DALLARA F308

Manual F308 **CONTENTS** VR -03

DALLARA F308

DALLARA AUTOMOBILI IS HAPPY WITH THE CHOICE YOU MADE BUYING THE DALLARA F308. WE WISH YOU THE VERY BEST IN RACING IT.

Dallara Automobili
Via Provinciale 33
43040 VARANO MELEGARI – PR – ITALY

Telephone	+39 0525 550 711
Belgium office	+32 12 210 208

design	Mr Ferdinando Concari	Email	F.concari@dallara.it
technical assistance	Mr Jos Claes	Email	F3support@dallara.it
spares	Ms David Beck	Email	d.beck@dallara.it

On the Dallara web site www.dallara.it you can find useful information about the company, our people and the factory. It also includes a 'second hand' cars service.

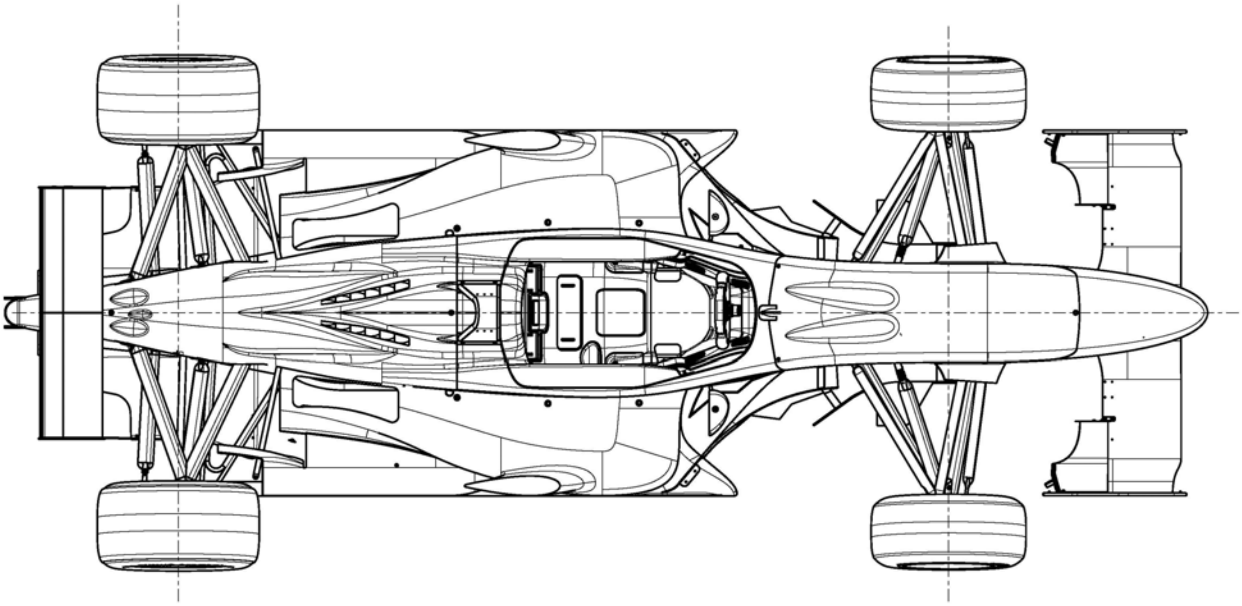
Our web site also includes information for customers only, in the restricted area. David Beck hands out the necessary pass-words.

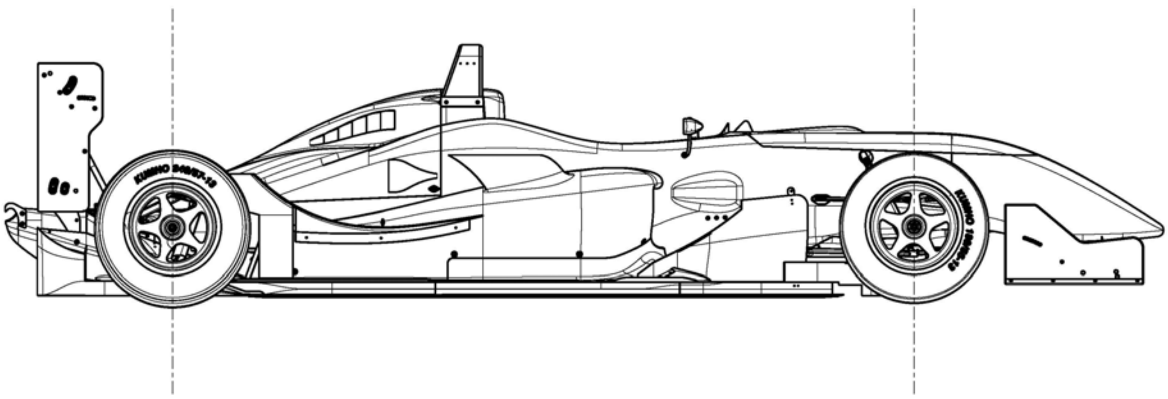
For any question, advice or idea you might have, please don't hesitate to contact us.

DALLARA SPARE PARTS DISTRIBUTORS

	JAPAN	ENGLAND	EURO SERIES	GERMAN CUP
contact	Shiro Matsunaga	Martin Stone	Tine Schwadtke	
Tel	+81 550 885 550	+44 1252 333 294	+49 3544 50030	
e-mail	matsunaga@lemans.co.jp	martin@carlin.co.uk	dallara@race-rent.com	

3 SIDE & TOP VIEW OF THE F308





wheelbase	2730 mm
front track	1585 mm
rear track	1535 mm
overall length	4264 mm
overall width	1835 mm [tire-tire front]
overall height	950 mm [roll hoop]
weight	540 kg incl. driver & ballast

front suspension	pushrod twin damper system
rear suspension	pushrod twin damper system

SUPPLIERS

chassis	carbon sandwich with AL/Nomex^{tm} honeycomb
bodywork	Glass fibre composite with Nomex^{tm} honeycomb
composites	Delta preg
castings	Magnesium World

gearbox	Hewland, sequential, six forward gears + reverse
g-box internals	Hewland gears and differential
springs	Eibach 3"/36mm ID
dampers	Koni 2812 bump and rebound adjustable
fuel cell	Premier – FT3
extinguisher	Lifeline (electric operated)
steering wheel	Sparco
quick release	SPA-Design
wheels	Taneysia 9"front & 10.5"rear
brakes	Brembo
battery	Deka
seat belts	TRW-Sabelt

Installed engines	Honda Mugen XJ6 Mugen & NBE
	Mercedes HWA
	Nissan Tomei
	Volkswagen Spiess
	Toyota Tom's & Torii
	Toyota Piedrafita

These set-ups consider the complete car with the driver seated in it, ready to race.

FRONT	AVON	BRIDGESTONE	KUMHO	DUNLOP
ride height (mm)	18	16	16	15
spring (Lb/in)	900	850	800	900
spring pre-load	the basic set-up does not suggest the use of spring pre-load			
pushrod length	use the pushrod adjuster to set the ride height			
roll centre setting	std	lower	std	Std
ARB (kg/mm)	35	60	90	35
camber	3,00°	3,50°	3,25°	3,50°
caster-WMP	10,60°	11,00°	10,00°	10,60°
caster-UMP/P-15	12,50°	13,50°	12,50°	13,50°
toe (mm total)	3,00 OUT	3,00 OUT	2,00 OUT	3,00 OUT

REAR				
ride height (mm)	35	32	34	35
spring (Lb/in)	800	800	700	800
spring pre-load	avoid using rear spring pre-load			
pushrod length	use the pushrod adjuster to set the ride height			
roll centre setting	A-1	A-1/F-1	E-2/G-2	A-1
ARB (kg/mm)	60	75	120	90
camber	2,50°	2,25°	2,50°	3,00°
toe	1,00 IN	2,00 IN	1,00 IN	2,00 IN
Differential	70/60 4F	60/80 6F	60/60 4F	60/80 4F

Notes:

- Ride heights are measured at the axles
- When using spring pre-load you can lower the front ride height
- ARB values are those as you can find in the following pages
- Caster WMP means caster on the suspension with the pushrod mounted on the wishbone
- Caster UMP/P-15 means caster on the suspension with the pushrod mounted on the upright, in position P-15 [see later in the manual]
- Toe is measured at the wheel rim's, total value means left and right wheels added
- Differential, see following pages.

Comments:

- In fast corners aerodynamics (ride heights and wing settings) have more influence on the balance than in slower corners.
- In mid-and slow speed corners the weight distribution and the differential settings are the most important contributors to the balance of the car.
- Tune the dampers to the chosen springs, not the springs to the dampers.
- Always pay attention to reach enough high tyre temperatures. No car can reach its limit on too cold tyres. No car can be reasonably balanced with a significant difference between front and rear tyre temperatures.
- Run the car always as low as possible, although without going stiffer on springs for running lower.

SETUP ADJUSTMENTS 6

Effects of the adjustments on the cars' set-up.

Positive change in:	means:
Height	car rises
Toe	toe-out
Camber	upper part of rim outward
Castor	lower part of rim points ahead

	FRONT	**REAR**
PUSHROD ADJUSTER **1TURN** **Height change (mm)** Camber change (deg) Thread step	**4.096** 1′ 24/″R+24/″L=2.12mm	**6.413** 12′ 20/″R+24/''L=2.32mm
TOE ADJUSTER (PER WHEEL) **1TURN** **toe change (deg)** thread step	**37′72″** 24/″=1.06mm	Height change -3.37mm Camber change -18′3″ **-45′27″** 20/″R+24/″L=2.32mm
CAMBER SPACER **+1mm** height change toe change	**17′33″** 0.38mm	**24′47″** 1.87mm 11′= + 1/4Turn
CASTOR ADJUSTER **1TURN** Castor change (deg) thread step height change (mm) camber change (deg) toe change (deg) SPRING PLATFORM **+1TURN** thread step (mm) height change (mm)	**29′41″** 24/''=1.06mm -1.427 -4'34″ 0 2 2.29	23° brake calliper=16° **-36′00″** 24/''=1.06mm -0.4 2'40″ -1'30″ 2 2.61
WHEEL/SPRING RATIO (vertical)	1.131	1.299
ARB/WHEEL RATIO	See table	1.884
ROLL CENTRE HEIGHT	Tyre dependent	Tyre dependent

- Spacers to adjust camber are available in the following thickness: FRONT: 1.0, 1.5 and 2.0 mm. REAR: 0.8, 1.0, 1.2, 1.5 and 2.0mm. Combine these to make fine adjustments.
- Front and rear wheel to spring, front and rear wheel to drop link motion ratios may be considered as constant for typical wheel travel.
- For a given ride height the F308 front roll centre is 15mm higher compared the F305.
- The front roll centre is adjustable by moving the spacer between the upright and the lower wishbone. More information further in this manual.

VERTICAL PRELOAD ADJUSTMENT

Remind there is always some 'pre-load' in the damper: typically this is 24-27kg for the standard Koni damper. This 'pre-load' depends on damper make/type and comes mainly from the internal gas pressure.

In a non pre-load condition, as long as the damper is not fully extended, turning on the spring platform changes the car ride height (and lowers the gas pressure inside the damper). When the damper gets fully extended, turning on the platform increases vertical spring pre-load on the car. We advise though, not to proceed this way, because some dampers [including Koni] should not be used fully extended. Therefore we advise to use the droop-stop for limiting rebound travel or applying spring pre-load.

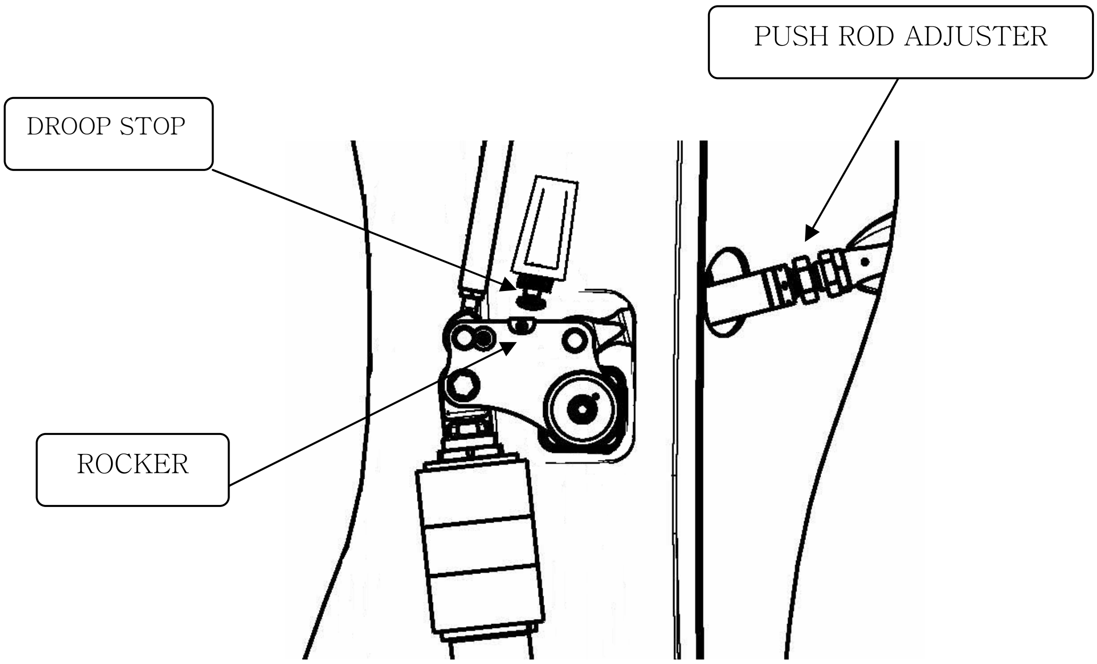
Pre-load in this text is considered to be the necessary force that has to be applied to the spring to change its length with respect to the static length value.

$P = Ks \times t \times 2$

P = pre-load in kg
Ks = spring stiffness in kg/m [(Ks in Lb/in) / 56 = Ks in kg/mm]
T = number of spring platform turns
2 = mm / turn (for standard Dallara Koni damper top)

SETTING PRE-LOAD

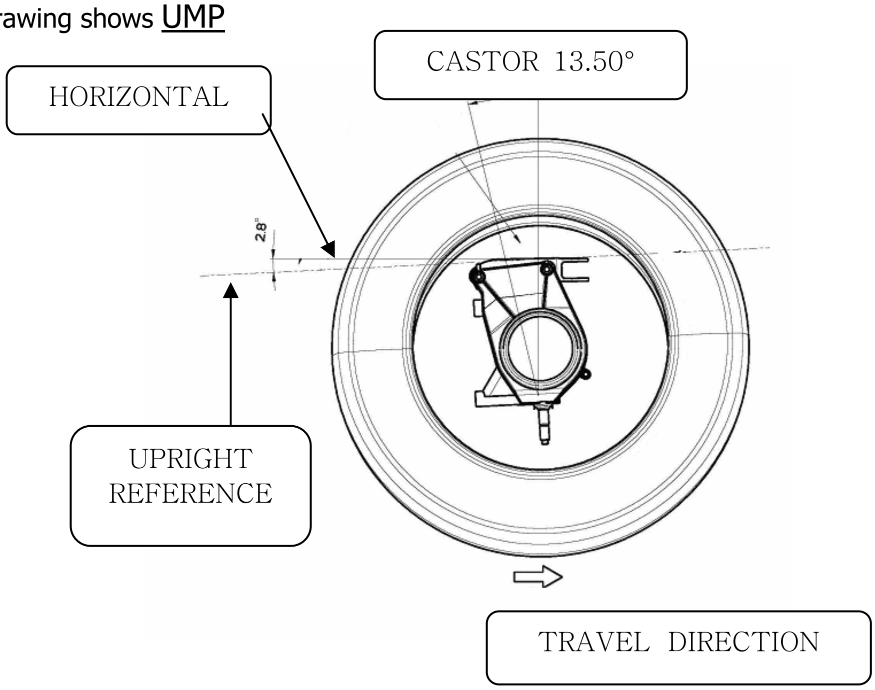
- Mount the damper-spring combination with the spring platform just in contact with the spring
- Put the car including the driver on the set-up floor
- Clear the droop-stop from touching the rocker
- Adjust ride height with the pushrod adjusters to the desired setting [further correct for corner weights at this point]
- Bring the droop-stop in contact with the rocker
- Now turn the spring platform to achieve the desired pre-load



When the car is flat, that is with the same front and rear ride height:

- WMP: when the upright inclination angle (apparent castor) is **+2.10°** the castor angle (build in castor) is **10.60°**. The upright reference plane points downwards in forward direction.
- UMP: when the upright inclination angle (apparent castor) is **-2.80°** the castor angle (build in castor) is **13.50°**. The upright reference plane points upwards in forward direction.

