2RM SEQUENTIAL GEARBOX

ETV

INFORMATIONS

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ETV MAINTENANCE

Preventive maintenance

The maintenance plan must be respected to maintain your ETV product in a correct exploitation condition. However, according to the preamble (P.5 ETV catalogue), it's neither contractual nor a motive for any guarantee requirement.

ETV MAINTENANCE	Visual inspection	Crack control	Typical lifespan
Clutch shaft	600km or 12h	1200km or 24h	2400km or 24h
Bearings	600km or 12h	1200km or 24h	2400km or 24h
Final drive	600km or 12h	-	2000km
Gears	600km or 12h	-	Depending on use
Dog rings	600km or 12h	-	Depending on use
Selector axis	600km or 12h	-	1200km or 24h
Indexing function	-	-	1000km
LS Differential preload	300km or 6h	-	Adjust if necessary
Slave cylindier	600km or 12h	-	Replace if necessary
Rebuild kit	**600km or 12h**		

Draining frequency

- Running-in 50 km …..... All disciplines
- 250 km ES ……..... Rally, rallycross
- 3h ……..... Touring-car

– Oil qty : 1,4 litres (excluding cooling circuit)

The oil level must be adjusted after a few kilometers in order to compensate the volume lost in the lubrication circuit and in the cooling circuit, if there is one.

Procedure : drain and measure the quantity of oil retrieved. Complete to reach the recommended value and put back the oil.

– Oil recommendation : EPLUB-X3V

Revision frequency

- **Maximum** 800 km ES …..... Rally
- **Every** 12 hours ……..... Touring-car

– **For each revision,** establish the content of the appropriate revision pouch. Please contact our technical service to be provided of the corresponding pouch.

– Inspect the gearings, the dog gears, the cylinder barrel : Replace if need be

ETV TECHNICAL FILE

It's necessary to read this ETV technical catalogue in order to carry out the assembly on your vehicle.

CHARACTERISTICS – ETV GEARBOX

ETV gearbox N°	
Oil pump option	
Self-locking differential	
Shells set	
Final drive	
1st	
2nd	
3rd	
4th	
5th	
6th	

USER GUIDE

In order to limit the risk of wdog rings wear, the gearshift must executed as fast as possible, with the maximum energy expenditure during the first moments.

In case of strong wheel slippage under engine load (first or even second speed ratios), it's preferable to disengage to upshift.

In case of wheel locking when braking, it's necessary to disengage in order to downshift. Too frequent wheel lockings when braking can strongly reduce the lifespan of the gears, shafts and casings.

During non-timed use or in non-sport areas (road, service park...), we recommend you to adopt a traditionnal driving with a « normal » use of the clutch.

The reverse gear ratio of your gearbox is a manœuvre ratio : to pass and use at low engine speed. The maximum operation torque is 170 **N.m**. In order to make the passage of the reverse gear more fluid, we recommend you to shift back the first speed (while disengaging of course), before shifting successively and quickly the neutral, and then the reverse gear. Indeed, it allows to align the primary and secondary lines.

CLUTCH RECOMMENDATIONS

Clutch mechanism

The ETV gearbox and its engine installations are defined for clutches such as thin single plate or double plate Ø184mm maximum. Driven plates have to be 1" x 23 splines. The release bearing holder on the diaphragm has a Ø 52/54 mm.

Hydraulic clutch bearing

It is imperative to install an adjustable stop of end race on the clutch pedal. Indeed, the hydraulic clutch doesn't have a mechanical stop. Wedge the stroke end at declutching, which means right after the slip point of the declutching. Besides, you have to think about putting a realease spring on the clutch pedal.

Hydraulic transmitter

The master cylinder of the clutch control must have a Ø0.7" inch. Besides, the pedal ratio must be around 4.5.
Example : For a 20cm-pedal-travel, the lever arm towards the hydraulic drive must be around 4.44cm.

