

TECHNICAL SPECIFICATION for <LRU/SYSTEM Name> for <Platform Name>

Issue/Rev No: 01/00 Date of Release: 8 Feb 2025



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20002		Document	□ Secret			Confidential	
		Classification :	□ Restricted			□ Unrestricted	
Title:					Projec	ct/System :	
					< Proj	ect/System Name>	
TE	CHNIC	AL SPECIFICA	TION		LRU/S	ystem Part No.	
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#### **Disclaimer:**

This document is a guidance document. Applicable section / table rows may be considered. Any additional details may be added. Any not applicable section/ table rows may be deleted. The template is very general and vary with process to process followed by Development Agency. The document may be fine-tuned with the TAA for finalization.

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Amendment History

Issue	Issue	Brief	Change	Affected	Affected	Change
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001		Initial Issue	NA	NA		All
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### List of Tables:

Give the list of all the tables used in the specification

## List of figures :

Give the list of all the figures used in the specification

• <u>Note :</u>

In case any of the sub sections of Section 2.0 are not applicable for a system/ LRU, those sections may be removed and other relevant information may be added.

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#### 1 Introduction

<Give a brief about the background and need for new system design, any predecessor system used earlier for the same purpose, what were the shortcomings of the earlier system etc.>

#### 1.1 Scope

<Mention the Purpose and scope of the specification document with identification of the system. Ex: This specification establishes the broad functional and technical characteristics and design requirements for the <System Name> <Part No.> for use on the Military and Civil variants of the <Platform Name>.

### **1.2 Applicable/Reference Documents**

<All the applicable documents of the system and the standards to which the system should conform to, should be given here along with the document number, issue number & date of issue. Also, Feasibility study report and QR references are to be included here.>

### **1.3 Definitions and Acronyms**

*<Give all the list of Acronyms used in the specification Alphabetically. Any special/non-generic definitions if applicable can be given here>* 

### 2 System Specifications

#### 2.1 Description of the system

<Describe the LRU functionality in brief. Overall responsibilities of the LRU in the context of the next level system. >

### 2.2 System Operational Capability

<Describe LRU functional or operational capabilities in detail including states and modes of operation.>

### 2.3 Interface Specifications

<Interface block diagram depicting other systems /sensors on the aircraft interfacing with the system can be given here>

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#### 2.3.1 Power Supply Interface

<Describe the Power supply requirement and Power consumption budget for the system. If power consumption varies for various modes of operation (like Tx mode, emergency mode etc) the power budget for each mode to be mentioned. >

#### 2.3.2 Bus Interface

<Give ARINC 429, RS 422/232, MIL 1553B, Ethernet details. If a separate Bus ICD exists, reference to Bus ICD may be given here>

#### 2.3.3 Human Machine Interface (HMI)

<If the LRU is required to be operated by pilot/co-pilot, mention the top level requirements and details of various switches, knobs, controls and display along with their required functionality Include a diagram of HMI display, positions of controls, markings etc. >

### 2.3.4 Analog Input Specifications

<Tabulate All Analog voltage/current/frequency signals coming to the system from external environment>

S.No	Signal name	Source	Range	Resolution	Tolerance	Signal Characteristics	Remarks

#### 2.3.5 Analog Output Specifications

<Tabulate all expected Analog voltage/current/frequency signals from the system to the external environment.>

S.No	Signal name	Destination	Range	Resolution	Tolerance	Signal Characteristics	Remarks

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### 2.3.6 Discrete/Digital Input Specifications

<Tabulate all the Discrete/Digital Inputs received by the system from external environment >

S.No	Signal name	Source	Range	Tolerance	Signal Characteristics	Remarks

#### 2.3.7 Discrete/Digital Output Specifications

< Tabulate all the Discrete/Digital outputs sent from the system to external environment >

