







# **USER MANUAL**

# CONTENTS

1.	OVERVIEW OF THE CAR	5
2	CONTACTS	7
	2.1. Organizer	7
	2.2. Technical contacts	7
	2.3. Manufacturer	7
	2.4. Renault Sport extranet	8
3.	OVERALL DESCRIPTION	9
	3.1. Dimensions	9
	3.2. Capacities	10
	3.3. Technical Specifications	10
	3.4. Identification plate	11
4	, USE	11
	4.1. Switch panel	11
	4.2. Elementary procedure	12
	4.2.1. Starting procedure	12
	4.2.2. Gear shifting procedure	12
	4.2.3. Switching off procedure	12
	4.3. Safety equipment	12
	4.3.1. Extinguisher	12
	4.3.2. Safety procedure	14
	4.4. Ballast location	15
5.	CHASSIS	16
•	5.1. Reference plan	16
	5.2. Basic Setup	16
	5.3. Setup adjustment	17
	5.4. Aerodynamic	18
	5.4.1. Aero setup	18
	5.4.2. Rear wing endplate position	20
	5.5. Suspension geometry	22
	5.5.1. Toe/Camber shims position	22
	5.5.2. Rear bracket position	23
	5.6. Wheel stud	23
	5.7. Wheel stud locking system	25
	5.7.1. Mounting description	25
	5.7.2. Removing description	28
	5.7.3. Mounting back description	29
	5.8. Damper setting	29
	5.9. Front antiroll stiffness setting	30
	5.10. Pedals	31
	5.11. Brakes	31
	5.11.1. Discs / Pads bedding in procedure	31
	5.11.2. Wear	31
	5.11.3. Brake balance device	31
	5.11.4. Bleeding brake system	32
	5.11.5. Brake reservoir mounting	34
	5.11.6. Caliper piston springs	35





	37
5.13. Radiator nets	38
5.14. Camera	38
5.15. Nosebox cap change	39
5.16. Monocoque repair	39
5.17. Tightening torques	40
5.18. Damper displacement sensors mounting	41
5.18.1. Front suspension	41
5.18.2. Rear suspension	42
5.19. Beacon receiver mounting details	43
5.20. Safety Harness	43
5.21. Extractable seat	44
5.22. Driving seat dimension	46
5.23. Higher Roll Hoop	47
5.24. 2015 Fuel System	47
6. ENGINE	52
6.1. Engine identification	52
6.2. Characteristics	52
6.3. Seals	53
6.4. Engine working parameter	53
6.5. Sensors	54
6.6. Dash alarm threshold	54
6.7. Water system bleeding	55
6.8. Fuel tank draining	55
6.9. Oil system draining and oil level measuring	57
7. TRANSMISSION / GEARBOX	58
7.1 Clutch bleeding procedure	EО
	20
7.2. Ratio charts	58 59
7.2. Ratio charts	58 59 59
<ul><li>7.2. Ratio charts</li><li>7.3. Lubrification</li></ul>	59 59 59 60
<ul> <li>7.2. Ratio charts</li></ul>	59 59 60 61
<ul> <li>7.2. Ratio charts</li></ul>	50 59 59 60 61 63
<ul> <li>7.2. Ratio charts</li></ul>	50 59 59 60 61 63 65
<ul> <li>7.2. Ratio charts</li> <li>7.3. Lubrification</li> <li>7.4. Glue components</li> <li>7.5. Gears</li> <li>7.6. Selector</li> <li>7.7. Differential</li> <li>7.8. Final drive</li> </ul>	50 59 59 60 61 63 65 66
<ul> <li>7.1. Clutch block of proceeding proceeding and the second secon</li></ul>	50 59 59 60 61 63 65 66 67
<ul> <li>7.1. Clutch block of proceeding proceeding proceeding and proceeding proceeding of the second seco</li></ul>	58 59 59 60 61 63 65 66 67 70
<ul> <li>7.1. Clutch block of proceeding proceeding and the second secon</li></ul>	58 59 59 60 61 63 65 66 67 70 71
<ul> <li>7.2. Ratio charts</li></ul>	58 59 59 60 61 63 65 66 67 70 71 72
<ul> <li>7.1. Clutch block of proceeding proceeding and the second secon</li></ul>	50 59 59 60 61 63 65 66 70 71 72 73
<ul> <li>7.1. Clutch blecding procedure.</li> <li>7.2. Ratio charts</li></ul>	58 59 60 61 63 65 66 67 70 71 72 73 <b>74</b>
<ul> <li>7.1. Clutch blocking procedure.</li> <li>7.2. Ratio charts</li></ul>	58 59 59 60 61 63 65 66 70 71 72 73 74 74
<ul> <li>7.1. Clutch blockung procedure:</li> <li>7.2. Ratio charts</li> <li>7.3. Lubrification</li> <li>7.4. Glue components</li> <li>7.5. Gears</li> <li>7.6. Selector</li> <li>7.7. Differential</li> <li>7.8. Final drive</li> <li>7.9. Bearings</li> <li>7.10. Clutch shaft</li> <li>7.11. Rebuilding of the gearbox</li> <li>7.12. Driveshaft</li> <li>7.13. Gear shift setup</li> <li>8. ELECTRONICS</li> <li>8.1. Dashboard</li> <li>8.1.1. Driver pages</li> </ul>	58 59 59 60 61 63 65 66 70 71 72 73 74 74 74
<ul> <li>7.2. Ratio charts</li></ul>	58 59 59 60 61 63 65 66 70 71 72 73 74 74 75
<ul> <li>7.1. Clatch biccurry procedure.</li> <li>7.2. Ratio charts .</li> <li>7.3. Lubrification .</li> <li>7.4. Glue components .</li> <li>7.5. Gears .</li> <li>7.6. Selector</li> <li>7.7. Differential</li> <li>7.8. Final drive .</li> <li>7.9. Bearings</li> <li>7.10. Clutch shaft</li> <li>7.11. Rebuilding of the gearbox</li> <li>7.12. Driveshaft</li> <li>7.13. Gear shift setup</li> <li>8. ELECTRONICS</li> <li>8.1. Dashboard</li> <li>8.1.2. Diag pages</li> <li>8.1.3. Diag CAN</li> </ul>	58 59 59 60 61 63 66 67 71 72 73 74 74 75 76
<ul> <li>7.1. Citter Dicedulty procedule</li></ul>	58 59 59 60 61 63 65 66 70 71 72 73 74 74 75 76 77
<ul> <li>7.1. Clitch Dictang procedule:</li> <li>7.2. Ratio charts</li> <li>7.3. Lubrification</li> <li>7.4. Glue components</li> <li>7.5. Gears</li> <li>7.6. Selector</li> <li>7.7. Differential</li> <li>7.8. Final drive</li> <li>7.9. Bearings</li> <li>7.10. Clutch shaft</li> <li>7.11. Rebuilding of the gearbox</li> <li>7.12. Driveshaft</li> <li>7.13. Gear shift setup</li> <li>8. ELECTRONICS</li> <li>8.1. Dashboard</li> <li>8.1.2. Diag pages</li> <li>8.1.3. Diag CAN</li> <li>8.1.4. Display settings</li> <li>8.1.5. Dash configuration</li> </ul>	58 59 59 60 61 63 65 66 70 71 72 73 74 74 75 77 77 77
<ul> <li>7.1. Clutch Dictum procedure:</li> <li>7.2. Ratio charts</li></ul>	58 59 59 60 61 63 66 67 71 72 73 74 74 75 77 77 81
<ul> <li>7.1. Clutch blocking procedules</li> <li>7.2. Ratio charts</li></ul>	58 59 59 60 61 63 65 66 70 71 72 73 74 74 75 77 77 81 82
<ul> <li>7.1. Eatior bretsing procedure and a second secon</li></ul>	58 59 59 60 61 65 66 70 71 72 73 74 74 75 77 77 81 82 84
<ul> <li>7.1. Ratio charts</li></ul>	58 59 59 60 61 65 66 70 71 72 73 74 74 75 77 77 82 84 84
<ul> <li>7.1. Ratio charts</li></ul>	58 59 59 60 61 65 66 70 72 73 74 74 75 77 77 82 84 85
<ul> <li>7.2. Ratio charts</li> <li>7.3. Lubrification</li> <li>7.4. Glue components</li> <li>7.5. Gears</li> <li>7.6. Selector</li> <li>7.7. Differential</li> <li>7.8. Final drive</li> <li>7.9. Bearings</li> <li>7.10. Clutch shaft</li> <li>7.11. Rebuilding of the gearbox</li> <li>7.12. Driveshaft</li> <li>7.13. Gear shift setup</li> <li>8. ELECTRONICS</li> <li>8.1. Dashboard</li> <li>8.1.2. Diag pages</li> <li>8.1.2. Diag pages</li> <li>8.1.3. Diag CAN</li> <li>8.1.4. Display settings</li> <li>8.1.5. Dash configuration</li> <li>8.1.6. Synthesis operation</li> <li>8.1.7. Dash screen</li> <li>8.2. Transponder</li> <li>8.3. Gear cut switch loom passing</li> <li>8.4. Composition of the PI Data system kit</li> <li>8.5. Data acquisition</li> </ul>	58 59 59 60 61 65 66 70 71 72 73 74 74 75 77 77 81 82 84 85 88



# FORMULA 16

8.5.1. Software Inst	all	88
8.5.2. Downloading	data	88
8.5.3. CF card settin	ig and formatting	88
8.6. Data analysis		93
8.6.1 Configuration	via software	93
8.6.2. Opening data		93
8.6.3. Analyzing dov	vnloaded data	94
9. ELECTRICAL		98
9.1. Loom versions an	d updates	98
9.2. Main Loom	·	99
9.3. Front Loom	1	.09
9.4. Engine Loom	1	.12

The repair procedures prescribed by the manufacturer in this manual have been written in compliance with the technical specifications in force at publication issuing date. They are subject to modifications in case of changes made by the manufacturer to the production of the various components and accessories of his brand name vehicles".

All copyrights are reserved to RENAULT SPORT TECHNOLOGIES.

Reproducing or translating this document, even partially, and using the spare parts reference numbering system are prohibited without the previous written consent of SIGNATECH AUTOMOBILES

#### © RENAULT SPORT TECHNOLOGIES 2015



# **1. OVERVIEW OF THE CAR**

















# **2. CONTACTS**

#### 2.1. Organizer

#### RENAULT SPORT

Renault Sport Technologies ZA Courtaboeuf 2 14, Avenue des Tropiques 91978 Les Ulis Courtaboeuf Cedex FRANCE Tel : +33-1 76 82 40 00 Sporting coordinator: Rudy Thomann rudy.thomann@renault.com

#### 2.2. Technical contacts

For any questions or advice, please contact:

#### **RENAULT** SPORT

#### **Renault Sport Technologies**

ZA Courtaboeuf 2 14, Avenue des Tropiques 91978 Les Ulis Courtaboeuf Cedex FRANCE Tel : +33-1 76 82 40 00 Fax : +33-1 76 82 12 40 http://extranet.renault-sport.com

#### Racing Technical Support: Guillaume Argy Tel: +33-1 76 84 18 93 Mob: +33-6 84 93 86 46 guillaume.argy-renexter@renault.com Racing Technical Dpt Referent: Julien Jehanne Tel: +33-1 76 82 41 25 julien.jehanne-renexter@renault.com

FORMUL

### 2.3. Manufacturer



Signatech Automobiles Parc Esprit 1 Rue Michael Faraday 18000 Bourges France Tel/Fax :+33-2 48 02 01 77 Racing Technical Support: Lionel Chevalier Tel: +33-2 48 02 01 77 lionel@signature-team.com

**Spare Parts:** Florent Pacholak Tel : +33-2 48 02 01 77 <u>signatech@signature-team.com</u>





### 2.4. Renault Sport extranet

The Renault Sport Extranet website is accessible for every FR1.6 owners, after asking for an access directly from the welcome page of the website:

http://extranet-competition.renault-sport.com/



or

All the technical documents issued are available through this website:

- Technical Regulations
- User Manual
- Technical Bulletins & Information Notes
- Spare parts catalogue
- Softwares
- HQ Loom drawings and so on.





# **3. OVERALL DESCRIPTION**

## 3.1. Dimensions



4118



Overall length	4118 mm
Overall width	1690 mm
Overall height	1000 mm
Wheelbase	2651 mm
Front track	1486 mm
Rear track	1436 mm
Front overhang	935 mm
Rear overhang	521 mm





# 3.2. Capacities

Products	Quantity	Characteristics
Petrol	43 L	Unleaded 98
Engine oil	Around 6.5 L	Elf HTX 825 (10W60)
Gearbox oil	2.1 L	Elf HTX 735 (75W90)
Coolant	6 L	Distilled water + KeepCool fluid Danielson)
Brake fluid	0.4 L	Elf HTX 115
Clutch fluid	0.15 L	Elf HTX 115

# 3.3. Technical Specifications

Weight	483 kg without driver and fuel (with catalyser exhaust)			
Front suspension Push road, mono damper unit (non adjustable)				
Rear suspensionPush road, twin damper unit (non adjustable)				
Wheels	Rims : one piece Speedline aluminium alloy rim with central nut Rims size : Fr 8"x13" Rr 10"x13 Kumho tyres : Fr 180/53x13 Rr 220/54x13			
	Dunlop tyres : Fr 175/535x13 Rr 230/535x13			
Brakes	4 piston Alcon calipers, 274x18.5mm ventilated discs Right/Left foot adjustable pedal			
Engine	Renault Sport Type : K4M 854 – 1.6L Max power : 140 bhp @ 6800 rpm Max torque : 160 Nm @ 4500 rpm			
	Max revs : 7200 rpm			
Transmission	SADEV SL66 5 front gears + one reverse gear Shift cut system Free differential			





# 3.4. Identification plate

The car is identified by a plate with the car type and the chassis number.



