

PROCEEDINGS OF THE PRE-BID CONFERENCE HELD ON 19TH DEC 2019 AT FMCD CONFERENCE HALL, CSIR-NAL, TOWARDS PROCUREMENT OF REAL TIME SIMULATOR FOR SYSTEM INTEGRATION FACILITY (SARAS MK2).

The Pre-bid Conference was held and the following T&PC members attended the meeting: -

Sl. No.	Name & Designation		Role
1	Dr. M. Manjuprasad	Chief Scientist, STTD	Chairman
2	Dr. Jatinder Singh	Chief Scientist/Head, FMCD	Member
3	Dr. Giresh Kumar Singh	Sr.Principal Scientist, FMCD	Member
4	Dr. C.M. Ananda	Chief Scientist/Head, ALD	Member
5	Mr. Dilip Kumar Sahu,	Sr. Technical Officer-2, CAD	Member
6	Mr. A. Muthukumar	Sr. Scientist, CAD	Member
7	Dr. C. Kamali	Principal Scientist, FMCD	Member
8	Dr. Abhay Pashilkar	Chief Scientist, FMCD	Member
9	Mr. K. P. Srikanth	Sr.Principal Scientist, FMCD	Member - Convener (T&SC)
10	AO or his representative		Member
11	FAO or his representative		Member
12	CoSP/SPO or his representative		Member - Convener (T&PC)


The list of Prospective bidders who attended the Pre-bid Conference is as per **Annexure-I**.

At the outset, the Chairman welcomed all the Members and the representatives of the Bidders and briefed in general the scope of the Project and thereafter requested **SPO** to brief the Bidders on the salient features of the commercial terms. The Indenting Officer to read out the clarification sought by the bidders and the replied thereto as detailed in **Annexure-II (Part A: Technical Clarification and Part B: Commercial Clarification, if any)**.

The representatives present were satisfied with the replies given and it was informed that the corrections / additions / clarifications given, as discussed during the Pre-Bid Conference would be hosted on the website of CSIR-NAL and all prospective bidders are required to take cognizance of the proceedings of the Pre-Bid Conference before formulating and submitting their bids as stipulated in bidding Documents.

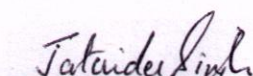
The meeting ended with a vote of thanks to the Chair.

Encl: as above.



CoSP/SPO-Member
Convenor -T&PC
19.12.19



FAO-Member


Admin-Member
25.12.19



Dr. Jatinder Singh
Member

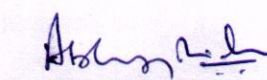

Dr. Giresh Kumar Singh
Member

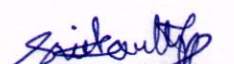

Dr. C.M. Ananda
Member
19/12/19



A. Muthukumar
Member
02/01/2020


Dilip Kumar Sahu,
Member


Dr. C. Kamali
Member


Dr. Abhay Pashilkar
Member


K. P. Srikanth
Member


Dr. M. Manjuprasad
Chairman
19/12

**CSIR-NATIONAL AEROSPACE LABORATORIES
BENGALURU - 560 017**

TENDER NO.: NAL/PUR/CAD/310/19-Z


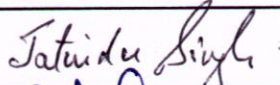




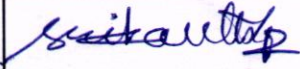
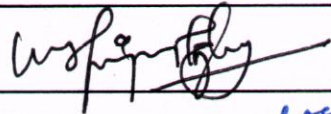


ANNEXURE - I

DATE & TIME : 19-12-2019 @ 10:30 AM

VENUE: FMCD Conference Hall, CSIR-NAL, HAL Airport Road, Kodihalli, Bengaluru-560017

Pre-Bid Conference for Procurement of Real Time Simulator for System Integration Facility (SARAS MK2)