S.No	Signal name	Destination	Range	Tolerance	Signal Characteristics	Remarks

### 2.3.8 RF Input (Receiver) Parameters Specifications

<Give details of RF Input parameters including the conditions under which the measurements are to be made. Ex: Signal level, bandwidth, Input impedance, VSWR etc.>

### 2.3.9 RF Output (Transmitter) Parameters Specifications

<Give details of RF Output parameters Ex: Power output, antenna feed, plumbing losses on the platform etc >

#### 2.3.10 Other Interfaces

<Describe in brief if any other types of interfaces exist with external environment like; pressure ports, tubes, removable cartridges etc. Also include details of In-Situ loading of the software using JTAG/Ethernet/USB port>

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#### 2.4 System Health check Specifications

<Indicate the requirement of on line and offline health checks for the unit. Mention whether off-line diagnostic facility is required or on line data storing is required for later analysis. Give details of the type duration of data/events to be recorded>

### 2.4.1 PBIT/POST

*<Give Resources to be checked, Time constraint of the PBIT. Mention actions to be taken in case of failures >* 

### 2.4.2 CBIT

*<Give the periodicity, Resources checked, Time constraint of the CBIT. Mention actions to be taken in case of failures >* 

### 2.4.3 IBIT

<Mention Extent of Resources to be checked, Time constraint of the IBIT. Mention actions to be taken in case of failures>

#### 2.5 Memory specification

<Mention the types of memory, their sizes and the expected spare memory capacity for future enhancements>

#### 2.6 Timing requirements

<Mention Timing requirements with reference to system performance/ system response to inputs. i.e maximum iteration time to complete one execution cycle of Input-Process-Output. Mention also the time margins available for future enhancements>

### 2.7 Criticality of the system

<Mention the criticality level of the system i.e. whether the failure of the system results in catastrophic, hazardous, major or minor damages to the aircraft and crew.>

### 2.8 Compliance to standards

<Mention applicable development, testing and documentation standards for Software, firmware and system like RTCA-DO or SAE or ICAO etc.>

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#### 3 Physical characteristics

#### 3.1 Dimensions

<Overall dimension of the LRU should be given with tolerances along with figure>

#### 3.2 Weight

< Mention the weight of the unit with tolerances>

#### 3.3 Mounting

<If mounting tray is used, provide the dimensions and weight of the Mounting tray along with tolerances . Otherwise provide details of mounting provision in the aircraft. This is for determining adequacy of mechanical structure, handles etc.>

#### 3.4 Type of the Connectors

<Mention all the connectors, their type and pin designations.>

#### 3.5 Insulation and Bonding

< Ex: Insulation resistance measured between connector pins & chassis:  $> 10M\Omega$ Bonding resistance measured between any two contacts on the Chassis  $< 100m\Omega >$ 

#### 3.6 Marking

<Nameplate or product marking shall specify

- Name of the equipment with part number
- Name of the manufacturer
- Serial number
- Year of manufacture
- Provision to indicate Hardware and Software Configuration status
- Any other relevant details.>

#### 3.7 Finishing

<Mention Product finish requirements Ex: Black painted matt finish on all external surfaces and conductive chromate conversion coating on all inside surfaces>

#### 4 Growth Potential

<Specify how many additional Inputs, outputs the system can cater for, including spare

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connector pins available. Also mention whether any other interfaces are available in the hardware which are currently unused but may be used in future>

### 5 Reliability, Maintainability and Life

MTBF of the unit shall be MTTR of the unit shall be	_ Hrs at _ Hrs.	°C.
Total Technical Life of the unit	:	Hours.
Storage Life of the unit	:	Years from the date of manufacture.
Total Calendar Life of the unit	:	Years from the date of manufacture, including storage and operation.
Time Between Overhaul (TBO)	:	(If applicable)

### 6 Thermal Specification

<Mention whether any cooling/ heating is required for the system on the platform>

## 7 Environmental and EMI/EMC Requirements

The system shall be used for operation in *<name of the aircraft>* with the flight profile given in Appendix 1. The complete set of mission profiles for the platform are given in Appendix 2. Equipment shall comply Environmental tests as specified in Appendix 3.

