


Tender ID: 2021_CSIR_68778_1

**PROCEEDINGS OF THE PRE-BID CONFERENCE HELD ON 16-Feb-2021 AT ICAST
CONFERENCE HALL, CSIR-NAL, TOWARDS PROCUREMENT OF AVIONICS SUITE FOR SARAS
MK-II AIRCRAFT.**

The Proceedings w.r.t Technical Queries and Commercial Queries are appended below:

Encl: as above.


Sr. Controller of Stores & Purchase
For and behalf of CSIR

वरिष्ठ भंडार एवं क्रय नियंत्रक
Sr. Controller of Stores & Purchase
सीएसआईआर-राष्ट्रीय वातरिक्ष प्रयोगशालाएं
CSIR-National Aerospace Laboratories
एचएएल एयरपोर्ट रोड, कोडिहल्ली/HAL Airport Road, Kodihalli
बेंगलूरु/Bengaluru-560 017

Pre-Bid Conference Held On 16th Feb 2021 At ICAST Conference Hall

Towards

Procurement of Avionics Suite for SARAS Mk II Aircraft

Technical Queries By Supplier And Responses From NAL

The queries raised by supplier, who attended the pre bid conference through WebEx, conducted on 16th Feb 2021 at ICAST Conference Hall, National Aerospace Laboratory, Bangalore and reply by NAL is listed below:

Sl. No.	Reference to tender document/ section	Description	Query Raised /Clarification Required By Supplier	Answers/Clarifications by NAL
1.	4.2, Page 38-41	4.2 – Specifications of Integrated Avionics and Autopilot System-Page 38-41	➤ Here under configuration column, it is mentioned that DUAL or single as qty required for each set. We are considering wherever Dual as 2nos each set and wherever as Single as 1 no per set. Hope our understanding is OK. Please clarify.	➤ Yes correct.
2.	4.2.2 page-42	Installation requirements4.2.2 page-42	➤ All LRUs are proposed to be installed in Avionics bay outside the pressurized cabin (nose of the aircraft) which is not conditioned environment and hence the qualification specifications shall be accordingly chosen. Please clarify for Minimum and maximum Temperatures to be considered since it is not a	The detailed minimum requirement of the environmental map for each system/LRU is provided in Appendix - A

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Sl. No.	Reference to tender document/ section	Description	Query Raised /Clarification Required By Supplier	Answers/Clarifications by NAL
			CONTROLLED ENVIRONMENT.	
3.	4.13Page 66	Commercial format-4.13Page 66	➤ Total qty –mentioned as Total qty -3 sets & in Qty -2 –Please clarify whether we have to consider qty as 3 sets or only 2 sets.	➤ Phase I deliverable is 02 sets and Phase II deliverable is 01 set. ➤ For additional information refer section 4.16.3.1(Phase I Deliverable)/4.16.3.2(Phase II Deliverable) of tender document
4.	Rack Mounting	Ensure no avionics system shall be RACK mounting	➤ Is NAL looking for tray mounted system instead of rack mounted? Most of the avionic LRUs like TCAS, Transponders, SSCVR, SSFDR etc from OEMs across the globe are made to be rack mounted. This is the most acceptable system architecture. Do they have any specific reason to believe that the RACK mounting system is prohibitive. Request you to relook at this requirement and allow rack mounted LRUs like the ones stated above.	Most of the avionics LRUs is proposed to be installed in nose bay area and there is space constraints, due to this reason NAL requested no rack mount installation. However each LRU may have its own mounting trays as per LRU OEM design and recommendations if required based on the LRU design.
5.	section 4.2.6.9 on Page 56	The avionics system should be of latest TSO	➤ I would like to draw your attention to section 4.2.6.9 on Page 56 of the RFQ. For the SSCVR the TSO requirement as stated is TSO-C 124 A& B which not the latest. Please clarify what should be considered while	➤ For FDR it is TSO C124c and for CVR it is TSO C123c

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			bidding the RFQ. ➤ What if during the process of signing of the contract or execution of the project the TSO standard changes? How would NAL view the requirement at that point?	➤ In such cases, supplier shall do the gap analysis and provide analysis document if the change is applicable to SARAS Mk II Aircraft. If it is relevant then the requirement shall be complied by supplier.
6.	Development phase	TCAS and TAWS	➤ The recorder and T3CAS (TCASII + TAWS + Transponder) are to be configured to the specific requirement of the aircraft during the developmental phase. Those information are missing in the RFQ. In absence of the same we would not be able to quote the NRE. Can we get this information from NAL?	➤ Please refer RFQ section 4.13 Part I Sl. No c and Section 4.13 Part II Sl. No f and Section 4.2.6.6.5 for details on the requirement and provision to quote NRE if applicable.
7.	General	General	➤ This RFP calls out for only 3 ship sets. What is the anticipated production quantity?	➤ Regarding production quantity, the decision will be taken after successful integration & certification of the aircraft. ➤ However our estimate based on sources available, Initial requirement would be around 80 Numbers approximately.
8.	General	Cockpit Related	➤ Total Dimensions of the display area assigned in cockpit for Displays.	➤ MIP cockpit instrument panel dimension is approximately 3feet x 1feet. Proposal shall be for portrait/landscape version of the display to accommodate maximum of



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				4 display. Supplier has to propose the available display configurations.
9.	General	Display Related	➤ Is it mandatory/firm requirement for 4 displays or 3 displays Avionics suits can also be proposed?	➤ 4 displays are required in case of portrait arrangement and 3 displays are also acceptable in case of landscape arrangement. However landscape 4 display configuration is preferred if available
10.	page 72 of the tender document	EVS (Enhanced Vision System) is mentioned	➤ Does EVS camera or EFVS system is in NAL interest and is defined as a requirement for this tender?	➤ NAL RFQ section 4.2.6.6.6 specifies the requirement of SVS only
			➤ Does EVS camera or EFVS system can be offered as an option when apply to this tender?	➤ Not Applicable as EVS is not part of the RFQ
11.	Section 4.2-I A1 (d):	VHF Communication System	➤ Clarification on Piggyback mount for VHF. ➤ What is VIR in VHF communication	➤ Piggyback is kind of mechanical installation of the system. However, this may be the choice of installation based on the LRU OEM recommendations. Can be ignored if not applicable ➤ VIR is one more LRU which would be installed in same installation arrangement. However, mechanical installation of LRU will be based on the designer/LRU OEM recommendations.
12.	Section 4.2-I	Emergency	➤ Elaborate in details of	➤ Some of ELT system comes with

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	A3	Locator/Transmitter (ELT)	"w/voice transmitter" in ELT	voice transmission capability. ➤ Requirement will be updated as "ELT with voice communication is a desirable requirement" ➤ Mandate requirement if standard ELT with 121.5 MHz, 243.0 MHz and 406.025 MHz for "No Voice communication in ELT"
13.	Section 4.2-I C13	Terrain Awareness Warning System (TAWS) with reactive and predictive wind shear features	➤ "TAWS with reactive and predictive wind shear feature": As per details on modes in per para 4.2.6.3.2.1, this is not required.	➤ Reactive and predictive wind shear is part of the warning system which is covered in 4.2.6.3.2.1. However supplier shall provide the reactive and Predictive wind shear features either part of integrated TAWS suite or with WxR suite separately without compromising the performance. If it is with TAWS and should not call for any additional ground support for predictive wind shear warnings.
14.	Section 4.2-II	Autopilot System with Actuators and Mode Select Panel compliant to CAT II and FAR 23 compatible to Avionics suite offered as per I above	➤ Clarification whether requirement is CAT-II Auto-Pilot dual systems or dual CAT-I independent systems.	➤ CAT-II autopilot with 1 AP and dual FD system required(two independent systems).
15.	Section 4.2.4 Certification	Certification Requirements	➤ The avionics suite is whether Civil certified as per TSOd and	➤ Yes, all avionics suite systems should be qualified as per TSO/RTCA