# **4. USE**



- 1- Unused Connector
- 2- Main switch
- 3- Rain light switch
- 4- Connector for the mechanic electronic throttle (joystick)
- 5- Dashboard reset
- 6- Neutral and reverse handgrip
- 7- Ignition switch
- 8- Starter button
- 9- Fuel pump switch for drain tank
- 10- Fire extinguisher handgrip
- 11- Brake balance handgrip (clock wise increases front brake pressure)

"ON" is the up position of the switches





#### 4.2. Elementary procedure

#### 4.2.1. Starting procedure

- Switch the master switch and the ignition on.
- No throttle.
- Push the starter button few seconds. The engine must start.
- If the engine doesn't start, switch ignition of f and on and push the starter button again.
- After starting you can accelerate gently.
- Warm the engine up to 80°C before running.

### 4.2.2. Gear shifting procedure

N -> 1st	1 - Push the clutch pedal
	2 - Pull the gear lever
1st -> 2nd -> 3rd -> 4th -> 5th	1 - Pull the gear lever
5th -> 4th -> 3rd -> 2nd -> 1st	1 - Push the gear lever
1st -> N	1 - Push the clutch pedal
	2 - Pull the gear lever
N -> R	1 - Push the clutch pedal
	2 - Pull the neutral and reverse handgrip
	3 - Push the gear lever
R -> N	1 - Push the clutch pedal
	2 - Pull the gear lever

#### 4.2.3. Switching off procedure

- Switch the ignition off.
- Switch the main switch off.

#### 4.3. Safety equipment

#### 4.3.1. Extinguisher







The extinguisher is located under the fuel tank, behind the driver seat. The support must be first tightened on the extinguisher and then fitted on the tub.



When you'll tight the extinguisher in its support, take care to have the pressure gauge parallel at the support's fixation face and on the top of the extinguisher.

This is necessary to connect the extinguisher with the extinguisher hose.

The extinguisher gauge must be in green area all time.



Two models of extinguishers are allowed on the car:

- Lifeline Zero2000 3,375L
- Sparco FW20-10 4,25L

The extinguisher nozzles are located in two points:

• One in the cockpit







• Two in the engine area



#### 4.3.2. Safety procedure

In case of fire, the driver pulls the handgrip on the right side of the steering wheel or an external person pulls the red ring on the right side of the roll hoop.

This action triggers the extinguisher and switches the electrical system off. After this action, the electrical system can be on again only by pushing the fire switch on the extinguisher ones (Spare parts catalog page 14 Ref 12). If the fire switch is off, the master switch is off too.

Fire extinguisher cables are located in two points:

Behind the roll hoop

Inside the cockpit







The two following types of external extinguisher command are allowed to use on the car:



Pulling command



Pulling loop cable

#### 4.4. Ballast location

The ballast must be placed inside the cockpit, under the driver seat. The lead ballast has to be fitted between the bottom of the chassis and the stainless steel cover.

Ballast system are described as follows:

- 3mm stainless steel cover : 2.0kg
- 1.5 mm lead ballast: 1.5kg

Maximum ballast weight possible: +/- 15kg.

You can only fit the steel cover plate.

Mounting screws: 3 FHC M5 with diam5x12 washers and nylstop nuts. Length depending of the thickness of the ballast







# **5. CHASSIS**

### 5.1. Reference plan

The red area on the picture below is the reference plan (the bottom of the monocoque without rear floor).



### 5.2. Basic Setup

Gearbox	Final drive	1st	2nd	3rd	4th	5 <sup>th</sup>
SADEV SL66	10/31	11/35	14/31	18/30	19/25	25/27

	Front		Rear	
SPRINGS				
Spring Stiffness [lb/in - daN/mm]	800	14	700	12.3
Motion Ratio Wheel / Damper	0.	86	1.	18
DAMPERS	Nad	al Tech n	on adjust	able
ANTIROLL				
Bellevilles Stack	11	x1		
Motion Ratio Wheel / Bellevilles	1.	77		
Element Stiffness [daN/mm]	81			
GEOMETRY				
Ride Height [mm]	18 33		3	
Castor [°]	10	٥٥		
Camber [°]	-3.5°	-3.5°	-2.5°	-2.5°
Toe per Wheel	1,5 mm OUT 1 mm IN		n IN	
Roll centre position vs ground [mm]	2	3	5	2
Anti-Dive	38% 15%		%	
Anti-Squat			40	%





WINGS		
Main [°]	4°	9°
Flap [°]		P2 = 3°
TYRES		
Pressure [bar] @ 20° C	1.2	1.2
Hot Pressure [bar]	1.5-1.6	1.5-1.6
Kumho Circumference [mm]	1665	1696

# 5.3. Setup adjustment

Adjustment	Front	Rear				
RIDE HEIGHT change						
1 turn of damper platform (2mm)	1.7 mm	2.4 mm				
	CAMBER change					
1 mm shim	0.285°	0.278°				
3.5mm shim	1°	0.97°				
+10mm ride height	-0.3°	+0.15°				
TOE change						
1 turn (1mm)	0.653° around 4 mm at the Wheel					
1.5 flat	1 mm at the wheel					
1mm shim		0.157° around 1 mm at the wheel				
	CASTER change					
1mm shim	0.218°					
	WING change					
1mm shim	-0.6°					

Special damper spanners are available (one for each size of platform)





# 5.4. Aerodynamic

### 5.4.1. Aero setup



#### Ride Height Measurement Place







Flap Angle adjustment – shims position

The front wing shims must only be fitted on the rear of the front wing brackets.

Available shims thickness: 0.5mm, 1mm and 2mm.

Without shims, the wing angle is 5° (Maximum value)





Rear wing



0° parallel to the car floor or to the reference plan on the top of the bellhousing

#### 5.4.2. Rear wing endplate position

The rear wing endplate angle is ruled according to the picture below:



The chassis reference plane and the endplate reference plane must be parallel  $(angle=0^{\circ}\pm1^{\circ})$  and must be measured using a digital level following the procedure below:

I. <u>Chassis reference plane</u>: the chassis reference is the top surface of the catch tank along the longitudinal axis as shown on the photo below:

The digital level must prior be reset to 0 on this reference plane







II. <u>Rear wing endplate reference plane:</u> Top edge of the rear wing endplate

The digital level must be positioned on the top edge of the endplate as shown below:



In order to respect this rule, the rear wing endplate angle can be adjusted thanks to the rear mainplane angle setting options (left side) and the lower rear wing brackets using the setup slot (right side) as shown on the picture below:







### 5.5. Suspension geometry

### 5.5.1. Toe/Camber shims position



Rear toe and camber shims are the same.





#### 5.5.2. Rear bracket position



Only one rear bracket position is allowed (red fixing points)

#### 5.6. Wheel stud

A specific care must be paid during the wheel stud mounting or replacement following strictly the recommendations below:

• Check all your wheel studs fitted on your car

Note:

Old version of wheel studs MUST be replaced by the new wheel stud specification The wrong old wheel studs can be recognized as follows:







- Lock the wheel hub with a roll pin set or a screwdriver between brake disc and calliper for the rear, or using the specific tool G04-20A001V1 for the front.
- Heat the wheel stud around 200°C with a heater gun in order to overheating and ruining the thread locker (Loctite).
- Loose the wheel stud. The loosing torque must not exceed 350Nm. If the loosing torque is higher, the thread locker is not enough ruined. Heat again the wheel stud.
- Clean the wheel stud from the remaining Loctite either the homocinetic joint for the rear or the front bearing stud for the front.
- Check carefully the wheel stud abutment face of the homocinetic joint (rear) or the front bearing (front) from excessive wear. The abutment face must be smooth without wear mark on it in order to ensure a good contact between the wheel stud and the homocinetic joint or front bearing.

If excessive wear is noticed, the homocinetic joint or front bearing must be changed (please see example below)



Excessive deep wear around the wheel stud abutment face. Homocinetic joint must be changed.

- Degrease the wheel stud thread and put Loctite 270 on the homocinetic joint for the rear or the front bearing stud for the front. Put a sufficient amount of Loctite.
- Tight the wheel stud to 350Nm.

#### Note:

Wheel stud tightening torque must be regularly checked following the procedure above.





### 5.7. Wheel stud locking system

In order to secure the Rear Wheel Studs (**G04-17B008V2 Wheel Stud**) mountig, a Wheel Stud Lock (**G04-17B019V1 Wheel Stud Lock**) <u>must be</u> mounted on the left rear wheel of the car.



#### 5.7.1. Mounting description

• Prior to assembly, check transmission and hub parts from wear and ensure that they are in good conditions.

• Proceed to the upright assembly **tightening the Wheel Stud to 350Nm** and bonding the Wheel Stud using Loctite 270.

• Place the Wheel Stud Lock as shown in the picture below positioning the countersunk face inward and push it as much as you can in the Outer Hub (**G04-17B005V1 Outer Hub**)











Now, you will have to drill the Outer Hub and the Wheel Stud Lock together with a Ø5 mmp drill bit following the steps below :

• Block the Wheel Stud Lock by using a spacer (External Ø50, internal Ø46 and 43 mm length) and hand tight the wheel nut (do not tighten too much due to the cone)



• Choose a location onto the wheel centering surface of the Outer Hub to drill a Ø5 mm hole ensuring that the hole is drillet perpendicularly to a Wheel Stud plane Face as shown on the picture below :







• Drill the Ø5mm hole according to the drawing below for the position hole



- Drill until you start to drill the Wheel Stud Lock (4-5 mm maximum)
- Remove the Wheel Stud Lock and finish drilling it through
- Put the Wheel Stud Lock back in its place (be sure that the two holes are exactly in front of each other) and block it as previously





- Start to thread in M6 the two parts together. As for drilling thread to 4-5 mm the Wheel Stud Lock
- Remove the Wheel Stud Lock and finish M6 thread

• When the M6 thread is finished, put the Wheel Stud Lock back in its place and mount and tight the STHC M6 x 12 (G04-21A081V1 STHC M6 x 12) at 10Nm using Loctite 243



### 5.7.2. Removing description

To remove the Wheel Stud :

- Untighten an remove the screw STHC M6 x 12
- Remove the Wheel Stud Lock with the help of two CHC M3 x 8 (G04-
- 21A080V1 CHC M3 x 8) as per the photo below

Two screws CHC M3 x 8 may be mounted in the two M3 threatened holes toç remove the Wheel Stud Lock when necessary.



![](_page_27_Picture_13.jpeg)

![](_page_28_Picture_1.jpeg)

#### 5.7.3. Mounting back description

To mount back the Wheel Stud Lock, repeat the mounting operation by choosing a new plane face of the Wheel Stud ensuring not to drill and thread in the older threatened hole. Hence, this new assembly method only allows 6 mountings.

### 5.8. Damper setting

![](_page_28_Figure_5.jpeg)

force	[kg]
-------	------

[mm/sec]	bump min	bump	bump max	rebound min	rebound	rebound max
20	14,35	15,60	16,85	-13,16	-14,30	-15,44
100	44,34	48,20	52,06	-50,05	-54,40	-58,75
160	58,88	64,00	69,12	-71,02	-77,20	-83,38

gas force measured at middle stroke = 15kg + -1,5kgall measures are done at  $30^{\circ}C$  shock temperature

![](_page_28_Picture_9.jpeg)

Snood

![](_page_29_Picture_1.jpeg)

### 5.9. Front antiroll stiffness setting

The front antiroll stiffness is set by a Belleville washer stack. Belleville dimensions: diam  $31.4 \times 16.4$ mm thickness 1.75mm

Only following Belleville stacks with the corresponding spacers are allowed:

Stack	Spacer	Stiffness (daN/mm)	Max Deflection (mm)
4x2 <<>><<>>	6x1 >>>>>	444	2.4
5x2 <<>><<	4x1 >>>>	355	3.0
6x2 <<>><<>>	4x1 >>>>	296	3.6
7x2 <<>><<>><<		254	4.2
8x2 <<>><<>>		222	4.8
9x2 <<>><<>><<>>		197	5.4
5x1 <><><	9x1 >>>>>>>	178	3.0
6x1 <><><>	7x1 >>>>>>	148	3.6
7x1 <><><>	6x1 >>>>>	127	4.2
8x1 <><><>	5x1 >>>>>	111	4.8
9x1 <><><><	4x1 >>>>	99	5.4
10x1 <><><><>	4x1 >>>>	89	6.0
11x1 <><><><><		81	6.6
12x1 <><><><><>		74	7.2
13x1 <><><><><><		68	7.8
14x1 <><><><><>		63	8.4
15x1 <><><><><><		59	9.0
16x1 <><><><><><><>		56	9.6

Take care to respect the mounting direction of the Belleville stack with the smaller diameter of the Belleville in contact with the preload nut.

If the Belleville stack needs a spacer, the spacer has to be mounted after the Belleville stack with the bigger diameter in contact with the preload nut.

![](_page_29_Picture_8.jpeg)

![](_page_30_Picture_1.jpeg)

### 5.10. Pedals

![](_page_30_Figure_3.jpeg)

There are possible pedal box positions (A, B, C, D, E and F).

- Install the Pedal Box in the chassis and fit it in the chosen position.

Tighten the screws.

### 5.11. Brakes

### 5.11.1. Discs / Pads bedding in procedure

- During the first 2 laps do not over heat the new brake discs and pads. Brake earlier than usually and with less brake pressure (50%) Don't be aggressive; warm progressively the brakes by small and frequent braking: every 10 seconds.
- After 2 laps, do half slow lap to cool down the brakes
- Do again 2 laps like the first ones but with more brake pressure (75%)
- Do half lap to cool down the brakes and so after 5 laps you can brake like usual.

### <u>5.11.2. Wear</u>

Disc nominal thickness: 18.5mm Disc minimal thickness: 16.5mm

#### 5.11.3. Brake balance device

The driver can adjust the brake balance device from inside the cokpit.

Turn control ( 1 ) clockwise to increase braking on front and decrease it on rear.

Turn control ( 1 ) counter clockwise to decrease braking on front and increase it on rear.