ATTENDANCE SHEET - T&PC MEMBERS

Sr. No.	Name		Signature
1	Dr. M. Manjuprasad, Chief Scientist, STTD	Chairman	
2	Dr. Jatinder Singh, Chief Scientist/Head, FMCD	Member	
3	Dr. Giresh Kumar Singh, Sr.Principal Scientist, FMCD	Member	
4	Dr. C.M.Ananda, Chief Scientist/Head, ALD	Member	
5	Mr. Dilip Kumar Sahu, Sr.Technical Officer-2, CAD	Member	—
6	Mr. A. Muthukumar, Sr.Scientist, CAD	Member	—
7	Dr. C. Kamali, Principal Scientist, FMCD	Member	
8	Dr. Abhay Pashilkar, Chief Scientist, FMCD	Member	
9	Mr. K. P. Srikanth, Sr.Principal Scientist, FMCD	Member- Convenor -TSC	
10	FAO or his representative	Member	
11	AO or his representative	Member	 28/12/19
12	CoSP/SPO or his representative	Member- Convenor T&PC	 19.12.19

NATIONAL AEROSPACE LABORATORIES
BENGALURU - 560 017

TENDER NO.: NAL/PUR/CAD/310/19-Z

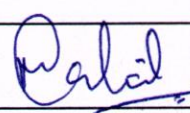
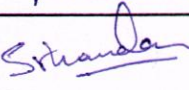
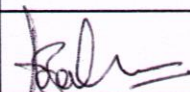



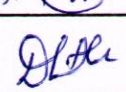

DATE & TIME : 19-12-2019 @ 10:30 AM

VENUE: FMCD Conference Hall, CSIR-NAL, HAL Airport Road, Kodihalli, Bengaluru-560017

ANNEXURE - I

Pre-Bid Conference for Procurement of Real Time Simulator for System Integration Facility (SARAS MK2)

ATTENDANCE SHEET - PROSPECTIVE BIDDERS

Sr. No.	Name of the Firm	Name & Designation of Representative	E-tender Registration (Yes/No)	Email ID	Signature
1	Trident Infosol	MOHIT NAIGAONKAR	Yes	mohit.n@tridentinfosol.co.in	
2	"	Spoorthi Raj	"	spoorthi.n@tridentinfosol.co.in	Spoorthi Raj
3	"	Shreenandan R	"	Shreenandan.r@tridentinfosol.com	
4	OPAL-RT	ABDUL ZAHIR	"	abdul.zahir@opal-rt.com	
5	DILabs	Sunil Kumar V	Yes	SUNIL@Dilabs.in	
6	Altair/Ess	Bhooshan Iyer	Yes	bhooshan.iyer@embeddedindia.com	
7	Capronics Systems Pvt Ltd	Hariprasad R	Yes	hariprasad@capronicsystems.com	
8	"	Senthil Kumaran D	"	Senthil@capronicsystems.com	
9	NATIONAL INSTRUMENTS	VINEET THAPLIYAL	Yes	vinet.thapliyal@ni.com	
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**CSIR-NATIONAL AEROSPACE LABORATORIES
BENGALURU**

TECHNICAL QUERIES & CLARIFICATION

Tender No. : NAL/PUR/CAD/310/19-Z

Item Description : Procurement of Real Time Simulator for System Integration Facility
(SARAS Mk2)

Sr. No.	Query / Clarification Sought	Clarification/Amendment
1	<p>Query on software version to be changed to version 2018 and above in section 4.2</p> <p><u>Detailed Specifications</u> The project aims to develop a system integration facility for SARAS Mk2 design and development. A six degrees of freedom flight dynamics model needs to be run on a real time simulator/environment. The six DoF model will be completely implemented using Model Based Development (MBD) tools such as Mathworks-Matlab (Version 2019 and above)/Simulink and Altair-Compose/Activate (Version 2019 and above) and legacy codes in C and FORTRAN.</p>	<p><u>Detailed Specifications</u> The project aims to develop a system integration facility for SARAS Mk2 design and development. A six degrees of freedom flight dynamics model needs to be run on a real time simulator/environment. The six DoF model will be completely implemented using Model Based Development (MBD) tools such as Mathworks-Matlab (Version 2018 and above)/Simulink and Altair-Compose/Activate (Version 2018 and above) and legacy codes in C and FORTRAN.</p>
2	<p>Query on GUI – Section 4.2</p> <p>c) A GUI to control the various IO channels, and as well as the simulation such as start, stop, pause, continue, inject faults and failures.</p>	<p>c) A GUI to perform the following:</p> <ol style="list-style-type: none"> 1) Simulation start, stop, pause, continue 2) Record data in the form of file 3) Plotting the simulation trajectories, displays/dials for observing/entering numerical inputs. 4) Injecting winds when the simulation is running 5) Creating engine failure when the simulation is running. 6) Changing some of the aircraft parameters when the simulation is running. 7) Injecting various failures to various LRU's. 8) Controlling the various IO channels. <p>This GUI can be in the host PC.</p>