Sl. No.	Reference to tender document/ section	Description	Query Raised /Clarification Required By Supplier	Answers/Clarifications by NAL
	Requirement:		RTCA 160X and same is acceptable to CEMILAC or specific MI-STD requirement for certification from CEMILAC. ➤ Please clarify the requirement.	and DO 160x compliance(refer Appendix A for DO 160 requirements)
16.	Section 4.2.6.1.5, Elaborate in detail following requirement:	Audio Warning Generator	➤ “AWS shall accommodate additional around 10 audio warnings apart from the mandate audio warnings” ➤ “supplier shall provide mechanism for users to load the synthesized digital audio files to 7AWS without effecting the cert and qualification	➤ There should be at least 10 additional synthesized audios and those are user loadable and it shall not impact certification status of already TSOd function/product. The requirement shall be as per 4.2.6.1.5
17.	Section 4.2.6.1.4	Radio Tuning Heads or Radio Tuning Units	➤ Elaborate “Minimum two radio tuning heads” as Dual systems have two independent radio tuning heads and single system has single tuning head.	➤ Two independent radio tuning heads are required as per section Para 4.2.6.1.4
18.	Section 4.5, of Chapter 4	Architecture definition	➤ To be elaborated	Supplier shall be primary responsible agency for Definition of the suitable architecture for SARAS Mk II as per NAL RFQ requirement covering the mandate requirements in section 4.2.
19.		Aircraft installation kit	➤ Does it include design of brackets/racks for housing the LRUs and mounting for Antennae.	Yes if the LRU demands such installation kit (as recommended by LRU OEM)
20.	Section 4.2	Autopilot Systems - Dual	➤ As per FAA AC 120-29A.	➤ Supplier shall propose autopilot



Sl. No.	Reference to tender document/ section	Description	Query Raised /Clarification Required By Supplier	Answers/Clarifications by NAL
	Autopilot Systems	(Two Independent Systems)	w.r.t. Airborne Equipment for category II, requirement of at least 1 autopilot (AFGS) and at least dual flight director system with an independent display for each pilot is recommended. In this view, it is hereby assumed that fulfillment of autopilot system minimum requirement as per AC120-29A shall qualify for this NAL RFP. NAL to provide concurrence on the same.	system with single AP and Dual FD system with CAT II complaint. And the proposed system shall meet the AC 120-29A requirements. However the requirement is to have this AP and FD implementation in two independent systems.
21.	Section 4.2.A.2	Audio Management System – Dual (Two Independent System)	<p>➤ A Typical AMS consists of an impedance matching LRU (Junction Box) and two/three (depending up on aircraft configuration) Audio Control Units (ACUs) in the aircraft. ACUs are installed in cockpit one each for pilot and co-pilot. This combination caters for all the audio requirements in a FAR 23 level-4 aircraft like SARAS. Moreover, this combination generally provides the following add-on safety features:</p> <p>I. Slave Mode: In case of fault in one ACU, its headset can be switched to the other serviceable ACU.</p> <p>II. Backup Mode: In case of</p>	Independent systems shall be provided.

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			<p>Junction Box failure or its power failure, pilot headset will automatically be assigned to COM1 (Tx 1) and Fix-1 channels and co-pilot headset will be assigned to COM 2 (Tx 2) and Fix-2 channels</p> <p>These features may be considered sufficient to meet FAR 23 Level-4 aircraft certification requirements. NAL to provide concurrence on the same.</p>	
22.	Section 4.2.A.10	DME – Dual (Two Independent System)	➤ NAL may clarify if a single 3-channel DME Transceiver can be proposed to meet this requirement. In this configuration, on DME Tx Rx is capable of getting tuned simultaneously to NAV1 and NAV2 paired frequencies and also to 3 rd HOLD frequency.	Supplier shall provide two independent DME either single unit or part of the Radio Cabinets
23.	Section 4.2.I.C13	TAWS	➤ As per FAR 23 class 4 aircraft requirement, in TAWS, the wind shear is not the requirement and the same is also not required in para 4.2.6.3.2.1 of RFP, Please clarify	Please refer clarification provided in Sl. No. 13
24.		Rack Mounting	➤ “ Ensure no avionics system shall be RACK mounting” – Are you looking for tray mounted	Most of the avionics system will be installed in nose bay area and there is space constraints, due to this reason



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			system instead of rack mounted? Most of the avionic LRUs like TCAS, Transponders, SSCVR, SSFDR etc. from OEMs across the globe are made to be rack mounted. This is the most acceptable system architecture. Do you have any specific reason why you believe that the RACK mounting system is prohibitive. Request you to relook at this requirement and allow rack mounted LRUs like the ones stated above.	NAL requested no rack mount installation. However, each LRU may have its own mounting trays as per LRU OEM design and recommendations.
25.	Section 4.2.6.9 on Page 56	Section 4.2.6.9 on Page 56	➤ "The avionics system should be of latest TSO" – I would like to draw your attention to section 4.2.6.9 on Page 56 of the RFQ. For the SSCVR the TSO requirement as stated is TSO-C 124 A& B which not the latest. Please clarify what should be considered while bidding the RFQ.	For FDR it is TSO C124c and for CVR it is TSO C123c.
26.	Section 4.2.6.6.4	Is NAL looking for internal or external battery?	➤ Point F , The ISIS shall have at least 30 minutes independent battery backup to ensure continued functioning during total electrical failure.	➤ Requirement is Internal inbuilt Battery part of ISIS with TSO approval. The requirement is 60 minutes
27.	Page 33	Protection against Damage : The system shall not be prone	➤ Commercial supply is mentioned. The equipment will	➤ The equipment shall work on typical 28V DC as per DO 160G



Sl. No.	Reference to tender document/ section	Description	Query Raised /Clarification Required By Supplier	Answers/Clarifications by NAL
	Para reference 2.38.1	to damage during power failures and trip outs. The normal voltage and frequency conditions available at site as under: (a)Voltage 230 volts – Single phase/ 415 V 3 phase (+_ 10%) (b)Frequency 50 Hz.	either work on 28V DC or 115AC/400Hz. NAL to clarify. Since the grid power supply will not be directly to any of the airborne systems, NAL to confirm that the conversion equipment that deliver power to the aircraft will confirm to the airworthiness requirement.	requirements.
28.	Page 38 Para reference 4.1	Certification of avionics suite of SARAS Mk-II	➤ Please clarify that the stated Avionics Suite of 3 sets will be first approved for CEMILAC or FAA or EASA or DGCA certification and NAL will be responsible for certification.	➤ Proposed avionics suite to be approved/certified by CEMILAC/DGCA. ➤ Supplier shall provide required support requested by certification agencies. All system should have TSO qualified.
29.	Page 38 Para reference 4.1	Certification of SARAS Mk-II	➤ Please clarify that the first three prototypes of SARAS Mk-II aircraft will be type certified for CEMILAC or FAA or EASA or DGCA and NAL will be responsible for it.	➤ Proposed avionics suite to be approved/certified by CEMILAC/DGCA. ➤ Yes, but supplier shall produce all certification artefacts.
30.	Page 41 Para reference 4.2 point 20	Autopilot System for FAR 23 category Aircraft meeting Cat II requirements with Mode Select Panel, Rudder, Aileron and Elevator Actuators, Pitch Trim Actuator and Autopilot Computer	➤ Please clarify whether one Autopilot System with two channels or ➤ Two Autopilots systems are implied	➤ Requirement is two independent AP/FD systems with single channel each.