![](_page_30_Picture_19.jpeg)

![](_page_30_Picture_20.jpeg)

![](_page_31_Picture_1.jpeg)

#### 5.11.4. Bleeding brake system

*Frequency :* You should bleed the brakes before each track event and, if the pedal becomes soft during an event, it may even be necessary to bleed between sessions. If you find yourself bleeding between sessions, then you should look for any loose connections or other sources of leaks.

#### Supplies required :

- Box-end wrench suitable for your car's bleeder screws. An offset head design usually works best.

- Extra FR1.6 brake fluid Elf HTX 115.

- 12-inch long section of clear plastic tubing, ID sized to fit snugly over your car's bleeder screws.

- Disposable bottle for waste fluid.

- One can of brake cleaner
- One assistant (to pump the brake pedal)

Car preparation and support :

- 1. Loosen the nut of the wheels and place the entire car on jack stands. Be sure that the car is firmly supported before going ANY further with this procedure
- 2. Remove all wheels
- 3. Check the level of the brake fluid reservoir. Add fluid as necessary to ensure that level is at the MAX marking of the reservoir. Do not let the reservoir become empty at any time during the bleeding process!

Bleeding procedure :

- 1. Begin at the rear axle then bleed the front axle. The actual sequence is not critical to the bleed performance. This will also allow the system to be bled in such a way as to minimize the amount of potential cross-contamination between the new and old fluid.
- 2. Locate the bleeder screw at the rear of the caliper body.
- 3. Place the box-end wrench over the bleeder screw. An offset wrench works best since it allows the most room for movement.
- 4. Place one end of the clear plastic hose over the nipple of the bleeder screw.
- 5. Place the other end of the hose into the disposable bottle.
- 6. Place the bottle for waste fluid on top of the caliper body or drum assembly. Hold the bottle with one hand and grasp the wrench with the other hand.
- 7. Instruct the assistant to "apply". The assistant should pump the brake pedal three times, hold the pedal down firmly, and respond with "applied". Instruct the assistant not to release the brakes until told do so.
- 8. Loosen the bleeder screw with a brief ¼ turn to release fluid into the waste line. The screw only needs to be open for one second or less. (The brake pedal will sink completely as the bleeder screw is opened. Instruct the assistant in advance not to release the brakes until instructed to do so.)
- 9. Close the bleeder screw by tightening it gently. Note that it is not necessary to pull on the wrench with excessive force. Usually just a quick tug will do.

![](_page_31_Picture_25.jpeg)

![](_page_32_Picture_1.jpeg)

- 10.Instruct the assistant to "release" the brakes. Note: do NOT release the brake pedal while the bleeder screw is open, as this will suck air back into the system!
- 11. The assistant should respond with "released".
- 12.Inspect the fluid within the waste line for air bubbles.
- 13.Continue the bleeding process (steps 11 through 16) until air bubbles are no longer present. Be sure to check the brake fluid level in the reservoir after bleeding each wheel! Add fluid as necessary to keep the level at the MAX marking. (Typically, one repeats this process 5-10 times per wheel when doing a standard' bleed).
- 14.Move systematically toward the driver right rear, left rear, right front, left front repeating the bleeding process at each corner. Be sure to keep a watchful eye on the brake fluid reservoir.
- 15. When all four corners have been bled, torque each bleed screw to 14 17 Nm and spray (and any other parts that were moistened with spilled or dripped brake fluid) with brake cleaner and wipe dry with a clean rag. (Leaving the area clean and dry will make it easier to spot leaks through visual inspection later!). Try to avoid spraying the brake cleaner DIRECTLY on any parts made of rubber or plastic, as the cleaner can make these parts brittle after repeated exposure.
- 16.Test the brake pedal for a firm feel. (Bleeding the brakes will not necessarily cure a "soft" or "mushy" pedal since pad taper and compliance elsewhere within the system can contribute to a soft pedal. But the pedal should not be any worse than it was prior to the bleeding procedure!)
- 17.Be sure to inspect the bleeder screws and other fittings for signs of leakage. Correct as necessary.
- 18.Properly dispose of the used waste fluid as you would dispose of used motor oil. Important: used brake fluid should NEVER be poured back into the master cylinder reservoir!

Vehicle completion and test :

- 1. Re-install all wheels.
- 2. Raise the entire vehicle and remove jack stands. Torque the lug nuts to the manufacturer's recommended limit.
- 3. With the vehicle on level ground and with the car NOT running, apply and release the brake pedal several times until all clearances are taken up in the system. During this time, the brake pedal feel may improve slightly, but the brake pedal should be at least as firm as it was prior to the bleeding process.
- 4. Test the vehicle to confirm proper function of the brakes.

![](_page_32_Picture_16.jpeg)

![](_page_33_Picture_1.jpeg)

#### 5.11.5. Brake reservoir mounting

An evolution of the old brake reservoir assembly has been done as shown below:

![](_page_33_Picture_4.jpeg)

![](_page_33_Picture_5.jpeg)

Old mounting

New mounting

To achieve the new mounting, you must follow the following instructions:

- Disassemble the brake reservoirs removing the counter nut
- Release the banjo screw mounted with the brake reservoir

![](_page_33_Picture_11.jpeg)

![](_page_33_Picture_12.jpeg)

![](_page_34_Picture_1.jpeg)

• Cut the outer threaded section of the banjo screw to a length 12mm as follows:

![](_page_34_Picture_3.jpeg)

Cut the banjo to a length of 12mm

- Assembly the banjo screw with the brake reservoir
- Fit back the brake reservoir on the brake master cylinder fitting between a copper seal washer (11x15mm) as follows:

![](_page_34_Picture_7.jpeg)

Fit a copper seal washer

5.11.6. Caliper piston springs

Caliper piston springs can be removed following the procedure below:

• Remove the caliper bridge pipe.

![](_page_34_Picture_12.jpeg)

![](_page_34_Picture_13.jpeg)

![](_page_35_Picture_1.jpeg)

• Place a block of wood (or similar) in the middle of the caliper.

![](_page_35_Picture_3.jpeg)

• Place an air blow gun in the hole of the caliper pipe and pressurize to push the pistons out.

![](_page_35_Picture_5.jpeg)

![](_page_35_Picture_6.jpeg)

• Remove the block of wood and remove the springs

![](_page_35_Picture_8.jpeg)

- Put the pistons back in place.
- Repeat these steps for the other side of the caliper.
- Put the caliper pipe back in place.

![](_page_35_Picture_12.jpeg)


### 5.12. Steering column universal joint

To avoid any interference in the steering column universal joint, the distance between the tub top and the back of the steering column universal joint must not be lower than 45mm as defined below:



It is allowed to trim the edge of the universal joint in case of remaining interferences.







### 5.13. Radiator nets

It's allowed to fit radiator nets onto the car following these points below:

• Radiator nets must be fitted inside the sidepod. Nets location is ruled at 5cm behind the sidepod inlet section as shown below:



• Shape and dimensions of the nets are free

### 5.14. Camera

Any camera with inboard battery (like GoPro®) fitted on the car must have its casing safely secured to the car using a steel wire (or similar) as shown below:



Camera casing to be secured with a steel wire





### 5.15. Nosebox cap change

In case of nosebox cap damage, it's possible to change it.

- Cut the nosebox cap at the mentioned dimensions. Around 20mm of the nose cap is still on the nosebox.
- Unstick carefully this part of the nose cap. Take care not to damage the main part of the nosebox.
- Use "ARALDITE 2031" to bond the new nose cap.

For safety reason it's forbidden to repair the nosebox if the honeycomb is damaged.



## 5.16. Monocoque repair

Please contact Signatech Automobiles.

• For Sweden :

Daniel Andersson Speed Perfection Sweden AB Gryllbergsv 9 774 61 Avesta Sweden Phone : +46 73 - 09 76 280 Mail : daniel@speedperfection.com

• For Netherland :

Advanced Composite Repairs mercuriusstraat 18F 3133 EN Vlaardingen





Phone : 0031(0)648354612 www.advancedcompositerepairs.com

# 5.17. Tightening torques

Bolt and nut	Nm
М5	10
M6	14
M8	25
M10 Roll Hoop	45
M10	40
M18 Wheel Nut	140
M20 Wheel Stud	180
Brake Bleeder	12





### 5.18. Damper displacement sensors mounting



### 5.18.1. Front suspension

- 1. G04-17D017V1 Machined Screw for Damper Displacement Sensor
- 2. Nut H M3
- 3. FHC M3 x 45
- 4. G04-18A036V2 Damper Displacement Sensor with DTM connector

To mount the damper displacement sensor on the front rocker, replace the CHC M8 x 45 by the part "**G04-17D017V1 Machined Screw for Damper Displacement Sensor**". Use the nuts H M3 to tight the FHC M3 x 45 on the "**G04-17D017V1 Machined Screw for Damper Displacement Sensor**" and to avoid any contact between the sensor and the damper.







#### 5.18.2. Rear suspension



- 1. G04-17D017V1 Machined Screw for Damper Displacement Sensor
- 2. FHC M3 x 20
- 3. G04-16D013V1 Damper Displacement Sensor Support
- 4. G04-18A036V2 Damper Displacement Sensor with DTM connector
- 5. Flat Washer Ø3 x 10
- 6. Nylstop M3

To mount the damper displacement sensor on the rear rocker, replace the CHC M8 x 45 by the part "G04-17D017V1 Machined Screw for Damper Displacement Sensor". Place the part "G04-16D013V1 Damper Displacement Sensor Support" on the bell housing : use the two threaded holes (the closest to the back of the tub) used to mount the Catch Tank Hatch.









# 5.19. Beacon receiver mounting details

There is only one possible position for the **G04-05B007V2 Beacon Receiver** (Rep. 7) in the car. It must be mounted on the part **G04-05B008V2 Beacon Bracket** (Rep.8) on the "tub's back" as shown in the picture.

It can be mounted on the right side or left side of the roll hoop depending position of the track beacon cell with the same part (reversible part).

If the old version of the Beacon receiver (**G04-05B007V1 Beacon Receiver**) is used, you must only mounting it on the **G04-05B008V1 Beacon Bracket**.

### 5.20. Safety Harness

To avoid any problem of fuel in the cokpit, mount 4 STHC M8 x 16 (**G04-21A079V1 STHC M8 x 16 / Rep. 179**) with Loctite 577 in the unused threated hole of the safety harness fixation.







# 5.21. Extractable seat





Rep.	Reference	Part Name	Qty	Comment
	G04-23A000	Extractable Seat		
1	G04-23A001V1	Extractable Seat	1	
11	G04-23A011V1	Centering Pin	2	





To install the Extractable Seat in the car, you have to mount the two Centering Pin (**Rep. 11**) in the two threadened holes shown in the picture below.



You will have to replace the two FHC M5x16 (**G04-21A014V1 FHC M5 x 16**) shown in the picture below by two FHC M5 x 12 (**G04-21A012V1 FHC M5 x 12**).

Please keep in mind that, in the event of a serious crash, the driver should be extracted with no harm and difficulty. For this purpose you have to make sure that the following points below are strictly respected when you make your driver's seat.





- Driver seat must not exceed the carbon shell length and wide
- Driver seat is correctly fitted in the carbon shell
- Holes for leg straps in the carbon shell and in the seat are in front of each other
- Leg straps come out in front of the driver's crotch
- Driver does not sit on the leg straps
- Straps are always visible and easily usable when the driver is in the car
- Middle blue and red straps can be easily extended (i.e. make loops and fit them using bodywork tape to the extractable seat)

Here are some illustrations of these points (sources : F.I.A.) :



The hole made in the driving seat to pass the lower seat belts must be large enough. Some tape can be added on the lower belt in order to avoid any friction during the extraction.

# Failure to respect this rule will be considered as a non conformity

## 5.22. Driving seat dimension

The driving seat must not exceed the carbon shell length and width.





# 5.23. Higher Roll Hoop



To mount the new Roll Hoop (mandatory since 2015) on the cars, you will have to adjust your engine cover in the area around the Roll Hoop following the drawings below.

The fixations holes of the engine cover onto the new roll hoop remain the same than the genuines ones

The 8 BHC M10 x 20 must be tighten at 45 Nm.



## 5.24. 2015 Fuel System

To mount the 2015 fuel system (aeroquip kit), you will have to modify your part "**G04-01A004V2 Fuel Filler Tube**".







Pump Plug ' Plate

On the "Fuel Filler Tube", you will have to remove the Pump Plug following the procedure below.

• Cut with a hacksaw the Pump plug (approximately at 2 - 3 mm from the plate) at the two side of the plate.











• Drill the hole at Ø13 mm. Before drilling, if it's necessary, you can use a flat file to deburr the cutting edges.



• Drill the hole at Ø15 mm



• Deburr the hole with a deburring device or with a deburring cutter. Be sure, you have a good finishing for the mounting of the seal. , if it's necessary, you can use a flat file to remove the remaining weld bead.







• The 2015 Fuel Filler Tube update is done



For the new fuel system mounting, you will have to change the grommet hole used in the tub rear face. The fuel hose passed throught the left one (and the fuel pump wire pass throught the middle grommet now).







You will have to trim an opening in the engine to ensure the good mounting of the fuel line following the drawings below.





Be sure to protect all the parts in this area, from dust and shavings, before starting to increase the opening.





