



## **INVITATION TO TENDER FOR SOLE SUPPLY CONTRACT**

### **TENDER SUMMARY AND ADDITIONAL TENDER REQUIREMENTS**

The Fédération Internationale de l'Automobile (FIA) is the governing body for world motor sport and the federation of the world's leading motoring organisations.

The FIA is the sole body governing international motor sport and is recognised by its members as the sole authority having the sporting power with the right to organise international FIA Championships.

The Automobile Club de l'Ouest (hereinafter "ACO") is a partner of the FIA within the framework of the FIA World Endurance Championship, the founder and owner of the Le Mans 24 Hours as well as the European Le Mans Series (ELMS) and the Asian Le Mans Series, and a partner of the International Motor Sports Association (hereinafter "IMSA").

The objective of the FIA, the ACO and the IMSA is to select, through a tendering procedure launched by the FIA, an exclusive supplier of LMP 2 **electronic control unit packages** (ECUPs), whose task it will be to ensure the production and delivery of the ECUPs to the competitors entered into the 2017, 2018, 2019 and 2020 seasons of the aforementioned Championships, Series and competitions:

- the FIA World Endurance Championship,
- the Le Mans 24 Hours,
- the European Le Mans Series,
- the Asian Le Mans Series (from 2019 onwards),
- the Tudor United Sportscar Championship.

Interested parties are hereby invited to tender to become the exclusive supplier of ECUPs to the competitors of the above mentioned Championships, Series and competitions.

The selected tenderer will be invited to enter into a contract with the FIA that will establish the terms of the tenderer's appointment as exclusive supplier. The exclusive supplier will supply the products directly to the teams (not to the FIA) under terms and conditions to be agreed.

Bids must be submitted in accordance with the FIA's "Invitation to tender for sole supply contract – tendering instructions" available on the FIA's website [www.fia.com](http://www.fia.com) apart article 1.1.8 which does not apply to this procedure.

The FIA reserves the right to make amendments to this invitation to tender at any time and to issue a new invitation to tender.

Publication of invitation to tender:	1 July 2015
<b>Tender submission date:</b>	13 August 2015
Opening date:	14 August 2015
Notification of decision as to selection of tenderer no later than:	7 September 2015

### **ADDITIONAL REQUIREMENTS**

All prices shall be given in euros. In addition to the prices in euros, each tenderer is required to provide its national currency. A price in the tenderer's currency, fixed for the complete duration of the tender period, will be determined applying an exchange rate determined by the FIA at the date of the submission to the declared price in euros. In January of each year, the FIA will communicate to the selected tenderer the yearly applicable exchange rate from its national currency.

DRAFT CONTRACT FOR SUPPLYING ELECTRONIC CONTROL UNITS PACKAGES (ECUPS)  
IN THE 2017, 2018, 2019 AND 2020 SEASONS OF THE FIA WORLD ENDURANCE  
CHAMPIONSHIP, THE LE MANS 24 HOURS, THE EUROPEAN LE MANS SERIES, THE ASIAN LE  
MANS SERIES AND THE TUDOR UNITED SPORTSCAR CHAMPIONSHIP

BETWEEN

**THE FEDERATION INTERNATIONALE DE L'AUTOMOBILE (FIA)**

8 Place de la Concorde  
75008 Paris

hereinafter referred to as the "**FIA**"

ON THE ONE HAND,

AND

[•]

hereinafter referred to as the "**PROVIDER**"

ON THE OTHER HAND.

## **PART 1 - GENERAL CONDITIONS**

### **RECITALS**

- (A) The FIA's authority in relation to international motor sport has been recognised since 1904 when national automobile clubs came together to establish the FIA to provide, amongst other things, an international forum to regulate motor sport internationally.
- (B) The FIA is the sole body governing international motor sport and is recognised by its members as the sole authority having the sporting power with the right to organise international FIA championships, including the CHAMPIONSHIPS.
- (C) The FIA has an absolute obligation conferred on it by its members to safeguard its authority over all safety, sporting, technical and disciplinary matters relating to the CHAMPIONSHIPS, as well as traditional values.
- (D) The FIA will publish the GOVERNING RULES annually.
- (E) The FIA has determined that the interests of the CHAMPIONSHIPS require that a single supplier of the PRODUCT should be appointed for a limited term.
- (F) It is intended that the FIA and the PROVIDER will enter into this CONTRACT pursuant to which the PROVIDER will be appointed as the sole supplier of PRODUCT to the CHAMPIONSHIPS for the term set out herein (see Part 3 – DEFINITIONS).

### **1. APPOINTMENT AND SUPPLY**

- 1.1 The FIA hereby appoints the PROVIDER to be the exclusive supplier of the PRODUCT to the COMPETITORS for the CHAMPIONSHIPS and the PROVIDER hereby accepts this appointment and agrees to supply the PRODUCT to the COMPETITORS for the CHAMPIONSHIPS in accordance with the terms of this CONTRACT and the terms of the SUPPLY AGREEMENTS.
- 1.2 Following from its appointment, the PROVIDER shall enter into a SUPPLY AGREEMENT with each COMPETITOR setting out the terms upon which the PRODUCT shall be supplied.
- 1.3 The PRODUCT that is supplied by the PROVIDER to the COMPETITORS shall be compliant with the TECHNICAL REGULATIONS, the SPORTING REGULATIONS and the TECHNICAL SPECIFICATIONS.

### **2. RELATIONS BETWEEN THE PROVIDER AND THE COMPETITORS**

- 2.1 The PROVIDER shall treat all COMPETITORS in accordance with the PRINCIPLES OF SPORTING EQUALITY.
- 2.2 The PROVIDER shall supply the PRODUCT to all COMPETITORS on equivalent terms. It shall enter into a standard SUPPLY AGREEMENT with each COMPETITOR.