Drawing shows UMP



When the car has a pitch angle, that is with different front and rear ride height.

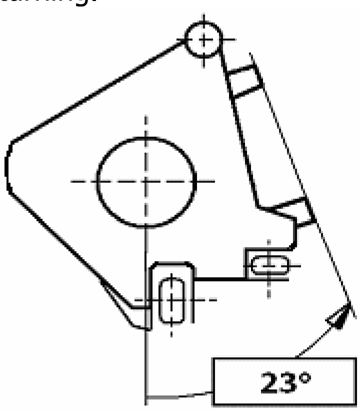
For instance, with FRH 15mm and RRH 30mm the pitch angle equals:

[(30-15)/2730] x 57.29 = 0.31°

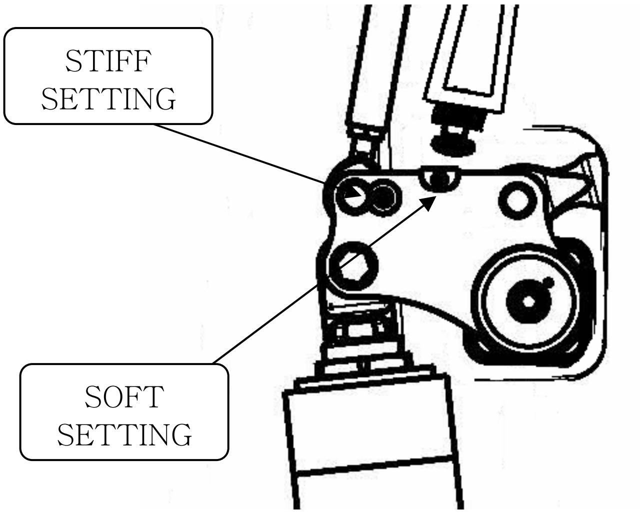
- WMP: the upright inclination angle (apparent castor) is **2.10° + 0.31° = 2.41°** and the castor angle (build in castor) becomes **10.60° - 0.31° = 10.29°**.
- UMP: the upright inclination angle (apparent castor) is **-2.80° + 0.31° = 2.49°** and the castor angle (build in castor) becomes **13.50° - 0.31° = 13.19°**.

REAR

The rear wheel 'castor' angle can be measured to check bump steer to be zero. You can measure the angle on the brake calliper mounting platforms. When the car is flat (front ride height is equal to rear ride height) and you measure 'apparent' castor of 23°, the 'castor' angle is 16° and bump steer is zero.
The castor angle on the rear axle is, other than for the bump steer control, not relevant since the rear wheels are not turning.



The drawings shows both motion ratio's



The TABLE below shows the motion ratio's for all ARB's and different blades available. Two multiple position ARB's are available too.

RATIO = WHEEL/ARB [WHEEL vertical travel / ARB drop link travel]

ADJUSTABLE BLADE ARB			
BLADE LENGTH [mm]	SOFT SETTING	STIFF SETTING	PART ITEM CODE
270	1.187	0.998	30255050
245	1.207	1.012	30555083
221	1.227	1.027	30555031
170	1.272	1.058	T0245066
115	1.324	1.093	30255129
MULTIPLE POSITIONS ARB			
ARB 5P	1.276	1.059	30555068
	1.295	1.073	
	1.315	1.087	
	1.336	1.102	
	1.357	1.118	
ARB 7P	1.239	1.031	30755068
	1.255	1.044	
	1.272	1.056	
	1.290	1.069	
	1.308	1.082	
	1.326	1.095	
	1.345	1.109	

BLADE LENGTH: total blade length in *mm*, measured between extremities.

SOFT SETTING:
- use the fixation point close to the rocker axle
- for a given ARB travel the WHEEL must travel more compared with the STIFF SETTING

STIFF SETTING:
- use the fixation point further away from the rocker axle
- for a given ARB travel the WHEEL will travel less compared with the SOFT SETTING

- The values shown below are in kg/mm [daN/mm] at one end of the blade while the other end is locked.
- The values below are measured on the ARB isolated from the car. You may use the Motion Ratio's from page 5 to calculate the ARB stiffness *at ground*.
- On various ARB's we suggest not to use the 115mm blade.

ARB	BLADE	BLADE POSITION						
		1	**2**	**3**	**4**	**5**	**6**	**7**
T-13 solid	B-270	3,0	3,1	3,4	3,9	4,0		
	B-245	3,8	3,9	4,2	4,7	4,8		
	B-221	5,0	5,1	5,4	5,9	6,0		
	B-170	10,0	10,2	10,7	11,4	11,6		
	~~B-115~~							
T-18x2,5	B-270	5,5	6,0	7,4	9,4	10,0		
	B-245	6,9	7,4	9,0	11,1	11,8		
	B-221	9,5	10,1	11,8	14,2	15,0		
	B-170	21,0	22,2	25,7	30,5	32,0		
	~~B-115~~							
T-20x2,0	B-270	6,5	7,1	8,7	10,8	11,5		
	B-245	8,0	8,6	10,4	12,7	13,5		
	B-221	11,0	11,8	13,5	17,0	18,0		
	B-170	24,0	25,3	28,9	33,9	35,5		
	~~B-115~~							
T-30x5,0	B-270	8,5	10,7	17,1	25,7	28,5		
	B-245	11,1	13,8	21,7	32,3	35,8		
	B-221	16,0	19,4	29,3	42,7	47,0		
	B-170	41,5	47,8	66,2	91,0	99,0		
	B-115	187,0	190,0	198,5	210,0	213,8		
5 POINTS ARB 30x2,0		70,0	99,0	150,0	250,0	545,0	-	-
7 POINTS ARB 25x2,0		26,5	33.9	44.4	60.3	85.5	129.0	213,1

- Since there have been some quality problems with the *T-13 Solid* we replaced this ARB by a slightly stiffer new ARB, the T-14.5mm Solid. In its softest position with the 270 blade the stiffness is 4,1kg/mm, in its stiffest position using the 170 blade the stiffness is 16,1kg/mm.

The F308 car has two different options for its front suspension.

- WMP [Wishbone Mounted Pushrod]: This is a conventional suspension with the pushrod mounted on top of the lower wishbone. This suspension is only in detail different from the front suspension on our previous F3 car.
- UMP [Upright Mounted Pushrod]: In this suspension the pushrod is mounted on the upright. The pushrod position is adjustable in longitudinal sense. Extra load is transferred to the corner front inner wheel, potentially reducing understeer thanks to a more equal vertical load between front inner and outer wheels.

Between both suspensions the following parts are different:

- Lower wishbone
- Ackermann arm
- Lower part of the pushrod
- Additional bracket for UMP

For the UMP suspension we have foreseen 4 different positions [in longitudinal sense] to increase or decrease the effect typical of this suspension lay-out. Two different brackets give a total of four positions. We call these positions according the distance they are set behind the front axle line.

Positions:

- P -5(mm) [on standard bracket]
- P -10 [on optional bracket]
- P -15 [on standard bracket]
- P -20 [on optional bracket]

There are various ways to express the difference between the 4 positions, we choose one that clearly shows the level of effect.

- P -5 transfers 'X' load to the corner inner front wheel
- P -10 transfers 70% more compared P -5mm
- P -15 transfers 130% more compared P -5mm
- P -20 transfers 170% more compared P -5mm

Further information:

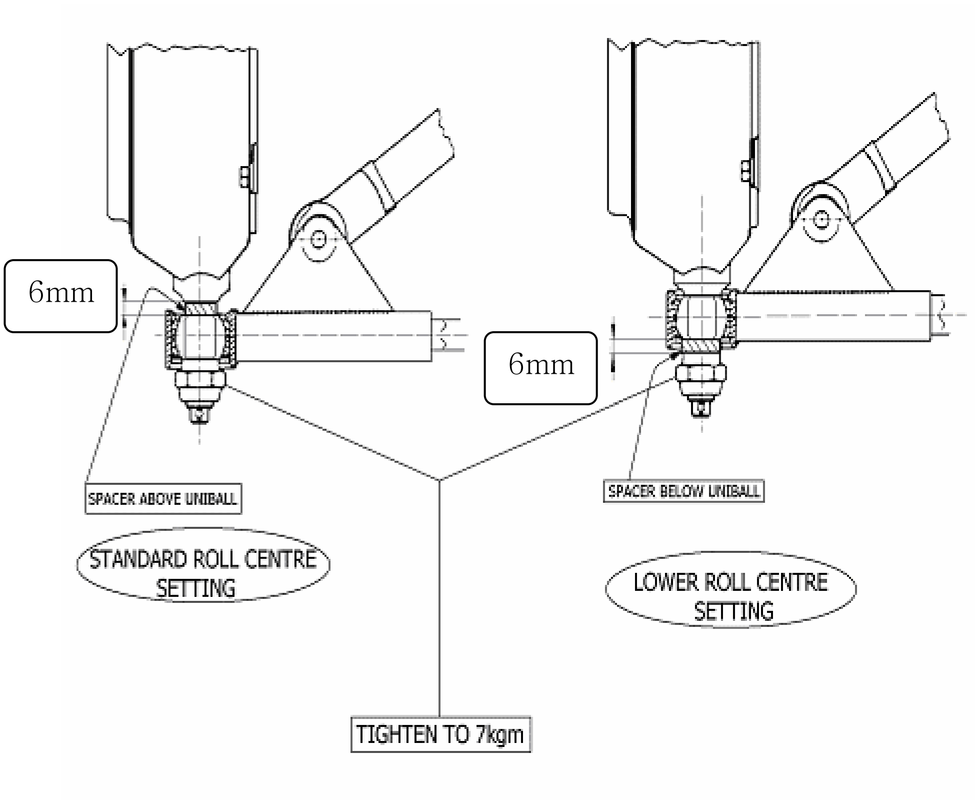
- The effect on load transfer [by turning steering wheel] of the standard geometry with 'typical' caster is near identical to the effect on load transfer on the UMP P -5
- In a straight line the UMP behaves identical compared to a conventional WMP front suspension. UMP's effect increases with steering angle. Therefore the effect is most noticeable in slow corners.
- All 4 positions cause an increase of steering force, P -20 being the heaviest of the 4 positions.
- All positions cause an increased load transfer on the rear axle opposite in direction compared to what occurs on the front axle. This will decrease traction capacity, P -20 causes the largest load difference between rear inner and outer wheel.
- Roll centre height, camber, camber change, steering ratio, damper ratio, ARB ratio, Ackermann, off-set and trail do not vary between the 4 positions. When changing the pushrod position always check the front ride height, the only [other]feature that varies between different positions.

Front roll centre height can be changed by moving the spacer relative to the wishbone spherical joint.

When you change to ´low roll centre´ configuration the push-rod length has to be shortened by 1.2 register turns (≈7 faces of the adjuster) to put the car back at the same front ride height.

When adjusting the roll centre height camber gain versus wheel travel varies a little.

OPTION	Roll centre height @ static ride height	Camber change with 10mm wheel travel
Std	X	3′
Low	-14.0 mm	5′



The drawing shows the roll centre setting on WMP. The procedure and effect are identical on UMP suspension.

Note that the spacer is now 6mm high, compared to 5mm on our previous cars.

STEERING

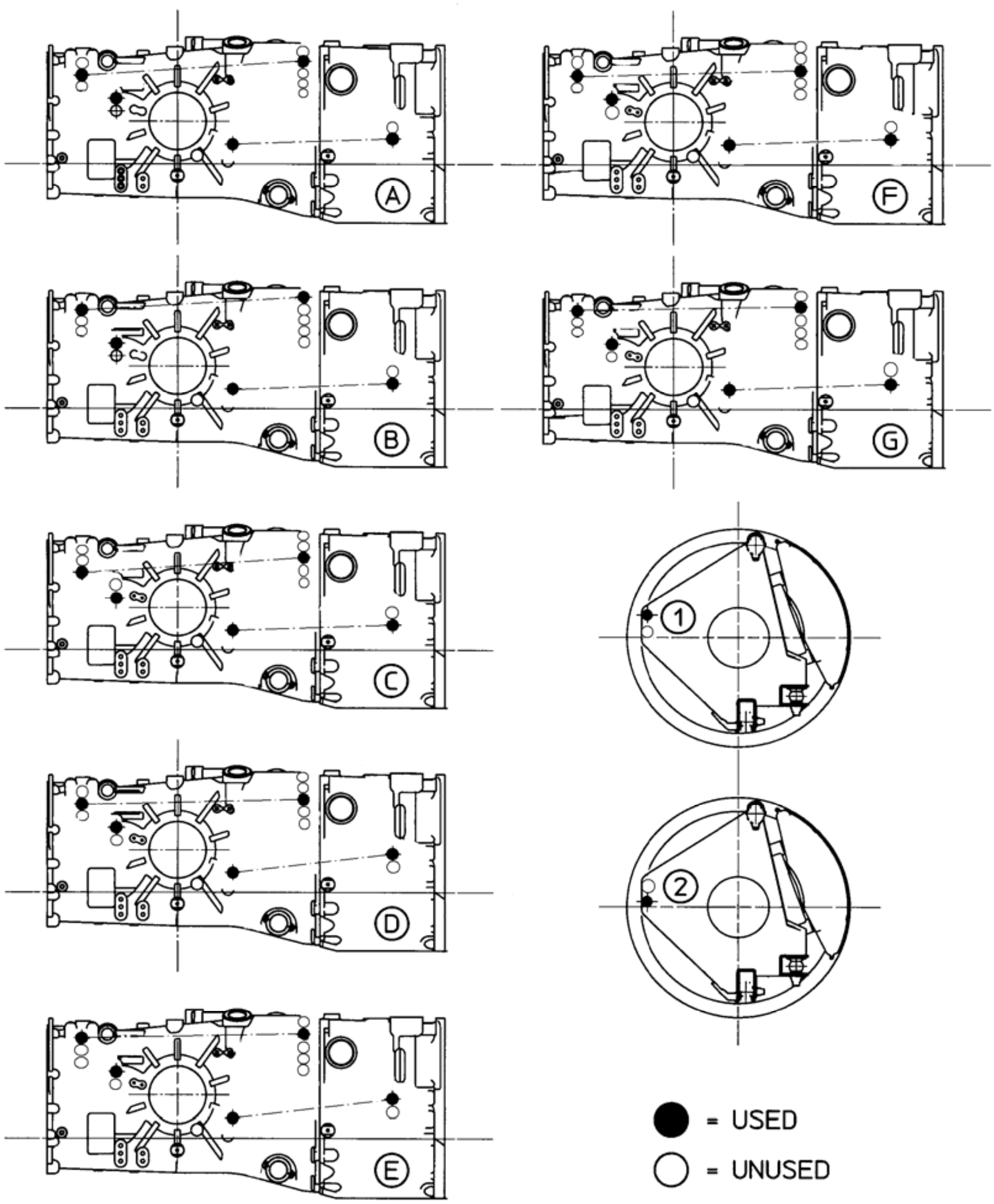
Pinion primitive diameter	15.60 mm
Static steering ratio	12.5° steering wheel/1°wheel
Ackermann [%]	28

REAR SUSPENSION GEOMETRY

CFG	Roll centre height	Camber change	Anti-rise	Anti-squat	To adjust 'caster' adjust joint
	@ static ride height	with 10mm wheel travel	%	%	+ means longer
A-1	std	20′	7	49	-
***B-2**	-19	16′	7	49	-1.0 turns
C-1	+17	24′	7	49	-
***D-1**	std	23′	69	69	-0.5 turn
***E-2**	-20	18′	69	69	-1.5 turns
F-1	+9	22′	22	36	+1.5 turns
G-2	-10	18′	22	36	-

Note:

- **B-2** needs special brackets for the front top mounting (available from Dallara).
- **D-1** and **E-2** effect the 'caster' angle.