Oil stopper

We advise you the use of a « lookeed » type of oil, silicone based, more commonly classified as fluid DOT 5,1. Indeed, considering the mechanical restrictions caused by the use in rally, it's necessary to have a liquid of which the boiling temperature is the highest possible. The minimum required is 270° in boiling temperature at dry state and 190° with a humidity of 3.7%.

• The LC776 EVO product can operate with any existing premium brands on the market as long as they are classified DOT5 or DOT5,1.
• For the other products (TV89, ETV, TXB89, ETCW), we recommend you to use a « competition » oil of which the boiling temperature is the highest, meaning 295° to 335° « at dry state » and 205° to 270° with a humidity of 3.7%.

Here are some product examples :

Miscibles with DOT 3, 4, 5.1 :
• Motul RBF 600: (312°c/205°c)
• Castrol SRF Racing :(310°c/270°c)
• Brendo HTC 64 : (335°c°) to use on R5 PSA

Non-miscibles with the DOT :
• Motul RBF 660 : (325°c/205°c)
• *AP600 Racing : (315°c/210°c)*

FIXATION OF THE ANTI-TORQUE

The drawbar coupling on the gearbox is determined by effort calculations and tests. In case of doubt on the implementation location, please contact us.

Fixation on gearbox

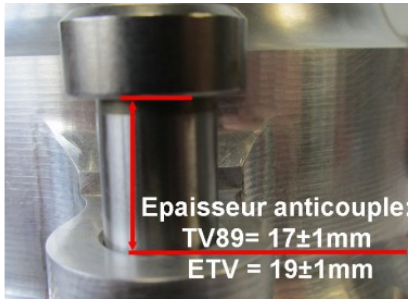
As soon as the implementation allows it, a very precise location to implant your anti-torque exists. This location requires the use of two washer head screws that enable a good fixation of the anti-torque. Reference : 512710040



Recommendations

For your anti-torque manufacturing, it's important to respect some ratings :

- Rating of the thickness of the anti-torque at the gearbox fixation :19±1mm
- Rating of the distance between the two screws of the anti-torque on the gearbox : 65±0,1 mm



The guide diameter of the two fixation holes on your anti-torque must be Ø12 H8. The tapping inside the crankcase of the gearbox is M10x1,5 reinforced by replaceable helicoils (helicoils reference : 212000007)

Attention *: The anti-torque must be assembled perpendicularly to the fixation support on the gearbox. The fixation point on the vehicle must be carried out in the median axis of the two screws. All must be assembled on the vehicle without any lateral forces.*

INPUT SHAFT INSTALLATION

It's important to check the right position of the clutch shaft, especially during the assembly of the gearbox on the engine. When the disks are wrongly centered and that it requires to force to engage the gearbox on the engine, it's possible that the clutch shaft move back and clip off during this operation. This being removable and maintened by a vee-ring, you have to be vigilant.

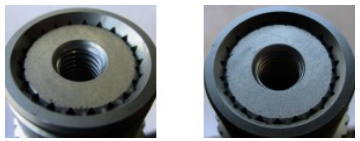
A visual control of the shaft's position before the starting up is necessary to garantee the correct functioning of it all.

Step 1 : Remove the plug at the back of the gearbox

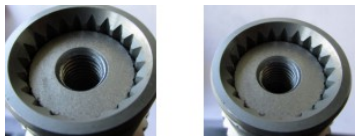
Step 2 : Visual control

→ **Case N°1** : The shaft is out. It's imperative to reposition it the same way as the case n°2.

→ **Cas N°2** : The shaft is correctly positioned, the face of the clutch shaft is at the same level as the lead-in chamfer of the primary shaft. In this case, no intervention is needed, the shaft is correctly assembled.