# **6. ENGINE**

# 6.1. Engine identification



# 6.2. Characteristics

Туре	K4M
Number of cylinders	4
Number of valves	16
Engine displacement	1598.4 cm <sup>3</sup>
Bore	79.5
Stroke	80.5
Volumetric ratio	12 : 1
Maximum power	133 hp
Maximum torque	165 Nm at 5650 RPM
Maximum revs	7200





#### 6.3. Seals

The engine is sealed. It is forbidden to carry out any intervention on the engine. An intervention can only be carried out by Renault Sport representatives. The engine seals must always be in good condition. There are three seals on the engine :



### 6.4. Engine working parameter

Oil Temperature	80°C - 140°C
Oil Pressure	1.4 bar - 5 bar
Water Temperature	80°C - 105°C (Optimum 90°C)
Fuel Pressure	3,5 bar ± 0,2 bar
Alternator Voltage	$14V \pm 0,2V$





Revs Limiter	7200 rpm	
Engine must be checked in case of an 8000RPM over rev		
Engine Oil and Filter Oil change	Every 2500km	
Engine Air Filter Cleaning	Every 1000km	

# 6.5. Sensors



Rep.	Reference	Part Name	Qty
25	G04-06A025V1	Air Pressure Sensor	1
26	G04-06A026V1	Camshaft Phase Shifter Solenoid	1
27	G04-06A027V1	Camshaft Sensor	1
28	G04-06A028V1	Knock Sensor	1
29	G04-06A029V1	Air Temperature Sensor	1

# 6.6. Dash alarm threshold

	MIN	MAX
Oil Pressure (bar)	1	8
Coolant Temperature (°C)	0	105
Oil Temperature (°C)	0	140
Vbattery (V)	9	16
Fuel Pressure (bar)	0	11
Gearbox Serve P (bar)	40	65
Gearbox Tank Pr (bar)	1.1	6
Dft Polar Gear	Х	0





### 6.7. Water system bleeding



- Remove the bleeding caps (G04-03A014V1 rep.14) and unscrew (but not totally) the bleeding screw of the water system (CHC M6 x 12 rep. 116) Fill slowly the water tapk until it is half filled

- Fill slowly the water tank until it is half-filled

- After 5 Liters (approximatly) the water will go out of the water box (tighten the bleeding screw), the right radiator (put the bleeding cap back in place) and the left radiator (put the bleeding cap back in place).

- Fill slowly the water tank until it is half-filled

- Start the engine and adjust the water level (water tank half filled)

## 6.8. Fuel tank draining



- Plug the part reference G04-01A018V1 (Fuel Tank draining Connector & Hose 15000 mm, Ø7.5 x 14 mm) on the G04-01A019V1 Quick Release Connector.

- Switch on the dashboard

- Switch on the Fuel Pump Switch. Don't forget to switch it off at the end of the draining!





#### Note: Fuel T connector mounting

To easy the draining of the fuel tank and to avoid removing every time the genuine fuel rail connector, a fuel T-connector equipped with a quick release connector and a fuel pressure sensor must be fitted on the fuel hose as follows:





The engine loom already includes the fuel pressure sensor connector; hence you can easily plug this sensor.

The equipped fuel T-connector and the fuel tank draining hose pluggable to the quick release are available through Signatech under the following references:

Fuel T connector kit Fuel tank draining hose kit

ref. G04-01A017V1 ref. G04-01A018V1







# 6.9. Oil system draining and oil level measuring

To drain the oil system, unscrew the oil plug. When all the old oil is gone, screw the oil plug. Change the oil filter (manually tighten). Fill the engine with the new oil (Elf HTX 825 / 10W60, around 6.5L) until the max level of the oil gauge. Start the engine and ajust the level of oil (max level of the oil gauge)





# 7. TRANSMISSION / GEARBOX

The SADEV SL66-14 gearbox, is a sequential 5 front gears & one reverse gear with cut off system. Its weight is approximately 36 kg. It is equipped with a bevel gear differential.



# 7.1. Clutch bleeding procedure







## 7.2. Ratio charts

Gear	Ratio	Ref.
1 st	11x35	
Ţ	(0,314)	
nd	14x31	D009002030J0J1
Z	(0,451)	
2rd	18x30	C661419206061
510	(0,6)	C00141030000J
1+h	19x25	C6614102E6061
40	(0,76)	C00141925000J
E+b	25x27	C66142E276061
Sth	.0 (0,925) (0,925)	C00142327606J

Reverse gear		
Primary shaft	11	
Reverse gear	16	
Secondary shaft	36	

Final drive		
Secondary shaft	10	
Crown wheel 31		

## 7.3. Lubrification

Oil capacity: 2.1 L (at drain plug level)

1rst drain	Drain frequency	Viscosity
After a 50Km running-in	Each meeting	75W90

### PARTICULAR PRECAUTIONS

No additives should be added to the oil. The resulting consequences are not in any circumstances covered by the SADEV supplier. When topping up the gearbox oil, do not mix any other oil with that already in the box.

#### 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.

### 7.4. Glue components

Glue components and tightening torque are shown in the rebuild section.

#### 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.





# 7.5. Gears

#### Removing

- Engage neutral
- Drain the gearbox through the lower plug (clean the oil level plug magnet)
- Disconnect the potentiometer
- Lock the differential using the dedicated tool.
- Remove the end cap (1) (4 M6 bolts)
- Remove the secondary shaft nut (2)
   , its circlip and stopping washer

#### Caution : It is left hand threaded.

Remove the back housing (3) (8 M7 nuts)



<u>Caution</u> : The secondary shaft, only guided with taper roller bearing and rested against the teeth, can drop a little.

- Remove the fork axle (4).
- Remove the gears 5<sup>th</sup>, 4<sup>th</sup>, 3<sup>rd</sup>, 2<sup>nd</sup> & 1<sup>st</sup> and reverse wheels, and all other parts of the primary and secondary stacks.
- Remove the reverse gear idler bolt (5).

<u>Caution :</u> It is glued, so use a hot air gun.

- Remove the reverse gear idler
- Remove the clutch shaft (7) (see 7.10)
- Remove the primary shaft (6).

### **Reinstallation**

- Clean and check the conditions of the parts. Clean the mating surfaces of the housings.
- Reinstall the primary shaft (support the clutch shaft to slide the primary shaft)
- Install the reverse gear idler







(tighten the reverse gear idler bolt bonded with Loctite 648 to 5.5daN.m)

- Reinstall all the parts in the reverse order as for removing. Lightly lubricate them with gearbox oil before fitting.
- Install the fork pin and make sure the fork actuating pins are in the relevant barrel slots. (Tool FOUT0085003 and check the barrel is in neutral position)

Set up the primary & secondary stacks clearance (you can do this simultaneously).

- Primary stack adjusting shim (8):
  - If you did refit all the original parts, refit the original shim.
  - If not: install the finest shim of the set (F90020181), and close the gearbox (without glu or seal component & tighten the nuts moderatly).
  - Remove the differential (see 7.7), and check the primary stack axial clearance.
  - Choose the ideal adjusting shim (after setting, the primary line must be tight form 0 to 0.1mm) re-install the differential, re-open the gearbox and install it.
- Secondary stack preload adjusting shim (9):
  - In exclusion of wheels, wheels bearings, dogring & forks, if you did refit all the original parts, refit the original shim.
  - If not : install the thickest (2.5mm) shim of the set (F90020121), and close the gearbox (without glu or seal component & tighten the nuts moderatly).
  - Tighten the secondary shaft nut to 18daN.m (left hand thread)
  - $\circ~$  Remove the differential (see 7.7), and check the secondary stack axial clearance "X".
  - Calculate the shim thickness : 2.5mm X. Choose the nearest thicker shim, re-install the differential remove the secondary shaft nut, reopen the gearbox and install it.
- Coat the rear housing mating surface with Loctite 518, and install it. Thighten the M7 nuts to 2.2daN.m
- Tighten the secondary shaft nut to 18daN.m (left hand thread), and install its stopping washer & the circlip.
- Coat the end cap mating surface with Loctite 518, and install it. Thighten the M6 bolts bonded with Loctite 222 to 1.5daN.m
- Reinstall and adjust the potentiometer.





## 7.6. Selector

### Removing the selector axle

- Engage reverse gear
- Drain the gearbox through the lower drain plug (Clean the drain plug magnet)
- Remove the external axle (1) (2 M7 bolts).
- Remove the reverse gear unlocking cable.
- Remove the control closing block with the cut off switch (2) (2 M7 bolts).
- Remove the dual pin rock pusher (3) (2 M5 bolts)
- Introduce a round magnet FACOM (4) in the pusher guide hole and raise the dual pin rock making sure it is not in contact with the barrel.
- Keeping the dual pin rock raised, make the selector axle turn 1/4 of a turn and extract it from the control closing block side.





## Reinstallation of the selector axle

- Clean and check the conditions of the parts
- Check the barrel is in reverse position. This position is visible when looking at the barrel through the selector axle hole : in reverse position, there is a notch on the barrel to let the selector axle go through.
- Put the dual pin rock into the selector axle.
- Insert the selector axle in the housing with the same position as when removing it.
- Drive in the selector axle until the spring is completely compressed, turn it 1/4 of a turn (in the opposite way to removing) and check the double ratchet is correctly installed in the barrel.





Install the dual pin rock pusher (3) (2 M5 bolts, Loctite 222, 0.5daN.m), control closing block with the cut off switch (2) (2 M7 bolts, Loctite 222, 2.2daN.m), Remove the external axle (1) (2 M7 bolts, Loctite 222, 2.2daN.m) and the reverse cable, being careful to clean and degrease all the screws.

# Removal of barrel

- Engage neutral
- Drain the gearbox through the lower drain plug (Clean the drain plug magnet)
- Remove the reverse gear unlocking cable & the potentiometer
- Remove the indexor (1)
- Lock the differential using the dedicated tool
- Remove the end cap (4 M6 bolts)
- Remove the secondary shaft nut, its circlip and stopping washer

#### Caution : It is left hand threaded.

- Remove the back housing (2)
- Remove the fork pin (3) and disengage the forks to get out the fork actuating pins from the barrel slots
- Remove the barrel (4)

# Reinstallation of the barrel

- Clean and check the condition of the parts
- Install the barrel taking care it's resting well in its main housing bearing.
- Adjust the barrel clearance:
  - $\circ~$  If you refit all the original parts, refit the original shim.
  - If not : install the finest shim of the set (F90020041), and close the gearbox (without glu or seal component & tighten the nuts moderatly).
  - Remove the differential (see 7.7), and check the barrel axial clearance.
  - Choose the ideal adjusting shim (after setting, the clearance must be as near of 0mm as possible) re-install the differential & re-open the.
- Install the chosen barrel clearance adjusting shim
- Check the barrel is in neutral position.
- Install the fork pin and make sure the fork actuating pins correctly fit the barrel slots. (Tool FOUT0085003)







- Coat the rear housing mating surface with Loctite 518, and install it. Thighten the M7 nuts to 2.2daN.m
- Tighten the secondary shaft nut to 18daN.m (left hand thread), and install its stopping washer & the circlip.
- Coat the end cap mating surface with Loctite 518, and install it. Thighten the M6 bolts bonded with Loctite 222 to 1.5daN.m
- Reinstall and adjust the potentiometer.

# 7.7. Differential

### <u>Removing</u>

- Engage the neutral
- Drain the gearbox through the lower drain plug (Clean the drain plug magnet)
- Remove the differential housing (1) (11xM8 bolts)
- Remove the differential (2)

# Rebuild operation

- Remove the bevel gears stops (3) (12xM6 bolts each)
- Remove the bevel gears (4) noting their mounting side.
- Remove the dowel pins (5)
- Remove the planet gears, their axles and the nut.
- Clean an check the good conditions of the parts (change them if necessary).
- Reinstall the planet gears, their axles and the nut.
- Reinstall new dowel pins.
- Reinstall the bevel gear (taking care of their mounting side).
- Reinstall the bevel gears stops. (for each one, tighten the 12xM6 bolts bonded with Loctite 243 to 1.5DaN.m)
- Before re-installing, check the condition of the final drive (crownwheel and secondary shaft) and if necessary, change it (see 7.8)







# **Reinstallation**

- Clean the threads , bolts & mating surfaces of the differential & main housings.
- Install the differential.
- Coat the differential/main housing mating surface with Loctite 518.
- Install the differential housing (tighten the 11xM8bolts bonded with Loctite 222 to 2.2DaN.m)
- Fill up the gearbox with oil to the Oil level.

# 7.8. Final drive

### <u>Removal</u>

- Engage neutral
- Drain the gearbox through the lower plug (clean the oil level plug magnet)
- Disconnect the potentiometer
- Lock the differential using the dedicated tool. (FOUT90020081)
- Remove the end cap (4 M6 bolts)
- Remove the secondary shaft nut, its circlip and stopping washer

#### Caution : It is left hand threaded.

- Remove the differential (see 7.7)
- Remove the gears (without primary shaft) (see 7.5)
- Remove the secondary shaft

# Secondary shaft

- Set the secondary shaft advance :
- Note the dimensions engraved inside the main housing (about 109.5mm) and on the secondary shaft (about 90mm)
- Make the following operation : housing dimension – shaft dimension – 18 = shim thickness
- Install the corresponding thickness shim (1), and the conical bearing on the shaft (2).
- Reinstall the secondary shaft and its gears (see 7.5).

## **Crownwheel**

- Remove the differential bearings (see 7.9)
- Remove the crownwheel. (8xM10 bolts)
- Clean and check the parts condition.
- Install the new crownwheel (tighten



4

3



the M10 bolts bonded with Loctite 648 to 9DaN.m)

- Install the differential bearings (see 7.9)
- Check the two differential bearings shim thicknesses, addition them and note the result (B).
- Set the final drive clearance :
- Install the FOUT90020401 (1) tool, and for each tooth of the tool, check the final drive clearance.

The average clearance must be of 0.1 to 0.2 mm.

If the clearance is too high : make the crown wheel and pinion closer by increasing the spacer thickness at the ring gear side

(2) and decreasing the opposite spacer thickness (3) : you must keep the same total thickness

If the clearance is too low : separate the crown wheel and pinion by decreasing the spacer thickness at the ring gear side and increasing the opposite spacer thickness : you must keep the same total thickness

- Process again until getting good values.
- Reinstall the gears (see 7.5)



#### 7.9. Bearings

### Primary shaft bearings

- Remove the primary shaft (see 7.5)
- Remove the bearing (2) and spacer
   (3) on primary shaft using a press, taking care not to damage it
- Clean and check the condition of bearing journal
- Fit the new bearing using a press making sure it is correctly seated on its journal.









