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 objective of the FIA is to select an exclusive supplier of **electronic control units** (ECUs), whose task it will be to ensure the production and delivery of the ECUs to the competitors entered into the 2018, 2019, 2020 and 2021 seasons of the FIA European Rallycross Championship.

Interested parties are hereby invited to tender to become the exclusive supplier of ECUs to the competitors of the above mentioned Championships.

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 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:	23 May 2017
Tender submission date:	3 July 2017
Opening date:	4 July 2017
Notification of decision as to selection:	25 July 2017

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

IN THE 2018, 2019, 2020 AND 2021 SEASONS OF THE FIA EUROPEAN RALLYCROSS 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 CHAMPIONSHIP 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 CHAMPIONSHIP 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 CHAMPIONSHIP and the PROVIDER hereby accepts this appointment and agrees to supply the PRODUCT to the COMPETITORS for the CHAMPIONSHIP 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 CHAMPIONSHIP 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

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 shall be present on the first dyno testing for PFI engine, and first dyno testing for GDI engine.

1.4 The PROVIDER shall be present on the first 3 official events (OFFICIAL TESTING or COMPETITION) of the first CHAMPIONSHIP season of each category. The COMPETITORS alone shall be responsible for the spare parts on track.

1.5 The PROVIDER shall supply three spare PRODUCTS free of charge to the FIA for every COMPETITION.

1.6 If the FIA decided to grant one of the spare PRODUCTS to a COMPETITOR, the COMPETITOR would be required to pay it directly to the PROVIDER.

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 1 September 2017 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 15 September 2017 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 COMPETITOR for testing on 1 October 2017 at the latest.

2.4 The PROVIDER shall make available the PRODUCT for private testing to all the potential COMPETITORS on 30 October 2017 at the latest.

2.5 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).

2.6 The PROVIDER shall ensure all necessary technical support on the COMPETITIONS as described in the TECHNICAL SPECIFICATIONS.

2.7 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.

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. The price shall not exceed 1500 euros.

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 **CHAMPIONSHIP** means:

- the 2018, 2019 and 2020 seasons of the Super 1600 category the FIA European Rallycross Championship and;
- the 2019, 2020 and 2021 seasons of the Touring Car category of the FIA European Rallycross Championship, subject to the FIA confirming its running in 2019, 2020 and 2021.

1.2 **COMPETITORS** means the racing teams that have been accepted to take part in the CHAMPIONSHIP.

1.3 **CONTRACT** means the GENERAL CONDITIONS, the SPECIAL CONDITIONS and the DEFINITIONS.

1.4 **DEFINITIONS** means the definitions set out in this Part 3 of the CONTRACT.

1.5 **COMPETITION** means any race forming part of the CHAMPIONSHIP. 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.

1.6 **FIA** means the Fédération Internationale de l'Automobile (FIA).

1.7 **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.

1.8 **GENERAL CONDITIONS** means the provisions contained in Part 1 of the CONTRACT.

1.9 **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 CHAMPIONSHIP.

1.10 **OFFICIAL TESTING** means official testing as described in the SPORTING and/or TECHNCIAL REGULATIONS of the CHAMPIONSHIP.

1.11 **PRICING FORM** means the pricing form stating the prices at which the PRODUCT will be supplied (see Appendix I).

1.12 **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.

1.13 **PRODUCT** means the Electronic Control Unit as such term is described in the SPORTING REGULATIONS, the TECHNICAL REGULATIONS and TECHNICAL SPECIFICATIONS of the CHAMPIONSHIP.

1.14 **PROVIDER** means the electronic control unit packages supplier which tenders and, after selection by the FIA, enters into the CONTRACT.

1.15 **PRODUCTION SITE** means the factory that will produce the PRODUCT supplied pursuant to the CONTRACT.

1.16 **SPECIAL CONDITIONS** means the provisions contained in Part 2 of the CONTRACT.