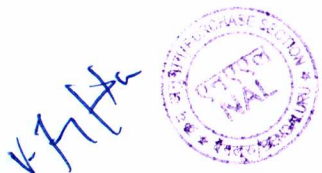


Sl. No.	Reference to tender document/ section	Description	Query Raised /Clarification Required By Supplier	Answers/Clarifications by NAL
		Dual (two independent Systems)		
31.	Page 42 Para reference 4.2.3	In case if the LRUs are not compliant to DO 160G, the supplier shall do the gap analysis to the LRUs which are compliant to earlier versions w.r.t DO 160G. If gap analysis indicates that the difference between the certified version and DO 160 G is major as per FAA order 8150-1D, the supplier shall comply to the Gap analysis findings. In such cases the delta tests to be carried out to meet the DO 160G specifications (if required) shall be in co-ordination with Indian Certification Agency	<p>➤ Option of considering the existing DO 160 applicable on the proposed equipment to be considered.</p> <p>➤ Who will be responsible agency to decide between minor and major gaps in the equipment?</p> <p>➤ Certain LRU's are granted TSO deviation to show compliance to environmental qualification requirements of DO160G. Will this deviation be considered?</p>	<p>➤ DO160 Gap analysis to be performed to meet the certification requirements by supplier and if the change is applicable to SARA Mk II, then it shall be complied.</p> <p>➤ CEMILAC and DGCA along with NAL</p> <p>➤ Based on Case to case analysis, the deviations if not impacting the SARAS Mk II requirements will be considered for deviations. Finally CEMILAC and DGCA shall agree or dis-agree</p>
32.	Page 42 Para reference 4.2.4	All LRUs shall be TSO certified by FAA or EASA or any other agency which in turn shall be acceptable to DGCA and CEMILAC. Each of the system shall be cleared for airworthy and be released with airworthy release forms.	➤ Few of the LRU might need to be customized as per the requirement. If customized or new product specific for this aircraft then TSO won't be possible. However, it can be EASA/FAA approved and issued with Form 1	<p>➤ Yes understood, the same to be detailed while bidding.</p> <p>➤ Ultimately the LRUs/Systems shall be cleared by CEMILAC/DGCA/FAA/EASA for airworthiness use with airworthiness approvals.</p>
33.	Page 42	The product shall also provide an emergency mode	➤ Is this feature optional for Civil Version?	➤ It is the mandatory requirement.



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Sl. No.	Reference to tender document/ section	Description	Query Raised /Clarification Required By Supplier	Answers/Clarifications by NAL
	Para reference 4.2.6.1.1.1	that with a single discrete input it will channel to 121.5 MHz with direct interface to the headsets such that you will need nothing else to keep in communications.		
34.	Page 43 Para reference 4.2.6.1.1.1	In addition to complying to the "Minimum Operational Performance Standards for Airborne Radio Communications Equipment Operating Within the Radio Frequency Range 117.975 - 137.000 MHz" extendable up to 152.0 MHz spelled out in the standard listed in the applicable TSO for the VHF COM system, the offered VHF COM system must also comply to the below requirements	➤ Please clarify whether the Extendable Radio Frequency Range as stated is relevant to India	➤ Supplier shall propose the LRUs as per international standard TSO approved systems.
35.	Page 43 Para reference 4.2.6.1.1.1	Power Output Minimum 18 Watts	➤ Please suggest if Power Output of 16W is acceptable.	➤ 18 Watts is required
36.	Page 49 Para reference 4.2.6.2.6	I. Calculating optimum rate of climb/descent, altitude, power setting. – Controlling the aircraft to meet these	➤ Is Auto Throttle also there in the aircraft. What is the details of the auto throttle?	No, auto throttle feature is not available in SARAS Mk II aircraft.



Sl. No.	Reference to tender document/ section	Description	Query Raised /Clarification Required By Supplier	Answers/Clarifications by NAL
		optimum parameters through autopilot and auto throttle. – Guiding pilot-controlled flight path through a flight director, and target speed and engine setting bugs – Cross referencing multiple navigation sources to continually update position. – Automatically tuning en-route nav aids. – Alerting pilots of systems status and malfunctions		
37.	Page 52 Para reference 4.2.6.6.1.1	A. Quantity 04 numbers of Multi-Function Displays (MFD) shall be utilized	➤ Option for 3 Multi - Functional Displays can be proposed or not	➤ In case of landscape display, 3 display is also acceptable. However, there shall not be any compromise on the functionality across Pilot and co-pilot along with the Symbolology an its functions. NAL preferred requirement is 4 displays.
38.	Page 53 Para reference 4.2.6.6.1.1	e) In case of EICAS display failure, reversionary modes shall be activated through minimum key selection to display the EICAS information on PFD.	➤ The reversionary mode is one-sided mode where PFD data to be displayed on the MFD in case of PFD failure but not vice versa	➤ Both mode of reversionary is required
39.	Page 55 Para reference 4.2.6.7	Engine and Airframe Interface Units The Data Concentrator or Data Acquisition System for	➤ Compatibility check with the displays and other sensor needs to be performed. Who will perform the compatibility testing?	As per the NAL RFQ, the Engine and Airframe Interface Units shall be designed and developed by NAL and hence NAL shall take care of such



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		Airframe and Engine Interfaces will be developed by CSIR NAL. Supplier to indicate the necessary format and protocol architecture dependency if any in order to realise the proposed Avionics Architecture for this Aircraft.		requirements. However the required inputs and outputs for such Engine and Airframe Interface Units shall be provided as part of the bid as per Annexure A, Sl. No. 11.
40.	Page 60 Para reference 4.5	Work Share and Responsibility (Primary and Secondary)	➤ Please demarcate the boundary that separate the primary and secondary supporter. Do we consider that the 100% responsibility of the respective work share lies with primary? Kindly confirm.	➤ Yes. Primary indicates that they will lead the activities with support of secondary share holders.
41.	Page 60 & 62 Para reference 4.5 & 4.8	Work Share and Responsibility & Technical Support	➤ Please confirm whether cost of work share and technical support is part of commercial evaluation. As it will have commercial bearing on the overall project cost.	➤ Yes it should be part of commercial.
42.		General Query	➤ Has "Antenna Mapping", "EMI/EMC survey" and "HIRF" of the SARAS Mk II been addressed?	➤ This shall be the aircraft OEM responsibility. However supplier shall ask the required data for this in the technical bid document.



Annexure A - SARAS MK II Avionics Suite RFQ update table

Sl.No.	Reference to tender document/ section	Present Description	Proposed/updated Description
1.	Section 4.2, Part 1 (B navigation systems), Sl. No. 11. Section 4.2.6.2.6 : NAV/Flight Management System description	Dual FMS Functionalities of FMS is described.	The following additional point shall also be the requirement in 4.2.6.2.6 K. Dual FMS with independent GPS for each FMS to be provided
2.	Section 4.2.3	DO 160X Requirements Describes the definition of controlled and Un-Controlled environment for each LRU. However detailed requirement is not present.	The RFQ section 4.2.3 shall be read along with the Environmental specifications provided in Appendix A of this document where the detailed requirement of the DO 160 is provided for each LRU.
3.	Section 4.2.6.3, Radar Suite	Reactive and Predictive Wind Shear requirement is detailed part of 4.2.6.3 as part of TAWS.	The RFQ section 4.2.6.3 shall be read along with the following additional description a. Reactive and predictive Wind Shear system to be the part of either integrate TAWS or the color weather radar suite without demanding additional ground support and without compromising performance. b. Antenna size shall not exceed 18".
4.	Section 4.2, Part 1 (B navigation systems), Sl. No. 6 and 9.	Ps, Pt, TAT, AOA, Antennas	The RFQ section 4.2.6.2.4 shall be read along with the following additional description Section 4.2.6.2.4 shall also supply dedicated Pitot tube (1 count), Static port (2 count), TAT(1 count) sensors for each ADCU/ADAHRS/IRS and section 4.2.6.6.4 shall supply one set of Pitot tube(1 count), Static port (2count), TAT(1 count if required) sensors for Standby Instrument. Outside Air Temperature (OAT)sensor shall also be supplied and the



Sl.No.	Reference to tender document/ section	Present Description	Proposed/updated Description
			display of the Outside Air Temperature can be in PFD or MFD. OR if ADAHRS provides the OAT then no separate system is required. Section 4.7.1 Bid documents for technical evaluation added with following extra documents requirements for Antenna a) Radiation pattern measured values (Gain and Directivity for both polarizations) b) VSWR measurement Document for the entire frequency band c) Axial ratio measurement values for the frequency band. d) Environmental qualification artifact (DO-160)
5.	Autopilot section 4.2.6.10	Autopilot (Cat II Compliant)	The RFQ section 4.2.6.10 shall be read along with the following additional requirement Input signal requirements for Autopilot which is detailed in Appendix B of this document.
6.	Section 4.2.6.1.2	Audio Management System / DIGITAL INTERPHONE SYSTEM	An auditory alert that sounds/chimes feature as part of the AMS system for the requirements like <ul style="list-style-type: none"> • Passenger Call (High Tone) • Attendant Call (High/Low Tone) • Attendant Emergency Call (High/Low Tone Repeated Three Times) • Seat Belt Sign (Low Tone) • Smoking Sign (Low Tone) Shall be provided
7.	Section 4.2 part B Navigation system	Section 4.2.6.2.2 Attitude and Heading Reference System (AHRS) Section 4.2.6.2.4 Air Data computer (ADC)	Section 4.2.6.2.2, Attitude and Heading Reference System (AHRS) and Section 4.2.6.2.4 Air Data computer (ADC) : Dual ADIRS system shall also be as deliverable in the Section 4.2 Table under the Navigation systems. NAL reserves the right to place PO on either dual ADAHRS or Dual ADIRS or one ADAHRS and One ADIRS at the time of placing PO. However supplier shall quote for both ADAHRS and ADIRS if available.