- Fit the spacer making sure it is well positioned against the bearing inner race.
- Refit a new dowel pin
- Remove the back housing lip seal
- Heat the back casing using a hot air gun to approximately 120°C
- Position an extractor FACOM (ref. U.49AD5) on the primary shaft bearing loosened in the back casing and extract it with a slide hammer
- Clean and check the conditions of the bearing journal
- Put the new bearing using a press (or heating the shaft to approx. 120°C) making sure it is correctly seated in its housing
- Install a new lip seal in the back housing.
- Install the primary shaft and set up the primary line shims (see 7.5)

### **Barrel bearings**

- Remove the barrel (see 7.6)
- Remove the barrel bearing (4) using a press and taking care not to damage it
- Clean and check the condition of the bearing journal
- Install the new bearing using a press and making sure it is well positioned against the shoulder
- Remove the back casing lip seal
- Heat the back casing using a hot air gun to approximately 120°C
- Position an extractor FACOM (ref. U.49AD5) on the primary shaft bearing loosened in the back casing and extract it with a slide hammer
- Clean and check the conditions of the bearing journal
- Put the new bearing using a press making sure it is correctly seated in its housing
- Install the lip seal in the back housing after checking its condition
- Reinstall the barrel (see 7.6)

#### Secondary shaft bearings

- Remove the differential and the secondary shaft (see 7.8)
- Remove the front plate (1) (11xM6 bolts)
- Remove the back casing lip seal
- Heat the back casing using a hot air gun to









approximately 120°C

- Extract the external ring from the back casing by hitting the ring through the oil way hole
- Clean and check the condition of the bearing journal
- Fit the new ring using a press and making sure is correctly seated in its housing
- Install the lip seal in the back housing after checking its condition
- Extract the external ring from the main casing hitting the ring by the 3 dedicated holes (2)
- Clean and check the condition of the bearing journal
- Put the new ring using a press and making sure is correctly seated in its housing
- Remove the secondary shaft bearing using possibly the tool FACOM (ref. U.53T1) taking care not to damage the bearing journal
- Clean and check the condition of the bearing journal
- Install the new bearing using a press and making sure it is well positioned against the spacer adjuster
- Reinstall the differential and the gears (see 7.5)
- Reinstall the front plate. (tighten the 11xM6 bolts bonded with LOCTITE 222 to 0.5DaN.m)



- Remove the differential (see 7.7)
- Remove the differential case bearings

   (1) using a press and taking care not to damage it
- Clean and check the parts condition.
- Fit the new bearings using a press making sure it is correctly seated on its journal.
- Set the bearings preload (only if you







changed the main housing, the differential housing, the differential case or the bearings):

<u>Caution</u>: You will have to set the final drive clearance too (see §6-4-3).

- Install the differential and the thinnest shims (2) (1.5mm) between each bearing and its housing.
- Install the differential housing, tightening the bolts moderately.
- Measure the axial clearance of the differential "A".

<u>Note</u> : It is tight mounted, so you will have to push hard from one side and then from the other of de differential case to check the clearance.

- Make the following operation : A+3mm+0.1mm=B

<u>Caution</u> : Note it, this is an important measure for the final drive clearance set up.

- Remove the differential.
- Reinstall the differential (see 7.7). On each side, use shim thicknesses equal to B/2.

# 7.10. Clutch shaft

### <u>Removal</u>

- Drain the gearbox through the lower drain plug (Clean the drain plug magnet)
- Remove the lip seal from the front side of the gearbox
- Remove the circlip which retains the clutch shaft bearing
- Remove the clutch shaft



# **Reinstalling**

- Clean and check the conditions of the parts
- Reinstall the clutch shaft inserting it in the primary shaft (mesh a speed and lock the differential if necessary)
- Reinstall a circlip to lock the clutch shaft bearing
- Reinstall a new lip seal





# 7.11. Rebuilding of the gearbox

# In Sadev workshop rebuilding

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 the special stage and connection 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 SADEV sales department
- 2. Forward The material and its card (description above) in our workshops
- 3. Approve the estimate presented by SADEV sales department
- 4. APPROXIMATELY 2 TO 3 WEEKS OF DELIVERY TIME MUST BE CONSIDERED

#### Personal revision:

After sale parts for customers who want to proceed a revision by themselves, are delivered only by SADEV sales service.

SADEV IS NOT RESPONSIBLE FOR ANY DAMAGE FOLLOWING A REVISION NOT EXECUTED IN A SADEV AGREED TECHNICAL SERVICE (LIST ON DEMAND).

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





# 7.12. Driveshaft

Three types of driveshaft are allowed:



Driveshaft V1 is not available anymore.

To mount the G04-15A003V1 Tripod Joint on the G04-15A001V3 Drive Shaft, you have to use a press.

Insert the Tripod Joint at 4.2 mm from the end of the Drive Shaft, as shown in the picture below.






Mount the G04-15A005V1 Tripod Circlip SW24 on the Drive Shaft. Block the Tripod Joint as shown in the picture below and push the Drive Shaft to ensure the position of the Tripod Joint : the circlip must be in contact with the Tripod Joint and with the side of the groove that is nearer to the end of the Drive Shaft.



The maximum recommended mileage for both driveshafts is 3000km.

# 7.13. Gear shift setup

- Pull the gear shift level to upshift. No need to use clutch and to throttle off. The ignition cut is automatic and has to be set-up.

There is a switch cut on the left side of the gear box at the end of the barrel drive axle. It's screwed with shims to adjust its position. Each car is delivered with a set of shims. When reducing the thickness of the shims, the ignition cut is earlier in the level movement.

- As soon as the barrel drive axle starts moving (first mm), the ignition has to be cut off. It's possible to check the cut off position without running engine.
- Switch ignition on. The EDiag LED on the right of the dashboard is flashing. When pushing the barrel drive axle, the LED turns on permanently.





# **8. ELECTRONICS**

# 8.1. Dashboard



# 8.1.1. Driver pages

Three driver pages are available. You can change the driver pages by pushing the red button.







# 8.1.2. Diag pages

To access to the different Diag pages :

- Hold the green button down until this page appears :

Diag D	)isplay
Lap time	Alarm
Mini/Maxi	Custom
(+/-) to select	Valid to Enter

- Move the cursor with the blue or yellow button to access the 4 different Diag (Lap time ; Mini/Maxi ; Alarm ; Custom).
- When the cursor is located on the Diag you want, press the green button to display the page, and scroll it.
- Push the red button to exit.



Details on the 4 Diag pages:

• <u>Lap time</u>: displays the lap times made.

Sec: indicates the session by a letter. Lap: indicates which lap of the session. Time: indicates the lap time.







With the blue or yellow button, you can select a lap time. The date and beginning hour of this lap are displayed in the two little windows located on the right.

• <u>Mini-Maxi</u>: mini and maxi values of each parameter are displayed. To display all the parameters, scroll with the blue or yellow button. You can reset the values by pressing the blue and yellow buttons simultaneously until crosses (x) appear.



 <u>Alarm</u>: displays how long, in seconds, the parameter has remained in "alarm".

To display another parameter, scroll by pushing the blue or yellow buttons.

To reset the alarms completely, just press the blue and yellow buttons simultaneously, until the length figures are back to zero (all the duration of the different parameters will be reset at the same time).



 <u>Custom</u>: these pages allow to display other parameters in "real time".

Push the green button to scroll down.

Ped1	И	Gea V
Ped2	Pot2	Cam
Par	Syn	Res

Shif Gea Pit Sav Secu Lim Map Off Tot Tot Tot Fuel Hrs Kms

Mechanic page 1

Mechanic page 2

# 8.1.3. Diag CAN

You can access to the diag can page by pushing simultaneously the blue and yellow button when the dash is displaying the first mechanic page.

CAN1 CAN	Diagnostics CAN2
TEC: 0	TEC: 0
REC: 0	REC: 0
bus active	bus active





# 8.1.4. Display settings

To reach the display settings, press together the red and green buttons and hold them down until the page appears. To move within the different parameters, you have to use the green button. To change the value, you need to press the blue button in order to set the value down, and the yellow one to rise it up. Values go from 1 to 10.



- <u>Contrast</u>: to setup the shade between the screen background and the written indications.
- <u>Backlight</u>: to modify the brightness of the screen background.
- <u>Led</u>: to set up the brightness of the LEDs.
- <u>Day and night</u>: Set up for night or daylight.

# 8.1.5. Dash configuration

To reach the configuration menu, push the green button **before** to raise the ignition switch. Once the page is displayed, move the cursor with the blue or yellow buttons. When the cursor is on the parameter to tune, use the green button to validate and the red one to exit.











Details on the configuration pages:

• **<u>Beacon</u>**: to set up the timing parameters.

Beacon	
Min lap time:	s
Display delay:	s
Display time:	s
(+z-) to adjust. Ual	id to select

Press the green button to select one of the three parameters and the blue or yellow one to adjust the time in seconds.

<u>Min lap time</u>: to set the minimum gap time between two laps (to avoid in between beacons on the track).

<u>Display delay</u>: to set the delay in seconds, between the time the beacon is set off and the lap time displayed on the screen. <u>Display time</u>: to set the length of time, during which the lap time remains displayed.

• **<u>Alarms</u>**: to set the min and the max values of warning of the different parameters.



You go from one value to the other by pushing the green button and you adjust the value thanks to the blue and yellow buttons (the unit value is displayed next to the given parameter).

• **<u>Gear</u>**: to set the minimum and maximum of each gear (in volt)



In the little window on the right, you have the voltage value given by the barrel potentiometer for the current gear engaged (R; N; 1).

<u>Setting example</u> : for the first gear

- Put the first gear
- Check the value displays in the box current input
- Move the cursor with the green button on the first row
- Adjust the min and max values to "frame" the current input value with the blue or yellow button.

NB: keep a little margin between the max value of a gear and the min value the following gear.





• **Led:** to set the revs leds and the shift led switch on (on top of the dash).



You switch from a value to the other by pushing the green button and you tune the value with the blue and yellow buttons.

- <u>Bargraph first led</u>: to set the first bargraph led (green) switch on.
- <u>Bargraph last led</u>: to set the last bargraph led (orange) switch on.
- Led shift: to set the revs (rpm) for which the shift led lights.

### • <u>RPM+Speed:</u>

		RPM +	speed	
	RPM:	Nb top		
	Speed	Nb top		
Allow	Speed.	Perimeter	mm	to adjust the
Allow	(+/-)	to adjust	Valid to select	
				number of top per

rotation on engine target for the calculation of the engine revs, and the number of top per rotation on the wheel target and the circumference of the wheel (in mm) for the calculation of the vehicle speed.

You switch from one value to the other by pushing the green button, and you adjust the value with the blue and yellow buttons.

• <u>About:</u>



This window contains information about the Firmware used in this Dash, the date of the firmware and the appliance specific configuration.













# 8.1.7. Dash screen

- Driver page



- 1 : Revs
- 2 : Engaged gear
- 3 : Car speed (km/h)
- 4 : Water temperature
- 5 : Battery voltage
- 6 : Oil Pressure

### - Engine page

Ŷ	1	)/(	2	Pcol	3
	4	•	5	Pfu	6
Toil	7	Vba	8	$\lambda$	9

- 1 : Revs
- 2 : Throttle angle
- 3 : Inlet manifold pressure
- 4 : Water temperature
- 5 : Oil pressure
- 6 : Fuel pressure (*optional*)
- 7 : Oil temperature
- 8 : Battery voltage
- 9 : Lambda (*optional*)







FORMUI

- 1 : Front brake pressure
- 2 : Rear brake pressure
- 3 : Brake balance (%)

- Engine diagnostic page

Ped1	1	)/(	2	Gea	3
Ped2	4	Pot2	5	Cam	6
Par	7	Syn	8	Res	9

- 1 : Pedal position (signal 1)
- 2 : Throttle angle (signal 1)
- 3 : Gearbox potentiometer (Volts)
- 4 : Pedal position (signal 2)
- 5 : Throttle angle (signal 2)
- 6 : Error camshaft phaseshift position
- 7 : Target motor error counter
- 8 : Sync loss error counter (between crankshaft and camshaft)
- 9 : ECU reset counter

- Gearbox page

Shif	1	$\Theta$	2	Gea V	3
Pit Lim	4	Sav Map	5	Secu Off	6
Tot Fuel	7	Tot Hrs	8	Tot Kms	9

83

- 1 : Shift position
- 2 : Steer angle (*optional*)
- 3 : Gearbox potentiometer (Volts)
- 4 : Limiter potentiometer (optional)
- 5 : Sav map
- 6 : Secu off
- 7 : Fuel consumption counter
- 8 : Total driven hours counter
- 9 : Total driven kilometers counter



# 8.2. Transponder

The transponder must be fitted on the left hand side of the gearbox using a specific support plate designed by Signatech. The transponder has to be fitted to the gearbox as shown below:



The transponder support plate and hardware are available through Signatech under the following reference:

### Transponder bracket: ref. G04-20A017V1

DTM04-2P connector Pin1: +12V Pin2: Ground

# 8.3. Gear cut switch loom passing

To avoid any contact with the engine cover, the gear cut switch loom must be fitted under the damper as shown on the picture below:







It's allowed to heat up the connector boot to bend it inward of the car in order to easy the wire passing.



Possible to bend inward the connector boot

# 8.4. Composition of the PI Data system kit

• One PI compact logger Signatech spec with an integrated lateral accelerometer



- One compact flash card
  - Note: Only certain type of CF card may be used for this application. Please refer to the data acquisition section for more information.
- One steering angle sensor (Rep. 22) with its fastening







• Two wheel speed sensors (Rep. 20 / Front Upright Assy)



• Two brake pressure sensors with its hoses, bleeders and support



• One beacon receiver (Rep. 7)







- The PI Toolbox and Pectel Card Management sofwares
- Damper Displacement Sensor (optional sensor / Rear Rocker Assy)



• Damper Displacement Sensor (optional sensor / Front Rocker Assy)







# 8.5. Data acquisition

The software used to download data from the car is Pectel Card Management.