- 2.3 All SUPPLY AGREEMENTS shall be fully compliant with the PRINCIPLES OF SPORTING EQUALITY, the CONTRACT, the SPORTING REGULATIONS, the TECHNICAL REGULATIONS and the TECHNICAL SPECIFICATIONS.
- 2.4 Each SUPPLY AGREEMENT requiring a COMPETITOR to purchase the PRODUCT for use at more than one COMPETITION shall include a clause permitting the COMPETITOR and/or PROVIDER to terminate the SUPPLY AGREEMENT without a penalty of any kind in the event of expiry or earlier termination of the CONTRACT.
- 2.5 If requested by the FIA, the PROVIDER shall supply a copy of each SUPPLY AGREEMENT in order to demonstrate that the PRINCIPLES OF SPORTING EQUALITY are maintained. With respect to the FIA, the PROVIDER hereby waives and confirms that it shall not assert or seek to rely on any confidentiality provision in any SUPPLY AGREEMENT or other agreement relevant to the supply of the PRODUCT to prevent the FIA from reviewing relevant agreements or carrying out its regulatory functions (including ensuring that the PRINCIPLES OF SPORTING EQUALITY are maintained).
- 2.6 The FIA may request amendments to a SUPPLY AGREEMENT if it considers that the SUPPLY AGREEMENT is not consistent or compatible with, or is otherwise contrary to, the PRINCIPLES OF SPORTING EQUALITY. For the avoidance of doubt, the PROVIDER's obligation to abide by the PRINCIPLES OF SPORTING EQUALITY shall not be limited or otherwise affected by the FIA's review of a SUPPLY AGREEMENT and/or a request for an amendment to be made.
- 2.7 In the event of uncertainty regarding whether any action taken or proposed to be taken by the PROVIDER may breach the PRINCIPLES OF SPORTING EQUALITY, the PROVIDER shall request guidance from the FIA, which shall make a determination in this regard.
- 2.8 Where such a determination is made by the FIA, the PROVIDER's actions in complying with that determination shall be deemed to be in compliance with the PROVIDER's obligation in GENERAL CONDITION 2.1 to treat all COMPETITORS in accordance with the PRINCIPLES OF SPORTING EQUALITY.

### 3. **LIABILITY**

- 3.1 Without prejudice to the FIA's other rights, the PROVIDER shall indemnify and hold harmless the FIA from and against all reasonably foreseeable losses incurred by the FIA as a direct result of the PROVIDER's:
- (a) failure to supply the PRODUCT of the requisite quantity;
  - (b) failure to supply the PRODUCT of the requisite quality; and
  - (c) negligence in the supply of the PRODUCT.
- 3.2 The PROVIDER represents and warrants that it is in a position to meet any liability that may arise under clause 3.1 of this CONTRACT and hereby covenants to maintain such position for the period of time during which the PROVIDER may be liable.

#### 4. **WARRANTIES**

- 4.1 The PROVIDER represents and warrants that it has full power and authority to enter into and fully perform its obligations under the CONTRACT and the provisions of the CONTRACT, when executed, will constitute valid and binding obligations on the PROVIDER in accordance with its terms. The PROVIDER also represents and warrants that it has full power and authority to enter into and fully perform its obligations under the SUPPLY AGREEMENTS when executed.
- 4.2 The FIA represents and warrants that it has full power and authority to enter into and fully perform its obligations under the CONTRACT and the provisions of the CONTRACT, when executed, will constitute valid and binding obligations on the FIA in accordance with its terms.

#### 5. **TERMINATION**

- 5.1 Notwithstanding any other provision hereof, either party may terminate the CONTRACT with immediate effect by written notice to the other if any of the following events occur:
- (a) the other party has committed a material breach of the CONTRACT which is not capable of remedy or, if remediable, has not remedied it within 30 days of the non-breaching party's written notice requiring the default to be remedied (for the avoidance of doubt, a breach by the PROVIDER of any of GENERAL CONDITIONS 1.2, 1.3, 2, 3 and 4.1 and any of the SPECIAL CONDITIONS is acknowledged by the parties to be a material breach);
  - (b) steps (including any steps analogous to those following) have been taken to wind up the other party or to place the other party into administration or to have a receiver appointed over any of its assets, other than as part of a scheme of solvent reconstruction or amalgamation; or
  - (c) the other party shall cease or threaten to cease carrying on business or the other party shall make any composition or arrangement with its creditors or become subject to any other insolvency process or proceeding (other than as part of a scheme of solvent reconstruction or amalgamation) or have all or any of its assets or undertakings seized by a government or governmental agency or authority (including any acts analogous to the above).

#### 6. **GOVERNING RULES**

- 6.1 The GOVERNING RULES constitute the legal, administrative and technical framework of the CHAMPIONSHIPS and the conditions set forth therein shall have binding force and prevail among the parties to the CONTRACT.
- 6.2 The CONTRACT shall in principle be interpreted in a manner that gives effect to the provisions of the GOVERNING RULES, the intention of the parties being to construe the provisions of the CONTRACT in the context of the more general framework of the GOVERNING RULES.
- 6.3 The PROVIDER acknowledges that the TECHNICAL SPECIFICATIONS and GOVERNING RULES are subject to amendment from time to time. The PROVIDER will be responsible (at its own cost) for all research and development associated with the

manufacture of the PRODUCT, including the making of any changes to the PRODUCT to be supplied pursuant to the CONTRACT that may be necessitated by any amendment to the TECHNICAL SPECIFICATIONS or the GOVERNING RULES.

- 6.4 The PROVIDER acknowledges that the FIA may take decisions regarding the supply of the PRODUCT, this CONTRACT and any obligations accruing from the GOVERNING RULES through whatever structure it deems appropriate, including through its disciplinary structures. The PROVIDER shall not challenge the competence of an FIA disciplinary body acting in accordance with the GOVERNING RULES.

## **7. GOVERNING LAW AND LANGUAGE**

- 7.1 The language that shall prevail for the interpretation of the CONTRACT shall be English and the CONTRACT and all documents connected with the CONTRACT shall be written in English. In the event of any conflict between the language of the CONTRACT and any translation thereof, the language of the CONTRACT shall prevail. In the event of any conflict between the language of any document connected with the CONTRACT and any translation thereof, the language of the document connected with the CONTRACT shall prevail.

- 7.2 The governing law of the CONTRACT shall be French law.

- 7.3 The Tribunal de Grande Instance de Paris, France, shall have sole jurisdiction to settle any dispute that may arise between the FIA and the PROVIDER in connection with the CONTRACT.

## **8. GENERAL**

- 8.1 Nothing in the CONTRACT guarantees or shall be construed as guaranteeing, the solvency of a COMPETITOR. The FIA is not responsible for ensuring that the COMPETITORS satisfy the terms of the SUPPLY AGREEMENTS and the FIA shall not be liable for a failure by any COMPETITOR to satisfy the terms of a SUPPLY AGREEMENT.

- 8.2 No delay or omission or failure to exercise any right or remedy provided herein shall be deemed to be a waiver thereof.