< The customization of test severities will be done in QTP/ SOFT document based on Appendix 1&2>

### 8 Packing and Storage

<Mention how the product is required to be packed for transportation and storage.>

### 9 Maintenance Specification

<Mention whether any periodical maintenance is required during storage or operation of the system like, calibration, change of gasket, alignment, lubrication, tuning, pressurization etc. Also mention whether the modules will be interchangeable or any adaptation is required before using them in another system of the same part number on the same platform.>

### **10** Product Deliverables

#### 10.1 Delivery Set list :

<Provide the Delivery Set list including the LRU, mating connectors, cables, antennas and any other accessories. Exact part number and make **need not** be mentioned>

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#### **10.2 Deliverable Documentation**

<Mention the documentation including User hand book, maintenance manual, D-level/ I-level repair manual etc>

## **10.3 Test and Support Equipment**

<If any ground equipment is required to be delivered, ex: rugged laptop for field loading of data/ downloading of flight data, in-situ programming tools, ATEs etc, give details about the tools.>

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### **APPENDIX 1**

#### **PLATFORM CHARACTERISTICS**

<Mention all the applicable parameters in the table as per applicable platform. This information will be used for deciding severities and applicability of environmental, EMI/EMC and Power supply tests. The table given below is to be filled if the system is for use in Jet aircraft. Use respective tables for other platforms like propeller aircraft, helicopter or aircraft external store.>

Sl.		Parar	neter		Value/ Response			
no								
1	Maximun	n Operational Altitude						
	Maximun	n and minimum operatin						
	Maximun	n and minimum Storage t						
2	Max fligh	t speed, rate of ascent an	d rate of descent					
3	d = Whet	her afterburner present?	(y/n)					
	R = Vecto	or distance from center of	f engine exhaust plane to					
	materiel	center of gravity (in mts)						
	$\theta$ = Angle	e between R vector and en	ngine exhaust vector (aft	along				
	engine ex	khaust centerline), degree	es (For 70 °< $\theta \le 180$ ° us	se 70 °)				
	Dc = Engi	ine core exhaust diamete	r (mts)					
	Dt= Engi	ne fan exhaust diameter	(mts)	,				
	VC = Eng	ine Core exhaust velocity	(without afterburner) if	n m/sec				
	$v_1 = \text{Elign}$	t dynamic prossure in kN	/ m <sup>2</sup>	n/sec				
4	Vector di	stance of the unit from th	/ III2 ne gun muzzle (D)					
1	Gun stan	doff distance (h)						
	Depth pa	rameter (R <sub>s</sub> ) i.e. normal	distance from unit to airo	craft				
	skin.							
	Gun calib	ore (C)						
	Firing rat	te (F <sub>1</sub> ) in Rounds/ sec						
	Blast ene	rgy of the gun (E)						
	No. of gu	ns closely spaced, firing t	ogether (N)					
5	Enduran	ce of the aircraft (Maximu	um Continuous flight dur	ation)				
6	Is arresto	or landing expected in the	e platform?					
7	Are there	e fuel/ hydraulic fluid/ er	igine oil lines near unit					
	installati	on/storage/ handling loc	ation? Are Cleaning fluid	S,				
	solvents,	de-icers, coolants etc like	ely to come in contact wit	th unit?				
8	Unit Mou	nting orientation on the	platform? (Attach a diagr	am)				
9	Is Arresto	or landing expected for th	ne aircraft ? If yes, what a	re the				
	shock levels?							
10	Is unit water tightness required?							
11	1 Is the unit exposed to direct sunlight?							
12	Does the	platform have ASW capa	bility?					
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13	Is the unit Aircraft external or safety critical or used for Army/	-
	Navy platforms?	
14	Unit Functionality required during Change from Ground (External	
	Power supply) to Aircraft internal Power supply (50 ms)?	
15	Unit Functionality at 16V required?	
16	Unit Functionality at 12V required?	
17	Is lightning Protection required for the equipment?	
	If yes,	
	Is the aircraft body metallic or composite?	
	Is the unit well-protected/ partially protected/ moderately	
	exposed/ in severe EM environment?	
	Is the unit shielded or unshielded?	
	Is the unit aperture/ aperture-resistive coupled with the aircraft?	

