Date: 2019, September, 11th

This decision is with immediate application and valid until further notice.

1. Telemetry Systems working on public mobile phone network are allowed for Endurance Races longer than 3 hours. Technical Delegates will have access to the telemetry systems and data.

2. Any adjustment of Engine or Transmission Control Units by running engine is forbidden.

3. <u>TCR BoP & Certified Cars:</u> (Modifications in bold)

TCR Car Models	Engine Power Level [%]	Target Racing Weight** [kg]	Compens. Weight* (CW)	BoP Ballast [kg]	Min. Racing Weight [kg]	Ride Height [mm]
Alfa Romeo Giulietta RF TCR	100.0	1265	-	-60	1205+CW	70
Alfa Romeo Giulietta Veloce TCR	100.0	1265	-	-40	1225+CW	80
Audi RS 3 LMS SEQ	100.0	1265	-	-30	1235+CW	70
Audi RS 3 LMS DSG	102.5	1230	-	10	1240+CW	80
Cupra TCR SEQ	100.0	1265	-	-40	1225+CW	70
Cupra TCR DSG	102.5	1230	-	-10	1220+CW	70
Honda Civic FK7 TCR	100.0	1265	-	20	1285+CW	80
Honda Civic FK TCR	100.0	1265	-	-20	1245+CW	70
Hyundai i30 N TCR	97.5	1265	-	20	1285+CW	90
Hyundai Veloster N TCR	97.5	1265	-	20	1285+CW	90
KIA Cee'd TCR	100.0	1265	-	-40	1225+CW	70
Lada Vesta TCR	100.0	1265	-	-10	1255+CW	**70**
Lada Vesta Sport TCR	100.0	1265	-	20	1285+CW	80
Lynk&Co 03 TCR	97.5	1265	-	40	1305+CW	80
Opel Astra TCR	**102.5**	1265	-	0	1265+CW	70
Peugeot 308 TCR	102.5	1265	-	-30	1235+CW	70
Peugeot 308 Racing Cup TCR	102.5	1225	-	-60	1165+CW	70
Renault Mégane RS TCR	100.0	1265	-	-30	1235+CW	**60**
Subaru STI TCR	102.5	1265	-	-60	1205+CW	70
VW Golf GTI TCR SEQ C-ECU	100.0	1265	-	-30	1235+CW	70
VW Golf GTI TCR SEQ	100.0	1265	-	-40	1225+CW	70
VW Golf GTI TCR DSG	102.5	1230	-	-10	1220+CW	70

* The Compensation Weight of 60kg applies at the 1st event of a model in a TCR Series and will be corrected during the season using the particular CW Automatic Formula. For Single Endurance Events CW may be zero.
** For any TCR Series or class with a participation of DSG cars over the 40% of the total number of cars on grid, the Target Racing Weight of the SEQ cars may be increased by the Series Promoter from 10 to 40 kg maximum. Promoters are requested to inform WSC in written.

MG 6 TCR has Temporary Technical Form and may race without marking points at BoP Weight=±0kg and CW=+60kg.

Andreas Bellu / WSC Technical Director

Annexe: Imposed parameter for accepted software
ERRATUM for TCR Turbocharger Boost Pressure Monitoring Method