- 8.3 The CONTRACT shall be binding on and enure to the benefit of the parties and their respective successors and permitted assigns. The PROVIDER shall not be entitled to assign or sub-contract its rights or obligations under the CONTRACT in whole or in part without the prior written consent of the FIA.

- 8.4 Any notice to be given under the CONTRACT shall be given in writing delivered to the other party by any one or more of the following methods:

- (a) personal delivery to one of its corporate officers, in which case notice shall be treated as having been given at the time of such personal delivery;
- (b) first class registered post or courier delivery service (such as DHL or UPS) to the address mentioned above (or such other address as may be notified to the other party in writing from time to time), in which case notice shall be treated as having been given on the date of actual receipt at that address (or on the next local business day if delivered on a local non-business day or

after 4.00 p.m. local time on a local business day), which shall rebuttably be presumed to be the second local business day after posting; or

- (c) facsimile to the numbers below (or such other facsimile number as may be notified to the other party in writing from time to time), in which case notice shall be treated as having been received at the time of actual receipt (or on the next local business day if delivered on a local non-business day or after 4.00 p.m. local time on a local business day) and rebuttably be presumed to have been duly received at the time indicated on the automatic acknowledgement transmitted by the recipient fax machine:

PROVIDER: [•]

FIA: [•]

- 8.5 Any variations of the CONTRACT shall be ineffective unless agreed in writing and signed by the parties.
- 8.6 If any term, provision or condition of the CONTRACT is held by a court of competent jurisdiction to be invalid, void or unenforceable such invalidity, voidness or unenforceability shall not invalidate the remainder of the CONTRACT, all of which shall remain in full force and effect.
- 8.7 The CONTRACT may be executed in any number of counterparts (whether original or facsimile counterparts) and upon due execution of all such counterparts by all parties, each counterpart shall be deemed to be an original hereof.
- 8.8 GENERAL CONDITIONS 3, 7 and 8 shall survive expiry or termination of the CONTRACT for any reason (but shall terminate at the time expressly provided in the relevant GENERAL CONDITION, if any).



## **PART 2 - SPECIAL CONDITIONS**

*[The CONTRACT shall contain, inter alia, the following minimum terms and conditions relating to the supply of the PRODUCT.]*

### **1. SUPPLY OF THE PRODUCT**

- 1.1 The FIA does not guarantee the PROVIDER a minimum quantity of the PRODUCT to be supplied.
- 1.2 The SUPPLY AGREEMENT may provide that each COMPETITOR shall be responsible for the care and maintenance of the PRODUCT and for transportation of them to each COMPETITION.
- 1.3 The PROVIDER is exempted of any presence on track. The COMPETITORS alone shall be responsible for the spare parts on track.

### **2. PRODUCTION DATES AND DELIVERY OF THE PRODUCT**

- 2.1 The hardware and software design specifications of the PRODUCT shall be approved by the FIA by 30 November 2015 at the latest, after which date no further modifications or alterations to the PRODUCT's specifications shall be permitted without the express written previous consent of the FIA.
- 2.2 The PROVIDER shall make available to the FIA, at the PROVIDER's own cost, no later than 1 March 2016 one pre-production unit with test loom and all required development tools for bench testing and evaluation for the purposes of hardware and software design approval.
- 2.3 The PROVIDER shall make available one pre-production unit and all required development tools to each CHASSIS MANUFACTURER for testing on 1 July 2016 at the latest.
- 2.4 The PROVIDER shall make available one pre-production unit and all required development tools to the ENGINE SUPPLIER for testing on 1 April 2016 at the latest.
- 2.5 The PROVIDER shall make available the PRODUCT for private testing to all the COMPETITORS entered in the COMPETITIONS on 1 October 2016 at the latest.
- 2.6 The PROVIDER shall make available to each COMPETITOR all necessary technical support, personnel and equipment to assist with installation of the PRODUCT during the first deliveries of the PRODUCT to the COMPETITORS (see TECHNICAL SPECIFICATIONS).
- 2.7 The PROVIDER shall ensure all necessary technical support on the COMPETITIONS as described in the TECHNICAL SPECIFICATIONS.
- 2.8 To facilitate OFFICIAL TESTING by COMPETITORS, if requested by the FIA, the PROVIDER will be present at its own expense at OFFICIAL TESTING with all necessary spare parts, personnel and equipment to fit and service the PRODUCT.

### **3. TECHNICAL CONDITIONS**

- 3.1 The PROVIDER shall ensure that the PRODUCT to be supplied is in conformity with the TECHNICAL SPECIFICATIONS, the SPORTING and TECHNICAL REGULATIONS. In addition, the PROVIDER shall supply the PRODUCT that is capable of being used to ensure that the COMPETITORS' cars comply with TESTING requirements.
- 3.2 The PRODUCT must be adaptable to different types of engines in addition to the one used in the FIA and ACO Championship, Series and competitions. The cost of all necessary adjustments will be at the cost of the engine suppliers concerned.

### **4. PROJECT SUPERVISION**

- 4.1 The PROVIDER shall make such modifications to the PRODUCT to be supplied pursuant to the CONTRACT as the FIA ENGINEER may require.
- 4.2 The PROVIDER shall bear all reasonable costs of development of the PRODUCT incurred by the FIA ENGINEER and his support staff, including software tools, looms and test equipment.

### **5. PRICING OF THE PRODUCT**

- 5.1 The price of the PRODUCT (in euros) supplied pursuant to the CONTRACT shall be as detailed on the PRICING FORM, which amount shall be inclusive of all taxes and charges and which amount shall not be increased for any reason.
- 5.2 VAT (value added tax) shall not be charged to those COMPETITORS that are exempt from VAT and that have supplied proof of such exemption to the PROVIDER.

### **6. MANUFACTURING CONDITIONS OF THE PRODUCT**

- 6.1 Before starting the manufacturing of the PRODUCT to be supplied pursuant to the CONTRACT, the PROVIDER shall provide to the FIA a detailed technical study for the approval of the FIA ENGINEER. In the event that an amendment is made to the TECHNICAL SPECIFICATIONS or the TECHNICAL REGULATIONS that requires an amendment to the PRODUCT supplied pursuant to the CONTRACT, the PROVIDER shall provide to the FIA a detailed technical study of the amended PRODUCT to be supplied pursuant to the CONTRACT to take account of such amendment.
- 6.2 The PROVIDER shall make such modifications to the PRODUCT to be supplied pursuant to the CONTRACT as the FIA ENGINEER may require.
- 6.3 The PROVIDER shall not make any change to the PRODUCT during the CONTRACT without the express prior written agreement from the FIA.