REAR ANTIROLL BAR

The F308 has rear anti-roll bars with twin adjustable blades, their length is 80mm.
Ø 40mm is the biggest possible RARB, Ø13mm is the softest RARB available.
The two digits in this table represent the blade positions: 1=full soft, 5=full stiff.
Stiffness in kg/mm from the isolated ARB. One blade is fixed while the other blade displaces 1mm.

The hollow 30x3mm ARB is equal to std Ø26mm

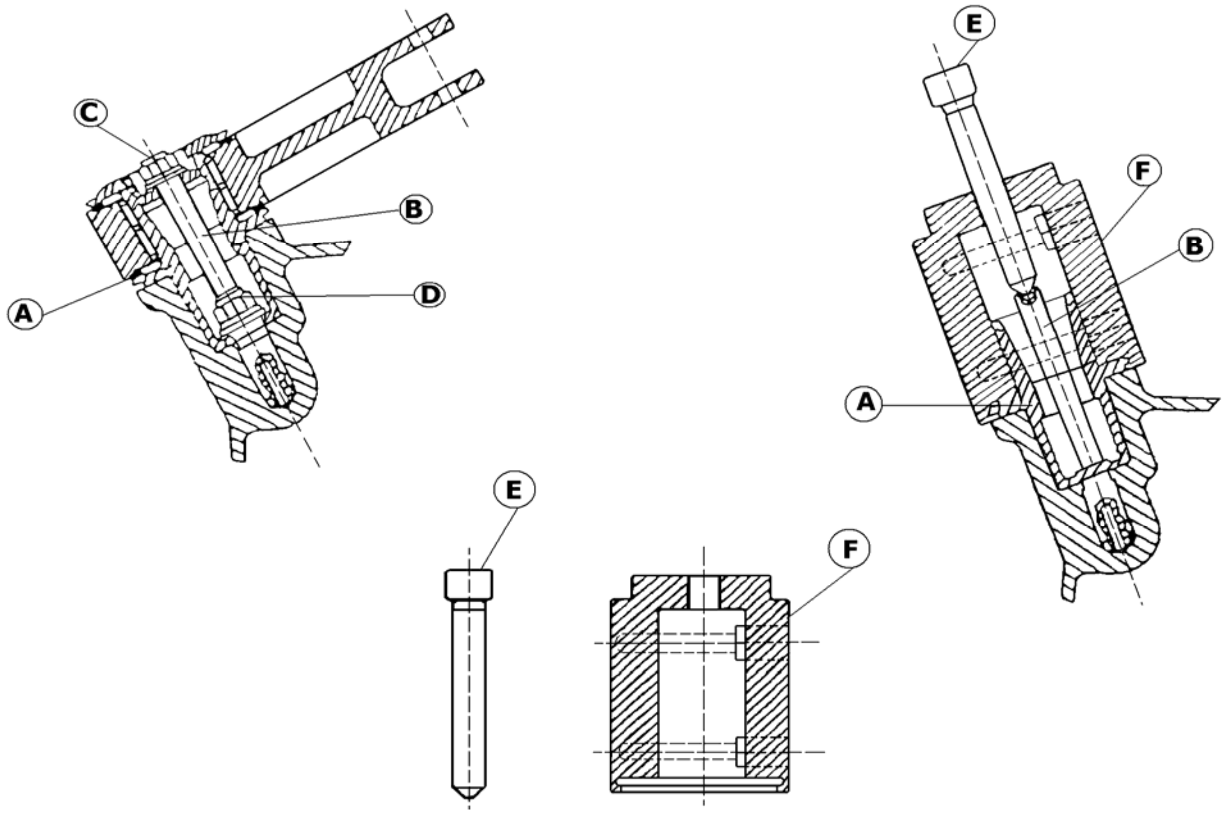
P1-P5 ≈ P3-P3 ≈ P2-P4

	Ø 13	Ø 14	Ø 16	Ø 19	Ø 21	Ø 22	Ø 24	Ø26/30*	Ø 28	Ø 30	Ø 35	Ø 40
P1-P1	15.7	19.9	29.4	44.6	53.8	57.8	65.0	70.6	75.1	78.7	84.5	87.7
1-2	15.8	20.2	30.0	45.9	55.7	60.1	67.9	74.1	79.0	83.0	89.5	93.0
2-2	16.0	20.4	30.6	47.4	57.8	62.5	71.0	77.8	83.3	87.7	95.0	99.0
1-3	16.3	20.8	31.5	49.5	61.1	66.3	76.0	83.8	90.2	95.5	104.1	108.9
2-3	16.4	21.1	32.1	51.2	63.6	69.3	80.0	88.7	95.8	101.8	111.7	117.3
1-4	16.7	21.5	33.1	53.7	67.6	74.1	86.3	96.6	105.1	112.3	124.5	131.4
1-5*	16.9	21.8	33.8	55.7	70.7	77.8	91.5	103.1	112.8	121.2	135.5	143.8
2-5	17.0	22.1	34.6	57.8	74.1	82.0	97.3	110.5	121.8	131.6	148.7	158.7
3-4	17.3	22.6	35.7	61.0	79.6	88.7	106.9	123.0	137.2	149.8	172.3	185.9
3-5	17.5	22.9	36.6	63.5	83.9	94.2	114.9	133.8	150.7	166.0	194.2	211.5
4-4	17.8	23.4	37.9	67.5	91.0	103.1	128.4	152.5	174.9	195.8	236.3	262.5
4-5	18.0	23.8	38.8	70.6	96.7	110.5	140.2	169.3	197.5	224.5	279.4	316.8
5-5	18.2	24.2	39.8	74.0	103.2	119.1	154.3	190.4	226.7	263.1	341.7	399.4

REAR SUSPENSION ROCKER REPLACEMENT

The rear rocker spins around a steel pivot (A) fitted into the gearbox case by the stud B, fixed with LOCTITE 242™. The following procedure shows how to extract the rocker and the pivot. Contact DALLARA customer's service regarding the special tools E and F.

- Unscrew nut C and take off the cap and rocker. (Tightening torque for nut C is 3.5 Kgm)
- Unscrew nut D with 14mm tube spanner. (Tightening torque for nut D is 5.5 Kgm)
- Fit extractor F around pivot's outer flange. By winding on bolt E the pivot will come out.
- Remove stud B with the proper tool. The stud is fitted with Loctite in its insert. When removing the stud, heat the stud to about 140°C to break the Loctite.



This differential is designed with versatility as its major asset. Many parameters will lead you to the required setting. A car with good grip and limited power requires a very different arrangement than that required for a high poor grip/high power car.

Working principles: Ten friction plates within the diff, six connected to the side gears, four to the diff casing, control the amount of 'differential' action. The amount of *limited slip* only depends on the friction force between these ten plates.

Four factors contribute to the level of this friction force:

1. The bevel gears thrust apart as soon as the car moves. This is a feature of bevel gears and is not adjustable. The contribution of this on friction is minimal.
2. The ramp angle on the side gear ring influences the amount of the driving force on the diff that gets directed sideways and onto the plates. E.g. on the power/drive side ramp, 60 degrees transmits less force sideways than a 30 degree ramp. Likewise, on the off-power side ramp, an 80 degrees angle will transmit little force while 45 degrees locks more. 60°/80° is fitted as standard;
3. The pre-load with which they are assembled to start. In each diff there is a pre-load spacer that looks like one of the B plates, but thicker. Depending on diff model, it is either the first or the last component assembled into the diff casing. Its thickness dictates to what degree the plates are pre-loaded / forced against each other. The pre-load is set and checked on each diff by holding one side gear locked, via a dummy output shaft locked in a vice, and by turning the other with a torque wrench. If the measured resistance is deemed too high, the spacer is ground down until the desired figure is achieved. The preload should be checked periodically as it tends to reduce as the diff runs, meanwhile a slightly thicker spacer will allow re-setting;
4. The re-arrangement of the order of the friction discs. The arrangement 1, with a disc succession A, B, A, B, A, has the maximum number of working friction faces. It gives the maximum resisting torque. The arrangement 3 has the minimum of working friction faces and gives the minimum resisting torque.

Standard Hewland available ramp angles are: 30/60; 45/45; 45/80; 60/80; 80/80; optional: ramps including 70

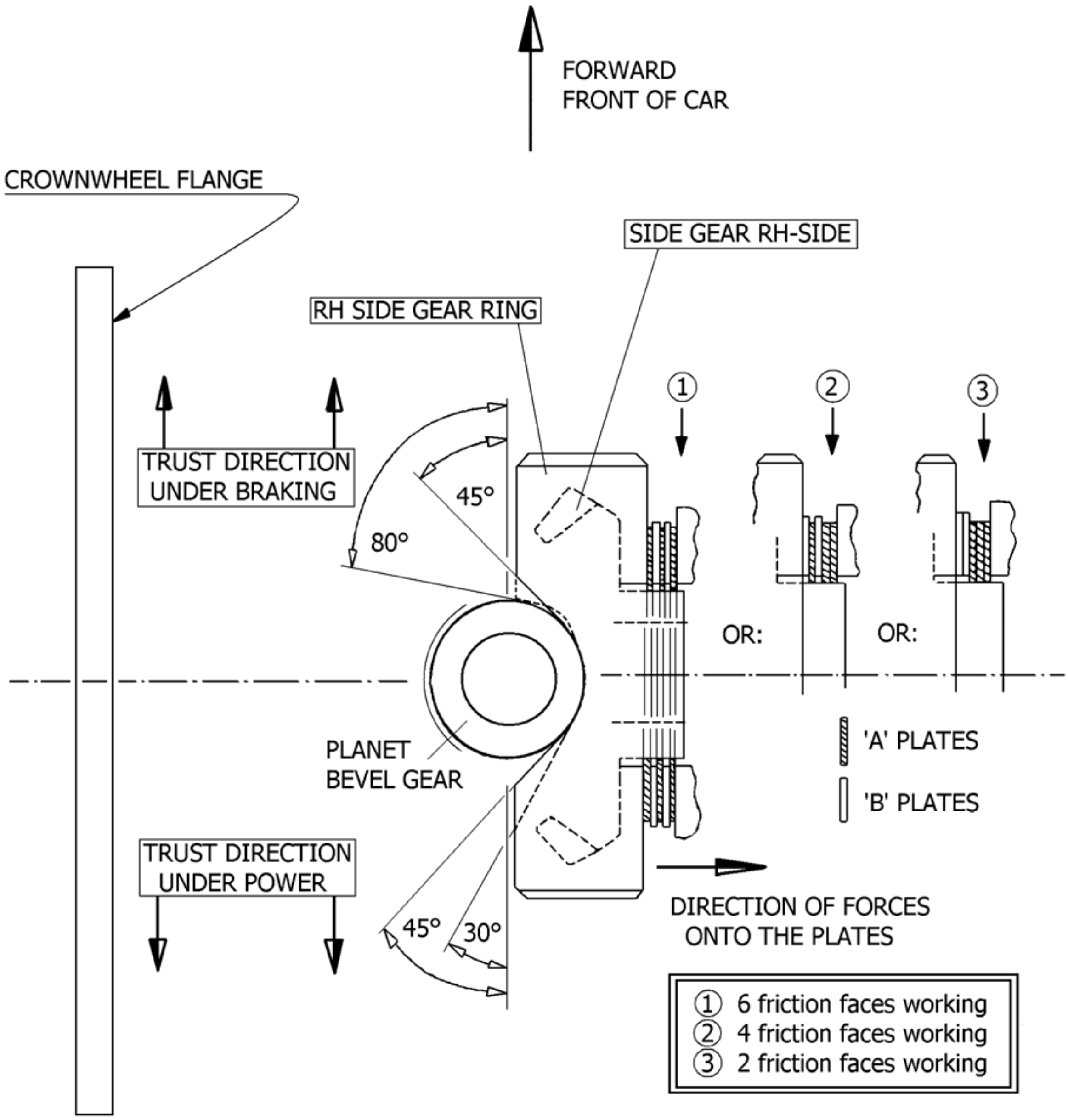
Differential settings have an important influence on the car's balance throughout the corner. Also handling is affected, especially so on corner turn-in and exit.

- The torque on the differential in drive (acceleration) is much bigger than the torque on the differential given by the engine brake (deceleration). Typical in line acceleration gets to about 1g starting from a relatively low speed, off-power/braking by the engine only gets typically up to 0.3g.
- The disc configuration (2, 4 or 6 faces) has the same effect on drive and off-power, the ramps are the only tool to differentiate the friction force or 'lock' between drive and brake.
- The discs wear off, just as a clutch, and should get checked regularly. This also means that the pre-load is 'wearing' down, faster so when using the 2 friction discs configuration and significantly less when using 6 friction faces.
- Pre-load is kind of a 'constant lock' and the effect is felt in slow and fast corners in entry, mid-corner and exit. The ramps and disc configurations typically have more effect in slow and less in fast corners, and affect corner entry and exit, less so mid-corner.
- Pre-load locks the differential (both wheels turn at the same speed) until the difference in torque is higher than the pre-load. Once passed the pre-load, the remaining lock is achieved by the ramps and disc configuration mainly.
- Most circuits require little lock to prevent the inner wheel from spinning coming out of corners, depending though on tyres, track, driving style and weather conditions. Excessive lock might result in power understeer.
- Some amount of lock in off-power helps to stabilize the rear end, excessive lock might cause turn-in understeer.