Imposed parameters for Certified Software

Model	Power level [%]	SW Name	SW ID or Checksum	Check Method	Rev limiter	Max Boost Pressure [mbar] / engine revs								Correct. [mbar/°C]
Alfa Romeo Giulietta RF TCR	100	1.639_TCR2019_BOP_100%	34882/10107	CAN hi/lo	7100	Revs	4600	5100	5600	6100	6600	7100		1
						Boost	2500	2705	2700	2700	2680	2660		
Alfa Romeo Veloce TCR	100	1.639_TCR2019_BOP_100%	34882/10107	CAN hi/lo	7100	Revs	4600	5100	5600	6100	6600	7100		1
						Boost	2500	2705	2700	2700	2680	2660		
Audi RS 3 LMS SEQ	100	5F6906259AB	CVN	OBD	7000	Revs	4500	5000	5500	6000	6500	7000		9
						Boost	2380	2510	2620	2630	2400	2250		
Audi RS 3 LMS DSG	102.5	5F6906259L	CVN	OBD	7000	Revs	4500	5000	5500	6000	6500	7000		5
						Boost	2450	2450	2630	2650	2580	2520		
CUPRA SEQ	100	5F6906259AB	CVN	OBD	7000	Revs	4500	5000	5500	6000	6500	7000		9
						Boost	2380	2510	2620	2630	2400	2250		
CUPRA DSG	102.5	5F6906259L	CVN	OBD	7000	Revs	4500	5000	5500	6000	6500	7000		5
						Boost	2450	2450	2630	2650	2580	2520		
Honda Civic FK7 TCR	100	TCR_H70_1.02.35	100	ECAL	7500	Revs	4500	5000	5500	6000	6500	7000	7500	9
						Boost	2310	2370	2490	2490	2410	2290	2290	
Honda Civic FK TCR	100	TCR-V2.7.98+7.5	100	ECAL	7100	Revs	4700	5200	5700	6200	6700	7100		2
						Boost	2130	2275	2415	2550	2540	2370		
Hyundai i30N TCR	97.5	V1.639.X1_i30_TCR2019_975_v3	44078/2007	CAN hi/lo	7000	Revs	4500	5000	5500	6000	6500	7000		2
						Boost	2200	2255	2320	2340	2340	2520		
Hyundai Veloster	97.5	V1.639.X1_i30_TCR2019_975_v3	44078/2007	CAN hi/lo	7000	Revs	4500	5000	5500	6000	6500	7000		2
						Boost	2200	2255	2320	2340	2340	2520		
KIA Cee'd TCR	100	1502_KIA_TCR_100%_WSC_BoP_19_final	Firmware ID	Motec tool	6900	Revs	4400	4900	5400	5900	6400	6900		1
						Boost	2430	2545	2570	2560	2550	2530		
Lada Vesta Sport TCR	100	SRG_MMGEN_14X8_12.10.4.3a	0x4A2D1916/0x8E640174	Marelli	6750	Revs	4200	4700	5200	5700	6200	6750		2
						Boost	2150	2340	2580	2780	2675	2540		
Lada Vesta TCR	100	SRG_MMGEN_14X_12.10.1.3	0xFC35A13A/0x2BEBC88A	Marelli	6750	Revs	4200	4700	5200	5700	6200	6750		2
						Boost	2230	2270	2370	2500	2420	2200		

Model	Power level [%]	SW Name	SW ID or Checksum	Check Method	Rev limiter	Max Boost Pressure [mbar] / engine revs								Correct. [mbar/°C]
LynK&Co 03 TCR	97.5	**LynkCo 03 TCR Engine Custom ECU 97% v2.02**	Firmware ID	Motec tool	7200	Revs	4700	5200	5700	6200	6700	7200		**4**
						Boost	**2370**	**2400**	**2420**	**2420**	**2440**	**2390**		
Opel Astra TCR	**102.5**	12.7.3.32_BOP_2019_102prozent_final	**0x08AFD417**	CAN hi	6900	Revs	4400	4900	5400	5900	6400	6900		2
						Boost	**2300**	**2465**	**2620**	**2610**	**2520**	**2260**		
Peugeot 308 TCR	102.5	TCR_121030_VSCC_100_BOP_2019	0x87752a77	MapSel 1	7300	Revs	4800	5300	5800	6300	6800	7300		1
						Boost	2530	2630	2750	2810	2810	2800		
Peugeot 308 Racing cup	102.5	TCR_121030_VSCC_100_BOP_2019	0x2d56713d	MapSel 2	7100	Revs	4600	5100	5600	6100	6600	7100		1
						Boost	2630	2650	2670	2760	2780	2670		
Renault Mégane TCR*	100	059_Megane TCR VMTCR_6900 rpm_100%	BOP_26-04-19_100	A2L	6900	Revs	4400	4900	5400	5900	6400	6900		1
						Boost	2630	2630	2660	2660	2660	2660		
Subaru STI TCR	102.5	Subaru_STI_TCR_2019_BoP_102	Firmware ID	Motec tool	7200	Revs	4700	5200	5700	6200	6700	7200		2
						Boost	2345	2450	2750	2700	2500	2400		
VW Golf GTI TCR SEQ	100	5F6906259AB	CVN	OBD	7000	Revs	4500	5000	5500	6000	6500	7000		**9**
						Boost	**2380**	**2510**	**2620**	**2630**	**2400**	**2250**		
VW Golf GTI TCR DSG	102.5	5F6906259L	CVN	OBD	7000	Revs	4500	5000	5500	6000	6500	7000		5
						Boost	2450	2450	2630	2650	2580	2520		
VW Golf GTI TCR C-ECU*	100	SRG140_VAG_12.11.1.9_BOP_100%_2019_Final_2.clx	A4846272	Marelli	7200	Revs	4700	5200	5700	6200	6700	7200		3
						Boost	2510	2510	2485	2440	2340	1380		