### **7. ASSOCIATION RIGHTS**

The PROVIDER is prevented from advertising, publicising or otherwise promoting in any form whatsoever, including either direct or indirect advertising, via any media, and in any country, its supply of the PRODUCT to a COMPETITOR, or its relationship with the CHAMPIONSHIP. All phases of PRODUCT delivery pursuant to the CONTRACT shall be carried out by personnel wearing no distinctive symbols or designs on their uniforms and using equipment that does not give any indication as to the identity of the PROVIDER.

### **PART 3 - DEFINITIONS**

The following terms shall be understood to have the following meanings for the purposes of the "CONTRACT".

- 1.1 **CHAMPIONSHIPS** means the 2017, 2018, 2019 and 2020 seasons of the FIA World Endurance Championship, the Le Mans 24 Hours, the European Le Mans Series, the Asian Le Mans Series and the Tudor United Sportscar Championship.
- 1.2 **COMPETITORS** means the racing teams that have been accepted to take part in the CHAMPIONSHIPS.
- 1.3 **CHASSIS MANUFACTURER** means the chassis suppliers registered by the FIA, the ACO and the IMSA to supply the chassis in the CHAMPIONSHIPS.
- 1.4 **CONTRACT** means the GENERAL CONDITIONS, the SPECIAL CONDITIONS and the DEFINITIONS.
- 1.5 **DEFINITIONS** means the definitions set out in this Part 3 of the CONTRACT.
- 1.6 **COMPETITION** means any race forming part of the CHAMPIONSHIPS. A COMPETITION is deemed to commence at the scheduled time for scrutineering and administrative checks and includes all practice, qualifying and the race itself and ends at the expiry of the deadline for the lodging of a protest.
- 1.7 **ENGINE SUPPLIER** means the exclusive engine supplier designated by the FIA to supply the engines in the CHAMPIONSHIPS with the exception of the Tudor United Sportscar Championship.
- 1.8 **FIA** means the Fédération Internationale de l'Automobile (FIA).
- 1.9 **FIA ENGINEER** shall mean the technician appointed by the FIA:
  - (a) to carry out all technical checks and controls;
  - (b) to grant any necessary approval in relation to the development and production of the PRODUCT.
- 1.10 **GENERAL CONDITIONS** means the provisions contained in Part 1 of the CONTRACT.
- 1.11 **GOVERNING RULES** means:
  - (a) the International Sporting Code and the Appendices thereto;
  - (b) the SPORTING REGULATIONS;
  - (c) the TECHNICAL REGULATIONS;
  - (d) the Code of Ethics;
  - (e) any other regulations applicable to the CHAMPIONSHIPS.

- 1.12 **OFFICIAL TESTING** means official testing, if any, for the CHAMPIONSHIPS.
- 1.13 **PRICING FORM** means the pricing form stating the prices at which the PRODUCT will be supplied (see Appendix I).
- 1.14 **PRINCIPLES OF SPORTING EQUALITY** means the equal treatment by the PROVIDER of all COMPETITORS with respect to:
- anything which may affect the performance of the PRODUCT;
  - the terms on which the PRODUCT is supplied;
  - the support, access and information made available to COMPETITORS in relation to the PRODUCT; and
  - any other matter which affects or may have an effect, however minor, on sporting performance.
- 1.15 **PRODUCT** means the LMP 2 electronic control unit packages as such term is described in the SPORTING REGULATIONS, the TECHNICAL REGULATIONS, any other regulations applicable to the CHAMPIONSHIPS and the TECHNICAL SPECIFICATIONS.
- 1.16 **PROVIDER** means the electronic control unit packages supplier which tenders and, after selection by the FIA, enters into the CONTRACT.
- 1.17 **PRODUCTION SITE** means the factory that will produce the PRODUCT supplied pursuant to the CONTRACT.
- 1.18 **SPECIAL CONDITIONS** means the provisions contained in Part 2 of the CONTRACT.
- 1.19 **SPORTING REGULATIONS** means the Sporting Regulations applicable to the CHAMPIONSHIPS. The Sporting Regulations are available on the FIA website [www.fia.com](http://www.fia.com).
- 1.20 **SUPPLY AGREEMENT** means any agreement, and all amendments thereto, between the PROVIDER and a COMPETITOR pursuant to which the PROVIDER shall supply the PRODUCT to the COMPETITOR.
- 1.21 **TECHNICAL REGULATIONS** means the Technical Regulations applicable to the CHAMPIONSHIPS. The Technical Regulations are available on the FIA website [www.fia.com](http://www.fia.com).
- 1.22 **TECHNICAL SPECIFICATIONS** means the PRODUCT's requirements (see Appendix II).

Signed

On behalf of the FIA

In his/her capacity as

In

On

On behalf of the PROVIDER

In his/her capacity as

In

On

**APPENDICES**

I - PRICING FORM

II – TECHNICAL SPECIFICATIONS

**APPENDIX I**  
**PRICE LIST**

<b>Equipment</b>	<b>Price in euros (inclusive of all taxes and charges)</b>
Full kit LMP2 FIA	
ECU LMP2 FIA	
Powerbox LMP2 FIA	
Steering wheel dash	
Switch panel	
Other components	
<b>Optional (recommended)</b>	
Full steering wheel	
<b>Support and service</b>	
Extra Licence	
Servicing of the package (minimum every 24 month)	
Extra support days for chassis or engine manufacturer	
Extra support days for championships	

National Currency:

**APPENDIX II**  
**TECHNICAL SPECIFICATIONS**

**1. INTRODUCTION**

For 2017, the FIA/ACO/IMSA are introducing a standard electronic package for LMP2 cars entering WEC championships, and any championships willing to adapt it. This tender is a four-year contract, lasting from 2017 to 2020.

For 2017, the FIA/ACO have decided to modify LMP2 regulations in order to maintain a high field level and improve cost control.

Different invitations to tender will be issued for the:

- Chassis: Four suppliers will be designated for all LMP2 championships (WEC + ELMS + TUDOR, etc.) They will be in charge of the chassis, bodywork, gearbox (including actuation), ancillaries, etc.
- Engine: One supplier will be designated for FIA/ACO championships (WEC + ELMS); could also be used in other championships, such as TUDOR, but their use in other championships is not mandatory.
- Electronics: One supplier will be designated for FIA/ACO championships (WEC + ELMS). Le Mans 24 Hours cars from other championships (TUDOR) will have to run with the FIA electronic package but could have a specific ECU to manage engine functionalities.