This table shows the % of lock from minimum to maximum lock.
Lock%= (slower wheel torque – faster wheel torque)/ total torque

LOCK%	2.5	5.0	7.0	9.5	11	12.0	15.5	18.0	24.0	25.0	33.5	42.0	44.0	55.0	68.5
RAMP	80	80	70	80	70	60	70	60	45	60	45	30	45	30	30
DISCS	2	4	2	6	4	2	6	4	2	6	4	2	6	4	6

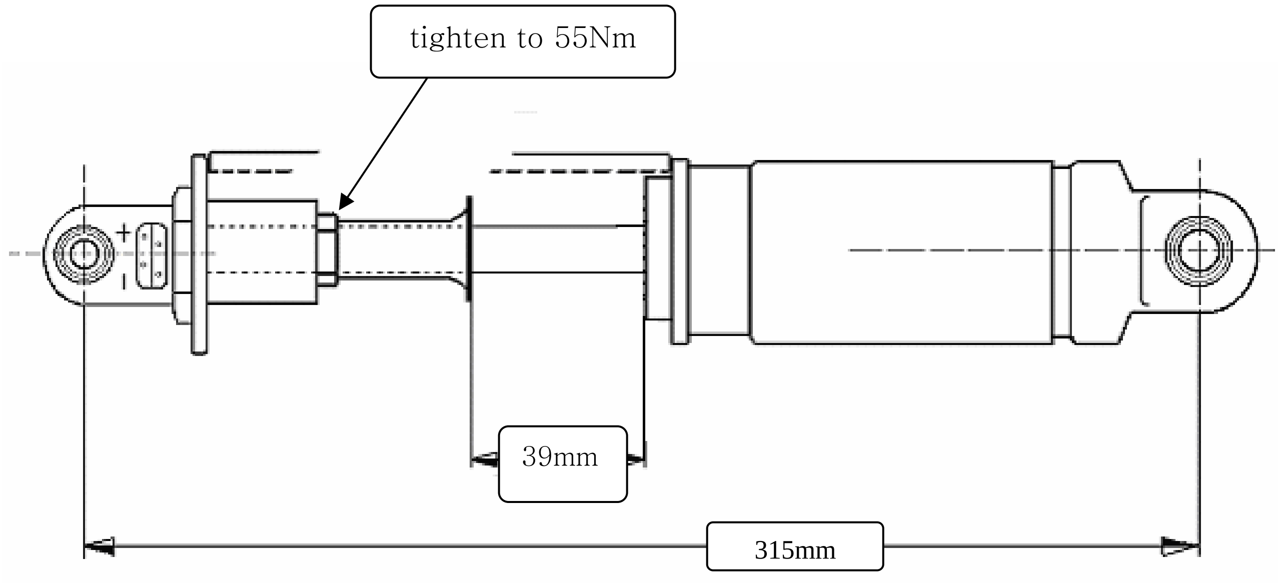
- Always use an equal friction plates arrangement on both sides.
- Side gear ring, diff end plate, diff wall and pre-load spacer all act as "B" plates
- A bigger ramp angle transmits less thrust onto the plates than a smaller ramp angle.



DAMPER DIMENSIONS

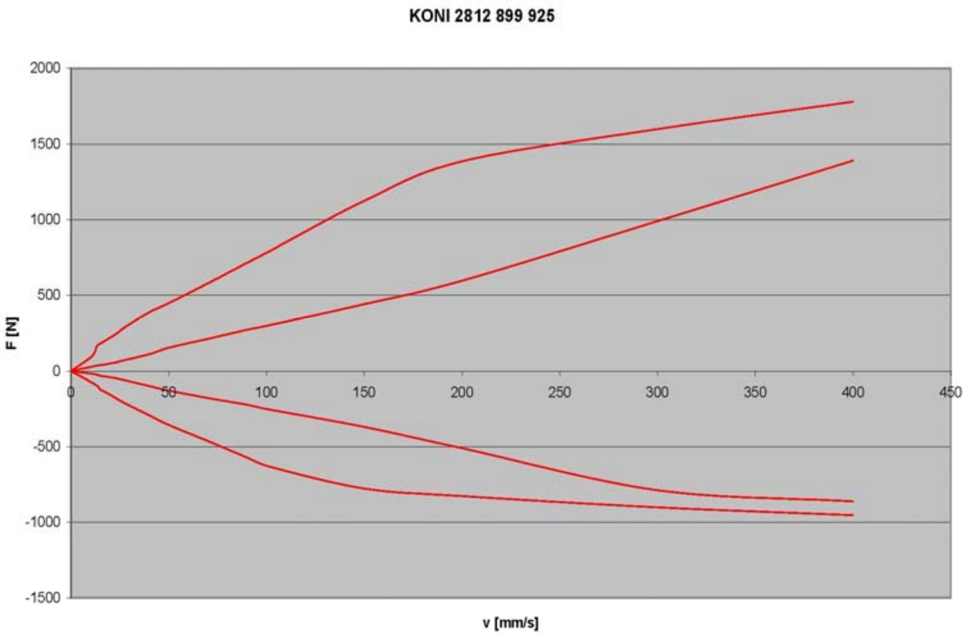
Standard dampers are KONI 2812-899-925. Front and rear have the same dimensions and identical installation parts. Damper assembly dimensions are:

	Mm
full open length	315
full closed length FRONT & REAR	276
Stroke FRONT & REAR	39



DAMPER GRAPH

This Koni 2812-899-925 is a damper specific for Dallara F3 cars.



- Ride height is fundamental to setting and changing the aero balance of the car.
- A lower car improves performance thanks to its lower centre of gravity.
- The easiest way to measure the ride heights is checking the FR and RR distances between the skid block wood and the set-up floor, with the driver on board and tyres at hot tyre pressure. This is the only method which takes into account the ride height changes caused by wear on the skid block wood.

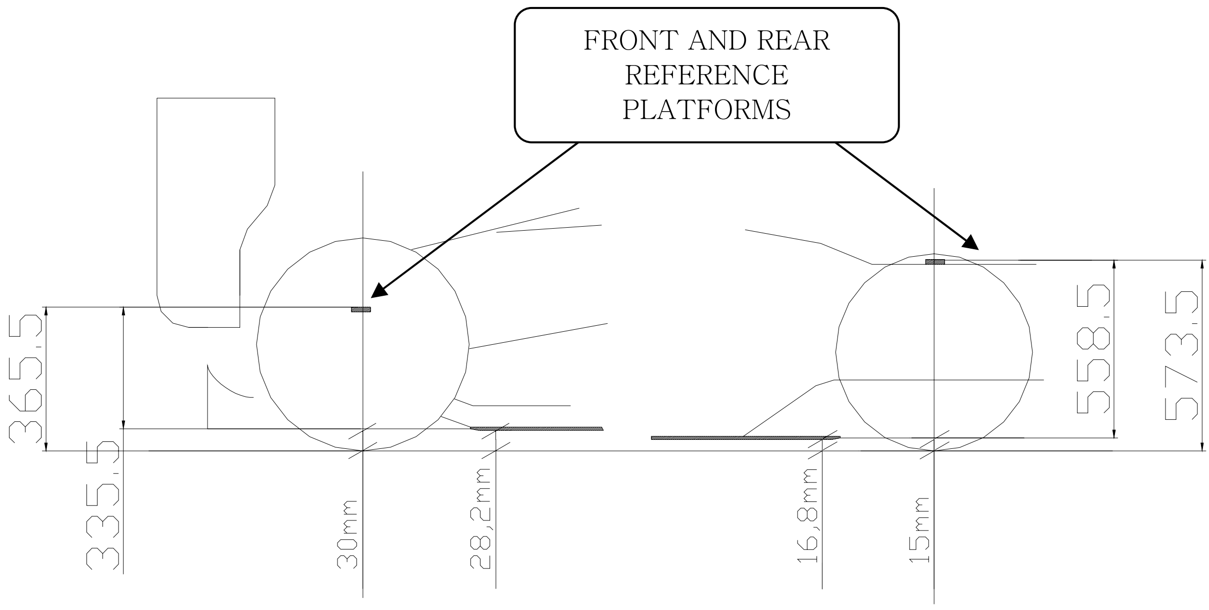
It might sometimes be difficult to measure ride heights directly, so we also provide alternative references.
The **example** shows **front ride height 15mm** and **rear 30mm** (at wheel axis).
With 2730mm wheelbase, which gives a 0.315 ° pitch angle.

At the **front end** of the car you have two alternative references:

- Two platforms 558.5mm from the car's bottom, on top of the tub at the wheel axle. You can measure their distance from the ground as 573.5 – 558.5 = **15**mm ride height
- The skid block, about 330 mm behind the wheel axis and some 50 mm behind the skid block's leading edge. Measure its distance from ground as 16.8 - (tan0.315°*330) = **15**mm

At the **rear end** of the car you have two alternative references:

- Two platforms, at 335.5 mm from the car's bottom, on the gearbox at the wheel axle. You can measure their distance from the ground as 365.5 – 335.5 = **30**mm ride height
- Under the skid block, about 330 mm ahead of rear wheel axis and 50mm ahead of the rear end of the skid block. Measure and calculate its distance from ground as (tan0.315° *330) + 28.2 (measured) = **30**mm ride height



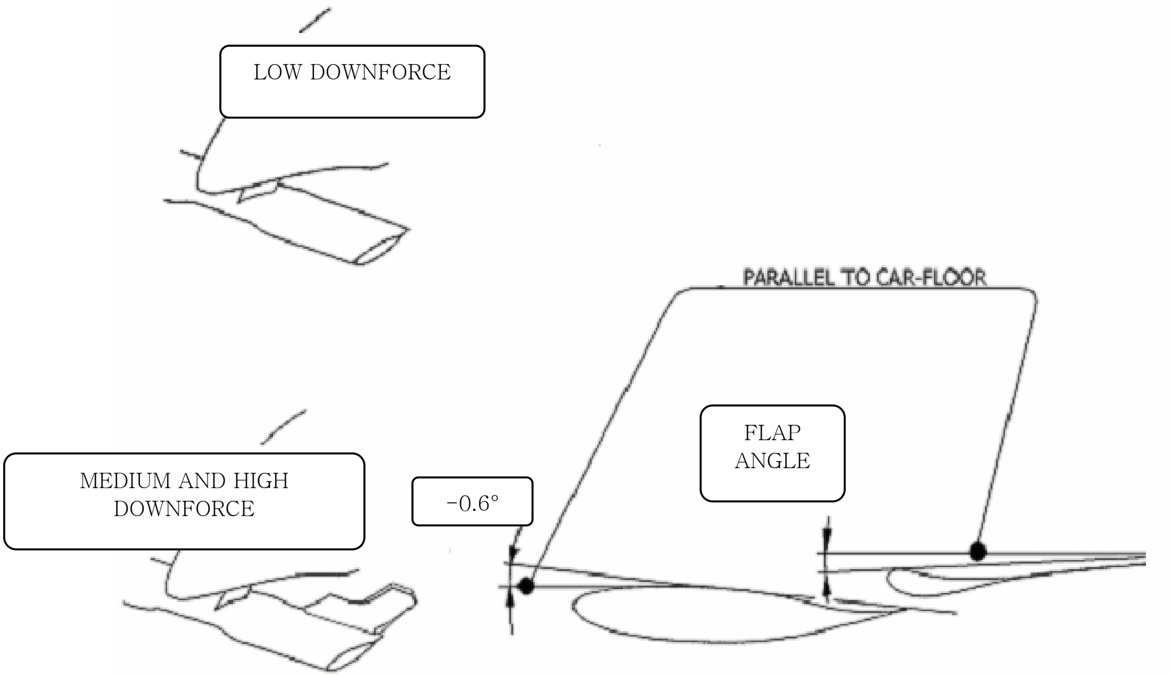
REAR RIDE HEIGHT
30mm

FRONT RIDE HEIGHT
15mm

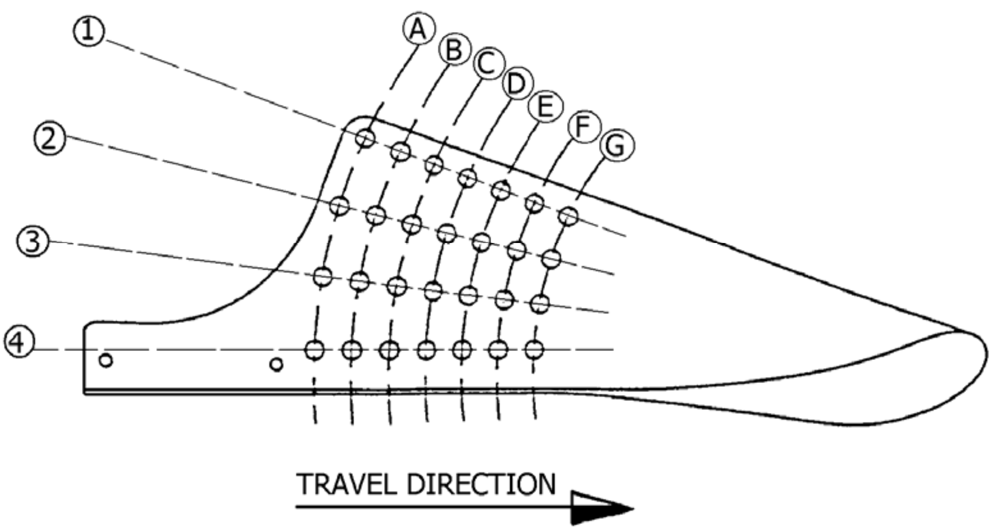
FRONT WING CONFIGURATIONS

Note: For medium downforce settings we propose a specific front flap (more narrow than std flap); the high downforce flap is the standard flap.
Both the Medium Flap and the Standard Flap are identical to those used in 2005 and 2006 [in 2007 the Gurney on the SF was modified].

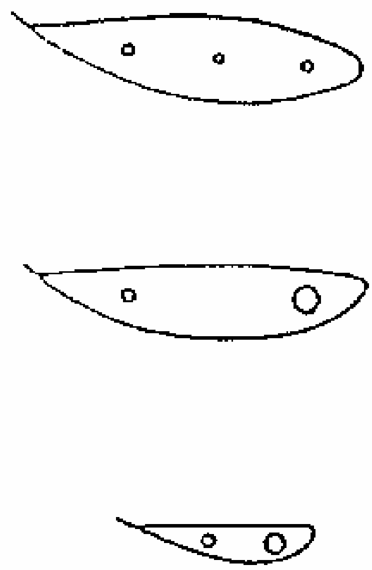
The front main-plane is supposed to be set at **–0.6°** [from the car's floor]



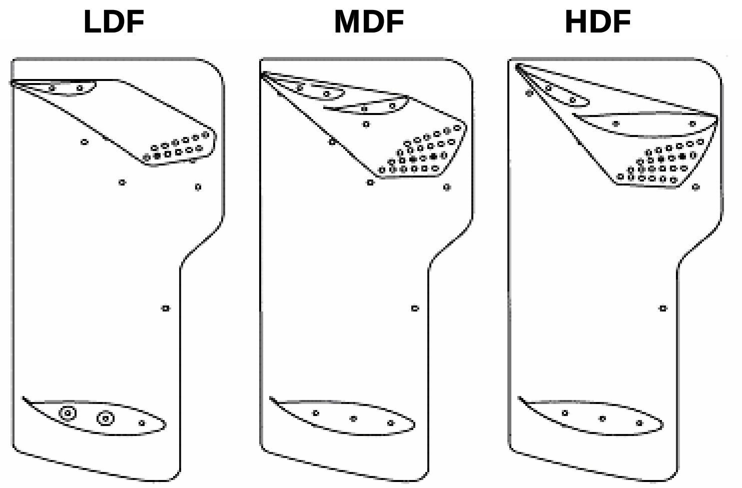
FRONT WING SIDEPLATE



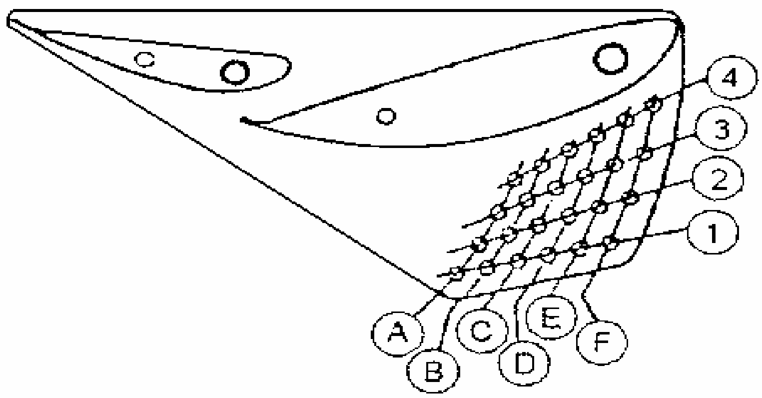
REARWING PROFILES These 3 profiles are given by the FIA regulations.