Boost pressure will be monitored and interpreted according to the TCR Technical Bulletin no. 4 / 2019 **by moving car**. Values between reference points are piece wise cubic interpolated. The given values are referenced to scrutineering data channel Tmanifold at 40°C.

It is not allowed in any circumstances to exceed the highest listed boost pressure values.

The boost pressure below the 2500rpm monitored area is limited to the value at the lowest rpm of the reference window.

Accepted limit violation:

- 0,3% of the total valid data points with the highest values in regard to the low over boost limits (30mbar < p Boost < 100mbar relative to the corresponding Max Boost Pressure)
- 0,1% of the total valid data points with the highest values in regard to the high over boost limits (p Boost ≥ 100mbar relative to to the corresponding Max Boost Pressure)

ERRATUM:
TCR Turbocharger Boost Pressure Monitoring Method

This document corrects tipping errors in the Monitoring Method published in the TCR Technical Bulletin no. 4/2019. Changes are highlighted.

1. Conditions

Each of the following conditions has to be met to discard meaningless results

- Engine speed is within the rpm range that is defined for the p_{boost} check by the relevant Bulletin.

- Throttle pedal position is at least at 90% of its total travel.

- No gearshift window is active.
  A gearshift window is defined as a time span of maximum 300ms starting by the 1st detected overboost within 1000ms after gear upshift.

- Lap time of the car is ≤ 107% of the fastest lap time of the monitored session or of the fastest simultaneously driven lap time (in sessions with changing weather conditions).

If one of these conditions is not met, the monitoring method is not considering the actual boost pressure value. All previous values are kept for continuing the monitoring after the conditions are met again.

If each of these conditions are met, the corresponding boost sensor value at each sampling time is considered a valid data point.

For the upshift detection, two methods are in place:

a. Consider an rpm drop of more than 200rpm within 20ms. This drop indicates a gear upshift. The actual point in time for the upshift is considered the one at which the rpm curve has its inflection towards positive incline.

b. Reliable information (e.g. CAN signal, gear potentiometer, etc.) on the Scrutineering Data Logger on the time of operated gear upshift will be preferred.

2. Boost Pressure Monitoring Method

2.1 Description
The boost pressure is measured with the official TCR Sensor using 1mbar resolution and a sampling rate of 100Hz.
The monitoring method itself is composed of steps that are described below and executed with the same sampling frequency as the boost pressure sensor is captured. It is not applied before 50 boost pressure samples has been measured that met the conditions given above and not for the last 25 boost pressure samples of each measuring period:

Smoothing the boost sensor raw value

The smoothing of the boost sensor raw value is performed by applying a rolling average algorithm to the boost sensor values. The rolling average algorithm is performed on 50 equally weighted samples. Initially the 50 samples are set to zero (0mbar). The samples are collected in a so-called circular buffer where the oldest sample is replaced by the latest sample at each sampling point.

Evaluating the Overboost (OB) Condition

The OB is detected by subtracting the maximum permitted boost pressure from the result of the rolling average calculation (pBoostavg (i)). Only results greater 0mbar will be considered for the next steps. The maximum permitted boost pressure is dependent on rpm and has to be derived from the relevant TCR Technical Bulletin. The relevant rpm value for each evaluation is the one that was captured 25 samples before the current sample point. In the equation below this is term is defined as $pBoostlim(rpm_{i-25})$.

$OB(i) = pBoostavg (i) - (pBoostlim(rpm_{i-25}) + \text{intake temperature compensation})$

For the first valid data point after an upshift OB(i) is set to zero. The intake temperature compensation is calculated as $(Tmanifold-40)*cFactor$. The value for cFactor is given in the BoP Bulletin.