### 8.5.1. Software Install

The Pectel Card Management software (release 2.18.64) can be downloaded on the extranet Renault Sport into the Formula Renault 1.6 section.

Install Pectel Card Management by running the *setup.exe* file inside the Pectel Card Management directory. Open the Configs directory and copy all of the IP, AAB and PLC files to *C:\Program Files\Pectel Card Management\IP*.

The CAN logger is already set up to use and it logs all channel in the CAN stream at the maximum rate they are sent. This configuration gives  $\sim$ 47 minutes of logging time. The logger is set to start logging once it sees RPM>1000 on the CAN stream and stops when RPM is <=0 for 3s.

### 8.5.2. Downloading data

- When the car has been out on track, remove the CF card from the Compact Logger and insert it into the card reader.
- Start Pectel Card Management
- Go to File|Select Card Drive and choose the drive letter of the CF card from the Compact Logger (this may be E: if the laptop has just one hard disk and a DVD drive)
- In the *Logged Outings* tab you should see sessions which have been logged.
- Select the sessions and click Save to offload them from the card. You will be prompted for outing details and a file name.
- Click Erase Card to delete all of the old outings and prepare the card for the next outing.
- Reinsert the CF card into the Compact Logger and ensure the light on the logger goes green (meaning the card has been accepted).

### **<u>8.5.3. CF card setting and formatting</u>**

The compact flash card used in the Pectel data logging system must be configured before to use it according a specific formatting procedure.

However, based on some data logging issues with some compact flash cards, we strongly advise you to use **SanDisk® Compact Flash cards** with a capacity of **2GB maximum**.

Moreover, some CF card reader may corrupt CF cards. To prevent from this risk, we recommend using the CF card reader **LEXAR® Professional USB 3.0** 







LEXAR® Professional USB 3.0

The CF card has to be setup following the procedure below:

- Plug your CF card with a CF reader to your computer.
- Open "My Computer" section.
- Right click on the disk relative to your CF card and then, click on "Format...". A window appears.

) Back - 🕥 - 🎓	Ø	iearch 🜔 Folders 🛄 🕶		
ress 😼 My Computer				Sector
		Name 🔺	Туре	Total S
View system information Add or remove programs Change a setting Eject this disk		Dup Drive (c):     Premoval construction     Removal     Removal     Explore     Search	CD Drive Removable Disk Removable Disk CD Drive Digital camera	16.3
Other Places My Network Places My Documents Shared Documents Control Panel	۲	Shared E  Analyser avec.bsl Endpoint Antwirus  Options avancées  Abaring and Security  Add to Archive  Add to Archive  Add to Archive  Add to Archive  Explade to Archive  Explane to Archi	File Folder	
Details Removable Disk (F:) Removable Disk	*	Cut Copy Create Shortcut		
File System: FAT		Rename Properties		

• Click on the "File System" drop list and then click on "FAT".

Note: By default the "FAT 32" file system is usually chosen. Only the "FAT" file system allows the system to work.





Format Removable Disk (F:) 🛛 🛛 🔀
Capacity:
244 MB
File system
FAT 🗸
FAT32
exFAT
Volume label
Format options
Quick Format
Enable Compression
Create an MS-DOS startup disk
Start Close

• Click on « Start ».

**Warning :** The click on « Start » will erase all files available on the CF card.

- Open Pectel Card Management.
- Go to File|Select Card Drive and choose the drive letter of the CF card from the Compact Logger (this may be E: if the laptop has just one hard disk and a DVD drive)
- Go to Logging Configuration and click Select next to the DB version box. A window with one option CL v01-004 will appear, choose this option and click OK.

Pectel Card Management	
Card Status Logged Outings	ogging Configuration
DB version:	Select ECU version: Select
(no DB selected) (no ECU selected)	Select DB Version
Total logging time A / B :	Export Configuration
DB logging usage A / B :	Write to Card Save Configuration
ECU->DB link usage:	Stop logging when card is full Read from Card Open Configuration





• Then go to Tools|Format Card... click YES then type 15 in the MB to use box. Finally click OK.

10 YIOYY	Fools Help		
Card Statu	Read from Card Ctrl+R Write to Card Ctrl+W	ation	-10-
DB versioi	Format Card	Select ECU version:	Select
DBI Qu	Verify Card	Source Freq.A Freq.B Channel	
(10 5 5 1	Select DB Version Select ECU Version Import Ip File		
	Options		
		<	
Total loggin	g time A / B : [no channels]	(no channels) Export Config	uration
Total loggin DB logging	g time A / B : [no channels] usage A / B :	(no channels) Export Config	uration ave Configuratio

ard Status Logged Outings Logging Configu	Ination
)B version: CL v01-004	Select ECU version: Select
DBI Quantities (no ECU selected)	Source Freq A Freq B Channel
	MB to use:





• To write the logging configuration to the card click Open Configuration and find the "Table d'acquisition Signatech1.plc" file which is included into the Pectel Card Management zip file. Open this and Write to Card. The Card should be ready to use.

S (VENN) 118	And Control		
ard Status	Logged Outings	Logging Configuration	
B version:	CL v01-004	Open Logging Co	onfiguration
)Bl Quan no ECU s	tities selected)	Regarder dans :	🔁 Electronique
		Table d'acquisitio	on Signatech1.plc
		Nom du fichier :	Table d'acquisition Signatech1.plc
	1 1 19 Terr	Nom du fichier : Fichiers de type :	Table d'acquisition Signatech1.plc       Ouvrir         Pectel Logging Configuration File (*,plc)       Annuler
tal logging	time A / B : (no c	Nom du fichier : Fichiers de type :	Table d'acquisition Signatech1.plc     Ouvrir       Pectel Logging Configuration File (*.plc)     Annuler
tal logging u:	time A / B : [no c sage A / B :	Nom du fichier : Fichiers de type :	Table d'acquisition Signatech1.plc       Ouvrir         Pectel Logging Configuration File (*.plc)       Annuler         Write to Card       Save Configuration

🙀 F:\db.pc	f - Pi Card Management - [Table	d'acquisi	tion Signa	tech1]		
File View To	ools Help					
Card Status	Logged Outings Logging Configuration					
DB version:	CL v01-004	Select	ECU vers	tion: T6 v01-0	004	Select
DBI Quan	tities	Source	Freq A	Freq B	Channel	~
ECU Quar	ntities	DB DB DB DB DB DB DB DB	100Hz 100Hz 100Hz 100Hz 100Hz 100Hz 100Hz	100Hz 100Hz 100Hz 100Hz 100Hz 100Hz 100Hz	Lap Number Lap Time Distance RPM Front Brake Pressure Rear Brake Pressure Brake Balance	Alle
		DB DB DB DB DB DB	100Hz 100Hz 100Hz 100Hz 100Hz 100Hz	100Hz 100Hz 100Hz 100Hz 100Hz 100Hz	FR Speed Wheels FL Speed Wheels RR Speed Wheels RL Speed Wheels FL Damper FR Damper	
		<			)	>
Total logging	time A / B : (no card)	(no c	ard)		Export Configu	ration
DB logging u	sage A / B : (				) Write to Card Sar	ve Configuration
ECU->DB link	k usage:	) 🗌 Sta	op logging wi	hen card is full	Read from Card Op	en Configuration

<u>Note:</u> There is no ECU version to select. For the Signature application this feature is not necessary. If the IP files have been copied to the correct place the DB version will appear in the dialog box when you click Select.

• Plug the CF card back into the data logger and check that the light goes green which means that the card is well configured





# 8.6. Data analysis

# 8.6.1 Configuration via software

The software used to analyse data acquisition is PI Toolbox.

Software installation

The Pi Toolbox software can be downloaded from the extranet Renault Sport. Note: last release 6.2 (2012) is available on the extranet Renault Sport and must be unzipped using 7zip (software available on the extranet as well), then installed onto the computer.

#### How to use the software?

Once this software is opened, select a workbook, then refer to the next paragraph to find out how to open and analyse the data.

### 8.6.2. Opening data



- To open data:
  - Open PI Toolbox,
  - Select a workbook

- Go to Data -> Add Outing
- Select the run you want to open (.pds file)
- If you want to create a new workbook, go to Files -> New. Select a default model of template, then create your own workbook from this one.
- You can use the predefined workbook available on the Renault Sport Extranet.
- Some Pi Data samples are available on the Renault Sport Extranet in order to learn how to use the software.





# 8.6.3. Analyzing downloaded data

### • Displaying a channel

- To display a channel, select the left column and use the left and right arrow in the bar until you reach the "Selection" window
- Double click on the channel name.
- To remove a channel from the graphic window, right click on the channel name displayed on the bottom of the left column and select remove.



- Several channels can be overlaid.
- To zoom in, press Ctrl and select the part of the curve you want at the same time, or press Z.
- To zoom out, use BACKSPACE.

### • Changing the reference axis (time/distance)

It is possible to change the reference axis: you have the choice between distance and time.

• To change the axis, right click on the graph, then select Axes and select Time or Distance.







## • Comparing laps

You can overlay and compare two or more laps.

Select the "Tasks" window in the left column, right click and select "Add outing".



If you want to compare two laps from the same run, select this run and then double click on it in the left column; a window appears, select the lap.

If you have different laps overlaid, and you want to shift one compared to another, select the lap in the graph legend on the right, press "O" and move the curve. Press "O" again to exit this option.



Note: to add a "compare time" function, create a math channel using the following command: compareDist([Elapsed Lap Time])

o Graph type

It is possible to insert different types of graphs or tables.

 Go to Insert -> Display, and select the type of graph, table or map.

ns nom - Pi Toolbox*		
dit         Were         Insert         Data         Dirp           Ibin         Deplay         Worksheet           Ibin         Deplay         Marksheet           IP PCN Capactor Voltage 1         PPCN Capactor Voltage 3         PPCN Capactor Voltage 3           IP PCN Capactor Voltage 3         PPCN Capactor Voltage 3         PPCN Capactor Voltage 3           IP PCN Capactor Voltage 3         PPCN Capactor Voltage 3         PPCN Capactor Voltage 3           IP PCN Capactor Voltage 3         PPCN Capactor Voltage 3         PPCN Capactor Voltage 3           IP PCN Capactor Voltage 3         PPCN Capactor Voltage 3         PPCN Capactor Voltage 3           IP PCN Capactor Voltage 3         PPCN Capactor Voltage 3         PPCN Capactor Voltage 3           IP PCN Capactor Voltage 3         PPCN Capactor Status FCN         PPCN Capactor Status FCN           IP PCN Capactor Status FCN         PPCN Capactor Status FCN         PPCN Capactor Status FCN           IP PCN Capactor Status FCN         PPCN Capactor Status FCN         PPCN Capactor Status FCN           IP PCN Capactor Status FCN         PPCN Capactor Status FCN         PPCN Capactor Status FCN	ay Map Tools Window Help Map Tools Window Help Map Tools Window Help Map Tools Window Help Map Tools Map Tools Map Tools Map Tools Map Tools Map Tools Map Tools Map Tools Map Tools Map Tools Map Tools Map Tools Map Tools	





### **o** Graph properties

It is possible to change the scale of the graph:

In the channel properties (in "Display"), if Autoscale is selected ("yes"), the scale is automatically calculated.

To choose the scale manually, Autoscale should not be selected ('No').

Set up the scale using "Display minimum" and "Display maximum"

You can move the position of the graph along the Y axis: in "Y-axis % enabled", "yes" should be selected. Click on the left column when the channel is selected, and manually move the curve in the graphic window. This feature only works in "overlaid" mode (refer underneath).

When you modify in "Display", the change is only in the selected graphic window, whereas with "Workbook", all the graphic windows are modified.

The curves can be tiled or overlaid. To change this, right click on the graphic window, select "Axes" and "Tiled" or "overlaid"









![](_page_95_Picture_14.jpeg)

![](_page_96_Picture_1.jpeg)

![](_page_96_Figure_2.jpeg)

#### $\circ$ $\,$ Create the track map

The track map can be drawn thanks to the data logged by the lateral acceleration sensor and the speed sensor.

To obtain the track map:

• Go to Insert -> Display -> Map

•	Right click on the run (in "Tasks"
	window) and select Create Map,
	standard Map.

![](_page_96_Picture_8.jpeg)

![](_page_96_Picture_9.jpeg)

• Use "Offset" and "Scale" to reproduce the track map.

# Note: to invert the track map, use a negative scale factor.

![](_page_96_Picture_12.jpeg)

![](_page_96_Picture_13.jpeg)

![](_page_97_Picture_1.jpeg)

# 9. ELECTRICAL

# 9.1. Loom versions and updates

From 2013, new loom specification has been issued on the car inducing some connectors to change too.

Consequently, some parts directly linked to the loom have also evolved regarding their connectors.

All these modifications involve the following parts:

	Old version (before 2013)	New version (2013)
Main loom	G04-18A001V1	G04-18A001V2
Front loom	G04-18A002V1	G04-18A002V2
Engine loom	G04-18A003V1	G04-18A003V2
Parts attached to the looms		
Fuel tank loom	G04-01A007V1	G04-01A007V2
Fuel pump loom	G04-01A006V1	G04-01A006V2
Damper displacement sensor	G04-18A036V1	G04-18A036V2
Steering rack angle sensor	G04-18A022V1	G04-18A022V2
Main relay	G04-18A008V1	G04-18A008V2
Fuel relay	G04-18A009V1	G04-18A009V2
Fire switch	G04-18A007V1	G04-18A007V2
Positive battery power cable	G04-18A010V1	G04-18A010V2
Alternator cable	G04-18A016V1	G04-18A016V2
Battery negative cable	G04-18A013V1	G04-18A013V2
Positive starter power cable	G04-18A011V1	G04-18A011V2
Engine negative Power cable	G04-18A012V1	G04-18A012V2
Camshaft sensor (Renault reference)	8 200 285 798	8 200 963 886

Old and new parts are allowed to use on the car. It is forbidden to mix old and new versions.