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Sr. No.	Query / Clarification Sought	Clarification/Amendment
		In addition to this GUI, One GUI in the target PC (RTOS) is required to control the various IO channels for performing static testing. This is a requirement by Avionics team
3.	Query on software version – Section 4.2 h) The RT target should be compatible to a host PC where all the model development work will happen. The host PC will be with windows 10 OS and with a MATLAB Version 2019 and above.	h) The RT target should be compatible to a host PC where all the model development work will happen. The host PC will be with windows 10 OS and with a MATLAB/Simulink Version 2018 and above and Compose/Activate Version 2018 and above.
4.	Query on software version Other main specifications to be met as a part of the project scope are: a) The mandatory requirement is that the processing node capability should be able to run Model Based Development (MBD) architecture using at least: • Simulink • Altair-Activate	a) The mandatory requirement is that the processing node capability should be able to run Model Based Development (MBD) architecture using at least one of the following: • Simulink (2018 and above) • Altair-Activate (2018 and above)
5.	Query on technical support (e) Technical support from the vendor for the entire duration of the project (At least 1 year after commissioning of the simulator).	e) One Engineer from the vendor company to be deputed at NAL for providing technical support for at least 1 year after commissioning of the simulator.
6.	Query on Real Time Execution time Note: Real Time: Execution time form minimum of 6.25ms to 12.5ms.	Note: Real Time: Execution time/Integration step size should be minimum of 1ms or less.
7.	Query on ATP 4.4.3 Installation, Commissioning and Acceptance Test The acceptance tests at the final destination include the following: c) ATP for loop back tests of all the	c) • Loop back tests for all the communication protocols (Static tests) • Verification of functionalities of host GUI as presented in the clarification/Amendment (S.No 2). • Verification of communication protocols when the flight model is running on the target. (Dynamic tests)

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Sr. No.	Query / Clarification Sought	Clarification/Amendment												
	I/O, Showing that the processor over load is within prescribed limits, Latency with all the IOs are within acceptable values.	<ul style="list-style-type: none"> Engineer will fly the simulator, by giving some doublet inputs to pitch, roll and yaw axis. The responses in the form of various protocols will be logged including pilot inputs. The same inputs will be given to the offline simulation and the output of offline simulation should be matched with recorded real time simulation trajectories. In this process we will verify that there no loss of data, no delay and no aliasing/noise effects. Injection of winds. Injection of engine failure. Injection of LRU failures. Injection of parameter fail Aircraft model trimming feature using MATLAB/Altair Compose to be called from host 												
8.	<p>Query on ARINC future expandability and evaluation methods of 818 and AINC 664</p> <p>The following protocol hardware modules are planned to be integrated to the target platform at later part of time for expansion. The Bidder shall propose the solution with the capability to augment the platform later without change in basic platform architecture</p> <table border="1"> <thead> <tr> <th>Sl. No.</th><th>Protocol</th><th>Number of Channels</th></tr> </thead> <tbody> <tr> <td>1.</td><td>ARINC 664 IO</td><td>8</td></tr> <tr> <td>2.</td><td>ARINC 818 IN</td><td>8</td></tr> <tr> <td>3.</td><td>ARINC 818 OUT</td><td>8</td></tr> </tbody> </table>	Sl. No.	Protocol	Number of Channels	1.	ARINC 664 IO	8	2.	ARINC 818 IN	8	3.	ARINC 818 OUT	8	<p>Additional slot has to be provided for future use for ARINC 818 and ARINC 664. ATP of ARINC 818 and ARINC 664 is not scope of the delivery.</p>
Sl. No.	Protocol	Number of Channels												
1.	ARINC 664 IO	8												
2.	ARINC 818 IN	8												
3.	ARINC 818 OUT	8												
9.	<p>Query on Other main specifications to be met as a part of the project scope are: -</p> <p>(e) i</p> <p>GUI shall be provided in the simulation system.</p>	<p>GUI shall be operative both from Target machine and host machine.</p>												
10.	<p>Query on RTOS</p> <p>Any recommendation on RTOS</p>	<p>If RTOS is required, vendor shall provide the suitable one. The license shall be delivered part of the system</p>												
11.	<p>Query on Other main specifications to be met as a part of the project scope are: -</p>	<p>ARINC 818 is not scope of the delivery</p>												