## Appendix 2

<Provide various mission profiles of the platform **relevant to the system**. These may include take off, landing and taxiing characteristics, cruising, maneuvers like banking angles, vertical flight, inverted flight, sidewise or backward flight (for helicopters), parking on ship, maximum durations for each of these maneuvers etc>

## Appendix 3

### **QUALIFICATION TEST PROFILE**

< The table below lists all the tests as per MIL standards. Depending on the type of the equipment, mounting details and user requirements, some of the tests in the following table may be removed or some others may be added>.

Sl.	Name of	fthe		Standard, Method/ Clause and Procedure			
No.	Test						
1	Low pressure (altitude)			MIL-STD-810G Method 500.5 Procedure-II			
2	High temperatureMIL-STD-810G Method 501.5 Procedure			lethod 501.5 Procedure I & II			
3	Low temperature			MIL-STD-810G Method 502.5			
4	Thermal Shock			MIL-STD-810G Method 503.5 Procedure I-C			
5	Contamination by Fluids			MIL-STD-810G Method 504.1 Procedure I			
6	Solar radiation		MIL-STD-810G Method 505.5 Procedure II				
7	Blowing Rain/ Rain Drip Test		MIL-STD-810G Method 506.5 Procedure I and III				
8	Humidity		MIL-STD-810G Method 507.5 Procedure II				
	energy Dry Checked Dry Anneyword Dry Dec No. (Decument number						

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9	Fungus	MIL-STD-810G Method 508.6			
10	Salt fog	MIL-STD-810G Method 509.5			
11	Blowing dust and sand	MIL-STD-801G Method 510.5 Procedure I and II			
12	Explosive Atmosphere	MIL-STD-801G Method 511.5 Procedure I			
13	Immersion	MIL-STD-810G Method 512.5 Procedure I			
14	Acceleration (Functional, Structural, Crash safety)	MIL-STD-810G Method 513.6 Procedure I, II and III			
15	Vibration	MIL-STD-810G Method 514.6			
16	Shock (Functional, Transit drop, Crash hazard, Bench Handling, Arrestor landing)	MIL-STD-810G Method 516.6 Procedure I, IV, V, VI, VIII			
17	Gun fire shock	MIL-STD-810G Method 519.5			
18	Combined Humidity Altitude and Temperature (CATH)	MIL-STD-810G Method 520.3			
15	Icing/ Freezing rain	MIL-STD-810G Method 521.3			
16	Aircraft Power supply variation tests	MIL-STD-704F Section 4.2			
17	Lightning protection test (Indirect effects)	DO-160F Waveform set A3G33			
18	CE101	MIL-STD-461E Section 5.4			
19	CE 102	MIL-STD-461E Section 5.5			
20	CS101	MIL-STD-461E Section 5.7			
21	CS 109	MIL-STD-461E Section 5.11			
22	CS 114	MIL-STD-461E Section 5.12			
23	CS 115	MIL-STD-461E Section 5.13			
24	CS116	MIL-STD-461E Section 5.14			
25	RE 101	MIL-STD-461E Section 5.15			
26	RE 102	MIL-STD-461E Section 5.16			
27	RS 101	MIL-STD-461E Section 5.18			
28	RS 103	MIL-STD-461E Section 5.19			
29	RS 105	MIL-STD-461E Section 5.20			

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