![](_page_97_Picture_9.jpeg)

![](_page_98_Picture_1.jpeg)

# 9.2. Main Loom

![](_page_98_Picture_3.jpeg)

Main Loom V2

Please find below the pinout of the main loom V2 related to every attached loom connector:

### • ECU Grey

CONNECTOR TYPE	MOLEX CMC 64320-1318		
NUMBER OF PIN	48		
PIN NAME	DESTINATION		
A1	PIN A	ENGINE	
A2	PIN B	ENGINE	
A3	PIN C	ENGINE	
A4	PIN 9	LOGGER	
B1	PIN D	ENGINE	
B2	PIN E	ENGINE	
B3	PIN A	FRONT	
55	PIN 10	DIAG FH	
B4	PIN B	FRONT	
C1	PIN F	ENGINE	
C2	PIN G	ENGINE	
C3	PIN H	ENGINE	
C4	PIN J	ENGINE	
D1	PIN K	ENGINE	
D2	PIN C	FRONT	
D3	PIN D	FRONT	
D4	PIN E	FRONT	
E1	PIN J	GEAR	
E2	PIN L	ENGINE	
E3	PIN 6	DIAG FH	
E4	PIN 7	DIAG FH	
F1	PIN 1	OPTIONAL	
F2	PIN 11	OPTIONAL	
F3			
F4	PIN 6	OPTIONAL	
G1	PIN 7	OPTIONAL	
G2	PIN 8	OPTIONAL	

![](_page_98_Picture_8.jpeg)

![](_page_99_Picture_1.jpeg)

G3	PIN 1	RESET SW
G4	PIN M	ENGINE
H1		
H2		
H3		
H4		
J1	PIN 2	DIAG FH
J2	PIN 3	DIAG FH
J3	PIN 4	DIAG FH
J4	PIN 5	DIAG FH
K1	PIN 1	DIAG FH
1/2	PIN C	GEAR
KZ	PIN 3	LOGGER
<b>V</b> 2	PIN D	GEAR
KJ	PIN 2	LOGGER
K4	PIN N	ENGINE
L1	PIN 2	IGN SW
L2	PIN 2	FUSE
L3	PIN 2	FUSE
L4	PIN 2	FUSE
M1	PIN T	ENGINE
M2	PIN T	ENGINE
M3	PIN U	ENGINE
M4	PIN U	ENGINE

### ECU Brown

CONNECTOR TYPE	MOLEX CMC 64320-3319		
NUMBER OF PIN	48		
PIN NAME	DESTINATION		
A1	PIN V	ENGINE	
A2	PIN W	ENGINE	
A3			
A4			
B1	PIN z	ENGINE	
B2	PIN K	FRONT	
B3	PIN L	FRONT	
B4	PIN aa	ENGINE	
C1	PIN X	ENGINE	
C2	PIN Y	ENGINE	
C3			
C4			
D1	PIN Z	ENGINE	
D2	PIN a	ENGINE	
D3	PIN b	ENGINE	
D4	PIN c	ENGINE	
E1			
E2			
E3			
E4			

![](_page_99_Picture_5.jpeg)

![](_page_100_Picture_1.jpeg)

F1		
F2		
F3		
F4		
G1		
G2		
G3		
G4		
H1	PIN M	FRONT
H2	PIN K	GEAR
H3	PIN N	FRONT
H4		
J1	PIN d	ENGINE
J2		
J3	PIN e	ENGINE
]4		
K1	PIN f	ENGINE
	PIN P	FRONT
K2	PIN f	ENGINE
КЗ	PIN g	ENGINE
	PIN 11	DIAG FH
K4	PIN R	FRONT
L1	PIN 12	DIAG FH
	PIN h	ENGINE
L2	PIN S	FRONT
	PIN T	FRONT
L3		
L4		
M1	PIN i	ENGINE
M2		
M3	PIN j	ENGINE

### • ECU Black

CONNECTOR TYPE	MOLEX CMC 64319-3211		
NUMBER OF PIN	32		
PIN NAME	DESTINATION		
A1	PIN m	ENGINE	
A2			
A3			
A4			
B1	PIN E	GEAR	
B2	PIN F	GEAR	
B3	PIN G	GEAR	
B4	PIN H	GEAR	
C1	PIN 85	FUEL PUMP RELAY	
C2			
C3	PIN 9	DASH	
C4	PIN 10	DASH	

![](_page_100_Picture_5.jpeg)

![](_page_101_Picture_1.jpeg)

D1		
D2		
D3		
D4		
E1	PIN n	ENGINE
E2	PIN p	ENGINE
E3	PIN q	ENGINE
E4	PIN r	ENGINE
F1		
F2		
F3		
F4		
G1	PIN s	ENGINE
G2	PIN t	ENGINE
G3		
G4		
H1		
H2		
H3		
H4		

### • <u>12V MS</u>

CONNECTOR TYPE	Ring Terminal D8	
NUMBER OF PIN	1	
PIN NAME	DESTINATION	
1	PIN 1	FUSE

### • Fuse

CONNECTOR TYPE	Cargo Fuse	Holder 30A
NUMBER OF PIN	2	
PIN NAME	DESTINATION	
1	PIN 1	12V MS
	PIN L2	ECU GREY
	PIN L3	ECU GREY
	PIN L4	ECU GREY
	PIN 30	FUEL PUMP RELAY
	PIN 3	RADIO
	PIN A	GEAR
2	PIN R	ENGINE
	PIN S	ENGINE
	PIN H	FRONT
	PIN 3	IGN SW
	PIN 3	RAIN SW
	PIN 3	START SW
	PIN 9	OPTIONAL

![](_page_101_Picture_7.jpeg)

![](_page_102_Picture_1.jpeg)

# • Fuel Pump Relay

CONNECTOR TYPE	Relay	Holder
NUMBER OF PIN	5	
PIN NAME	DESTINATION	
30	PIN 2	FUSE
95	PIN 3	ECU BLACK
65	PIN 2	FP SW
86	PIN 2	IGN SW
87	PIN w	ENGINE

### • Excit Main SW

CONNECTOR TYPE	AMP SUPERSEAL 2V Female	
NUMBER OF PIN	2	
PIN NAME	DESTINATION	
1	PIN 1	FIRE SW
2	PIN 1	VBATT

### • Fire SW

CONNECTOR TYPE	DTM06-2S	
NUMBER OF PIN	2	
PIN NAME	DESTINATION	
1	PIN 1	EXCIT MAIN SW
2	PIN 2	MS SW

### • <u>VBATT</u>

CONNECTOR TYPE	Ring Terminal 1.5 D6	
NUMBER OF PIN	1	
PIN NAME	DESTINATION	
1	PIN 2	EXCIT MAIN SW

### • <u>Radio</u>

CONNECTOR TYPE	DTM06-4S	
NUMBER OF PIN	4	
PIN NAME	DESTINATION	
1	PIN 4	OPTIONAL
2	PIN 5	OPTIONAL
3	PIN 2	FUSE
4	PIN u	ENGINE

![](_page_102_Picture_12.jpeg)

![](_page_103_Picture_1.jpeg)

#### • <u>Gear</u>

CONNECTOR TYPE	UTG 014-12 S	
NUMBER OF PIN	12	
PIN NAME	DESTINATION	
A	PIN 2	FUSE
В	PIN T	ENGINE
С	PIN K2	ECU GREY
D	PIN K3	ECU GREY
E	PIN B1	ECU BLACK
F	PIN B2	ECU BLACK
G	PIN B3	ECU BLACK
Н	PIN B4	ECU BLACK
J	PIN E1	ECU GREY
К	PIN H2	ECU BROWN
L		
М		

# • Engine

CONNECTOR TYPE	UTG 124-48 S	
NUMBER OF PIN	48	
PIN NAME	DESTIN	IATION
A	PIN A1	ECU GREY
В	PIN A2	ECU GREY
С	PIN A3	ECU GREY
D	PIN B1	ECU GREY
E	PIN B2	ECU GREY
F	PIN C1	ECU GREY
G	PIN C2	ECU GREY
Н	PIN C3	ECU GREY
J	PIN C4	ECU GREY
К	PIN D1	ECU GREY
L	PIN E2	ECU GREY
м	PIN G4	ECU GREY
[*]	PIN 7	DASH
Ν	PIN K4	ECU GREY
Р	PIN 2	IGN SW
R	PIN 2	FUSE
S	PIN 2	FUSE
	PIN M1	ECU GREY
Т	PIN M2	ECU GREY
	PIN B	GEAR
	PIN M3	ECU GREY
U	PIN M4	ECU GREY
	PIN 2	RESET SW
V	PIN A1	ECU BROWN
W	PIN A2	ECU BROWN
Х	PIN C1	ECU BROWN

![](_page_103_Picture_6.jpeg)

![](_page_104_Picture_1.jpeg)

Y	PIN C2	ECU BROWN
Z	PIN D1	ECU BROWN
а	PIN D2	ECU BROWN
b	PIN D3	ECU BROWN
С	PIN D4	ECU BROWN
d	PIN J1	ECU BROWN
е	PIN J3	ECU BROWN
f	PIN K1	ECU BROWN
I	PIN K2	ECU BROWN
g	PIN K3	ECU BROWN
h	PIN L2	ECU BROWN
i	PIN M1	ECU BROWN
j	PIN M3	ECU BROWN
k	PIN M4	ECU BROWN
m	PIN A1	ECU BLACK
n	PIN E1	ECU BLACK
р	PIN E2	ECU BLACK
q	PIN E3	ECU BLACK
r	PIN E4	ECU BLACK
S	PIN G1	ECU BLACK
t	PIN G2	ECU BLACK
	PIN 4	RADIO
u	PIN 10	LOGGER
	PIN J	FRONT
	PIN 2	DASH
	PIN 3	MS SW
v	PIN 10	OPTIONAL
	PIN 3	FP SW
W	PIN 87	FUEL PUMP RELAY
x	PIN 2	RAIN SW
У	PIN 2	START SW
Z	PIN B1	ECU BROWN
аа	PIN B4	ECU BROWN

### • Logger

CONNECTOR TYPE	IMC 26-2212X	
NUMBER OF PIN	12	
PIN NAME	DESTINATION	
1		
2	PIN K3 PIN 3	ECU GREY OPTIONAL
3	PIN K2 PIN 2	ECU GREY OPTIONAL
4		
5		
6		
7		
8	PIN 2	IGN SW
9	PIN A4	ECU GREY

![](_page_104_Picture_5.jpeg)

![](_page_105_Picture_1.jpeg)

10	PIN u PIN 12	ENGINE LOGGER
11		
12	PIN 10	LOGGER

### • Front

CONNECTOR TYPE	UTG 116-19S	
NUMBER OF PIN	19	
PIN NAME	DESTINATION	
A	PIN B3	ECU GREY
В	PIN B4	ECU GREY
С	PIN D2	ECU GREY
D	PIN D3	ECU GREY
E	PIN D4	ECU GREY
F		
G	PIN 2	IGN SW
Н	PIN 2	FUSE
J	PIN u	ENGINE
К	PIN B2	ECU BROWN
L	PIN B3	ECU BROWN
М	PIN H1	ECU BROWN
N	PIN H3	ECU BROWN
Р	PIN K1	ECU BROWN
R	PIN K4	ECU BROWN
S	PIN L2	ECU BROWN
Т	PIN L2	ECU BROWN
Ū		
V		

### • Dash

CONNECTOR TYPE	IMC 26-2212X	
NUMBER OF PIN	12	
PIN NAME	DESTINATION	
1	PIN 2	IGN SW
2	PIN v	ENGINE
3		
4		
5	PIN 2	OPTIONAL
6	PIN 3	OPTIONAL
7	PIN M	ENGINE
8		
9	PIN C3	ECU BLACK
10	PIN C4	ECU BLACK
11		
12		

![](_page_105_Picture_7.jpeg)

![](_page_106_Picture_1.jpeg)

### • <u>IGN SW</u>

CONNECTOR TYPE	Ring Terminal 1.5 D3	
NUMBER OF PIN	2	
PIN NAME	DESTINATION	
1		
	PIN L1 PIN 86	ECU GREY
2	PIN P	ENGINE
2	PIN 8	LOGGER
	PIN G	FRONT
	PIN 1	DASH
3	PIN 2	FUSE

### • <u>MS SW</u>

CONNECTOR TYPE	Ring Terminal 1.5 D3	
NUMBER OF PIN	2	
PIN NAME	DESTINATION	
1		
2	PIN 2	FIRE SW
3	PIN v	ENGINE

### • Rain SW

CONNECTOR TYPE	Ring Terminal 1.5 D3	
NUMBER OF PIN	2	
PIN NAME	DESTINATION	
1		
2	PIN x	ENGINE
3	PIN 2	FUSE

### • Start SW

CONNECTOR TYPE	Ring Terminal 1.5 D3	
NUMBER OF PIN	2	
PIN NAME	DESTINATION	
1		
2	PIN y	ENGINE
3	PIN 2	FUSE

# • Optional

CONNECTOR TYPE	IMC 24-2212X	
NUMBER OF PIN	12	
PIN NAME	DESTINATION	
1	PIN F1	ECU GREY
2	PIN 3	LOGGER
2	PIN 5	DASH

![](_page_106_Picture_12.jpeg)

![](_page_107_Picture_1.jpeg)

	PIN 8	DIAG FH
	PIN 2	LOGGER
3	PIN 6	DASH
	PIN 9	DIAG FH
4	PIN 1	RADIO
5	PIN 2	RADIO
6	PIN F4	ECU GREY
7	PIN G1	ECU GREY
8	PIN G2	ECU GREY
9	PIN 2	FUSE
10	PIN v	ENGINE
11	PIN F2	ECU GREY
12		