REAR WING CONFIGURATION



REAR WING SIDEPLATE



- Front flap angle is measured on top of the flap front-end and inside the Gurney 'corner'.
- Correspondence between holes and incidence angle is just indicative, because wing angle is also a function of the front and rear ride heights.

FRONT

FRONT FLAP (MF = Medium Flap)							
	A	B	C	D	E	F	G
1	7°	8°	9°	10°	11°	12°	13°
2	14°	15°	16°	17°	18°	19°	20°
3	21°	22°	23°	24°	25°	26°	27°
4	28°	29°	30°	31°	32°	33°	34°

FRONT FLAP (SF = Standard Flap)							
	A	B	C	D	E	F	G
1	10°	11°	12°	13°	14°	15°	16°
2	17°	18°	19°	20°	21°	22°	23°
3	24°	25°	26°	27°	28°	29°	30°
4	31°	32°	33°	34°	35°	36°	37°

REAR

LOWER WING			
	MIN	MAX	use specific rear wing supports for low or high downforce (available from Dallara)
LOW DOWNFORCE	-1°	10°	
HIGH DOWNFORCE	7°	18°	

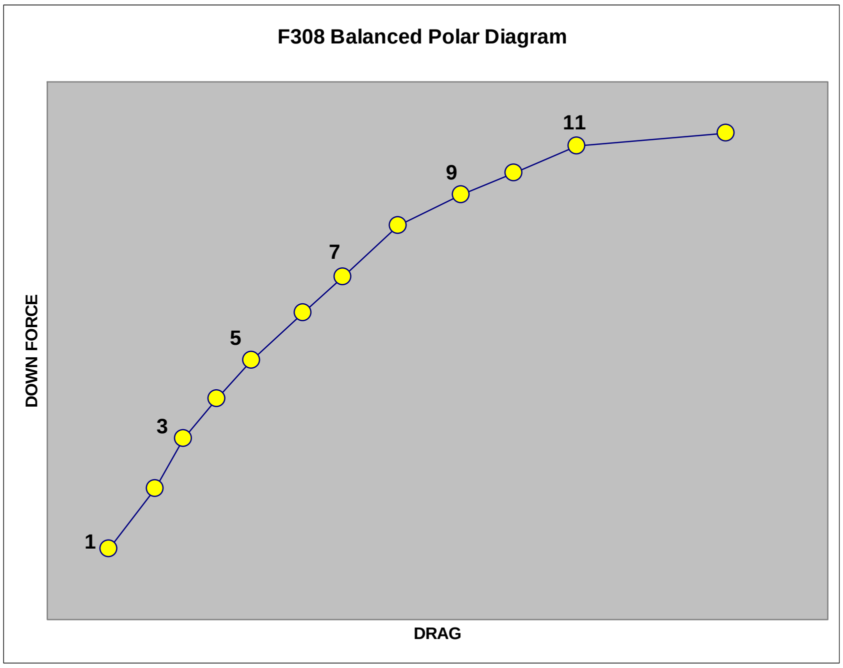
REAR TOP LDF						
	A	B	C	D	E	F
1	0°	1°	2°	3°	4°	5°
2	6°	7°	8°	9°	10°	11°

MDF & HDF						
	A	B	C	D	E	F
1	2°	3°	4°	5°	6°	7°
2	8°	9°	10°	11°	12°	13°
3	14°	15°	16°	17°	18°	19°
4	20°	21°	22°	23°	24°	25°

F308 compared to F307

This table shows **equivalent down force levels** for various **F307** settings compared to **F308** settings.

F308		F307	
Rear top	Lower/top	Lower/top	Rear top
MDF	3°/3°	3°/8°	MDF
HDF	5°/7°	3°/14°	HDF
HDF	7°/9°	7°/14°	HDF
HDF	12°/13°	13°/23°	HDF



AERO CONFIGURATIONS

REAR (upper wing)	**FRONT** (flap)
LDF = Low Down Force (single small profile)	
MDF = Medium Down Force (twin small)	MF = Medium Flap
HDF = High Down Force (small and mid combined)	SF = Standard Flap

- LDF and MDF configurations give **39% balance** [% of total downforce on the front].
- HDF configurations give **40% balance**.
- Front ride height is 10mm and rear ride height is 20mm corresponding to typical medium to high speed dynamic ride heights.
- Front SF at 10° is equivalent in front downforce to MF at 16° [both flaps with Gurney].

CFG	REAR				FRONT			**CFG**
	TOP TYPE	TOP SETTING	LOWER		FLAP TYPE	FLAP SETTING	MAIN PLANE	
1	LDF	1°	1°		none		-0.6°	**1**
2	MDF	3°	3°		MF	7°	-0.6°	**2**
3	MDF	7°	5°		MF	13°	-0.6°	**3**
4	MDF	9°	8°		MF	15°	-0.6°	**4**
5	MDF	13°	8°		MF	21°	-0.6°	**5**
6	MDF	17°	10°		MF	24°	-0.6°	**6**
7	HDF	9°	7°		SF	17°	-0.6°	**7**
8	HDF	13°	12°		SF	23°	-0.6°	**8**
9	HDF	17°	12°		SF	26°	-0.6°	**9**
10	HDF	19°	14°		SF	29°	-0.6°	**10**
11	HDF	23°	16°		SF	32°	-0.6°	**11**
12*	UHDF	-	7°		SF	36°	-0.6°	**12**
BALANCE [in % front]				**39 %**	**39 %**	**40 %**		**40 %**

* configuration 12 [UHDF] is not recommended since drag increase is significant compared to the limited gain in downforce.

- Front wing main-plane and rear lower wing are set relative to the chassis reference plane.
- The optimum setting for the front main-plane is –0.6° [nose up]. Any chassis rake angle will alter this setting.
- Front flap inclination is intended to be the angle, relative to the chassis reference plane, measured on top of the flap front and inside the Gurney 'corner'.
- Rear top wing assembly inclination is intended to be the angle, relative to the chassis reference plane, measured between the front of the flap, on top and the rearmost trailing edge. Any chassis rake will affect the angle.
- Front and rear ride height settings are fundamental to the aerodynamic balance and ultimate performance of the car. Pay attention to the changes between static setting and the dynamic values, at speed, on the track.

	MINIMUM		MAXIMUM	
	HOLE	INCIDENCE	HOLE	INCIDENCE
FRONT MF FLAP	A1	7°	G4	34°
FRONT SF FLAP	A1	10°	G4	37°
REAR TOP MDF WING	A1	0°	F2	11°
REAR TOP HDF WING	A1	2°	D4	23°
REAR LOWER (std)		-1°		10°
REAR LOWER*		7°		18°

*requests different rear wing supports, available in Dallara

HOW TO KEEP THE BALANCE FOR SMALL CHANGES

HOW TO BALANCE **+1° FRONT FLAP** BY ADJUSTING:

1. TOP REAR WING
2. REAR RIDE HEIGHT
3. FRONT RIDE HEIGHT

Front flap type	**Rear top: MDF**	**Front flap type**	**Rear top: HDF**
MF	1.0 holes RR top	**SF**	1.3 holes RR top
	1.4mm lower RR ride height		1.9mm lower RR ride height
	0.5 mm higher FR ride height		1.2mm higher FR ride height

MF: FRONT MEDIUM FLAP; **SF**: FRONT STANDARD FLAP

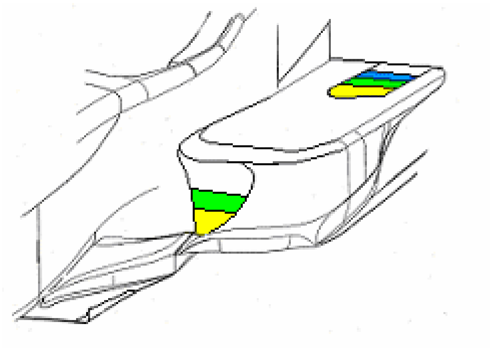
- Depending on the ambient temperature and the engine manufacturer requested water temperature you may need to adjust the cooling capacity of the car.
- The car is aerodynamically most efficient with the chimney's closed We suggest to open the chimney's only when extra cooling is needed.
- For the event in which even more cooling is requested we will propose additional louvers on top of the side pod. Mounting the louvers result in a slight increase of rear downforce.
- Cooling efficiency increases by sealing any eventual leakage in the inlet ducts to the radiators.
- Blanking generally slightly increases front and rear down-force. To keep the same balance you need to reduce the rear top wing incidence, or increase the front flap incidence.

The aerodynamically most efficient way of adjusting the cooling is as follows:

requested cooling level	side pod entry & exit	chimney	louvers
LOW	blanking	closed	none/closed
MEDIUM	open	closed	none/closed
HIGH	open	open	none/closed
EXTRA	open	open	mounted/open

Side pod blanking:

Blanking levels	side pod entry	Side pod exit
	30%	25%
	50%	50%
		75%



Effects on balance:

Front Blanking	
CONFIGURATION	EQUIVALENT INCREASE IN REAR HDF WING INCIDENCE
no blanking	Reference
30% front blanking	+0.5° (in order to re-balance you should reduce the rear wing incidence by 0.5°)
50% front blanking	+1° (in order to re-balance you should reduce the rear wing incidence by 1°)

Rear Top Blanking	
CONFIGURATION	EQUIVALENT INCREASE IN REAR HDF WING INCIDENCE
25% rear top blanking	Reference
50% rear top blanking	+0.5° (in order to re-balance you should reduce the rear wing incidence by 0.5°)
75% rear top blanking	+1° (in order to re-balance you should reduce the rear wing incidence by 1°)
Without rear top blanking	-0.5° (in order to re-balance you should increase the rear wing incidence by 0.5°)

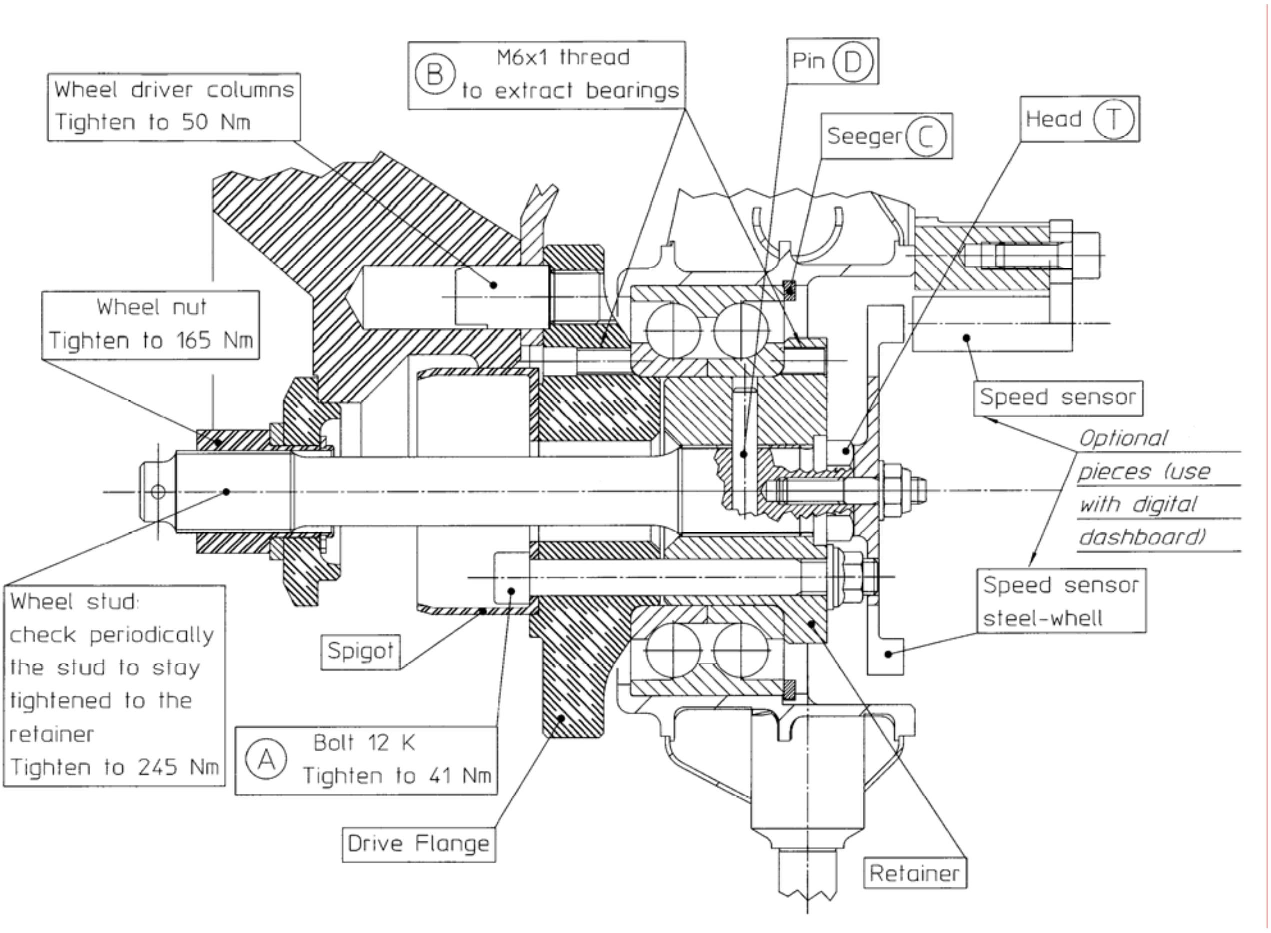
Louvers	
Louver	EQUIVALENT INCREASE IN REAR HDF WING INCIDENCE
Off	Reference
On	+1° (in order to re-balance you should reduce the rear wing incidence by 1°)