1.17 **SPORTING REGULATIONS** means the Sporting Regulations applicable to the CHAMPIONSHIP. The Sporting Regulations are available on the FIA website www.fia.com.

1.18 **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.

1.19 **TECHNICAL REGULATIONS** means the Technical Regulations applicable to the CHAMPIONSHIP. The Technical Regulations are available on the FIA website www.fia.com.

1.20 **TECHNICAL SPECIFICATIONS** means the PRODUCT's requirements (see Appendix II).

Signed:

On behalf of the FIA	On behalf of the PROVIDER
In his/her capacity as	In his/her capacity as
In	In
On	On

APPENDICES

I - PRICING FORM

II – TECHNICAL SPECIFICATIONS

APPENDIX I

PRICING FORM

Prices will stay the same throughout the period of the tender, without any modification.

Prices must be given in euros. If the selected PRODUCT SUPPLIER is not in the Eurozone, the exchange rate will be defined when the ECU manufacturer is selected and a fixed price in the manufacturer's currency will be defined for the full duration of the tender.

Equipment	**euros**	
Proposal 1: ECU compatible to drive GDI engine directly		
Full kit RX S1600/TC FIA (ECU, mating connectors, licence)		
ECU RX S1600/TC FIA only		
ECU RX S1600/TC FIA mating connectors only		
Proposal 2: ECU not compatible to drive GDI engine directly (external box needed)		
Full kit RX S1600/TC FIA (ECU, mating connectors, licence)		
ECU RX S1600/TC FIA only		
ECU RX S1600/TC FIA mating connectors only		
Optional (recommended)		
External GDI engine driving box (injectors + fuel pump)		
Support and service		
Extra Licence		
Support days for COMPETITORS		
Extra support days for CHAMPIONSHIPS on FIA request		

APPENDIX II

TECHNICAL SPECIFICATIONS

FIA ECU Requirement – RX S1600 / TC
Specification

1. INTRODUCTION

For 2018 the FIA is introducing a standard Electronic Control Unit (ECU) for FIA European Rallycross Championship Super 1600 cars with the aims of allowing the FIA to check engine use and car performances. The standard ECU will control the engine only, no other electronic controls being allowed.
The same standard ECU will be deployed from 2019 for the TC cars (Touring Car) entered in the FIA European Rallycross Championship.
This tender is a four-year contract, running from 2018 to 2021 (contract from 2018 to 2020 for Super 1600 cars, contract from 2019 to 2021 for TC cars).

The aim of this standard ECU is to deliver all the functionalities needed for an RX application at a low cost. It also serves to inhibit extra development in some technical areas and equalise the performance of the cars on the engine electronic control side.

All parts of the system must be designed to ensure that the system will effectively prevent the use of driver aids, including but not limited to traction control, and also designed to match the following requirements:

- There will be only one FIA-approved software version, which cannot be changed by the COMPETITORS.
- The FIA is in possession of a foolproof means of ensuring that all software contained within the units is identical to that validated and approved for use.
- Each unit will have a unique serial number, marked externally, and will be sealed and have its identity tracked throughout its entire life cycle.
- Each unit must have suitable provision to allow it to be sealed in order to prevent tampering.

Main technical specifications of FIA RX Super 1600 / TC championship cars:

- Engine:
  - Max 4 cylinders NA, with reciprocating piston or rotary piston covered by NSU-Wankel patents
  - Drive-by-wire throttle is forbidden
  - Variable valve timing is forbidden
  - Gasoline Direct Injection or Port Injection (max 4 injectors)
- Chassis:
  - 2 WD (front for Super 1600, rear for TC)
  - No wheel speed sensors allowed
  - No GPS allowed
  - No gearbox position sensor allowed
  - Manual sequential gearbox with load cell or switch sensor for engine cut

Main dates of the project:

- 2018 first race April 2018
- Final software delivery January 2018

- ECU available and ready to send to the COMPETITORS October 2017

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 will arbitrate.