Sl.No.	Reference to tender document/ section	Present Description	Proposed/updated Description
			Supplier shall propose the complete ADAHRS or ADIRS as independent system with ARINC 429 output and not just the sensor modules with raw data output. ADAHRS or ADIRS shall be supplied with required Magnetic sensor (Flux Valve) and Control panel as applicable.
8.	Section 4.2.3and 4.2.4	Section 4.2.3DO-160 requirements Section 4.2.4 Certification Requirements	The RFQ section 4.2.3shall be read along with the following updated requirement LRU's shall meet the DO 160 Compliance for SARAS MKII as per Appendix A of this document.
9.	Section 4.2 part D Surveillance suite and under the section 4.2.6.5	Mode S Transponder with ADS B IN/OUT	The RFQ section 4.2.6.5 shall be read along with the following updated requirement ADS-B IN and OUT requirement is mandate requirements and shall be included as standard delivery with required Mode S transponders.
10.	Section 4.2 partD Surveillance suite	TVI Display	TVI display to be removed from RFQ and hence it shall be ignored as it is part of MFD
11.	Section 4.2.6.7	Section 4.2.6.7, Engine and Airframe Interface Units section 4.4.1.2, Data Concentrator or Data Acquisition system for Airframe and Engine Interfaces	The RFQ section 4.2.6.7 shall be read along with the following updated requirement NAL is custom designing a system with following functionalities Utility System and Management System (USMS), Stall warning system (SWS), Brake Management System (BMS) and Central Maintenance Computer (CMC). This system shall interface different aircraft sub-systems with the avionics suite. To facilitate this, the supplier shall provide the complete ICD, signal definitions, connector pin designations, complete input/output signal details of each LRU of proposed suite.
12.	Section 4.2.6.6 Display Suite	RFQ heading describes only MFD and as part of MFD, PFD requirements are captures.	Section 4.2.6.6.1.1 shall be read as Primary Flight Display (PFD) and Multi Function Display (MFD). Also following requirements shall also be complied PFD shall provide the following parameters as output in ARINC 429



Sl.No.	Reference to tender document/ section	Present Description	Proposed/updated Description
			3. Point F in the section 4.2.6.6.5 data upload and download facility shall be complied MFD/PFD or any other device (which is responsible for hosting the emergency checklists) shall have the provision to upload the OEM Emergency checklist for SARAS Specific requirement by aircraft OEM using the Upload utility provided by LRU OEM and this process of OEM uploading the Emergency Checklists shall not impact the certification status of the LRU.
14.	Section 4.2.6.6	Display suite	Following requirement under section 4.2.6.6.1.1- Multi-Function Displays (MFD) shall be complied: 1. Under point K, sub point (d) -MFD/PFD controller shall be provided if applicable for each unit or for set of units as applicable.
15.	Section 4.2.6.6.4	Integrated Standby Instrument System (ISIS)	Following updated requirement in NAL RFQ Section 4.2.6.6.4, Point F shall be complied The ISIS shall have at least 60 minutes inbuilt battery backup to ensure continued functioning during total electrical failure
16.	Section 4.2.6.1.2.1	AMS general requirements	Following updated requirement in NAL RFQ Section 4.2.6.1.2.1, Points shall be complied: Sl. No. 10. Speaker in cabin - Supplier shall provide the independent passenger address (PA) system with at least 4 speakers for 19 seater category aircraft. This PA shall also receive Audio input from Audio Management unit from pilot/co-pilot Sl.No.17 Alert tone activation inputs is specified as Active Low, however the supplier may propose different logic also based on the source logic compatibility.
17.	Section 4.2.6.2.1.1	VOR or VHF general specification	Section 4.2.6.2.1.1, Sl. No. 4 is removed and shall be ignored as the requirement is captured in Sl. No 5 of the same section.
18.	Section 4.2.6.2.1.2	Localizer receiver- general specification	Section 4.2.6.2.1.2, Sl. No. 4 last line is repeated and hence shall be ignored



Sl.No.	Reference to tender document/ section	Present Description	Proposed/updated Description
19.	Section 4.2.6.2.1.3	Glide slope receiver- general specification	Section 4.2.6.2.1.3, Sl. No. 4, last line is repeated and hence shall be ignored
20.	Section 4.3.2	Aircraft to be capable of prolonged operation in the prevalent hot and cold conditions, ambient temperature of -40 deg C to +50 deg C, dusty conditions of arid zones and humid/saline atmosphere of coastal regions.	For updated environmental qualification requirements please refer appendix A .
21.	Section 4.3.3	Certification basis will be as per FAR Part 23 (Amdt. 23-64)Class IV Airplane including day, night, VFR(Visual Flight Rules) IFR(Instrument Flight Rules) and flight into known icing conditions. SARAS Mk II falls under certification Class IV and 'low speed' performance level. Additional six FAR 25 requirements of flight controls, aircraft performance and structural design are also required to be met.	Certification basis will be as per FAR Part 23 (Amdt. 23-64)Class IV Airplane including day, night, VFR(Visual Flight Rules) IFR(Instrument Flight Rules) and flight into known icing conditions. SARAS Mk II falls under certification Class IV and 'low speed' performance level.
22.	Full RFQ document	FAR 23/FAR 25	Few places in the NAL RFQ (Tender document) still reference of FAR 25 is present. The requirement is only FAR 23 and hence such reference of any FAR 25 shall be ignored unless otherwise specifically asked for.
23.	Section 4.2.6.8, SSFDR	Section 4.2.6.8.1,General Specification point No. C: The offered SSFDR system shall have any of the following option: i. Stand Alone Unit with inbuilt Data acquisition capability for all the parameters. ii. SSFDR with a separate Data Acquisition Unit. Supplier shall provide technical details of each of the LRU offered.	The RFQ section 4.2.6.8.1 shall be read along with the following updated requirement NAL shall provide data definition of required parameters to be recorded in flight data recorder. Vendor shall take responsibility to customize the flight data recorder to acquire and record as per NAL requirement.
24.	Section 4.7.1	Section 4.7.1 Bid Documentation (for	Following requirement in NAL RFQ Section 4.7.1, Point (b) sl. no. (iv)



Sl.No.	Reference to tender document/ section	Present Description	Proposed/updated Description
		Technical Evaluation)	shall be complied: Sl. No. (iv) For Each LRU of Avionics Suite, supplier shall provide documents stating clearly TSOd. However supplier shall provide the TSO deviation / incomplete TSO / Non TSO functional list if any in each LRU.
25.	Section 4.2	Section 4.2 , Integrated Avionics and Autopilot System, Notes	Following requirement in NAL RFQ Section 4.2, Point (9) shall be complied: Sl. No. (9) SARAS MK II is completely integrated solution and hence supplier shall quote for complete RFQ. No split order is allowed and hence partial quote shall not be accepted. No split order is allowed/applicable for SARAS Mk II avionics Suite.
26.	Section 4.2	Section 4.2 ,Integrated Avionics and Autopilot System, Notes	Following requirement in NAL RFQ Section 4.2, Point (10) shall be complied: Sl. No. (10) In section 4.2, against each LRU's the environmental category has been provided as Controlled (C)/ Uncontrolled (U) based on the traditional known LRU/System placements on aircraft. However supplier shall provide the proposed avionics configuration based on the Controlled (C))/ Uncontrolled (U), considered during design/certification phase of proposed avionics system/LRU.
27.	Section 4.7	Documentation after PO	Section 4.7 point (a) Manual of individual avionics LRUs, Sl. No. (xv) shall be complied: S. No. (xv) 3D CAD Model (CATIA or solid works) covering all LRU's envelop to be provided to work on the LRU installation on airframe. This will help NAL to optimize the space and location of the LRU on the aircraft.
28.	Section 4.2 Sl. No.3	ELT Locator/Transmitter (ELT) (w/voice transmitter)) Remote Unit	The requirement shall be read as : ELT Locator/Transmitter (ELT) Remote Unit