HUB ASSEMBLY

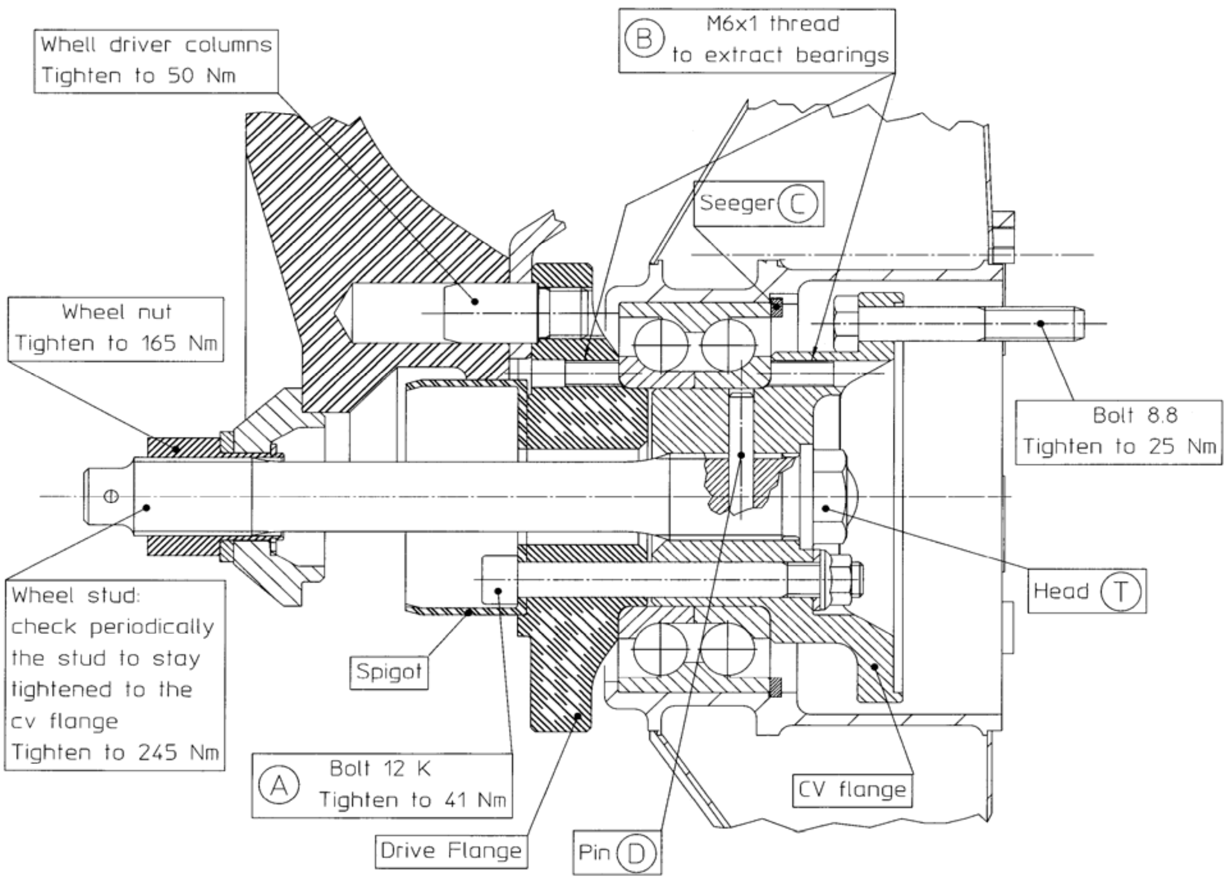
The following procedure explains how to change front and rear hub bearings

- **Removal of bearing**
  - a) Remove spigot by removing the 6 screws A;
  - b) push off drive flange by using two 6x1 screws set on thread B;
  - c) remove circlip C;
  - d) press off bearing from the upright;
  - e) push off retainer by means of two 6x1 screws set on thread B.
- **Replacement of bearing**
  - a) Press wheel bearing into the upright;
  - b) Fit circlip C;
  - c) Press the retainer into the wheel bearing;
  - d) Place spigot in position on the drive flange, fit A screws, washers and nuts and tighten to 41 Nm (**Caution**: this value is for 12K screws only).
- **Wheel stud removal**
  - a) To reduce resistance to Loctite, heat wheel stud and retainer to 180°C;
  - b) Remove pin D, remove wheel stud.
- **Wheel stud replacement**
  - a) Remove pin D;
  - b) Clean and degrease retainer thread and wheel stud;
  - c) Spray degreaser to threaded area of retainer and wheel stud. **Caution:** Don't use petrol;
  - d) Apply LOCTITE 638™ to wheel stud thread;
  - e) Screw wheel stud into retainer and tighten to 245 Nm by forcing on head T;
  - f) Drill wheel stud and insert pin D.
- **Bearing assembly into hub replacement**
  - a) Warm the hub to 100°C;
  - b) Fit the bearing assembly

FRONT HUB



REAR HUB



ENGINE OIL SYSTEM

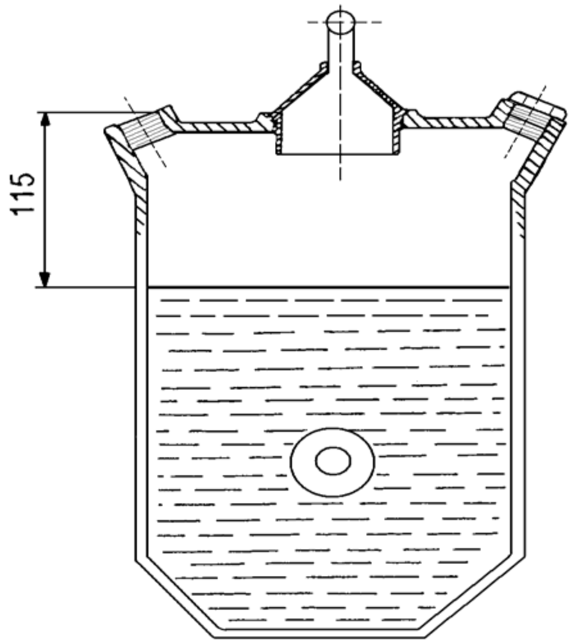
The distance between the oil cap and the oil surface should be about 115 mm.

Less oil may cause cavitation and lead air into the oil circuit.

More oil may cause excessive power consumption due to the oil splash.

Typically you would need a total of 4.5 litres to fit in the oil tank (including the oil in the engine and hoses). Check with the engine tuner for the specific amount for your engine.

The drawing shows the standard engine oil tank, integrated in the gearbox main casing.



Note: In combination with some engines, the Dallara F308 will not use the standard in the gearbox casing integrated oil reservoir for its engine oil.

GEARBOX

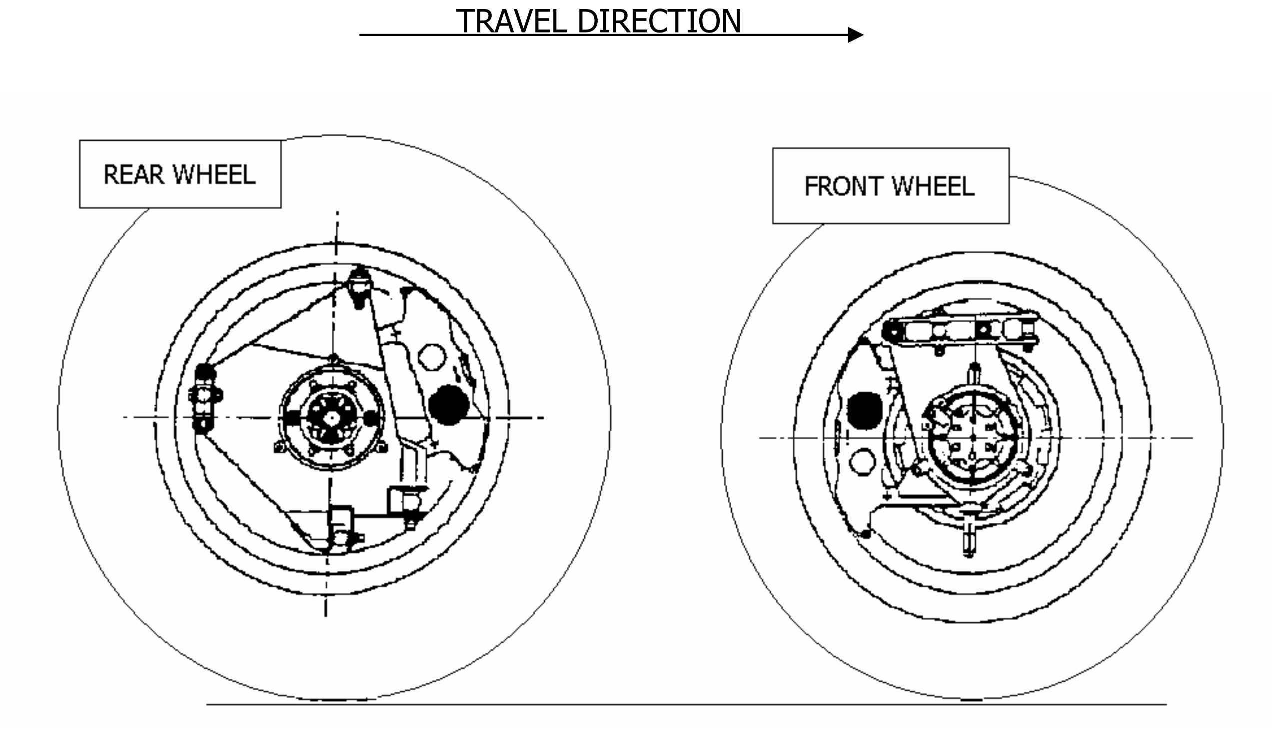
For the Dallara F308 car both the Hewland FTR and Drexler F3 gearbox passed the FIA mandatory homologation test. The differences between the two gearboxes mainly regard the selector system and the differential.

GEARBOX OIL

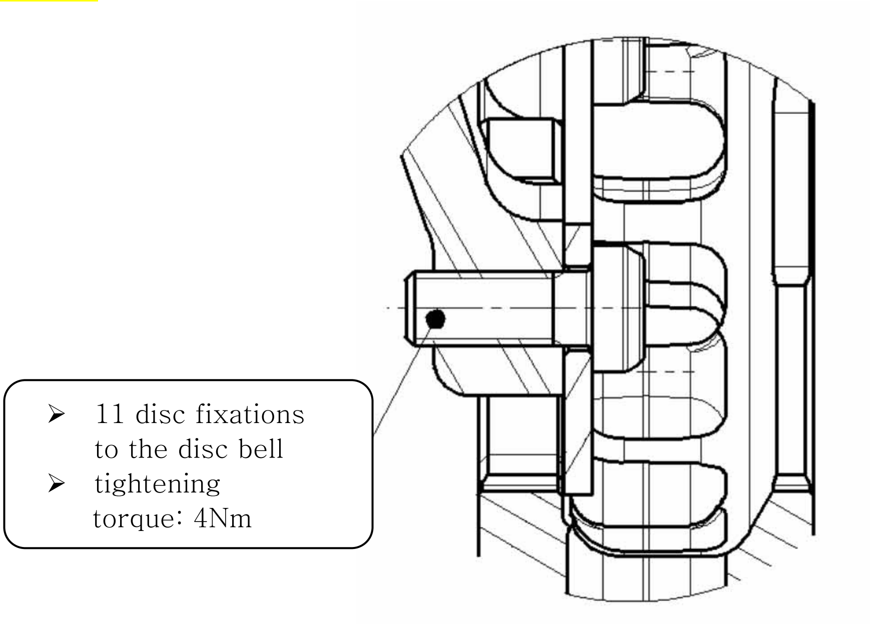
In order to always have enough oil in the gearbox and the differential you will need about 2.0 litres of oil. Only use specific gearbox oil, SAE 80 or 90.

BREMBO BRAKE CALIPER ASSEMBLY

Note: the dark piston is the one with a bigger diameter. The car features four different callipers.