2. MECHANICAL

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

To be defined by the PRODUCT SUPPLIER.

2.4 Connectors

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

The mating connectors to those of the ECU are included in the price of the ECU.

2.5 Installation

2.5.1 Heat sink

The unit must be designed to ensure necessary cooling when 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 housing.

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

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 common 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

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[1].

4.2 Supply Protection

Indefinite voltage reverse protection.

5. CONNECTIONS

USB or Ethernet connection to be able to set up the box and/or download the data.
A common specification connector must be defined to ensure that the FIA can connect on all cars to check the software and mapping or to download data.

At least one CAN line to allow connection to an external logging system, dashboard, power box, etc.

RF connection forbidden.

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 cannot receive orders from an external box to change engine performance or behaviour.
The ECU is in charge of managing all the sensors and actuators linked to the engine control.
All sensors must be directly wired to the ECU, without the need to add an extension box.
All software strategies will be running in this unit; all competitors must run with only one mandatory version of the software, which must be compatible with all different engine configurations.
The ECU must include data logging functionalities.

For GDI engines, the ECU must be able to manage injectors and fuel pump directly or through an external box.

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

If need be, the external driver box will not be part of this tender and it will be up to each competitor to select the box of his choice compatible with the standard ECU. Nevertheless, the PRODUCT SUPPLIER may propose it as an option.

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

6.4 Control System Input/Output Type Summary

Inputs		
	Single ended 5 V (10 bits)	**>= 8**
	Variable reluctance and/or Hall effect (software configurable)	**>= 3**
	NTC and/or PT1000 (software configurable)	**>= 4**
	Tck	**>= 0**
	Lambda probe (with heater)	**>= 1**
	Knock sensor	**>= 1**
	Digital ON/OFF	**>= 4**
	Lap trigger beacon	**1**
Outputs		
	PFI injectors	**>= 4**
	Ignition coils	**>= 4**
	Low side PWM	**>= 2**
	Digital output	**>= 2**
	Lambda heater	**>= 1**
	5 V supply for sensors	**>= 2**

6.5 Input/Output Specific Characteristics

6.5.1 Analogue Inputs

6.5.1.1 Type 1: 0-5 Volt

- Minimum resolution: 10 bit
- Maximum sample rate: 1 kHz

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: 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.

6.5.2.2 Type 2: 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.

6.5.2.3 Type 3: Switch Line

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

6.5.3 Digital Outputs

- Low or high side drive
- Maximum output frequency: 10 Hz
- Maximum output 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

6.5.5 Injector Drives

The ECU should be capable of driving PFI injectors as well as GDI injectors. This can be done either via the same outputs (software selectable type), or via dedicated outputs, or possibly via an external driver box.

For common PFI injectors, the characteristics shall be the following:

- Peak, Sustain and Hold with configurable peak and hold currents, sustain and hold times.
- Short and open-circuit fault detection on a per drive basis.
- Injector current monitor on a per drive basis.

The PRODUCT SUPPLIER shall provide a list of injector 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 injectors. These must be compatible with the ECU. After presentation of their characteristics, the PRODUCT SUPPLIER shall give its agreement. The ECU must be compatible with the majority of OEM injectors coming from different brands. If the FIA feels that the injector must be compatible because of its common based characteristics, it can ask the PRODUCT SUPPLIER to fulfil compatibility with this type of injectors.
In case of proved malfunction, the PRODUCT SUPPLIER has the right to oblige the COMPETITOR to use an injector from the above-mentioned approved list, in accordance with approval by the FIA.

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

6.5.8 Knock Sensor Inputs

The ECU shall provide at least 1 piezoelectric type knock sensor input.

6.6 Internal Sensors

The ECU shall include the following internal sensors:

6.6.1 Temperatures

The ECU shall measure its core electronics temperature. This sensor shall be accurate to ±3 °C over the range -20 °C to 120 °C.