V-176

Appendix A - SARAS MK II Environmental MAP

Sl. No.	Tests (RTCA/DO-160 Section)	Type of Tests	Severity	Category	Controlled Environment	Uncontrolled Environment
1.	Temperature and Altitude (Section 4)	4.1 Ground Survival Low Temperature and Short time operating Low Temperature	Ground Survival Low Temp: -55°C	A1	Controlled	
			Short Time operating Low Temp : -40°C			
			Ground Survival Low Temp : -55°C	C2		Uncontrolled
			Short Time operating Low Temp : -55°C			
		4.2 Operating Low Temperature	Temp: -15°C	A1	Controlled	
			Temp : -55°C	C2		Uncontrolled

V-H



Sl. No.	Tests (RTCA/DO-160 Section)	Type of Tests	Severity	Category	Controlled Environment	Uncontrolled Environment
		4.3 Ground Survival High Temperature and Short-Time Operating High Temperature	Ground Survival High Temp: +85 °C	A1	Controlled	
			Short Time operating high Temp: +70 °C			
			Ground Survival High Temp: +85 °C	C2		Uncontrolled
			Short Time operating high Temp: +70 °C			
		4.4 Operating High Temperature	Temp: +55 °C	A1	Controlled	
			Temp: +70 °C	C2		Uncontrolled
		4.5 Altitude Test	Temp: Ambient Equipment 'ON' Pressure corresponding to	A1	Controlled	

Vijay



Sl. No.	Tests (RTCA/DO-160 Section)	Type of Tests	Severity	Category	Controlled Environment	Uncontrolled Environment
			15000 ± 100 ft(57.18 kPa or 16.89 in Hg, absolute for Cat A1)			
			35000ft	C2		Uncontrolled
		4.6 Decompression	Equipment: ON Temp: Ambient Pressure: Equivalent from 8000 ft (2,400 m (75.26 kPa, absolute) reduce to 35,000 ft (10,700 m) (23.84 kPa) in 15 sec.	A1	Controlled	
2.	Temperature Variation (Section 5)		Temp: -55 °C (OLT) to +70 °C (OHT) Rate of Change of Temp: 5 deg C minimum per minute	B		Uncontrolled
			Temp : -15°C(OLT) to +55°C(OHT) Rate of change of Temp: 2 deg C	C	Controlled	



Sl. No.	Tests (RTCA/DO-160 Section)	Type of Tests	Severity	Category	Controlled Environment	Uncontrolled Environment
			minimum per minute			
3.	Humidity (Section 6)	Standard humidity	Temp: $38\pm 2^{\circ}\text{C}$ to $50\pm 2^{\circ}\text{C}$ Humidity : $85\pm 4\%$ RH to $95\pm 4\%$ RH	A	Controlled	
		Severe humidity	Temp: $38\pm 2^{\circ}\text{C}$ to $65\pm 2^{\circ}\text{C}$ Humidity: $85\pm 4\%$ RH to $95\pm 4\%$ RH	B		Uncontrolled
4.	Operational Shock & Crash safety (Section 7)	7.1 Operational Shock	6 g Saw tooth 11 ms, Impulse	B	Controlled	Uncontrolled
		7.2.1 Crash safety (Impulse)	20 g Saw tooth 11 ms, Impulse.			
		7.2.2 Crash safety Sustained (Structural linear acceleration)	18 g in all direction for Random orientation Or Fwd : 18g ; Aft : N/A;			



Sl. No.	Tests (RTCA/DO-160 Section)	Type of Tests	Severity	Category	Controlled Environment	Uncontrolled Environment
			Up: 3g; Dn: N/A ; L&R : 4.5g for fixed orientation.			
5.	Vibration (Section 8)	Standard Sinusoidal Vibration	Curve M: 0.1 inch displacement from 5 to 15 Hz , 0.01 inch displacement 15 to 55 Hz and from 55 to 500 Hz 1.5 g Pk	S	Controlled	Uncontrolled

2-18-12



Sl. No.	Tests (RTCA/DO-160 Section)	Type of Tests	Severity	Category	Controlled Environment	Uncontrolled Environment
6.	Explosive Atmosphere/ Proofness (Section 9) (Flammable atmosphere test)	Non Ignition test	Equipment not hermitically sealed and not contained in cases to prevent flame and explosion propagation.	Category E :		Uncontrolled
7.	Water Proofness (Section 10)	Condensing Water Proof Test	Low Temp: -10 °C for 3 Hrs High Temp : +40°C and 85% humidity for 10 min Transition time : Low temp chamber to High temp chamber within 5 minute.	Y		Uncontrolled

V-7/12



Sl. No.	Tests (RTCA/DO-160 Section)	Type of Tests	Severity	Category	Controlled Environment	Uncontrolled Environment
		Drip Proof Test	Volume Flow rate 140 l/m ² /hr Droplet size: 0.33 mm nominal diameter drip holes on 25 mm pattern. Dispenser placed approximately 1 meter above equipment.	W	Controlled	
8.	Fluid Susceptibility (Section 11)	Not applicable	Not applicable	Not applicable		
9.	Sand and Dust (Section 12)	Blowing Dust	Air Velocity 0.5 m/sec to 2.4 m/s, RH≤30% Dust : 97% to 99% silicon dioxide Dust concentration 3.5 to 8.8 g/m ³	D	Controlled	Uncontrolled



Sl. No.	Tests (RTCA/DO-160 Section)	Type of Tests	Severity	Category	Controlled Environment	Uncontrolled Environment
			Size distributions of 100% by weight less than 150 flm, with a median diameter (50 \pm 2 % by weight) of 20 \pm 5 flm			
10.	Fungus Resistance (Section 13)		Fungi Spores: a) Aspergillus niger b) Aspergillus flavus c) Aspergillus versicolor d) Penicillium funiculosum e) Chaetomium globosum	F		Uncontrolled
11.	Salt Fog (Section 14)		NaCl Salt solution of 5 \pm 1% concentration Ambient temperature 35 \pm 2 $^{\circ}$ C Ensure the fallout is between 1 and 3 ml/80 cm ² /hr with a pH	S	Controlled	Uncontrolled

V-AT



Sl. No.	Tests (RTCA/DO-160 Section)	Type of Tests	Severity	Category	Controlled Environment	Uncontrolled Environment
			between 6.5 and 7.2. - 24 Hrs exposure & - 24 Hrs drying constitute one cycle			
12.	Magnetic Effect Test (Section 15)		Distance at which the 1 degree (1°) deflection is observed. For Category A Equipment $0.3 < D \leq 1\text{m}$. For Category Z equipment $0 < D \leq 0.3\text{m}$	A (Avionics bay)		Uncontrolled
				Z (Cockpit)	Controlled	

V-JAN



Sl. No.	Tests (RTCA/DO-160 Section)	Type of Tests	Severity	Category	Controlled Environment	Uncontrolled Environment
13.	Power Input (Section 16)	Voltage (Average Value dc)	<p>Normal Voltage: 28V dc.</p> <p>Maximum Voltage: 30.3V dc</p> <p>Minimum Voltage: 22.0 V dc</p> <p>Abnormal Voltage: 32.2 V dc</p> <p>Emergency Operation: 18.0 V dc.</p> <p>All equipment required to be operated during engine start and emergency condition.</p>	B	Controlled	Uncontrolled