The aim of this package is to deliver all the functionalities needed for an LMP2 application at a reasonable cost. It also serves to inhibit extra development in some technical areas.

The package includes the ECU to control engine and chassis strategies, a power box to manage all electric ancillaries, a logger to store data, a dashboard to be installed on the steering wheel and a panel switch to allow the driver to interface with all the switches.

For the FIA/ACO championships (WEC, ELMS), all these electronics will be managed with a single version of software for all of the components, whatever application is being run.

Main technical specifications of FIA/ACO championship cars:

- Engine (WEC + ELMS) (a single supplier will be selected following the FIA/ACO invitation to tender):
  - V8 NA
  - Gasoline Direct Injection (one injector per cylinder) or Port Injection
  - Up to two high pressure pumps
  - Up to two electric throttles
- Chassis (four chassis suppliers selected by FIA/ACO from around the world):
  - Six-gear sequential gearbox with paddle shift
  - Traction control

TUDOR Championship technical specifications:

- Same chassis as Europe but engine is not a spec one; each manufacturer can use a different engine (engine control for TUDOR is not part of this tender).



- Cars will be equipped with the full FIA electronic package to which a specific engine ECU could be added, but it would have to work with the FIA ECU for all chassis management (traction control, gearbox control, etc.)
- The PRODUCT SUPPLIER can also offer to include engine management of the specific engines within the FIA ECU. To be charged to engine manufacturers if adaptations are needed.

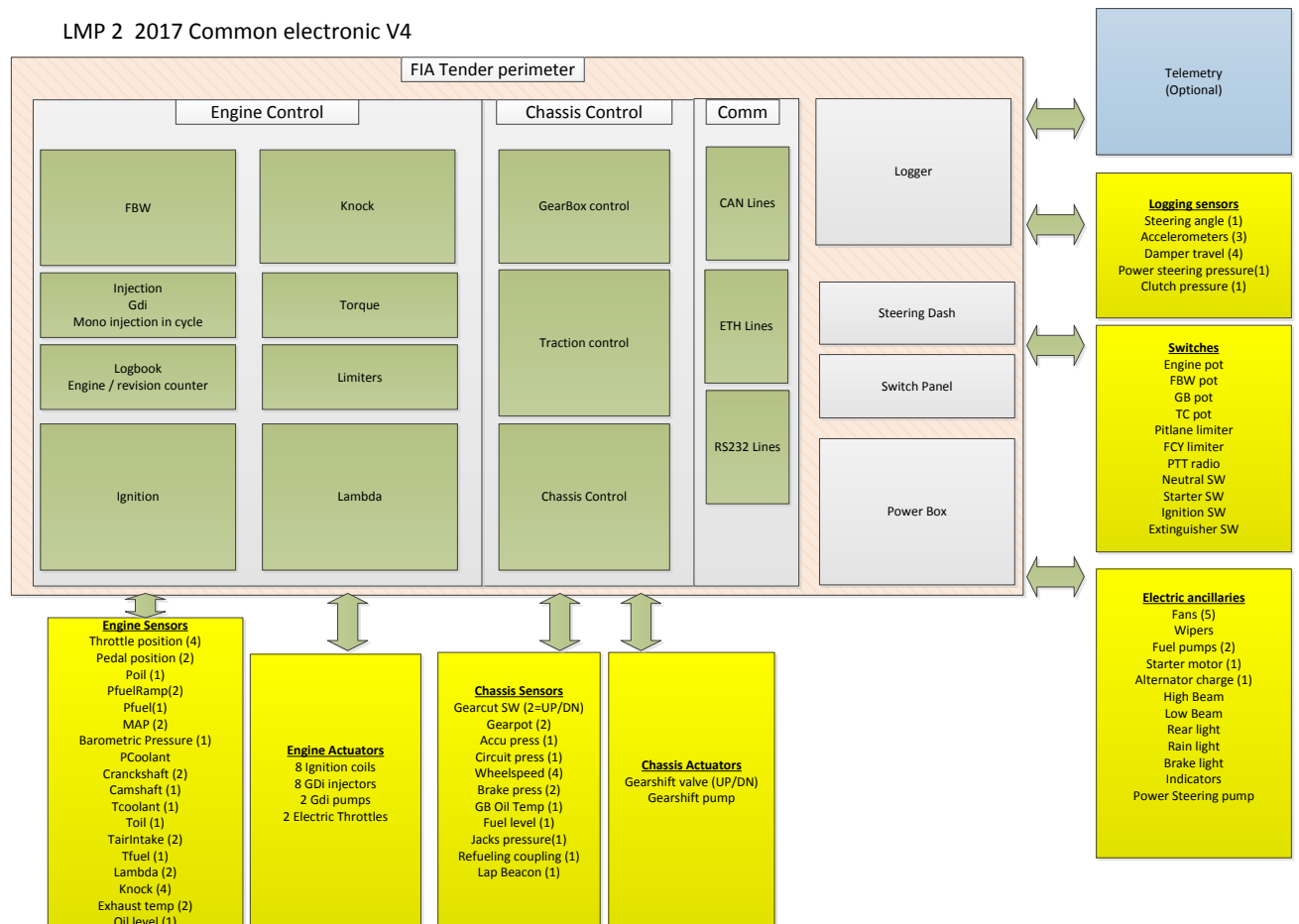
Main dates of the project:

- |   |                 |
|---|-----------------|
| • 2017 Rolex 24   | January 2017    |
| • Delivery of cars for IMSA teams                         | 15 October 2016 |
| • First CC car on the ground for testing with spec engine | September 2016  |
| • First CC car on the ground for testing with US engine   | August 2016     |
| • Spec engine first dyno test                             | May 2016        |

All proposals must comply with the attached technical and sporting regulations.

This document specifies the requirements in terms of hardware, software and support. Specifications are aimed at a mid-level to allow each supplier to propose what they already have without needing to recreate from scratch in order to exactly fulfil a specification. The FIA/ACO will arbitrate.

### Electronic package overview



Each functionality can be either integrated or stand alone, but it would be appreciated if the number of boxes managing the full system could be limited.

Also, the exchange of data should be managed using a CAN bus among the boxes.

## **2. MECHANICAL (for all equipment)**

### **2.1 Dimensions**

To be defined by the PRODUCT SUPPLIER. Maximised reliability by design has priority over miniaturisation.