6.6.2 Supply Voltage

The ECU shall 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 must 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 mentioned 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 mid-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 FIA shall approve the software and reserve the right to ask the PRODUCT SUPPLIER to add modifications to comply with the current technical regulations. All such modifications requested by the FIA shall be carried out free of charge and are unlimited in number.
The ECU software must provide the following, but not exclusively:

Engine Management:

- Ignition control (advance, dwell, etc.)
- Injection control (multi-injection, phase, etc.)
- Rpm cranking and synchro (1 crank + 1 cam), engine start up
- Limiter control (soft, hard, engine kill, 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, water fan, etc.)
- Gear cut control
- Start line control: RPM limiter
- Any other functionalities that the PRODUCT SUPPLIER would like to propose

Strategy not allowed:

- Traction control
- Antijerk
- Any other driving aids

System Management:

- CAN lines control
- Ethernet lines control

6.9 Software upgrade during the tender period

Only evolutions linked to a change of technical or sporting regulations during the tender period must be covered by the tender.
Any software bug needs to be covered by the PRODUCT SUPPLIER, and fixed for the next event after it was discovered. Determination of an issue as a bug is at the FIA's discretion.
The PRODUCT SUPPLIER must manage the ECUs software update for all championships free of charge. Nobody other than the PRODUCT SUPPLIER should be able to modify the ECUs software.

6.10 Communications interfaces

6.10.1 Pit System

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

- Transfer of setup 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

Baud rate: maximum 1 Mbit/s
The ECU must provide at least 1 CAN line specification 2.0B.
The configuration of the CAN line must be programmable, and all basic channels must be able to be sent by CAN for dashboard/logging usage (RPM, throttle, engine temperatures, alarms, etc.). List of channels available at the FIA's discretion.

7. DATA ACQUISITION SYSTEM

A logger must be included in the package.
Full access to the data must be provided to the FIA.

8. 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 must be provided with security to prevent unwanted reprogramming.

9. PC TOOLS

The complete package must be delivered with all the PC tools needed to configure and operate all components of the package. If the software includes a licensing system, one free licence must be provided per ECU unit.

PC tools need to be compatible with a Windows operating system, from Windows XP to Windows 10.

The PRODUCT SUPPLIER shall supply to the FIA all the necessary tools (unlimited number free of charge) in order to be able to upload the configuration (software, mapping, data) of the ECU. 1 communication loom per championship must be provided to the FIA free of charge. Any additional loom requested by the FIA must be provided free of charge.

A specific PC software must be provided to the FIA in order to be able to check that only the homologated software is running on the ECU. This tool must be easy to use and give an OK/NOK for the final check.
The binary upload from the ECU to perform the check must be archived on the computer in order to be able to carry out further analysis in case of NOK final result.
This control must be able to be done in 1 min. maximum per car.

10. MANUFACTURE, TESTING AND SERVICING

10.1 Service Interval
No servicing requirement.

10.2 Design Life Period
Five racing seasons, subject to servicing at specified intervals and use within operating limits.

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

10.4 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 for 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.

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

Support available in Europe as a mandatory condition.

Unlimited helpdesk assistance to competitors during open business days and working hours within a reasonable delay response (max 48 to 72 h). A website support must be provided (forum or any other web service).

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

1st dyno test for PFI engine: 2 support days.
1st dyno test for GDI engine: 2 support days.
1st season in Super 1600: On-track support must be provided free of charge for the first 3 events.
1st season in TC: On-track support must be provided free of charge for the first 3 events.

Free extra days can be allocated by the FIA if it 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 COMPETITORS.

10.6 On-Track Spare Parts

3 spare ECUs to be held by the FIA at any time. Charged only when sold.

10.7 FIA bench kit

One complete electronic kit (ECU + bench loom + PC software) to be provided to the FIA for the purpose of bench testing. Free of charge.

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

11. REFERENCES

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