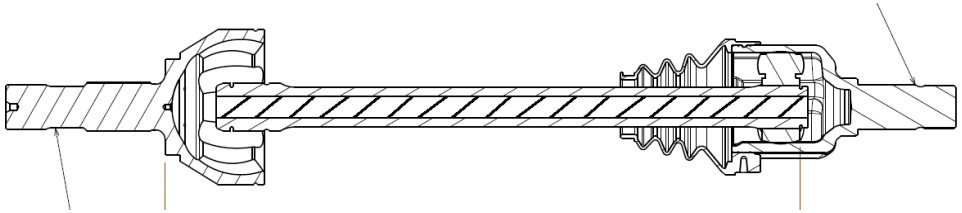
→ **Cas N°3** : The shaft is too retracted. It occures generally when the potioning of the shaft is too aggressive or the lock ring is too weak. This can be caused by the wear or the non replacement of the vee-ring (systematic after every revision or the disassembly of the clutch shaft).



DRIVESHAFTS

Recommendations on the Ø drive shaft

Observations : Over time, some deterioration can occure on the claws, including the second and third, that have been caused by a punctual and instense effort. There is an absorption problem of the grip resumption (slipping, wheel locking when braking, leap...) caused by the lack of elasticity of the driveshafts, if they are too big.



According to the customers feedback, the shafts Ø28 and 29 focus on reliability, but according to our calculations, they damage the absorption of torque crests. This enables us to establish the essential recommendations for the reductions of these risks.

Implementation recommendations

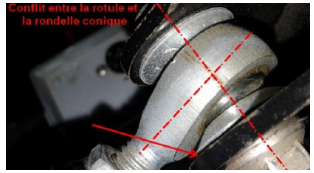
It's imperative to limit the diameters of the rungs up to Ø27. Ø25 for an optimum with a through hardening for a rigidity allowing to absorb the punctual torques (36% more absorption compared to a Ø27 rung).

Information : The lenght of a driveshaft doesn't affect its rigidity. The longer is a shaft, the more elastic it is, so the most resistant.

Connection of the rod with the gear lever

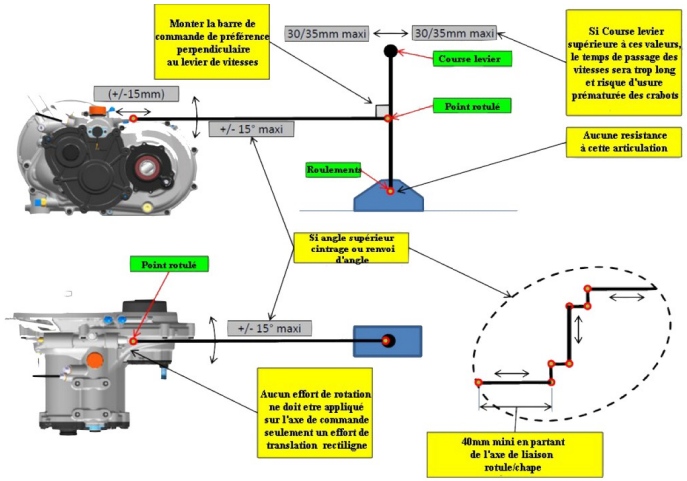
The connection rod on the gear lever side should be fixed ideally perpendicular to the gear lever. We recommend a maximum angle of inclination of 15 °.

As gearbox side, it is imperative to be vigilant to any constraints between the ball and the clevis.



It is also necessary to check the attachment of the lever base and the rigidity of the tunnel. Indeed the lever could move sideways with each change of ratio, which would give a feeling of passage felted with little precision and sensory irregularities.

En résumé



RECOMMENDATIONS ON OIL COOLERS

Valid only if your ETV gearbox has the « oil pump and intern lubrication system» option.

The ETV gearbox intern circulation pump allows an increased lubrication and cooling of the most requested elements. Warning, it's not a pressure pump (the pressure is 1.5 bar inferior).