### **2.2 Weight**

To be defined by the PRODUCT SUPPLIER. Maximised reliability by design has priority over weight reduction.

### **2.3 Case Material**

Machined aluminium with anodised finish.

### **2.4 Connectors**

Military spec is preferred but high quality plastic connectors will be acceptable. Connectors, pins, and crimping and assembly tools must be available on the market to any electrical harness manufacturer.

The mating connectors of those of the ECU are not included in the price of the ECU.

### **2.5 Installation**

#### **2.5.1 Heat sink**

The unit must be designed to ensure necessary cooling and mounted inside the cockpit at an ambient air temperature of up to 60 °C. If deemed necessary by the PRODUCT SUPPLIER, a bespoke heat sink shall be fitted on the unit's enclosure.

#### **2.5.2 Anti-vibration mounts**

The ECU shall be supplied with anti-vibration mounts and it is required that these be used to mount the unit in the car.

## **3. ENVIRONMENTAL (for all equipment)**

### **3.1 Storage Temperature**

-25 °C to 85 °C ambient temperature.

### **3.2 Operating Temperature**

0 to 85 °C case temperature.

### **3.3 Operating Thermal Shock**

1°C/second over operating temperature range.

### **3.4 Fluid Ingress Protection**

To be rated to IP66. Impervious to all normal motor racing fluids.

### 3.5 Vibration

The unit must be able to run continuously without damage when vibrated using typical closed car motor racing vibration profiles and duration.

### 3.6 Electromagnetic Compatibility

The ECU must comply with the requirements of electromagnetic compatibility directive 2004/108/EC, applicable from 20 July 2007.

## 4. ELECTRICAL (for all equipment)

### 4.1 Supply Voltage

Nominal operating voltage: 13.6 ±3.0 Volts.

Minimum start-up voltage threshold: 9.5 Volts.

Continuous DC operating range: 7.5 - 18.0 Volts<sup>1</sup>.

### 4.2 Supply Protection

Indefinite voltage reverse protection.

## 5. ACCESS RIGHTS FOR EACH COMPONENT OF THE PACKAGE (for all equipment)

As the project will be based on four kinds of contributors we will need to create access to setup maps, logging tables, software uploads, data readings, etc.

The four levels are:

- FIA/ACO: access to all
- Engine manufacturer: access to engine mapping and information (list TBD) with possibility of hiding channels from other users except the FIA/ACO
- Chassis manufacturer: access to chassis mapping and information (list TBD) with possibility of hiding channels from other users except the FIA/ACO
- Team: access to limited mapping, part of logging table.

Rights can be managed either via hardware (preferred) or software licensing.

This requirement is mandatory for the ECU and the logger but can be discussed for peripheral units depending on the capacity of the software of these units.

Number of licences per level:

- FIA/ACO/IMSA: unlimited free of charge
- Engine manufacturer: 3 + 1 licences per 6 cars free of charge
- Chassis manufacturer: 3 licences free of charge per chassis manufacturer
- Team: 2 licences free of charge per car

Any extra licence cannot exceed €1000.

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<sup>1</sup> Sensor excitation regulation, injector and ignition drive circuitry specification guaranteed only at nominal operating voltage.

## 6. ECU Specifications

### 6.1 General

The ECU is the main unit of the system. It is the brain of the system; all other units should be considered as working for that main unit.

The ECU is in charge of managing all the sensors and actuators linked to the engine and chassis control.

All software strategies will be running in this unit; all competitors will have to run with only one mandatory version of the software, which must be compatible with the different hardware configurations.

A solution in which the unit manages the ECU and the logger in the same box is preferred but not mandatory. If the number of inputs/outputs is not sufficient, an extension box connected by a data bus may be proposed.

### 6.2 Pinouts

To be specified by the PRODUCT SUPPLIER.

### 6.3 Hardware

One version of the hardware must be able to cover any application (relation to the four chassis manufacturers).

All unused input can be used for logging purposes only (should be blocked in strategy).

### 6.4 Control System Input/Output Type Summary

Inputs		
	Single ended 5 V (12 bits)	$\geq 40$
	Variable reluctance and/or Hall effect (software configurable)	$\geq 12$
	NTC and/or PT1000 (software configurable)	$\geq 8$
	Tck	$\geq 2$
	Lambda probe (with heater)	$\geq 2$
	Knock sensor	$\geq 4$
	Digital ON/OFF	$\geq 4$
	Lap trigger beacon	1
Outputs		
	FBW driver	$\geq 2$
	GDI injectors	$\geq 8$
	PFI injectors	$\geq 8$
	GDI pump driver	$\geq 2$
	Ignition coils	$\geq 8$
	Low side PWM	$\geq 6$
	Lambda heater	$\geq 2$
	5 V supply for sensors	$\geq 6$

## **6.5 Input/Output Specific Characteristics**

### **6.5.1 Analogue Inputs**

#### **6.5.1.1 Type 1: 0-5 Volt**

- Minimum resolution: 12 bit
- Maximum sample rate: 1 kHz
- Pull-up resistor to 5 V

#### **6.5.1.2 Type 2: NTC or PT1000 Temperature Input**

- Minimum resolution: 10 bit
- Maximum sample rate: 10 Hz

#### **6.5.1.3 Type 3: Lambda**

- Compatible with NTK or Bosch LSU 4.9
- Minimum resolution: 12 bit
- Maximum sample rate: 100 Hz

### **6.5.2 Digital Inputs**

#### **6.5.2.1 Type 1: Speed Input**

- Variable reluctance or Hall effect type (if there can only be one type, Hall effect is preferred)
- Maximum Input Frequency: 10 kHz

#### **6.5.2.2 Type 2: Crank Sensor**

- Variable reluctance or Hall effect type
- Maximum input frequency: 50 kHz
- Arm threshold: engine speed dependent
- The trigger disc configuration must be programmable to adapt the ECU to various patterns.

#### **6.5.2.3 Type 3: Cam Sensor**

- Variable reluctance or Hall effect type
- Maximum input frequency: 10 kHz
- Arm threshold: programmable and/or engine speed dependent
- The trigger disc configuration must be programmable to adapt the ECU to various patterns.