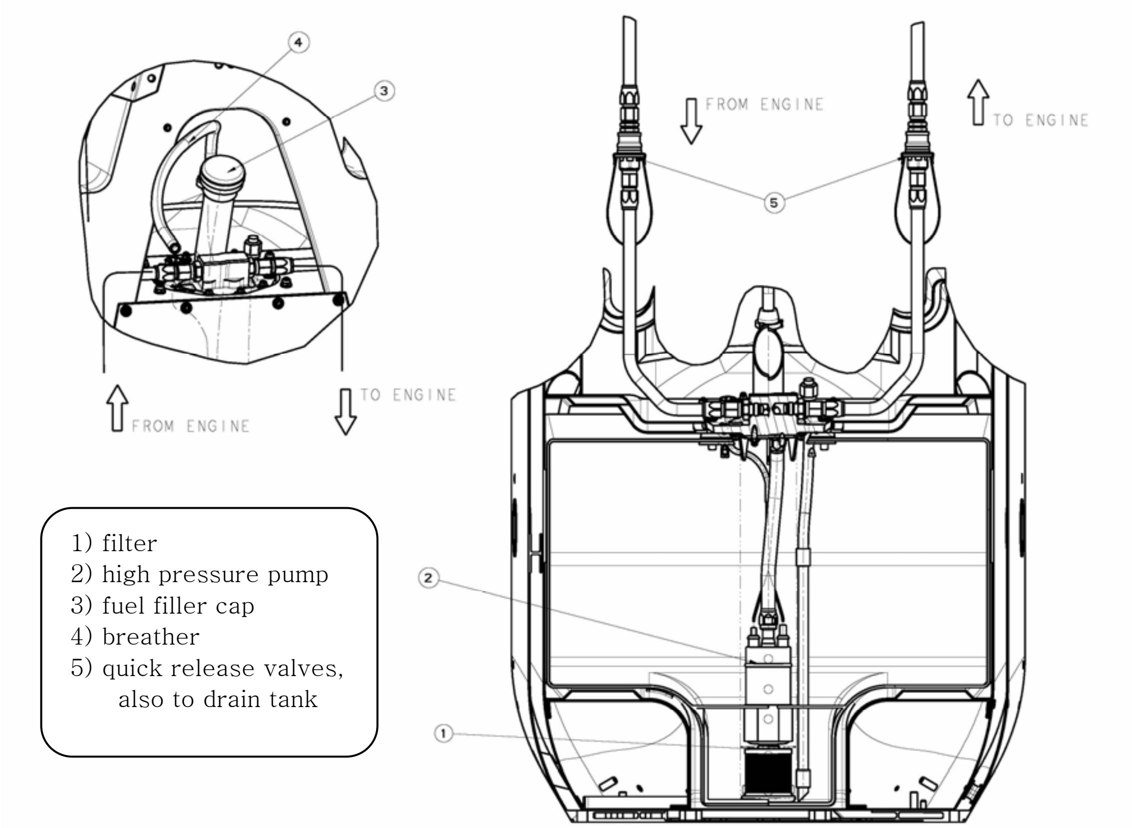


BRAKE DISC ASSEMBLY



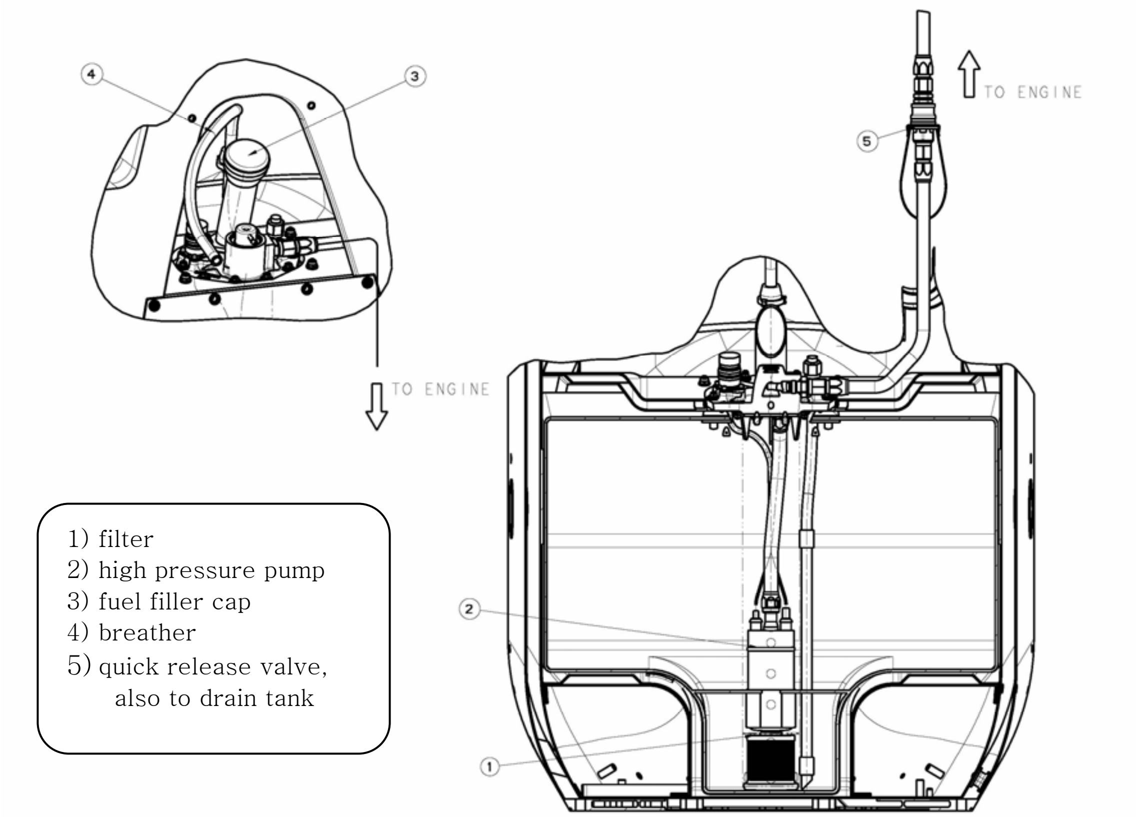
F308 features single electrical-submerged high pressure fuel pump.
A 'SAFETY' filling system with a dry-brake valve is available at Dallara.

Standard system



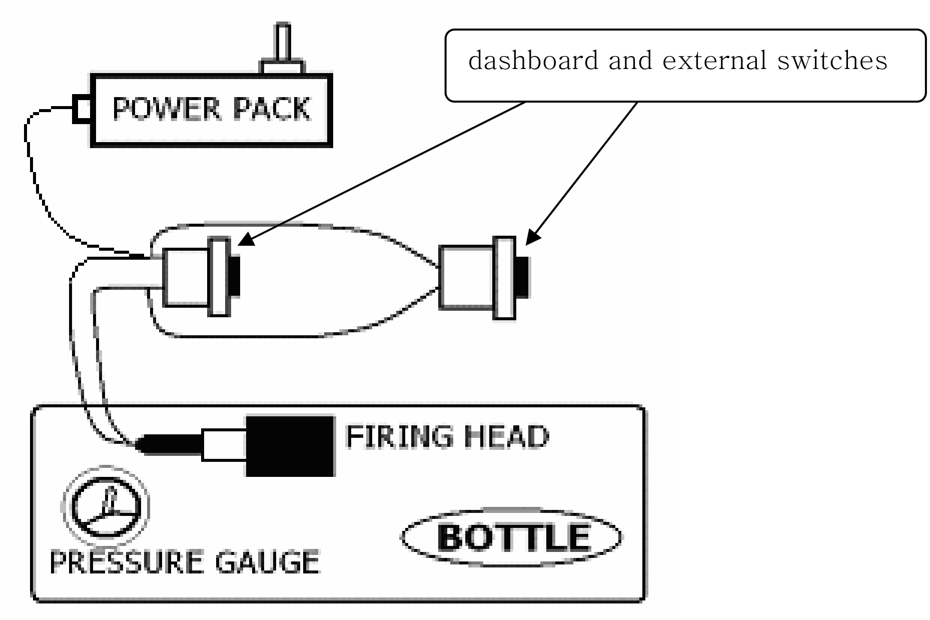
1) filter
2) high pressure pump
3) fuel filler cap
4) breather
5) quick release valves, also to drain tank

System with no return



1) filter
2) high pressure pump
3) fuel filler cap
4) breather
5) quick release valve, also to drain tank

LAYOUT



DETAILS

The LIFELINE system is an electrically triggered Halon or foam spray fire extinguisher system. The system uses an actuator to operate the valve located on the pressurised container, containing the extinguishing liquid. These are triggered remotely using a battery powered power pack.
In order to guarantee reliable operation the actuator follow military specifications. The system/battery test electronics are integrated into the remote power pack. The connector on the firing head is also of military grade.

TESTING

The power pack electronics can test the continuity of the electrical wiring, and provides a high current pulse test on the battery, to ensure system integrity before use. The battery test electronics do not excessively drain the battery during this test.
The tests are carried out using a three way switch on the power pack. Since the system is only as good as the battery that powers it and the integrity of the wiring and its connections, the tests should be performed before each race.
To check the battery, press and hold up the power pack switch. Every 2 seconds you'll see a YELLOW light flash. If the light flashes very dimly the battery should be replaced. If in doubt change the battery.
To check the wiring continuity, ensure that the power pack switch is on "SYSTEM INACTIVE" to ensure that the extinguisher is not fired. Press the internal firing button and check that the RED light comes on. Press the external firing button and check that this also makes the RED light comes on.

CARES

- Ensure that the wiring cables do not run next or in the same loom as the power ones, especially those for ignition and battery power. Ideally, run all cables next to the chassis (earth);
- ensure that all plugs exposed to water spray are protected with rubber boots;
- do not allow cables to run through sharp edged passages without protection;
- do not fix the cables next to or onto any surface likely to exceed 100 °C;
- do not attempt to turn firing heads as system may be activated.

GEARBOX information

The F308 car mounts a Hewland 6 speed sequential gearbox, it is an updated [for 2008] version of the FTR-200. The main casing is different only in detail.
Only use the specific tools to ensure proper maintenance. Hewland has written a technical manual, including a spare parts list, for the FTR-200. The manual is available at Hewland. To receive a copy you can contact the commercial office at Hewland by e-mail: sales@hewland.com

To take the differential out you first need to remove the LH-side outer tripod housing which is locked with a wire ring (circlip type fitting) inside the RH tripod housing. We build a specific tool, available at Dallara's stores.

To open the differential you have to remove the bearing in order to reach the bolts of the casing cover.

IMPORTANT BASIC INFO

- The mandatory standard Dallara crown-wheel & pinion ratio: 12/34
- Total oil quantity for diff and gearbox: 2.0L [Hewland]
- Oil type: SAE 80 or 90
- Pinion bearing nut tightening torque: 176Nm (130lbs.ft)
- Pinion shaft nut tightening torque: 135Nm (100lbs.ft)

Other information

- The new car is homologated with the Hewland FTR 2008 Dallara F3 version of the gearbox and differential casing and the light weight crown wheel only [as already on the F305].
- The use of the new Drexler gearbox is possible on Dallara F308 cars. Dallara did the homologation test also with the Drexler gearbox.

PLEASE; CONTACT US IMMEDIATELY
REGARDING ANY PROBLEM OR ANOMALY

STUD INSTALLATION AND REMOVAL

Please, take extreme care when removing and substituting any stud.
Typically use:
Loctite 270 (soft Loctite) for suspension brackets, brake callipers
Loctite 242 (hard Loctite) for chassis, gearbox, bell-housing, roll hoop

Most studs are mounted with Loctite and do require a proper installation procedure
- Clean the hole from dust, debris, oil etc
- Drive a screw tap to remove machining residuals
- Clean the hole with brake cleaner and dry with compressed air
- Pre-assemble the stud without Loctite to check its position and remove again
- Clean the hole again with a degreaser and dry with compressed air
- Coat the hole with Loctite
- Install the stud
- Tight the stud with the recommended tightening torque. You can do so by using a pair of nuts locked against each other.

TRANSMISSION

To prevent the drive-shaft bolts from loosing, fit them with LOCTITE 242;

AERODYNAMICS

Do not remove from high- and mid-downforce rear top wing assemblies the small profile for use as rear low downforce wing because these are not reinforced. Use the specific wing profile, available at Dallara.

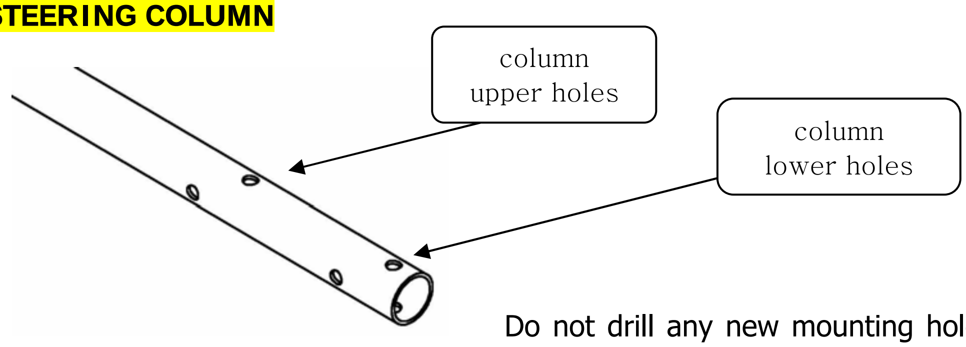
CLUTCH

Make sure to use the appropriate length of clutch bearing support. Check that the clutch piston can move backwards enough to release the clutch completely. You can shorten the clutch piston spacer by turning off the required amount.

WISHBONES

Never lift up the car gripping the middle of the wishbones. Never sit or stand on a wishbone.

STEERING COLUMN

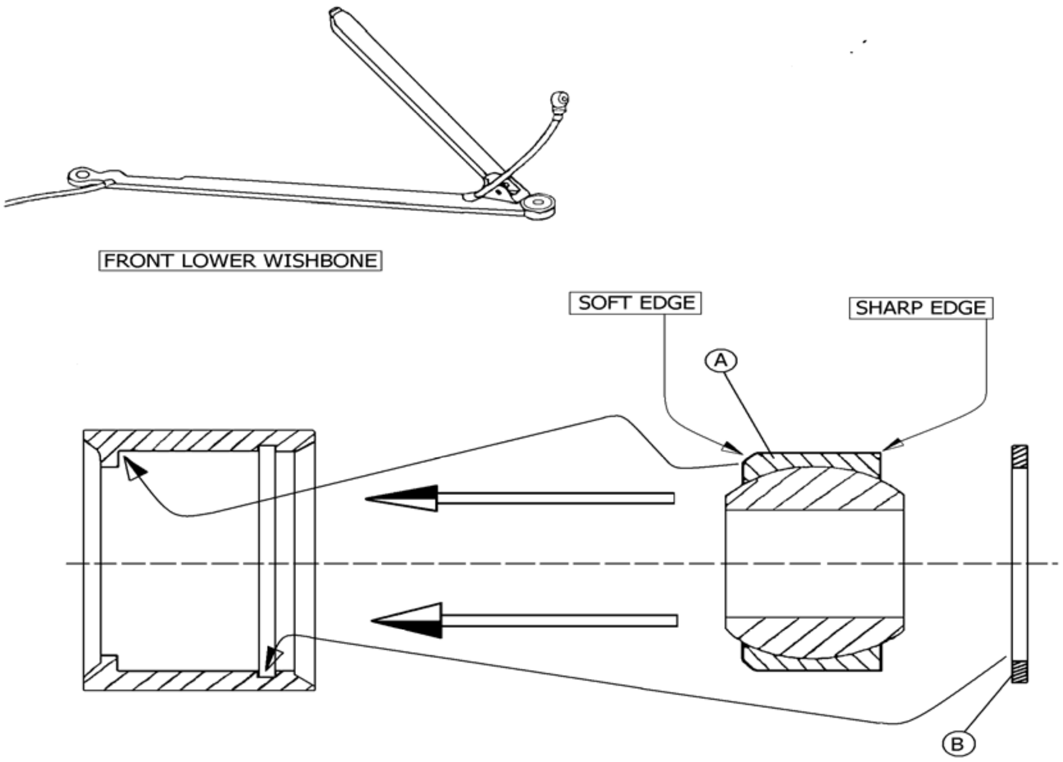


Do not drill any new mounting holes further up the column than the upper holes standard made by Dallara.
Any new fixation holes should always be between the lower and upper holes, standard in the column.

SUSPENSION

- Regularly check wheel stud to inner hub tightening in front and rear uprights. You can notice if the lock-nut came loose by observing relative displacement of two red notches on the lock-nut and on the spigot
- After an accident, carefully check the alignment of front and rear push-rods and their respective adjusters
- Regular spanner checks are suggested on the complete car, they never come too early!

Ball-joint A, used in the front lower and rear lower wishbones, must be fitted with sharp-edge side in contact with circlip B, as shown in following drawing. For the front lower wishbone this is only the case on the WMP suspension type.



TIGHTENING TORQUES

This table lists suggested tightening torques. For additional security use LOCTITE 242 or 243.

Tightening torques			
	Nm	Kgm	lbs ft
Pinion bearing nut	176	17.9	130
pinion-shaft nut	135	13.8	100
Final drive bolts	73	7.5	55
Brake disc bolt	7	0.7	5
Brake caliper studs	50	5.1	37
Wheel nut	165	17.0	125
Wheel stud	245	25.0	180
Damper end-stroke spacer	65	6.6	49
Wheel driver columns	50	5.1	37
Nut 7 × 1 (see hub assembly)	17	1.7	13
Bolt 8.8 (see hub assembly)	25	2.5	19
Bolt 12K (see hub assembly)	39	4.0	29
Rocker cap nut	34	3.5	25
Rocker stud nut	54	5.5	40
10-32 UNF 'K' nut	3	0.3	2
$^{1}/_{4}$ UNF 'K' nut	12	1.2	9
$^{5}/_{16}$ UNF 'K' nut	24	2.4	18
$^{3}/_{8}$ UNF 'K' nut	50	5.1	37

Table shows conversion from SWG (Std Wire Gage) to metric units for sheet-metal thickness

SWG	8	10	12	14	16	18	20
Metric (mm)	4.064	3.251	2.642	2.032	1.626	1.219	0.914

CONVERSION TABLE

Length

1 inch=25.4 mm	1 millimetre=0.03937 in
1 foot=304.8 mm=12 in	1 centimetre=0.3937 in
1 yard=914.4 mm=3 ft	1 meter=39.37 in
1 mile=5280 ft=1.60934 km	1 kilometre=0.62137 miles

Volume

1 cubic inch = 16.387 cubic centimetres	1 cubic centimetre=0.061 cubic inch
	1 litre=1000 cc=61.0255 cubic inch

Pressure

1 psi=0.0716 bar	1 kg/cm2=1.019 bar
	1 bar=10^5 Pa=0.1MPa
	1 bar=13.95 psi

Weight

1 ounce (oz)=28.35 grams	1 Kg=1000 grams = 2.205 lb
1 pound (lb.)=16 ounces=453.592 grams	

Speed

1 MPH=1.467 feet per second	
1 mph=0.62137 kilometres per hour	1 kilometre per hour=1.60934 mph
1 IPS (in/s)=25.4 mm/s	1 mm/s=0.039 IPS

Specific weight

Water=1 kg/l
Mineral Oil=0.903 Kg/l
Fuel/Gasoline=0.74 Kg/l

Motor racing is not covered by warranty due to the intentional choice of drivers to race in a dangerous environment

DALLARA indicates that, under normal operating conditions, a new car would not show failure in structural components before it has completed around 25,000km. It holds true if necessary maintenance and checks are provided and if the car had no incidents from the origin.