High (HOB) and Low Overboost (LOB) Detection

Thresholds are used to classify OB(i) into two cases:
- HOB Threshold (HOT): 100mbar
- LOB Threshold (LOT): 30mbar

Accepted Limit Violations

Tolerances for LOB and HOB data points are applied:
- 0.3% of the total valid data points may be higher as LOB limits but still lower as HOB limits: $LOB \leq OB(i) < HOB$
- 0.1% of the total valid data points may be higher as HOB: $OB(i) \geq HOB$

These tolerances are subject to modification though TCR Technical Bulletin (also brand specific).

2.2. Block Diagram

The diagram on next page shows the entire boost pressure monitoring method including all conditions for verification (corrected values according to the description).
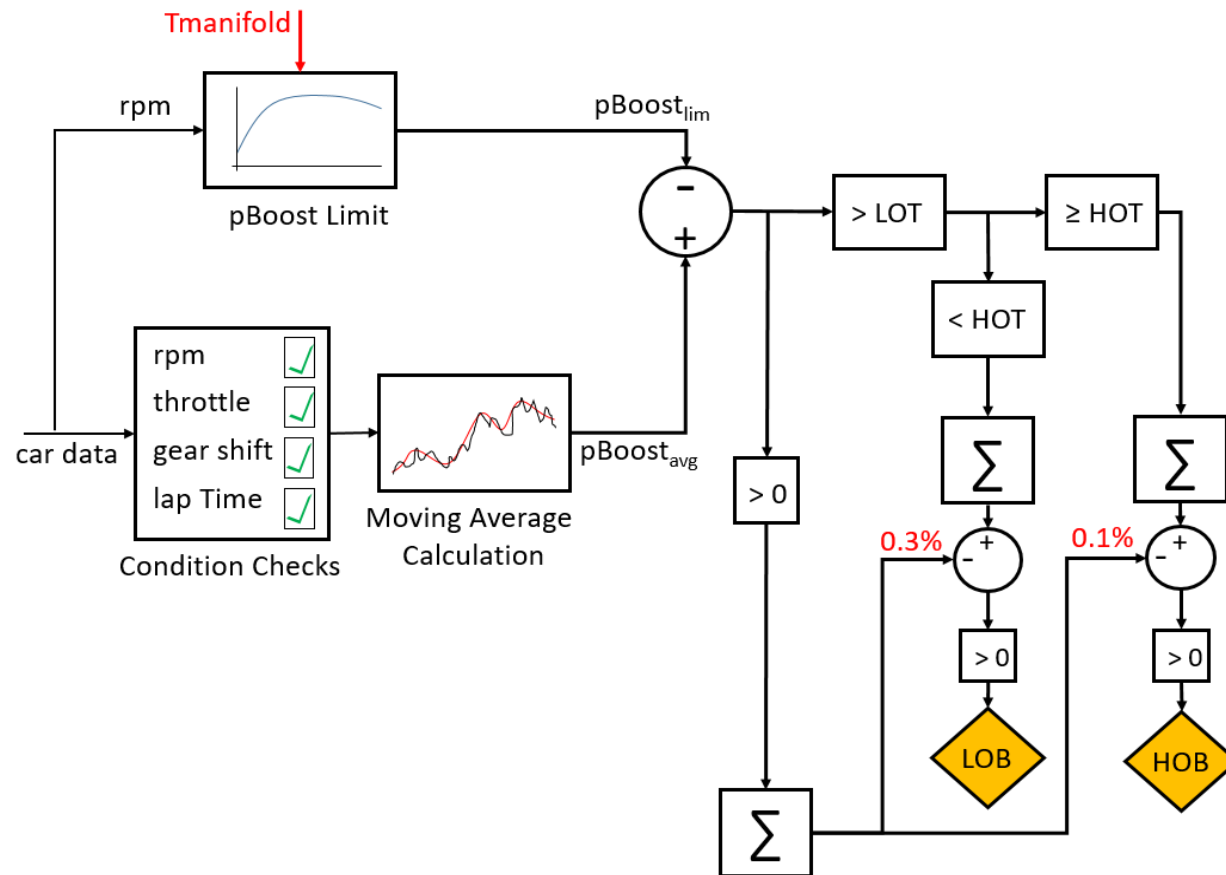
Authors' contacts for eventual clarification requests:

Markus Krug: markus.krug@tcr-series.com

Florian Eich: florian@tcr-series.com