#### **6.5.2.4 Type 4: Switch Line**

- Maximum input frequency: 10 Hz
- Input voltage range: 0-5 Volts, TTL level switching
- Pull-up to 5 V
- Maximum sample rate: 100 Hz

### **6.5.3 Digital Outputs**

- Low or high side drive
- Maximum output frequency: 10 Hz
- Output maximum current: 3 A minimum

#### **6.5.4 Ignition Drives**

- Inductive drive stage (20 A maximum peak current) or logic level (10 mA)
- Diagnostics on open and short circuit condition detection, indication on a per drive basis
- Will operate in wasted spark mode over full operating range if synchronisation lost
- May include current ionisation measurement system

#### **6.5.5 Injector Drives**

The ECU must be capable of using GDI injectors.

The software configuration must allow the driver to use different makes of injectors which are available on the market; the same applies to the HP pump drive.

Engine characteristics:

- V8 NA
- 10000 rpm max
- Number of injections per cycle: max two

#### **6.5.6 UEGO Sensor Heater Drives**

- Current drive type
- PWM low side drive
- Maximum peak current: 5 A

#### **6.5.7 PWM Drive**

- PWM low side drive
- 5 A continuous
- Maximum switching frequency: 10 kHz

#### **6.5.7 H Bridge Drive**

- min 10 A peak

#### **6.5.8 Knock Sensor Inputs**

The ECU shall provide four piezoelectric type knock sensor inputs, or include an individual ionisation current sensing system per cylinder (up to eight inputs).

### **6.6 Internal Sensors**

The ECU should include the following internal sensors:

#### **6.6.1 Temperatures**

The ECU should measure its core electronics temperature. This sensor should be accurate to  $\pm 3$  °C over the range -20 °C to 120 °C.

#### **6.6.2 Supply Voltage**

The ECU should measure the battery supply voltages to an accuracy of 0.05 V at a rate of up to 100 Hz.

### **6.7 Sensor Types**

The PRODUCT SUPPLIER shall provide a list of sensor types which are fully compatible with its ECU. Nevertheless, for cost reduction reasons, COMPETITORS may be allowed to use other makes or types of OEM sensors. These should be compatible with the ECU. After presentation of their characteristics, the PRODUCT SUPPLIER shall give its agreement.

In case of malfunction, the PRODUCT SUPPLIER has the right to oblige the COMPETITOR to use a sensor from the above-mentioned approved list.

## 6.8 ECU Software Functionalities

The software running in the ECU must propose a strategy for all functions below and any function regulated by the technical and sporting regulations. These strategies are expected to be at a good motor racing level, and the PRODUCT SUPPLIER shall demonstrate that these strategies are already used in high-level championships. All strategies must allow a good level of versatility by delivering setup mapping and avoiding hardcoded values as far as possible. Also, a strong auto diagnostic strategy must be present for each functionality in order to make the system robust, managing small issues autonomously.

The software must also deliver status to simplify operating in race conditions.

The target is to have previously validated software rather than proposing complex strategies.

The ECU software must provide the following, but not exclusively:

Engine Management:

- Ignition control (advance, dwell, etc.)
- Injection control (multi injection, phase, etc.)
- HP rail pressure control (PID, volume injected, etc.)
- Electric throttle control
- Rpm cranking and synchro (2 crank + 2 cam), engine start up
- Limiter control (soft, hard, engine kill, etc.)
- Torque model (pseudo model accepted): all demands are torque demands (driver, TC, gearbox, etc.)
- Lambda control (closed loop, etc.)
- Knock control (per cyl, ignition red, noise detection, knock level detection, etc.)
- Sensor diagnostic and fail mode
- Actuator diagnostic and fail mode
- Ancillary control (lift pump, HP pump, etc.)
- Logbook with engine trip values (TBD with engine supplier)
- Engine hour counter (TBD with engine supplier)
- Any functionalities that the PRODUCT SUPPLIER would like to propose

Chassis Management:

- Gearshift control (engine torque reduction, gearshift actuators, etc.)
- Gear actuator power circuit control (pneumatic, hydraulic, electric, etc.)
- Traction control (multi position, gain, slip rate, etc.)
- Pit lane limiter
- Slow Zone and Full Course Yellow limiters
- Ancillary control (wipers, lights, starter, alternator, etc.)
- Power box control (over current, short circuit, diagnostic, fail mode, etc.)
- Switch panel control
- Dashboard control (pots, switches, LEDS, screen, alarms, etc.)
- Sensor diagnostic and fail mode
- Actuator diagnostic and fail mode
- Logbook with chassis trip values (TBD with chassis suppliers: 1 version for all)
- Chassis hour counter (TBD with chassis suppliers: 1 version for all)
- Any functionalities that the PRODUCT SUPPLIER would like to propose

System Management:

- CAN lines control
- Ethernet lines control
- RS232 line

## **6.9 Software upgrade during the tender period**

Only evolutions linked to a change of technical or sporting regulations during the tender period will have to be covered by the tender.

Software bug need to be covered by the PRODUCT SUPPLIER, and fix for the next event after it was discovered.

PRODUCT SUPPLIER will have to manage ECUs software update for all championships free of charge. Nobody else than PRODUCT SUPPLIER should be able to modify ECUs softwares.

## **6.10 Communications interfaces**

### **6.10.1 Pit System**

A connection to the off-car server PC is provided by a 100BaseT link running a TCP/IP based protocol. This link is primarily used for the following purposes:

- Transfer of set-up and calibration parameters to any component of the package.
- Offload of logged data.
- Operating diagnostic, calibration and configuration modes of the control systems.

Standard PC tools will be required as part of the supplied system to perform these functions.

### **6.10.2 CAN Lines**

Baudrate: 1 Mbit/s

The ECU must provide at least 4 CAN lines that will be as follows:

- CAN 1: connection to FIA/ACO logger
- CAN 2 / 3: connection to system components
- CAN 4: connection to optional telemetry

### **6.10.3 RS232 line**

The ECU must provide 1 RS232 line.

This line will be used to send data to the radio telemetry modem.

### **6.10.4 Motor detection system**

The package must include a system that allows the ECU to know which engine it is speaking to. This device must be sealed on the engine and must send back its serial number to the engine.

## **7. DATA ACQUISITION SYSTEM**

A logger must be included in the package. This logger will be able to manage different levels of licence in order to create a logging table:

- FIA/ACO level: access to all
- Engine manufacturer level: can lock and/or hide channels from other profiles
- Chassis manufacturer level: can lock and/or hide channels from other profiles
- Teams level: can access channels allowed by engine and chassis profiles.

Those same levels will be duplicated for the PC analysis tool.