V-JP



Sl. No.	Tests (RTCA/DO-160 Section)	Type of Tests	Severity	Category	Controlled Environment	Uncontrolled Environment
		Ripple Voltage	Cyclic peak-to-peak dc ripple voltage $\leq 4V$ (for equipment terminals is above or equal to 22 V) Ripple voltage $\leq 2 V$ (for equipment terminals Voltage < 22 V)	B	Controlled	Uncontrolled
		Momentary Power Interruptions (dc)	Interrupt period : 50 ms	B	Controlled	Uncontrolled
		Normal Surge Voltage (dc)	Nominal voltage: 28 V Dc Increase the voltage to 47 V dc -0/+2 V dc for 5 ms then decrease the voltage to 40 V dc -0/+2 V dc for 30 ms. Rise time : within 1 ms, Fall time : within 5			



Sl. No.	Tests (RTCA/DO-160 Section)	Type of Tests	Severity	Category	Controlled Environment	Uncontrolled Environment
			ms Decrease the voltage to 17 V dc -0.7/+0 V dc. Return the voltage to 28 V dc for five seconds. Change of voltage: within 1 rms. Decrease the voltage to 12 V dc -0.7/+0 V dc for Emergency equipment. Surge Limits: 32.2 V for 5 sec; 40 V for 1 sec; 47 V for 0.5sec 60 V for 0.1 sec;	B	Controlled	Uncontrolled

VJH



Sl. No.	Tests (RTCA/DO-160 Section)	Type of Tests	Severity	Category	Controlled Environment	Uncontrolled Environment
		Engine Starting Under Voltage Operation (dc)	Equipment energized at nominal rated voltage, decrease the input voltage to 10.0 V dc and increase 0.30 volts per second for 35 seconds, then return to rated voltage	B	Controlled	Uncontrolled
		Momentary Undervoltage Operation (dc)	With the equipment energized at nominal rated voltage, decrease the input dc voltage to 12.0 V +/- 0.24 V for seven seconds.	B	Controlled	Uncontrolled
		Abnormal Surge Voltage (dc)	With the equipment operating at its appropriate nominal voltage, apply to the positive (dc) input lead voltage surges of 60 -0/+3 V dc for 100 ms and then reduce the voltage to 40 -	B	Controlled	Uncontrolled



Sl. No.	Tests (RTCA/DO-160 Section)	Type of Tests	Severity	Category	Controlled Environment	Uncontrolled Environment
			0/+2 V dc for one second.			
14.	Voltage spike (Section 17)		Equipment intended primarily for installation where a high degree of protection against damage by voltage spikes is required.	A	Controlled	Uncontrolled
15.	Audio Frequency and conducted Susceptibility (Section 18)		Equipment operating, apply a sine wave audio frequency signal successively in series with each ungrounded dc input power lead.	B	Controlled	Uncontrolled
16.	Induced Signal Susceptibility (Section 19)			ZCX X: Non e-field equipment	Controlled	Uncontrolled



Sl. No.	Tests (RTCA/DO-160 Section)	Type of Tests	Severity	Category	Controlled Environment	Uncontrolled Environment
				C: Power supply DC Z: Test level & Interference free operation		
17.	Radio Frequency Susceptibility (Section 20)	Conducted Susceptibility	10 kHz to 400 MHz	Category WR	Controlled	Uncontrolled
		Radiated Susceptibility (RS)	100 MHz to 18 GHz Category: R a) From 100 MHz to 400 MHz - 20 V/m CW b) From 400 MHz to 8 GHz - 150 V/m pulse Category: W 100 v/m from 100 MHz to 18GHz			
18.	Emission of Radio	Conducted RF Emission	150 KHz to 152 MHz Power Lines	Category L& M	Controlled	Uncontrolled



Sl. No.	Tests (RTCA/DO-160 Section)	Type of Tests	Severity	Category	Controlled Environment	Uncontrolled Environment
	Frequency Energy (Section 21)		[Refer Fig 21-1 DO-160G] 150 KHz to 152 MHz Bundles [Refer Fig 21-2 DO-160G]			
		Radiated Emission RF	100 MHz to 6000 MHz. [Refer Fig 21-7 DO-160G] (for equipment installed in Avionics bay or equipment rack.)	L		Uncontrolled
			[Refer Fig 21-8 DO-160G] (for equipment installed in	M	Controlled	

V-144



Sl. No.	Tests (RTCA/DO-160 Section)	Type of Tests	Severity	Category	Controlled Environment	Uncontrolled Environment
			Cockpit/Instrument panel and Passenger cabin.)			
19.	Lightning Induced Transient Susceptibility (Section 22)	B: Aperture & resistance coupling; K: Shielded aperture & resistance coupling; J: Wave form 3 (360 V/6 A)		B3K3J3	Controlled	Uncontrolled
		Pin Injection Tests: Waveform:3(1 MHz $\pm 20\%$), Voc/Isc:600 / 24 (+10%, -0%) Waveform:5A, 300/300 (+10%, -0%).				



Sl. No.	Tests (RTCA/DO-160 Section)	Type of Tests	Severity	Category	Controlled Environment	Uncontrolled Environment
		Cable Bundle and Ground plane Injection Test:				
		Waveform: 3 (1 MHz and 10 MHz $\pm 20\%$), Single Stroke	$V_T / I_L : 600 / 120$ (+20%, -0%)			
		Waveform: 3 (1 MHz and 10 MHz $\pm 20\%$), Multiple Stroke	First Stroke: 600 / 120 (+20%, -0%)			
			Subsequent Stroke: 300 / 60 (+50%, -0%)			
			Multiple Burst: 360 / 6 (+20%, -0%)			
		Waveform: 5A Single Stroke:	$V_T / I_L : 300 / 1000$ (+20%, -0%)			
		Waveform: 5A Multiple Stroke	First Stroke: 120 / 400 (+20%, -0%)			
			Subsequent Stroke: 60 / 200 (+50%, -0%)			
					Controlled	Uncontrolled

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Sl. No.	Tests (RTCA/DO-160 Section)	Type of Tests	Severity	Category	Controlled Environment	Uncontrolled Environment
20.	Lightning Direct Effect (Section 23)	a) High Voltage Strike Attachment Testing		ZZ1A		Uncontrolled
		b) High Current Physical Damage Test		ZZ1C	Controlled	
21.	Icing (Section 24)		Temp: Low ground survival temperature to 30°C RH 95%, at 5°C equipment surface temp change temp to Low ground survival temperature.	A		Uncontrolled
22.	Electrostatic Discharge (Section 25)		Electrostatic discharge pulses at a test level of 15,000 volts.	A	Controlled	Uncontrolled
23.	Fire, Flammability (Section 26)	Flammability	Equipment in OFF Condition. Applicable to enclosures housing electronics and non-metallic material,	C	Controlled	Uncontrolled



Sl. No.	Tests (RTCA/DO-160 Section)	Type of Tests	Severity	Category	Controlled Environment	Uncontrolled Environment
			component parts, sub-assemblies installed in pressurized or non-pressurized zones and non-fire zones.			



Appendix B - Input signal requirements for NALs indigenous system

Input signal requirements for NALs indigenous system

NAL proposes to integrate the indigenous system in the second phase of production version as part of make in India Initiative. This indigenous system shall be using the data from all the sensors and system (architecture) through the digital bus with maximum update rate of 40 Hz for critical sensors.

The following is the minimum (indicative and not exhaustive) list of inputs that are required for the NALs indigenous system. These signals have to be routed to the NALs indigenous system through ARINC 429 Buses.