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Sr. No.	Query / Clarification Sought	Clarification/Amendment
	(e)xii GUI shall be capable of configuring, simulating and monitoring ring ARINC 818 protocol standard parameters in real time.	
12.	Query on Other main specifications to be met as a part of the project scope are: - (e)xi GUI shall be capable of configuring, simulating and monitoring ARINC 664 protocol standard parameters in real time.	ARINC 664 is not scope of the delivery
13.	Query on GUI page	GUI Requirement/Specification are added. Refer Appendix A for Avionics Simulation Software specifications related to query on the GUI and its requirements.
14.	Query on cables 3 set clarity required	<p>a. Related to the query on cables, the clarifications are detailed in Figure 1 in this amendment document. Part 1 and part 3 of Figure 1 are the scope of supply of vendor. Vendor shall supply Real Time Target machine including cable harness and connectors.</p> <p>b. Section 2, 4 and 5 are not scope of vendor supply.</p> <p>c. Vendor shall provide the one set of spare connectors with cable from part 1 to part 3 (Note that part 2 is not required).</p> <p>d. Vendor shall provide one set of spare mating D38999 connectors in part 3 of Figure 1.</p>
15.	Query on GUI	<p>Vendor shall configure the system for two GUI applications</p> <p>1) 6DoF requirements</p> <p>2) Avionics Simulation application requirements. The detailed clarification / specifications are provided in Appendix A of this amendment document.</p>
16.	Query on Real Time Target System Daily Operational Readiness Test (DORT) On self-test, load of configuration file etc.	<p>a. Daily Operational Readiness Test (DORT) shall provide GO/NO GO status of the system before the system could be used for simulation activities. DORT shall execute</p> <p>1) Self test to ensure the status of the hardware(PBIT)</p> <p>2) Load configuration files based of</p>