#### Logger Specifications:

- Disc size: minimum 1 Gb
- Sampling rate: minimum up to 1 kHz
- Log channels: minimum 250
- Multi frequency triggering: change acquisition sampling on event
- Data rate supported: minimum 64 Kbits/s
- External memory: the PRODUCT SUPPLIER must provide mirroring of the logger memory available on an extractible memory support (USB stick, compact flash card etc.)
- Manage lap beacon by sensor or CAN message.

Downloading of the data must be done through high-speed data bus. The upload data rate should be over 10 Mbits/s effective rate.

## 8. POWER BOX

#### Specifications:

Spec	Values	Number	Comments
Battery voltage	30 V max , 6.5 V min		
Total output current	120 A continuous		
Operating Temperature	100 °C		
CAN lines	1 Mbit	minimum 2	
High power outputs	>= 20 A	>=8	Over current configurable, short circuit and overload protection
Low power outputs	>= 6 A	>= 20	Over current configurable, Short circuit and overload protection
digital inputs	Pull up	>= 10	

#### Extra features:

- Reverse battery protection
- Load dump transient protection
- Internal sensors:
  - Internal temperature
  - Power supply voltage
  - Current sensor for each output

CAN protocol: receive command from ECU, send back status voltage, current and diagnostic for each output and internal sensors and states of the power box.

The logic to command output can be either in the ECU (preferred) or inside the power box but must have a protection system to avoid access to any configuration.

## 9. SWITCH PANEL

This is the main switch interface with the driver. It allows activation of ancillaries and controls some strategy levels, in particular it controls MAIN and IGN switches. The panel should be easy to configure and allow different setups.

Typical usage as an example, but not exclusively:

- MAIN Switch (12 V)
- Ignition Switch
- Starter
- Wiper
- Head light
- Turn light
- Fuel pump
- Defrost
- Page up
- Page down
- Diming
- ...

Specifications:

The panel should propose a minimum of 15 switches.

For each switch, there must be a minimum of 2 status LEDS per switch. These could be multi-coloured.

Switches must be backlit with intensity control.

Switching conditions should be configurable (momentary or latch etc.)

CAN bus connection at 1 Mbit

Labels and icons of switches must be adaptable to any application.

## 10. STEERING WHEEL DASH AND BOARD

### 10.1 Screen and electronics

The target is to propose equipment that can be easily integrated in a steering wheel. This equipment should be as a maximum a screen and an electronic board allowing all inputs (switches, pot, etc.) to be connected directly to the steering wheel electronics and sent by CAN to the main system.

Typical inputs as an example, but not exclusively:

- Engine pot
- Gearbox pot
- TC rate pot
- TC gain pot
- PTT (Radio)
- Drink
- Wiper
- Kill engine
- Neutral
- Start engine
- Pit limiter
- Wiper

- Headlight flash
- FCY limiter
- Diming
- Page UP
- Page DN
- ...

**Hardware Specifications:**

- Must be colour display with full configurable display layout
- Brightness control depending on daylight
- CAN bus 1 Mbit
- Analogue inputs:                   minimum 6
- Digital inputs:                    minimum 15
- RPM limiter LED:                 minimum 8

**10.2 Full steering wheel (optional)**

An option delivering a complete, fully equipped steering wheel (including carbon steering wheel, quick release connection, etc.) should be proposed in the price list.

**11. MICROCONTROLLER**

In order to provide sufficient space for further development:

- All microprocessors not to be loaded to their maximum when running the software strategies defined as specified by the FIA, with CAN buses typically loaded and Ethernet and logging active. Control must be able to run whilst data upload is being performed.
- Main software code storage, map storage and workspace RAM not to be fully used when running the software strategies as specified by the FIA.

All code images including control applications, operating systems, drivers and logic gate array devices are programmable by external connection to the ECU with a means of verifying all of the code images programmed. This link has to be provided with security to prevent unwanted reprogramming.

**12. PC TOOLS**

The complete package must be delivered with all the PC tools needed to configure and operate all components of the package.

As much as possible, all units should be configured by a minimum of communication lines, meaning that being connected to 1 bus line in the car will allow the user to configure and supervise all components of the package.

The PRODUCT SUPPLIER should supply to the FIA/ACO all the necessary tools (unlimited number free of charge) to be able to upload the configuration of each box (ECU, power box ...).

## **13. MANUFACTURE, TESTING AND SERVICING**

### **12.1 Service Interval**

Minimum 24 months.

### **12.2 Design Life Period**

Four racing seasons, subject to servicing at specified intervals and use within operating limits.

### **12.3 Quality Systems**

The ECU is designed, manufactured and tested by an organisation operating a quality management system that is accredited with ISO9001 or equivalent.

### **12.4 Project Management**

The product supplier must designate one senior technical engineer as the technical leader of the project. He/she will be the entry point of any technical matters concerning the project. The product supplier must designate one senior commercial leader who will be the entry point for any commercial matters concerning the project.

### **12.5 Support**

This tender includes in the package price, under normal conditions:

Support available in Europe and the US as a mandatory condition. Having a US office is highly desirable.

Unlimited helpdesk assistance to engine and chassis manufacturers during open business days and working hours within a reasonable delay response (max 48 to 72 h).

Any days needed in case software update to be done at track or facilities.

Engine manufacturer support: 5 days at dyno or track.

Chassis manufacturer support: 5 days at the chassis facility or track per chassis manufacturer.

Free extra days can be allocated by the FIA/ACO if they considers these days necessary due to a problem with a component of the electronic system.

Any test days over this limit and not linked to any consideration mentioned above will be charged to the engine or chassis manufacturer. Teams cannot ask for any specific support.

On-track support included in the tender: three track days each year per championship (for example: Prologue test + Le Mans test day) + first race of the first year of each championship.

### **12.6 On Track Spare Parts**

One complete electronic kit to be in deposit sale per chassis constructor. Charged only when sold.

One complete electronic kit per championship deposited with the engine supplier to be used as test kit to check if teams' parts are working. The parts do not need to be new.

### **12.7 FIA/ACO bench kit**

One complete electronic kit to be provided to the FIA/ACO for bench testing purpose. Free of charge.

All the necessary bench test looms must be provided to the FIA/ACO free of charge. The bench test loom should allow the FIA/ACO to test any functionality. Update of these looms free of charge.

#### **14. REFERENCES**

References in Europe and in USA (teams or manufacturers), which the FIA could contact in order to obtain feedback on the systems proposed, would be appreciated.