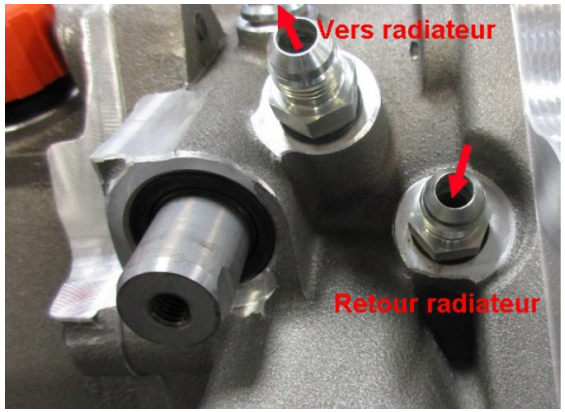
Cooling circuit

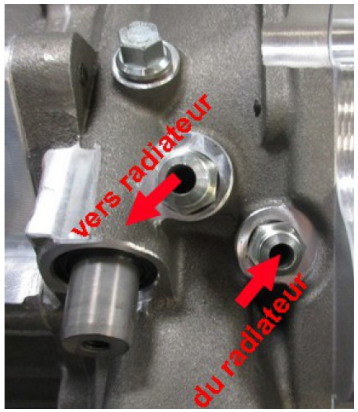
The assembly orientation of the cooler is important :

Without an oil cooler, a shunt is necessary between the 2 connectors (connectors DASH 6 and flexible Ø int 8,73 aviation type)

With an oil cooler :

- Flexible towards the entry of the oil cooler located as closely to the driving shaft
- Flexile for the return of the cooler located as closely to the clutch housing





Example of a type of cooler

Setrab type : serie 1 ; number of rows : 13 ; threading of the in and out conectors : AN6 (define according to ypur conectors) ; dimensions : 210x98x50 (mm)

CUT-OFF SENSOR WIRING

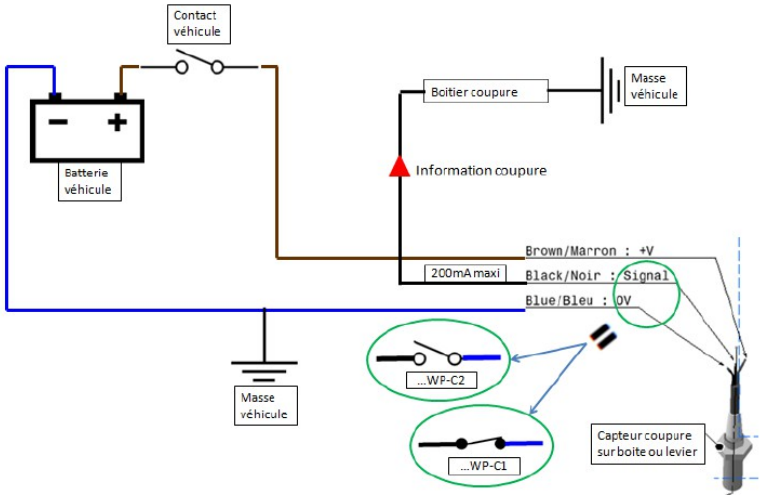
Your gearbox is equipped of a referenced denomination sensor :

- **WP-C2 Ref. (Original assembly - 3MOP Ref : 511020003)**
  Normal functioning with the sensor's electrical supply of 12V :
  - Selection axis at rest → sensor's light off (engine on)
  - Actuating of the axis → the light turns on (engine off)

Or :

- **WP-C1 Ref. (Available on demand - 3MOP Ref :511020002)**
  Normal functioning with the sensor's electrical supply of 12V :
  - Selection axis at rest → sensor's light on (engine off)
  - Actuating of the axis → the light turns off (engine on)

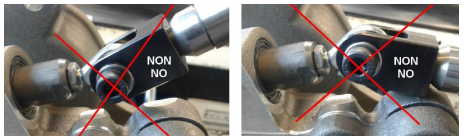
Cut-off sensor wiring



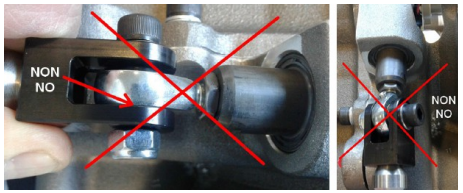
Observations :

- The denomination sensor operates as a serial assembled switch in the circuit that manages the denomination.
- This switch is driven by the presence of a metallic element in front of the sensor.
- **Warning** : selection axis or shift rad at rest, the metallic element is in front of the sensor so it's operated !
- The signal is a massive information towards the engine housing.