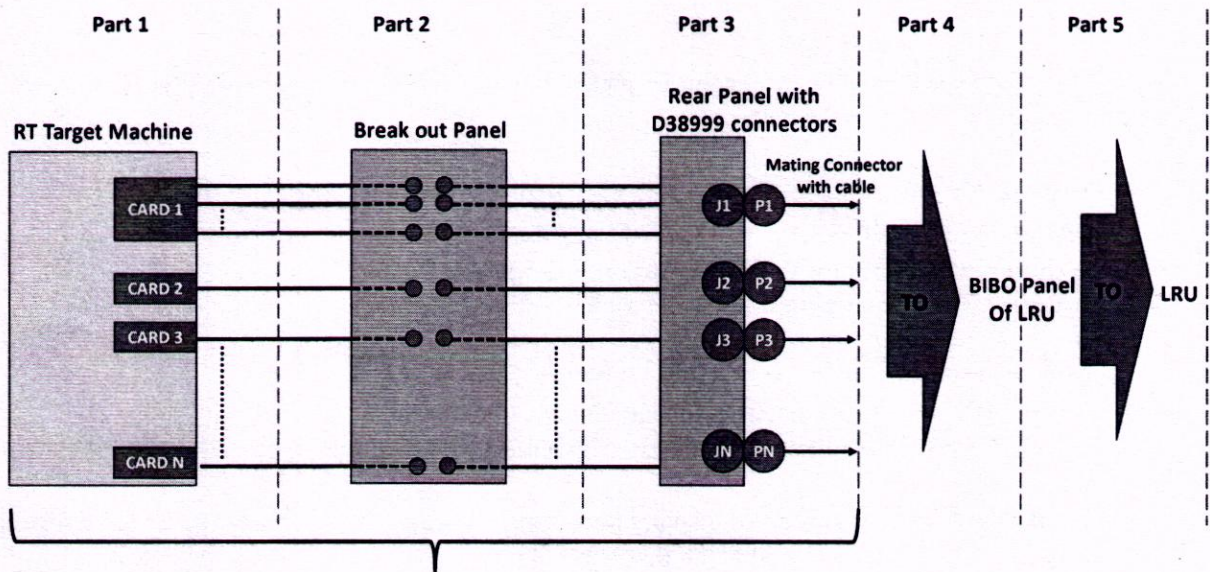
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Sr. No.	Query / Clarification Sought	Clarification/Amendment
		<p>application.</p> <p>b. DORT shall be executed in two modes, i. Auto Mode during Power up and ii. Manual mode after power up on user command using soft button.</p> <p>c. DORT shall test all the hardware and software interfaces before declaring the DORT Status as Go or NO GO.</p>
17.	Detailed requirement and scope of ATP shall be part of the RFQ document	<p>a. Configuration, Simulation and loop back monitoring of ARINC 429 shall be demonstrated in low as well as High speed mode for at least 10 labels in each channel with an update rate of minimum 50 Hz. The results shall be shown in the ARINC 429 analyser</p> <p>b. Configuration, Simulation and loop back monitoring of Analog Input / Analog Out shall be demonstrated.</p> <p>c. Configuration, Simulation and loop back monitoring of Discrete In/Out (G/O) shall be demonstrated.</p> <p>d. Configuration, Simulation and loop back monitoring of Discrete In/Out (28/O) shall be demonstrated.</p> <p>e. Configuration, Simulation and loop back monitoring of RS 232 up to baud rate of maximum of 921600 shall be demonstrated.</p> <p>f. Configuration, Simulation and loop back monitoring of RS 422 shall be demonstrated.</p> <p>g. Configuration, Simulation and loop back monitoring of CAN shall be demonstrated.</p> <p>h. Configuration, Simulation and loop back monitoring of ARINC 717 shall be demonstrated.</p> <p>i. Configuration, Simulation and loop back monitoring of ARINC 708 shall be demonstrated.</p> <p>j. Configuration, Simulation and loop back monitoring of RS 170A shall be demonstrated.</p> <p>k. Configuration, Simulation and loop back monitoring of Taco card shall be demonstrated.</p> <p>l. Configuration, Simulation and loop back</p>