List of Input Signals required for NALs indigenous System

Sl. No.	Input Signal	Label	Range	Update Rate (Hz)	Accuracy/ required	Resolution required	Remarks
ADCU Left & Right (ARINC 429)							
1.	Pressure Altitude	203	±131072 feet	32	0.5 feet	0.5 feet	
2.	Baro-Corrected Altitude	204	±131072 feet	32	0.5 feet	0.5 feet	
3.	Calibrated Airspeed	206	0 to 1024 knots	16	0.5 knot	0.00390625	
4.	True Airspeed	210	0 to 2048 knots	16	0.5 knot	0.0078125	
5.	Altitude rate/Vertical Speed	212	±32768 feet/min	32	0.5 feet/min	0.125	
6.	Impact Pressure (Q-bar)	215	0 to 512 mb	16	± 7.7 mb	0.001953125	



Sl. No.	Input Signal	Label	Range	Update Rate (Hz)	Accuracy/ required	Resolution required	Remarks
7.	Vmo	207	0 to 1024 knots	16	± 1 knot	0.0039062 5	
AHRS Left & Right (ARINC 429)							
8.	Magnetic Heading	320	±180 deg	40	± 2.0 deg	0.0006866 455078125	
9.	Pitch Angle	324	±180 deg	40	±0.5 deg	0.0006866 455078125	
10.	Roll Angle	325	±180 deg	40	±0.5 deg	0.0006866 455078125	
11.	Body pitch rate	326	±128 deg/sec	40	± 0.1 deg/sec	0.0004882 8125	
12.	Body roll rate	327	±128 deg/sec	40	± 0.1 deg/sec	0.0004882 8125	
13.	Body yaw rate	330	±128 deg/sec	40	± 0.1 deg/sec	0.0004882 8125	
14.	Body long. accln	331	±4 g	40	± 0.01 g	0.0000152 587890625	
15.	Body lateral accln	332	±4 g	40	± 0.01 g		
16.	Body norm accln	333	±4 g	40	± 0.01 g		
RADALT Left & Right (ARINC 429)							



Sl. No.	Input Signal	Label	Range	Update Rate (Hz)	Accuracy/required	Resolution required	Remarks
17.	Radio Altitude	164	8192 feet	20	± 1 feet	0.125	
18.	RADALT trip	270 - Bit 20	NA	NA	1- tripped	NA	
EFIS Left & Right (ARINC 429)							
19.	Selected Course #1	100	±180 deg	20	NA	180*2^-12 degs	
20.	Selected Heading	101	±180 deg	20	NA	180*2^-12 degs	
21.	Selected Altitude	102	65536 feet	20	NA	1 feet	
22.	Selected Course #2	110	±180 deg	20	NA	0.43945	
23.	Decision Height	170	±7000 ft	20	NA	1 feet	
24.	Course Error	300	±180 deg	20	NA	180*2^-14 degs	
25.	Heading error	301	±180 deg	20	NA	180*2^-14 degs	
26.	Course Datum	302	±180 deg	20	NA	0.01 deg	
27.	Discrete Word	270					
Format							
Format			NA				

V-88



Sl. No.	Input Signal	Label	Range	Update Rate (Hz)	Accuracy/required	Resolution required	Remarks
	Bit 11 NAV Selection 0 = VOR; 1 = ILS		NA	NA	NA	NA	
	Bit 12 NAV Selection; 1= VOR1		NA	NA	NA	NA	
	Bit 13 NAV Selection; 1= VOR2		NA	NA	NA	NA	
	Bit 14 NAV Selection; 1 = FMS		NA	NA	NA	NA	
	Bit 15 NAV Selection; 1 = ADF		NA	NA	NA	NA	
	Bit 16 0		NA	NA	NA	NA	
	Bit 17 0		NA	NA	NA	NA	
	Bit 18 ARC Mode ; 0 = ARC mode;1 = Full compass		NA	NA	NA	NA	
	Bit 19 Gnd Speed / TTG Selection 0 = Gnd Speed; 1 = TTG		NA	NA	NA	NA	
	Bit 20 Symbol Generator 0 = SG1; 1 = SG2		NA	NA	NA	NA	
	Bit 21 Range Code		NA	NA	NA	NA	
	Bit 22 Range Code		NA	NA	NA	NA	
	Bit 23 BP1 SSC 0 = ADF; 0 = VOR1; 1 = VOR2; 1 = FMS		NA	NA	NA	NA	



Sl. No.	Input Signal	Label	Range	Update Rate (Hz)	Accuracy/required	Resolution required	Remarks
	Bit 24 BP1 SSC 0 = ADF; 1 = VOR1; 0 = VOR2; 1 = FMS		NA	NA	NA	NA	
	Bit 25 BP2 SSC 0 = ADF; 0 = VOR1; 1 = VOR2; 1 = FMS		NA	NA	NA	NA	
	Bit 26 BP2 SSC 0 = ADF; 1 = VOR1; 0 = VOR2; 1 = FMS		NA	NA	NA	NA	
	Bit 27 BP2 Selection 0 = ON; 1 = OFF		NA	NA	NA	NA	
	Bit 28 BP1 Selection 0 = ON; 1 = OFF		NA	NA	NA	NA	
VOR-ILS Left & Right (ARINC 429)							
28.	VOR-ILS Input Freq. (VOR-ILS mode identification)	034 (Bit 14) 1 = ILS 0 = VOR	NA	5	NA	0.01 Mhz	
29.	LOC Dev.	173	± 0.4 DDM	20	NA	0.0002 DDM	
30.	GS Dev	174	± 0.8 DDM	20	NA	0.0004 DDM	
31.	VOR Bearing	222	±180 deg	20	NA	0.09 deg	



Sl. No.	Input Signal	Label	Range	Update Rate (Hz)	Accuracy/required	Resolution required	Remarks
DME Left & Right (ARINC 429)							
32.	All ARINC Labels from DME Sensors						
FMS Left & Right (ARINC 429)							
33.	All ARINC Labels from FMS						
ACMSP (ARINC 429)							
34.	All Button presses, Button statuses, Annunciation Status, Maintenance Word	273	NA	40	NA	NA	NA
Left PFD (ARINC 429)							
35.	LH Selected Course #1	100	±180deg	NA	NA	NA	NA
36.	LH Selected Heading	101	±180deg	NA	NA	NA	NA
37.	LH Selected Altitude	102	65536ft	NA	NA	NA	NA
38.	LH Selected Course #2	110	±180deg	NA	NA	NA	NA
39.	LH Decision Height	170	7000ft	NA	NA	NA	NA
40.	LH Course Datum	302	±180deg	NA	NA	NA	NA
41.							
Right PFD (ARINC 429)							



Sl. No.	Input Signal	Label	Range	Update Rate (Hz)	Accuracy/required	Resolution required	Remarks
42.	RH Selected Course #1	100	± 180 deg	NA	NA	NA	NA
43.	RH Selected Heading	101	± 180 deg	NA	NA	NA	NA
44.	RH Selected Altitude	102	65536ft	NA	NA	NA	NA
45.	RH Selected Course #2	110	± 180 deg	NA	NA	NA	NA
46.	RH Decision Height	170	7000ft	NA	NA	NA	NA
47.	RH Course Datum	302	± 180 deg	NA	NA	NA	NA

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**CSIR-NATIONAL AEROSPACE LABORATORIES
BENGALURU**

COMMERCIAL QUERIES & CLARIFICATION

nder Id : 2021_CSIR_68778_1
nder No. : NAL/PUR/ALD/100/20-Z
m Description : Supply of Avionics Suite for SARAS MKII Aircraft.

