault Sport Technologies staff, who will be in charge to evaluate the severity of the damage and decide if the gearbox housings can be repaired or have to be replaced.

## 5.3. Maintenance of the gearbox

### 5.3.1. Maintenance within the Sadev workshop

#### Notes :

The gearboxes are delivered leaded and numbered.

The absence of lead 'Sadev' imposes a careful attitude in the event of minor or major problem to us, and applies to complete reserve of our share if necessary.

#### Return gear boxes to revision :

At the time of the return of the gearboxes in our buildings, a certain procedure of delivery has to be respected, so that our intervention can be total, and practical (casing ' closed' for passage to the bench).

We must receive the complete product as described below:

- Release bearing in place
- entry and exit of lubrication closed by plugs envisaged for this purpose (Goodridge, SpeedFlow...)
- Gear box drained and cleaned

- Drain plug and drain plug seal in place
- Differential in place

*A card specifying the kilometers of running since the last service, available near our sales department*

The absence of elements can be specified on the card, but in case of doubt, the material will be send back re-equipped.

Administrative procedure:

1. Send a request for service to Renault Sport, copy to SADEV
2. Forward the material and its card (description above) in our workshops
3. Approve the estimate presented by Renault Sport
4. APPROXIMATELY 2 TO 3 WEEKS OF DELIVERY TIME MUST BE CONSIDERED

5.3.2. Personal maintenance

After sale parts for customers who want to proceed a revision by themselves, are delivered only by Renault Sport.

**SADEV IS NOT RESPONSIBLE FOR ANY DAMAGE FOLLOWING A REVISION NOT EXECUTED IN A SADEV AGREED TECHNICAL SERVICE (LIST ON DEMAND).  
SADEV IS NOT RESPONSIBLE FOR FAILURES OF PARTS MODIFIED BY THE CUSTOMER.**

**As every mechanical part which is dedicated for racing, there is not warranty at all from our side.**

For more information, please contact :

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