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Sr. No.	Query / Clarification Sought	Clarification/Amendment
		<p>monitoring of Temperature Card (RTD) shall be demonstrated.</p> <p>m. Configuration, Simulation and loop back monitoring of Temperature Card (Thermo-Couple) shall be demonstrated.</p> <p>n. GPS Time synchronisation (IRIG-B) with all parameters of all protocol cards as per Table 1 of NAL RFQ document shall be demonstrated.</p> <p>o. Real time monitoring and storage of all the parameters shall be demonstrated at a minimum sampling of 100 Hz.</p> <p>p. Self-test of the complete system shall be demonstrated as per DORT requirements detailed in SI.No 16 of this amendment document.</p>
18.	Query on GUI monitoring in real time	Real time monitoring requirement is essential requirement for complete system operating in all modes of operation.
19.	Query on Discrete (G/O) Voltage Levels Ground/Open (0 to 3V is GND; >7V is Open) Define the state between 3V and 7V.	Don't care condition (tristate). Also vendor shall refer to the aerospace standards for specific voltage levels.
20.	Query on Taco card specification	The output voltage of the transmitter is from 0V to 21Vac p-p Sine wave signal at 0 to 2000 Hz, load resistance >10 MΩ.
21.	Query on Analog card Resolution: 24bit or 16 bit	NAL suggests to have 16 bit or more
22.	Query on Monitor requirement Armed or rack mounted	Rack mount type monitor (pull and open) arm mounting points may be provided for future use.
23.	Query on Grouping of connector pin for different protocol	Grouping of connectors based on signal types. Each protocol card terminals in one dedicated connector shall be provided. 20% spare pin points shall be provided.
24	Query on Clearance of system and support	<p>Clearance of the system is from Section 1 to section 3 of Figure 1 of this amendment document.</p> <p>However, Vendor shall support for the complete testing and certification clearance of Avionics Integration test Rig.</p> <p>Note: NAL is responsible for certification clearance by CEMILAC after integrating the vendor supplied real time target machine with accessories.</p>

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System Clearance

Figure 1: Top Level Architecture

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Appendix A

Avionics Simulation application requirements

The word System referred in this Appendix shall be considered as combination of software and hardware

General Requirements

1. System shall have an option to STOP/PAUSE/START the simulation.
2. System shall have an option to allow the user to change any data while transmitting
3. System shall have an option to read data from stored file and same shall be transmitted on selected channel.
4. System shall have an option to log the data with time stamp.
5. Logged data shall be in readable format and shall be available at any time.
6. System Time synchronization shall be synchronized with time synchronization source (IRIGB-GPS)
7. System shall have an option to display the selected parameter in text or in graphical format.
8. Data logging sampling rate shall be 6.25 ms or less.
9. Technical support on hardware and software shall be provided till the warranty period expires.

Note : The application software shall be supplied with source code for NAL to modify based on the additional requirement. Vendor shall quote for source code as separate item. NAL will decide to procure the same or not at the time of placing PO.

	Avionics Simulation application
1	ARINC 429
1.1.	System shall simulate ARINC 429 protocol
1.2.	Execution cycle time shall be 1.0ms or less.
1.3.	System shall have an option to change Tx and Rx speed to 100 KHz and 12.5 KHz for all channels independently
1.4.	System shall have an option to change the update rate of the data being transmitted from 1 Hz to minimum of 50 Hz for all labels
1.5.	System shall have an option to change the data type to Binary / BCD / Discrete based on requirement for all labels
1.6.	System shall have an option to enter the data for every labels independently using GUI .
1.7.	System shall have an option to edit the status of each bit in a given label data for error injection or otherwise
1.8.	System shall have an option to inject error(Change SSM to NORMAL, SELF TEST, FAILURE and NCD) at label level independently
1.9.	System shall have an option inject error at bit level(Change the selected bit to either