1 - The entire rod is not in line with the selector axis. This creates a tilting force of the selector axis which considerably slows down the speed of gearshifts, and results in premature wear of the dog rings :

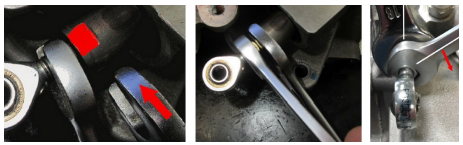


2 - The ball is not centered with the clevis, non-parallel to the engine/gearbox face or non-aligned. These assemblies create parasitic forces impeding the sliding of the selector axis, which considerably slows the speed of gearshifts, and results in premature wear of the dog rings.

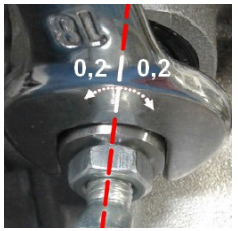


Ball tightening recommendations

To avoid force on the selector axis and anti-rotation system, it is imperative to hold the selector axis in position with a flat key of 18 to tighten the locknut of the ball.



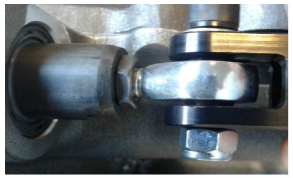
The last thing to do is to check the functional axial play when the command system (gear lever, rod, selector axis) is mounted on the vehicle. To do this, rotate to the left to estimate the clearance, then repeat the same operation to the right. The presence of a minimum clearance of 0.2mm is essential on each side of the selector axis. This control has to be done in the neutral position, in the upshift position (gearlever pulled) and in the downshift position (gearlever pushed).

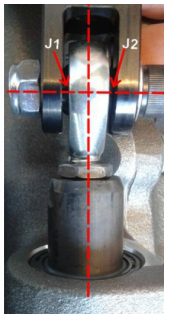


COMMAND SYSTEM ADVICE

Correct assembly

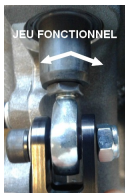
The clevis is mounted on the rod, the clevis pin is perpendicular to gearbox selector axis (the clevis+rod assembly has to be 40mm in line with the selector axis from its pin). The play between the body of the ball joint and the walls of the clevis must be equal: J1 = J2. The ball must be mounted on the selector axis (on the gearbox) parallel to the engine/gearbox face (vertical). It is imperative to respect these points in the following three situations: gearshift, neutral, downshift.



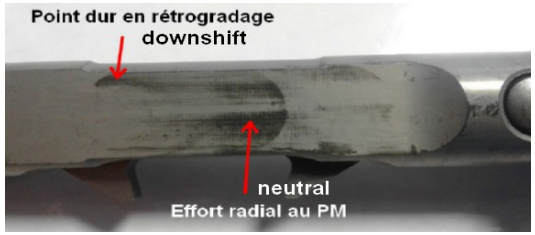


Un-correct assembly

The selector axis anti-rotation system (internal gearbox system) has the function of maintaining the original position of the selector axis. Although there is a small angular clearance to have an optimal functionment. Indeed, it is imperative to maintain a selector axis functional clearance. We will introduce two cases of mounting you have to avoid. They make an effect of "pinching of the axis" which affects the gearshift.



Please find below an example of a selector axis marked due to a misalignment of the rod in neutral and a ball joint in stress on the walls of the clevis at the downshift. This forces the axis to rotate beyond its required limit. The direct consequence is premature wear of the dog rings related to the slowing down of the selector axis displacement function.



CUT-OFF SETTINGS

The cut-off must be adjusted by a professional. It's obviously pre-adjusted in our factory. A wrongly-adjusted cut-off (too late release) can cause a too important gearshift load and a fast wear of the dog rings. Besides, the cut-off times must respect our recommendations :

	1st to 2nd	2nd to 3rd	3rd to 4th	4th to 5th	5th to 6th
Cut-off time	100 ms	90 ms	80 ms	60 ms	50 ms

If you decide to use a single cut-off time for every ratios, a cut-off time of **80ms** is recommended.