### <u>Reset SW</u>

CONNECTOR TYPE	Button APEM 8632 + Boot U1401	
NUMBER OF PIN	3	
PIN NAME	DESTINATION	
1	PIN G3	ECU GREY
2	PIN U	ENGINE
3		

### • <u>FP SW</u>

CONNECTOR TYPE	Button APEM 5636	
NUMBER OF PIN	3	
PIN NAME	DESTINATION	
1		
2	PIN 85	FUEL PUMP RELAY
3	PIN v	ENGINE

### • Diag FH

CONNECTOR TYPE	IMC 24-2212X	
NUMBER OF PIN	12	
PIN NAME	DESTINATION	
1	PIN K1	ECU GREY
2	PIN J1	ECU GREY
3	PIN J2	ECU GREY
4	PIN J3	ECU GREY
5	PIN J4	ECU GREY
6	PIN E3	ECU GREY
7	PIN E4	ECU GREY
8	PIN 2	OPTIONAL
9	PIN 3	OPTIONAL
10	PIN B3	ECU GREY
11	PIN K3	ECU BROWN
12	PIN L1	ECU BROWN

![](_page_107_Picture_9.jpeg)


# 9.3. Front Loom



Front Loom V2

Please find below the pinout of the front loom V2 related to every attached loom connector:

#### • Front

CONNECTOR TYPE	UTG 116-19S	
NUMBER OF PIN	19	
PIN NAME	DESTIN	IATION
A	PIN 4	PEDAL
В	PIN 1	PEDAL
С	PIN C	FRONT BRAKE P
D	PIN C	REAR BRAKE P
E	PIN 2	STEERING
F		
G	PIN 1	FR SPEED
G	PIN 1	FL SPEED
Н		
1	PIN 3	FR SPEED
J	PIN 3	FL SPEED
К	PIN 2	FR SPEED
L	PIN 2	FL SPEED
М	PIN 2	FRONT DAMPER
N	PIN 2	FRONT ROLL
	PIN 2	PEDAL
Р	PIN 3	PEDAL
	PIN B	FRONT BRAKE P
	PIN 1	STEERING
D	PIN 1	FRONT DAMPER
К	PIN 1	FRONT ROLL
	PIN B	REAR BRAKE P
S	PIN 5	PEDAL
	PIN 6	PEDAL
	PIN 1	FRONT BRAKE P
т	PIN 3	STEERING
I	PIN 3	FRONT DAMPER





	PIN 3	FRONT ROLL
	PIN 1	REAR BRAKE P
U		
V		

#### • <u>Steering</u>

CONNECTOR TYPE	DTM06-3S	
NUMBER OF PIN	3	
PIN NAME	DESTINATION	
1	PIN R	FRONT
2	PIN E	FRONT
3	PIN T	FRONT

## • FR Right

CONNECTOR TYPE	DTM06-3S	
NUMBER OF PIN	3	
PIN NAME	DESTINATION	
1	PIN G	FRONT
2	PIN K	FRONT
3	PIN J	FRONT

#### • Front Damper

CONNECTOR TYPE	DTM06-3S	
NUMBER OF PIN	3	
PIN NAME	DESTINATION	
1	PIN R	FRONT
2	PIN M	FRONT
3	PIN T	FRONT

#### • Front Roll

CONNECTOR TYPE	DTM06-3S	
NUMBER OF PIN	3	
PIN NAME	DESTINATION	
1	PIN R	FRONT
2	PIN N	FRONT
3	PIN T	FRONT

# • FL Speed

CONNECTOR TYPE	DTM06-3S	
NUMBER OF PIN	3	
PIN NAME	DESTINATION	
1	PIN G	FRONT
2	PIN L	FRONT
3	PIN J	FRONT





# • <u>Pedal</u>

CONNECTOR TYPE	YASAKI 6pts BLACK FEMALE	
NUMBER OF PIN	6	
PIN NAME	DESTINATION	
1	PIN B	FRONT
2	PIN P	FRONT
3	PIN P	FRONT
4	PIN A	FRONT
5	PIN S	FRONT
6	PIN S	FRONT

# • Rear Brake P

CONNECTOR TYPE	PACKARD 3PTS FEMALE T SHAPE	
NUMBER OF PIN	3	
PIN NAME	DESTINATION	
А	PIN T	FRONT
В	PIN R	FRONT
С	PIN D	FRONT

#### • Front Brake P

CONNECTOR TYPE	PACKARD 3PTS FEMALE T SHAPE	
NUMBER OF PIN	3	
PIN NAME	DESTINATION	
А	PIN S	FRONT
В	PIN P	FRONT
С	PIN C	FRONT





# 9.4. Engine Loom



Engine Loom V2

Please find below the pinout of the engine loom V2 related to every attached loom connector:

CONNECTOR TYPE	UTG 62448 PN	
NUMBER OF PIN	48	
PIN NAME	DESTIN	IATION
A	PIN 1	WATER T
В	PIN 1	AIR T
С	PIN B	INLET P
D	PIN 1	THROTTLE
E	PIN 4	THROTTLE
F	PIN 3	OIL P
G	PIN 2	FUEL P
Н	PIN 1	GEAR SHIFT
J	PIN 1	OIL T
К	PIN C	GEAR POT
	PIN 2	FUEL INJ
1	PIN 4	FUEL INJ
Ľ	PIN 6	FUEL INJ
	PIN 8	FUEL INJ
M	PIN 2	COIL
N	PIN 1	SCAM
	PIN 3	BEACON
	PIN 2	FUEL INJ
Р	PIN 4	FUEL INJ
	PIN 6	FUEL INJ
	PIN 8	FUEL INJ
R	PIN 3	COIL
	PIN 1	CHRONO

# • Engine





ĥ	PIN 3	LAMBDA
3	PIN 1	CAM PHASE
Т	PIN 1	GND P
U	PIN 1	GND P
V	PIN 1	CRANCK
W	PIN 3	SCAM
Х	PIN 1	KNOCK
Y	PIN 2	KNOCK
Z	PIN 1	LAMBDA
а	PIN 5	LAMBDA
b	PIN 6	LAMBDA
С	PIN 2	LAMBDA
d	PIN 2	RR DAMPER
e	PIN 2	RL DAMPER
	PIN 2	OTL P
	PIN 2	FUFL P
f	PIN 2	THROTTLE
	PIN C	INLET P
	PIN 1	RL DAMPER
q	PIN 1	RR DAMPER
5	PIN B	GEAR POT
	PIN 2	OIL T
	PIN 1	OIL P
	PIN 2	AIR T
	PIN 1	FUEL P
	PIN 2	CRANCK
h	PIN 6	THROTTLE
	PIN 2	WATER T
	PIN A	INLET P
	PIN 3	RL DAMPER
	PIN 3	RR DAMPER
	PIN A	GEAR POT
i	PIN 2	CAM PHASE
j	PIN 5	THROTTLE
k	PIN 3	THROTTLE
m	PIN 4	LAMBDA
n	PIN 1	FUEL INJ
р	PIN 3	FUEL INJ
q	PIN 5	FUEL INJ
r	PIN 7	FUEL INJ
S	PIN 1	COIL
t	PIN 2	COIL
u	PIN 1	GND P
V	PIN 1	GND P
W	PIN 1	FUEL PUMP
Х	PIN 1	RAIN LIGHT
у	PIN 1	STARTER EXCIT
Z		
aa		





# • <u>GND P</u>

CONNECTOR TYPE	Ring Terminal D8	
NUMBER OF PIN	1	
PIN NAME	DESTINATION	
	PIN T	ENGINE
	PIN U	ENGINE
	PIN 2	FUEL PUMP
	PIN 1	BEACON
	PIN 3	CRANCK
1	PIN 2	SCAM
	PIN 2	GEAR SHIFT
	PIN 2	RAIN LIGHT
	PIN 2	CHRONO
	PIN u	ENGINE
	PIN v	ENGINE

# • <u>Oil T</u>

CONNECTOR TYPE	JPT 2PTS BLACK FEMALE	
NUMBER OF PIN	2	
PIN NAME	DESTINATION	
1	PIN J	ENGINE
2	PIN h	ENGINE

# • Knock

CONNECTOR TYPE	JPT 2PTS BLACK FEMALE	
NUMBER OF PIN	2	
PIN NAME	DESTINATION	
1	PIN X	ENGINE
2	PIN Y	ENGINE

# • <u>Oil P</u>

CONNECTOR TYPE	PACKARD 3PTS FEMALE T SHAPE	
NUMBER OF PIN	3	
PIN NAME	DESTINATION	
1	PIN h	ENGINE
2	PIN f	ENGINE
3	PIN F	ENGINE





# • <u>Air T</u>

CONNECTOR TYPE	JPT 2PTS GREY FEMALE	
NUMBER OF PIN	2	
PIN NAME	DESTINATION	
1	PIN B	ENGINE
2	PIN h	ENGINE

# • <u>Coil</u>

CONNECTOR TYPE	JPT 4PTS BLACK FEMALE	
NUMBER OF PIN	4	
PIN NAME	DESTINATION	
1	PIN s	ENGINE
2	PIN t	ENGINE
3	PIN R	ENGINE
4		

# • Fuel Pump

CONNECTOR TYPE	DTM06-2S E007	
NUMBER OF PIN	2	
PIN NAME	DESTINATION	
1	PIN w	ENGINE
2	PIN 1	GND P

# • Fuel P

CONNECTOR TYPE	PACKARD 3PTS FEMALE T SHAPE	
NUMBER OF PIN	3	
PIN NAME	DESTINATION	
1	PIN h	ENGINE
2	PIN f	ENGINE
3	PIN G	ENGINE

#### • <u>Beacon</u>

CONNECTOR TYPE	SURE SEAL 3PTS FEMALE	
NUMBER OF PIN	3	
PIN NAME	DESTINATION	
1 - F	PIN 1	GND P
2 - M	PIN M	ENGINE
3 - M	PIN P	ENGINE





# • Fuel INJ

CONNECTOR TYPE	CINCH 8PTS FEMALE	
NUMBER OF PIN	5	3
PIN NAME	DESTINATION	
1	PIN n	ENGINE
2	PIN P	ENGINE
3	PIN p	ENGINE
4	PIN P	ENGINE
5	PIN q	ENGINE
6	PIN P	ENGINE
7	PIN r	ENGINE
8	PIN P	ENGINE

# • Starter Excit

CONNECTOR TYPE	Ring Terminal D5	
NUMBER OF PIN	1	
PIN NAME	DESTINATION	
1	Pin y	ENGINE

# • <u>Crank</u>

CONNECTOR TYPE	JPT 3PTS BLACK FEMALE	
NUMBER OF PIN	3	
PIN NAME	DESTINATION	
1	PIN V	ENGINE
2	PIN h	ENGINE
3	PIN 1	GND P

# • <u>Throttle</u>

CONNECTOR TYPE	FEP 6PTS BLACK FEMALE	
NUMBER OF PIN	6	
PIN NAME	DESTINATION	
1	PIN D	ENGINE
2	PIN f	ENGINE
3	PIN k	ENGINE
4	PIN E	ENGINE
5	PIN j	ENGINE
6	PIN h	ENGINE





# • Water T

CONNECTOR TYPE	JPT 2PTS BLACK FEMALE	
NUMBER OF PIN	2	
PIN NAME	DESTINATION	
1	PIN A	ENGINE
2	PIN h	ENGINE

### • Lambda

CONNECTOR TYPE	T&B GREY COVER 6PTS FEMALE	
NUMBER OF PIN	6	
PIN NAME	DESTINATION	
1	PIN Z	ENGINE
2	PIN c	ENGINE
3	PIN S	ENGINE
4	PIN m	ENGINE
5	PIN a	ENGINE
6	PIN b	ENGINE

### • <u>SCAM</u>

CONNECTOR TYPE	YASAKI RH 3F	
NUMBER OF PIN	3	
PIN NAME	DESTINATION	
1	PIN N	ENGINE
2	PIN 1	GND P
3	PIN W	ENGINE

# <u>CAM Phase</u>

CONNECTOR TYPE	SICMA II 2PTS GREY FEMALE	
NUMBER OF PIN	2	
PIN NAME	DESTINATION	
1	PIN S	ENGINE
2	PIN i	ENGINE

# • Inlet P

CONNECTOR TYPE	DELPHI 3PTS GREY FEMALE	
NUMBER OF PIN	3	
PIN NAME	DESTINATION	
1	PIN h	ENGINE
2	PIN C	ENGINE
3	PIN f	ENGINE





# • <u>RL Damper</u>

CONNECTOR TYPE	DTM06-3S-E007	
NUMBER OF PIN	3	
PIN NAME	DESTINATION	
1	PIN g	ENGINE
2	Pin e	ENGINE
3	PIN h	ENGINE

## • Gear Shift

CONNECTOR TYPE	FCI 2PTS GREEN	
NUMBER OF PIN	2	
PIN NAME	DESTINATION	
1	PIN H	ENGINE
2	PIN 1	GND P

#### <u>RR Damper</u>

CONNECTOR TYPE	DTM06-3S-E007	
NUMBER OF PIN	3	
PIN NAME	DESTINATION	
1	PIN g	ENGINE
2	Pin d	ENGINE
3	PIN h	ENGINE

## • Rain Light

CONNECTOR TYPE	FASTIN FASTON 2PTS 6.3mm FEMALE T SHAPE	
NUMBER OF PIN	2	
PIN NAME	DESTINATION	
1	PIN x	ENGINE
2	PIN 1	GND P

# • Gear Pot

CONNECTOR TYPE	UTG 110-04 S	
NUMBER OF PIN	5	
PIN NAME	DESTINATION	
А	PIN h	ENGINE
В	PIN g	ENGINE
С	PIN K	ENGINE
D		





# • <u>Chrono</u>

CONNECTOR TYPE	DTM06-2S-E007	
NUMBER OF PIN	2	
PIN NAME	DESTINATION	
1	PIN R	ENGINE
2	PIN 1	GND P