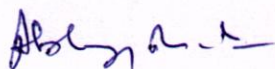
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		0 or 1).
	1.10.	System shall have an option inject error at LRU level either one LRU at a time or all LRUs together.
	1.11.	System shall allow the user to configure units for each parameters in the configuration file or in the application itself.
	1.12.	System shall have an option to load the stored configuration file of ARINC 429 label set based on LRU or application.
	1.13.	System shall have an option to read data from stored file and same shall be transmitted on selected channel independently or all together.
	2.	ARINC 717
	2.1.	System shall simulate ARINC 717 protocol
	2.2.	Execution cycle time shall be in 1.0 ms or less.
	2.3.	System shall have an option to change Words per second (WPS) from 64 to 2048
	2.4.	System shall transmit the data in 1.0 Hz
	2.5.	System shall have an option to enter the data for every word independently using GUI.
	2.6.	System shall have an option to modify each bit of the word independently
	2.7.	System shall have an option to capture data for ARINC 717 frame generation either from static field used for manual entry of data for each parameter or from automatically from simulated output data stream of the system based on the channel mapping.
	2.8.	System shall allow the user to configure units for each parameters in the configuration file or in the application itself.
	3.	ARINC 708
	3.1.	System shall simulate ARINC 708 protocol
	3.2.	Execution cycle time shall be in 1.0ms or less.
	3.3.	System shall have an option to change tilt , gain , status,range etc as per ARINC 708 protocol data
	3.4.	System shall have an option to configure the ARINC 708 data
	3.5.	System shall have an option to edit the data for every bins per sector.
	4.	RS 232
	4.1.	System shall simulate RS 232 protocol
	4.2.	Execution cycle time shall be in 1.0ms or less.
	4.3.	System shall have an option to transmit data in 110,300,2400,4800,9600,19200,38400,57600,115200,230400 ,460800, 921600, Baud rates
	4.4.	System shall have option to configure port data such as bits per second, data bits, parity, stop bits and flow control.
	4.5.	System shall have an option to edit the data for simulation
	4.6.	System shall have an option to read data from stored file and same shall be transmitted on selected channel.
	4.7.	System shall allow the user to select units for each parameters.
	5.	RS 422
	5.1.	System shall simulate RS 422 protocol
	5.2.	Execution cycle time shall be in 1.0ms or less.
	5.3.	System shall have option to configure data rate from 100 Kbps to 3Mbps
	5.4.	System shall have an option to edit the data fro simulation

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6.	Analogue Signals
6.1.	System shall simulate configurable analog voltages from +/-2.5VDC volts to +/-40 VDC (signal conditioning mechanism may be used)
6.2.	Execution cycle time shall be in 1.0ms or less.
6.3.	System shall have an option to configure the sampling frequency and edit voltage for simulation.
6.4.	System shall have a option to change the discrete signals state.
7.	CAN (Controller Area Network)
7.1.	System shall simulate CAN protocol data
7.2.	Execution cycle time shall be in 1.0ms or less.
7.3.	System shall allow the user to define data of ID, Data, Remote frame, Error frame and overload frame.
7.4.	System shall maintain the uniqueness of the ID.
7.5.	System shall allow the user to define data in any frame of the CAN bus.
7.6.	System shall allow the user to select units for each parameters.
8.	Tacho signals
8.1.	System shall simulate TACHO Signals
8.2.	Execution cycle time shall be in 1.0ms or less.
8.3.	System shall allow the user to edit the data at any point of the time.
8.4.	System shall transmit Tacho Signals (AC) as mentioned below. 21 VAC Peak to Peak, 0 to 2000 Hz
9.	RS 170 A
9.1.	System shall simulate RS 170A Signals
9.2.	Execution cycle time shall be in 1.0ms or less.
9.3.	System shall allow the user to change the data at any point of the time.
9.4.	System shall be capable to feed the live RS 170A videos from the camera
10.	Temperature Parameters
10.1.	System shall simulate temperature Signals
10.2.	Execution cycle time shall be in 1.0ms or less.
10.3.	System shall allow the user to edit the data at any point of the time.
11.	Time Synchronization
11.1.	System shall allow the user to monitor the IRIG-B time
11.2.	System shall Sync in realtime with the system time and globally Sync with GPS in defines interval of 1 secs.
11.3.	Sync shall be ensured with atleast with system time in the event of IRIG card failure and GPS no data.

Signature of IO & PL

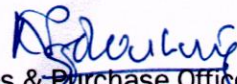


**CSIR-NATIONAL AEROSPACE LABORATORIES
BENGALURU**

COMMERCIAL QUERIES & CLARIFICATION

Tender No. : NAL/PUR/CAD/311/19-Z
Item Description : DESIGN, DEVELOPMENT ASSEMBLY AND INSTALLATION OF VISUAL
PROJECTION.

Tender Clause No	Query / Clarification Sought	Clarification/Amendment
Chapter 4 Clause No.4.8	<u>Delivery of the item:</u> 3 months from the date of PO	<u>Delivery of the item:</u> 6 months from the date of PO


Stores & Purchase Officer
For and on behalf of CSIR