DALLARA is not responsible for incorrect chassis repairs, if made outside its factory or in centres not-recognised by FIA.

Chassis should be checked for structural failure not later than two years after delivery from DALLARA factory, and anyway after any major accident. After the first check or after any major accident it is mandatory to check the chassis every year in a centre recognised by FIA authority.

DALLARA is not responsible for damage caused by non-genuine spare parts.

Under maintenance, following parts should be replaced after 25000km or two-years use:

- steering column
- steering rack and tie-rods
- brake pedal
- brake disc bell
- wheel bearings
- suspension arms and spherical joints
- engine installation parts
- drive-shafts
- wings and rear wing supporting plate

We firmly remind you that the **Main roll over hoop**, **Monocoque**, **Front nose-box**, **Rear crash structure** and all other parts mentioned in Art 2.7 of the FIA F3 regulations are **FIA approved** and cannot be modified by unauthorised personnel for whatever reason.

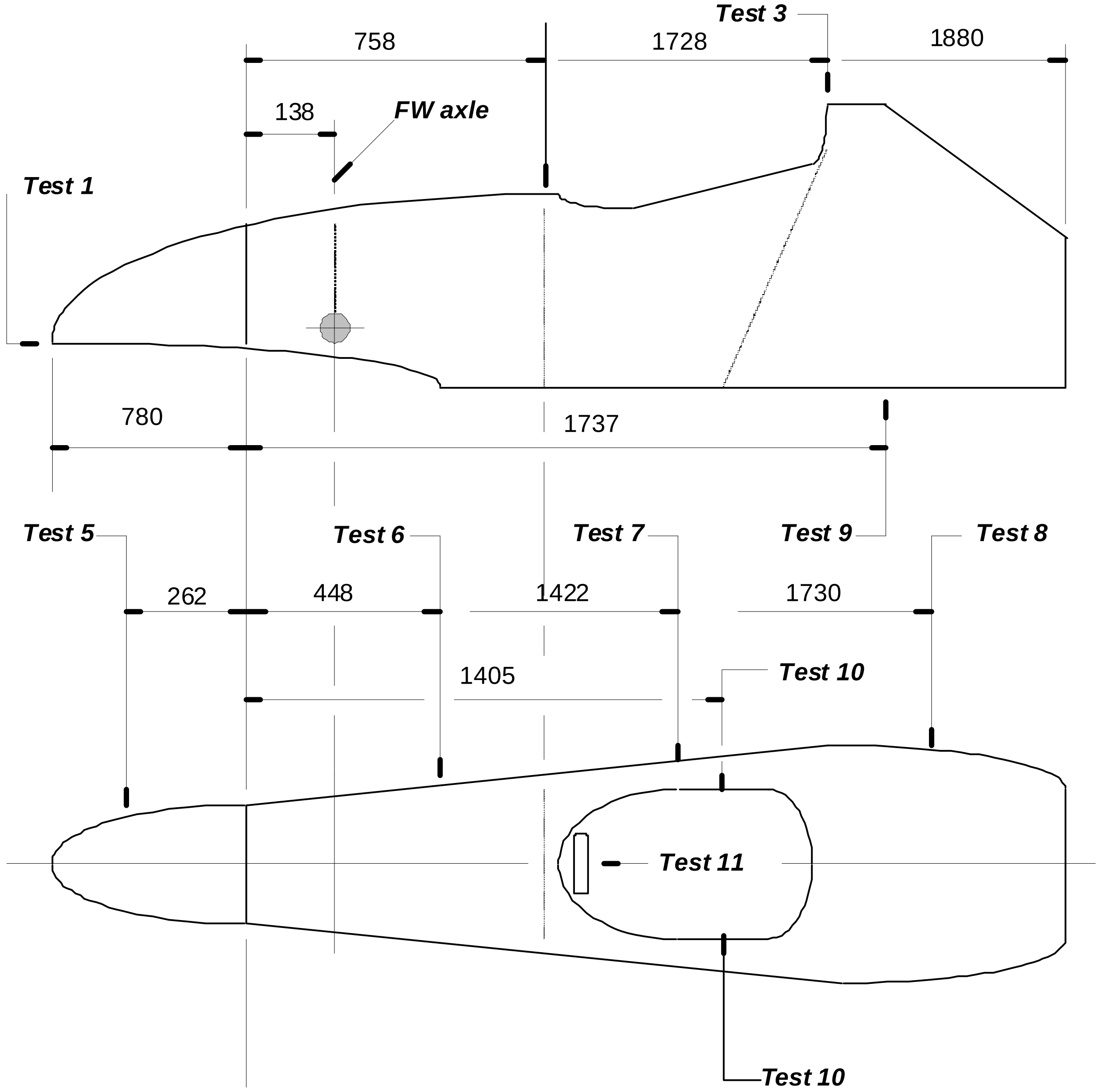
Any change to these parts is sufficient reason for disqualification.

CHASSIS HOMOLOGATION

The following pages show the FIA chassis approval document for the Dallara F308 car.
This document will remain valid for a period of 3 years, the term of this chassis generation, unless the Dallara Automobili chooses to re-homologate for any specific reason.

2008 F3 STRUCTURE TESTING RECORD

Constructor : Dallara Chassis type : 308 Chassis number : 11
Date : 1 – 3/10/07, 18/01/08 Place : Dallara, CSI, Politechnico
Present : G. Consonni, N. Concari, F. Grippa, G. Forbes



Test 1 : A frontal impact test against a solid barrier at 12 metres/sec with a total mass of 650kg

Impact speed : 12.03 ***m/s*** *Deformation : 500* ***mm***

*Deceleration : Peak: 28.42****g*** *Mean: 17.12* ***g*** *Dummy: 43.40* ***g***
Average deceleration over the first 150 mm : 3.65 ***g***

Nose fixings : 4 off M8
Nose weight : 4.40 ***kg*** *(with both wing hangers)*

Chassis weight : 58.9 ***kg*** *First chassis : 58.9* ***kg*** *Difference 100* ***%***

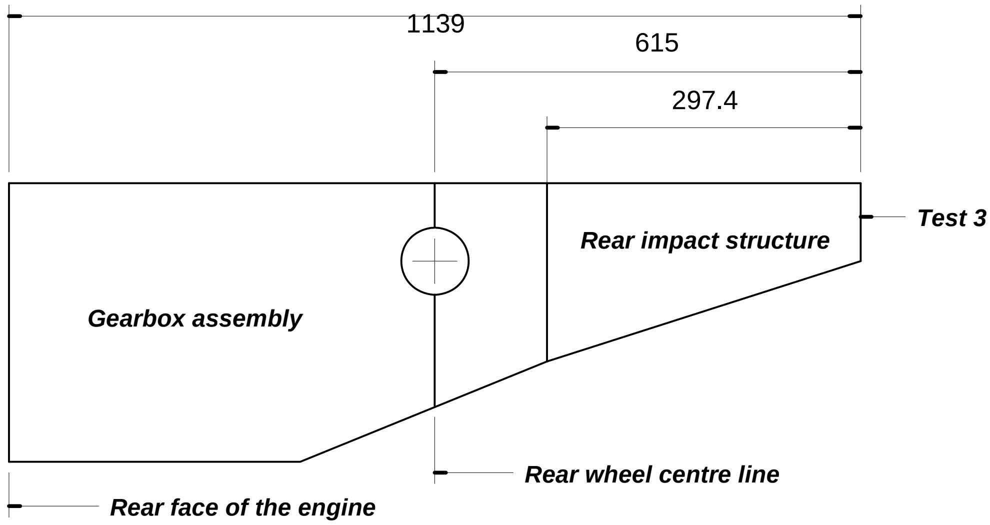
Chassis condition: bare unpainted chassis with fuel cell, seat belts, both roll hoops and full fire extinguisher (4.59kg)

Comments : Test OK.

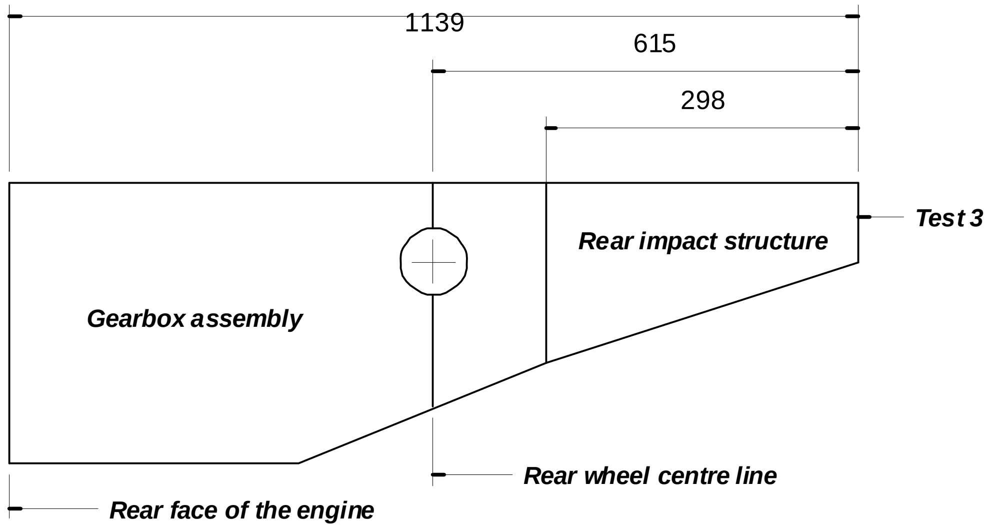
*Chassis number : **308 - 11***

Test 2a: An impact test against a solid barrier at 10 metres/sec with a total mass of 560kg	
*Impact speed : 10.09 **m/s***	*Deformation : 255 **mm***
Deceleration :	*Peak : 39.05 **g** Mean : 23.37 **g***
Structure fixings : 2 x 2 M8 laterally + 2 x M8 on top bolted to gearbox end cap	
*Structure weight : 1.539 **kg***	
Comments : Hewland gearbox; OK., no visible damage ahead rear wheel centre line, carry over from 2005	

Test 2b: An impact test against a solid barrier at 10 metres/sec with a total mass of 560kg	
*Impact speed : 10.07 **m/s***	*Deformation : 255 **mm***
Deceleration :	*Peak : 39.04 **g** Mean : 23.72 **g***
Structure fixings : 2 x 2 M8 laterally + 2 x M8 on top bolted to gearbox end cap	
*Structure weight : 1.504 **kg***	
Comments : Pankl gearbox; OK., no visible damage ahead rear wheel centre line, carry over from 2005	



Test 2c: An impact test against a solid barrier at 10 metres/sec with a total mass of 560kg	
*Impact speed : 10.1 **m/s***	*Deformation : 198 **mm***
Deceleration :	*Peak : 40.65 **g** Mean : 24.2 **g***
Structure fixings : 2 x 2 M8 laterally + 2 x M8 on top bolted to gearbox end cap	
*Structure weight : 2.0 **kg** (with pair of wing mounts (0.4 kg), pair of carbon jacking hooks)*	
Comments : Drexler DGB 003 gearbox; test OK; tested at Politechnico Milan on 18/01/2008	



Test 3 : A 83.55kN or 66.84kN load applied at a compound angle to the top of the main roll structure				
Load 83.8 **kN**	Displacement 9.37 **mm** (7.86 **mm**)	Difference 100 **%**	Deformation 5.70 **mm**	
Comments : Test OK., very little damage, roll hoop weight 2.3 kg				

Test 4 : A 75.00kN or 60.00kN load applied to the top of the front roll structure (optional)			
Load **kN**	Displacement **mm** (**mm**)	Difference **%**	Deformation **mm**
Comments :			

Test 5 : A 30.00kN load applied in 3 mins to the nose side 400mm in front of the front axle line and held for 30 secs	
Load: 30.1 **kN**	Marking of impact structure: FIA seal # 03018
Comments : OK., nose weight incl. pair of metal front wing hangers: 4.40 kg	

Test 6 : A 20.00kN or 16kN load applied in 3 mins to the footwell side and held for 30 secs			
Load 20.1 **kN**	Displacement 0.90 **mm** (0.68 **mm**)	Difference 100 **%**	Deformation 0.33 **mm**
Comments : OK., measurement at bulkhead location			

Test 7 : A 20.00kN or 16kN load applied in 3 mins in the seat belt area and held for 30 secs			
Load 20.1 **kN**	Displacement 2.76 **mm** (2.23 **mm**)	Difference 100 **%**	Deformation 0.18 **mm**
Comments : OK.			

Test 8 : A 20.00kN or 16kN load applied in 3 mins to the fuel tank side and held for 30 secs			
Load 20.3 **kN**	Displacement 1.32 **mm** (1.04 **mm**)	Difference 100 **%**	Deformation 0 **mm**
Comments : OK., displacement measured from outside			

Test 9 : A 10.00kN or 8kN load applied in 3 mins to the fuel tank floor and held for 30 secs			
Load 10.1 **kN**	Displacement 1.26 **mm** (1.07 **mm**)	Difference 100 **%**	Deformation 0.42 **mm**
Comments : OK.			

*Chassis number : **308 - 11***

Test 10: A 10.00kN or 8kN load applied in 3 mins to the cockpit rims and held for 30 secs
Load 10.0 ***kN*** *Displacement 2.84* ***mm*** *(2.13* ***mm****)* *Difference 100* ***%*** *Deformation 0.20* ***mm***
Comments : OK.

Test 11: An impact test on the steering assembly at 7 metres/sec with a total mass of 8kg
Impact speed : 7.06 ***m/s*** *Deformation : 36* ***mm***
Deceleration : Peak : 274.2 ***g*** *Time greater 80 g : 1.84* ***ms***
Structure fixings : plain bearing at rear of column, straight column to rack assembly which takes impact load
Component weights: steering wheel with dummy BOSCH electronic box; 0.844 ***kg****; column only (780 mm): 1.227* ***kg***
Comments : Test OK.

Test 12: A side intrusion test carried out on a 550mm x 550mm test panel incorporating a 25mm rigid border
Sample description: 30801002
materials used: see separate report
fabric lay-up: see separate report
Maximum load: 243.7 ***kN***
Maximum energy absorbed: 9713 ***J***
Comments : Test OK., tested on 07/09/2007 at ENEA

Chassis transponder numbers:

Front	*00 0686 6443*
LHS	*00 0686 58B4*
RHS	*00 0686 5B23*