Jr. No.	Reference to tender document/ section	Description	Query Raised /Clarification Required By Supplier	Answers/Clarifications by NAL
1	Docs 1.5.1 Chapter 8	Introduction / content of Tender	Ø In Chapter 8 (i) it is Mentioned about Bid Security Form . Ø But in Annexure -A it is stroked off on Bid security form. Please clarify.	EMD is NIL. Hence Bidder to submit only Bid Securing declaration form duly signed and stamped.
2	(Page 110-111)	Terms & conditions format	Ø There is no mention of doc ref or Annexure no to this format. Is it a part of Price Bid document?	It is part of both Technical and Financial Bid
3	Warranty- Chapter -2	Warranty- Chapter -2 Special conditions Sr.no.6-GCC 21.2.3 & Ref 2.21Warranty	Ø Under Warranty- Chapter -2 Special conditions Sr.no.6- GCC Ø 21.2.3, it is mentioned as 36 months (3 years) but in Ref2.21 Warranty-it is mentioned as 12 months from acceptance or 18 months from delivery whichever is earlier.—Please clarify	GCC clause to be referred in line with SCC as mentioned. Hence, warranty applicable as per SCC.
4		One manufacturer can also authorize only one agent/ dealer. Sr.no-8 Page no-3 of Invitation bid	Ø Since we have witnessed earlier in Govt tenders that one foreign OEM has collaborated with more than one Indian company, we request NAL to modify this clause to facilitate foreign OEM to authorize more than one Indian company.	Bidder participates in more than one bid in this bidding process. Participation by a bidder in more than one Bid will result in the disqualification of all bids in which the parties are involved. However, this does not limit the inclusion of the components/sub-assembly/assemblies from one bidding manufacturer in more than one bid.
5		General	Ø In case of agents quoting in offshore procurements, on behalf of their principal manufacturers, one agent cannot represent two manufacturers or quote on their behalf in a particular tender enquiry. One manufacturer can also authorize only one agent/ dealer. There can be only one bid from the following: i. The Principal manufacturer directly or through one Indian agent on his behalf, and ii. Indian/foreign agent on behalf of only one principal	
6		General	Ø We are a foreign OEM. Can we submit bid directly (or) do we have to partner with an Indian company and submit the bid through them?	Bid should be INR and Payment only in INR not in Foreign Currency
7		General	Ø Do we need to register in order to submit our bid in the CPPP website?	Yes, and it is mandatory.
8		General	Ø Will preference be given if we submit our bid through an Indian partner company?	No preferences will be provided in any aspects, and all procedures will be followed as per CSIR purchase guidelines.
9		General	Ø Can we submit the bid in US Dollar currency or does it have to be in Indian Rupee currency? No, bid should be only in Indian Rupee through Indian firm.	Bid should be INR and Payment only in INR not in Foreign Currency
10		General	Ø Do we need to show a local content value of 50% or more in the bid?	Refer DPIIT Notifications issued from time to time on the said subject.
11		General	Ø When is the contract expected to be awarded for this tender?	As per procedure No. Deadlines can be provided
12	Para 7, Pg 3	Local Content	Ø "-minus the value of imported content in the item (including all customs duties) Is it mean custom duty paid in India or paid in country of OEM ? Kindly clarify.	Refer DPIIT Notifications issued from time to time on the said subject.



Sr. No.	Reference to tender document/ section	Description	Query Raised /Clarification Required By Supplier	Answers/Clarifications by NAL
13	Para 8, Pg 3	One Indian Agent can represent only one manufacture and one manufacturer can only authorize only one agent/dealer	<p>Ø The requirement of RFP is not in-line with the procurement policies of DPSUs where procurement action/selection of the manufacturer/vendor on L-1 basis starts after signature of the contract/receipt of purchase order.</p> <p>Ø In order to satisfy this requirement DPSUs need to complete their vendor selection on L-1 basis prior to submission of the bid.</p> <p>Ø The time given for bid submission is not sufficient for establishing the contact with various manufacturers/ OEMs and finalizing the lowest possible price.</p> <p>Ø Further all systems of Avionics suite cannot be manufactured by one OEM. For the ease of submitting the proposal following is proposed:</p> <p>a) For each system of the Avionics suite only one manufacture should be quoted by the Indian partner.</p> <p>b) Each manufacturer can be represented by only one Indian partner</p>	Bidder participates in more than one bid in this bidding process. Participation by a bidder in more than one Bid will result in the disqualification of all bids in which the parties are involved. However, this does not limit the inclusion of the components/sub-assembly/assemblies from one bidding manufacturer in more than one bid.
14	Para 1.14.2,Pg 11	a) The bidder meets the qualification criteria listed in biding documents if any	Ø What are the qualification criteria? Kindly Elaborate.	Refer Chapter 4 & 6 of Tender Document
15		b) Bidder who doesn't manufacture the goods it offers to supply shall	Ø As per this only a MAF is required to be submitted by the bidder which is not in-line with para 8, pg3.	Bidder participates in more than one bid in this bidding process. Participation by a bidder in more than one Bid will result in the disqualification of all bids in which the parties are involved. However, this does not limit the inclusion of the components/sub-assembly/assemblies from one bidding manufacturer in more than one bid.
16	Para 1.15.4	Alternate offers/makes/models would not be considered	<p>Ø Not understood.</p> <p>Ø Change in specification is already mentioned in Para 1.15.3 above.</p>	Not applicable for the said procurement
17	Para 1.16.1	Bid Security	Ø HAL shall be submitting the Bid Security in the form of Indemnity Bond.	EMD is NIL, bidder to submit only bid securing declaration, duly signed and stamped.
18	3 & 90	In case of agents quoting in offshore procurements, on behalf of their principal manufacturers, one agent cannot represent two manufacturers or quote on their behalf in a particular tender enquiry. One manufacturer can also authorize only one agent/ dealer. There can be only one bid from the following:	Ø Please note that the requirement is for a complete Avionics Suite comprising of 20 Systems. No single OEM worldwide caters to all the systems. Hence the solution has to have equipment from more than one OEM. There can be many different probable solutions. Hence the restriction of equipment from one OEM to be proposed only by one bidder will lead to severe limitation in the possible solutions including elimination of fair competition for this program.	Bidder participates in more than one bid in this bidding process. Participation by a bidder in more than one Bid will result in the disqualification of all bids in which the parties are involved. However, this does not limit the inclusion of the components/sub-assembly/assemblies from one bidding manufacturer in more than one bid.
	8 & Note for bidders point c	i) The Principal manufacturer directly or through one Indian agent on his behalf; and	Ø It is therefore advisable to remove this restriction.	
		ii) Indian/foreign agent on behalf of only one principal.		
19	Page 3 Para reference 6	The schedule of Submission of e-Bids	<p>Ø It is requested to extend the Due Date of submission of response by at least additional one 1 month from the date of pre-bid</p> <p>Ø clarifications response from NAL as it will be practically very difficult to prepare detailed response as expected in the Tender till 4 March 2021.</p>	Extended upto 29-Mar-2021 for submission of bid.
20	Page 10 Para reference 6	Where there is no mention of packing, fo	Ø The option of quoting these charges inclusive with equipment price or separately should be left to the Bidder. In case bidder is silent this may be loaded by NAL as per market rate. This will help in making the Bid simpler for both the parties.	CSIR-NAL will not load any charges. The bid will be treated as inclusive of charges.



Sr. No.	Reference to tender document/ section	Description	Query Raised /Clarification Required By Supplier	Answers/Clarifications by NAL
21	Page 28 Para reference 6	High-sea sales delivery-term is not acceptable.	Ø How NAL plans to have WPC items being imported by Bidder who is not WPC Import License holder as majority of the bidders do not have WPC Import License?	High-Sea Sales delivery term is not acceptable. Hence, the bidder has to supply on FOR, CSIR-NAL basis.
22	Page 89 Criteria 3	Financial Standing - under all conditions	Ø Please find attached our MSME Udyog Aadhar Registration Ø Certificate. Please confirm if the condition of Qualification, Criteria 3 will be relaxed for SA Air Works.	As per GOI guidelines. Refer DOPIT
23		Import of WPC Items	Ø Please elaborate, as how NAL plans to have the bidders import the WPC items for which NAL has WPC License; as this will have regulatory and commercial implications which is dependent on your firm and clear response.	High-Sea Sales delivery term is not acceptable. Hence, the bidder has to supply on FOR, CSIR-NAL basis.
24	Bids- 1.32.3	Evaluation of comparison of Bids- 1.32.3	Ø If L1 bid is not from a local supplier, 50% of the order quantity shall be awarded to L1. Thereafter, the lowest bidder among the local suppliers, will be invited to match the L1 price for the remaining 50% quantity, subject to the local supplier 's quoted price which should fall within the margin of purchase preference of 20%– Since some of the items qty are asked in 2 phases as 3 sets and qty as 1 no ie.(Tools and Software to Update the database configuration in LRUs ADCU, EGPWS/TAWS, FMS during flight Tests including technical support & Documents as per section 4.7 Training (including training material) as per section 4.6 Technical Support (Hourly Basis) as per section 4.8 . Technical Support (Supplier shall quote for one visit of one person for 5 working days) Will be invoked on demand only).how is the distribution?	The said tender is open tender, hence bid from non-local supplier is not applicable.

11/2-3-21
Sr. Controller of Stores & Purchase
For and behalf of CSIR

वरिष्ठ भंडार एवं क्रय नियंत्रक
Sr. Controller of Stores & Purchase
सीएसआईआर-राष्ट्रीय वातरिक्ष प्रयोगशालाएं
CSIR-National Aerospace Laboratories
एयरपोर्ट एयरपोर्ट रोड कोडिहली/HAL Airport Road, Kodihalli
बेंगलूरु/Bengaluru-560 017