It's important to program a **200** milliseconds inhibition time. The inhibition time bans any new cut-off sequence after the initial cut-off. This configuration enables to prevent rebound phenomena when the driver release the lever, which would reset the sensor without a real demand from the driver.

It's imperative to respect the distance between the selector axis and the sensor end fitting notified on your gearbox (label). Regular controls of this distance must be executed.

One LED is linked to the cut-off sensor. This diode enables to assure the functioning of the cut-off sensor and visualise when the cut-off triggers. In average, this LED must trigger when the selector axis moves around 2,5mm.

It's important to use a fast management system of your engine's cut-off. Indeed, the time between the retrieval of the cut-off notice (diode is ON) and the engine torque curbe inversion on the crankshaft must not exceed 15ms.

In case of abusive engine cut-off related to the track variations, the following elements must be controlled :

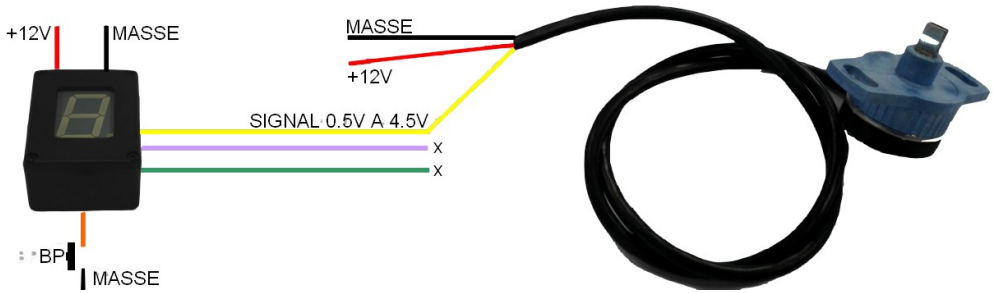
- *Engine brackets and supports*
- *The assembly of your gearshift lever and your rod*

BARREL POSITION SENSOR WIRING

Beam potentiometer P&G :

- Yellow : Display signal + 0.5V to 4.5V
- Red : (+) +12V
- Black : (-) Mass
- White : Not used

Wiring with a 3MO display



DISPLAY PROGRAMMING (GEARTRONICS UNIT)

In order for the display to show the selected gear, the position of the potentiometer and hence the selector barrel position must be learned for each gear. This is achieved by entering programme mode by use of the red button, adjacent to the connector on the bottom of the unit.

Gently press and hold the button for 3 seconds. The display will flash the repeating sequence 'P 4 5 6 7'. Momentarily press the button when the display is showing the number of forward gears, not including neutral & reverse. The display will now show 'R'. Select reverse gear and press the button momentarily (this applies even if your gearbox uses a separate lever to engage reverse, as is the case with gearboxes having the 1N23456 gear order). The display will then show 'N'. Select neutral and press the button again. The display will then show '1'. Select first gear and press the button.

Continue in this fashion until all gears have been selected. The display will then flash a repeating sequence of 'P R N B'. This allows the function of the relay output to be programmed. This can be configured to give a switched ground output for Reverse, Neutral or Both neutral and reverse.

Notes:

1. If the potentiometer is moved or replaced, it may be necessary to repeat the programming routine so that the new gear positions can be learned.
2. Some rotary gearbox potentiometers are only capable of providing an electrical output for approximately 340-350° of rotation. The remaining 10-20° is referred to as the 'dead band'.

The centre of the dead band is when the identification mark on the sensor shaft is pointing away from the cable. If possible, the potentiometer should be positioned such that the rotation of the selector barrel does not cause the potentiometer wiper to travel across the dead band. In most instances the shaft can be turned through 180° to achieve this. The programming algorithm is designed to work with the shaft in any position, but potentiometer wear can be an issue if the wiper repeatedly crosses the dead band.