

ELECTRONIC TURRET LOG BOOK (ETLB)

Bid / RFP Reference No: CVRDE/MMG/ENQ/22ATT028/2021-22

Part I – General Information and Instructions

1. **Pre- bid Conference:** **Not Applicable**

2. **Place of Opening of the Bids:** **CVRDE, Avadi, Chennai – 600 054.**

The Bidders may depute their representatives, duly authorized in writing, to attend the Technical bid opening on the due date and time. Such authorized representatives should also carry their acknowledgement (generated through e-procurement module) as a proof for their online bid submission. Technical bid opening date will not be postponed due to non-presence of your representative.

3. **Technical Bid:** Along with the Technical bid, the following **applicable** documents are to be furnished by the bidder:-

- i. Scanned Copy of documents like EMD / Proof of registration with DRDO/ MOD/ DGS &D / NSIC etc., and ECS details
- ii. Signed and scanned copy of Tender Acceptance Letter, Price bid undertaking.
- iii. Scanned Copy of Proforma for End User Certificate for Export License.
- iv. Scanned copy of Technical Literature / Catalogue & Brochures
- v. Scanned copy of PAN details / GST registration certificate.
- vi. Any other scanned copy or hard copy of documents as mentioned in the RFP / Appendix-A.

4. **Clarification Regarding Contents of the RFP:** A prospective bidder who requires clarification regarding the contents of the bidding documents shall notify to the Buyer in writing about the clarifications sought not later than 14 (fourteen) days prior to the date of opening of the Bids. Copies of the query and clarifications by the purchaser will be sent to all prospective bidders who have received the bidding documents from the lab and would be posted on the website in case of advertised tender enquiry.

5. Indian firms need to quote only in Indian Rupees. ~~An Indian firm can quote in FE on behalf of their OEM only if they are either a 100% subsidiary of the OEM or an Indian Agent of the foreign OEM in accordance with their agency agreement. The firms claiming to be:~~

~~a) A 100% subsidiary would be required to produce documentary evidence in support of their claim along with their Techno-Commercial bid failing which their bid would be disqualified.~~

~~b) An agent of foreign OEM, for submitting the offer on behalf of OEM, would be required to produce a copy of their agency agreement with their principals and a copy of registration/enlistment with DRDO/Ministry of Defence/ DGS&D as an Indian agent, if registered/enlisted, along with their Techno-Commercial bid, failing which their bid would be disqualified. It would be mandatory for an Indian agent to get registered/ enlisted with DRDO/ Ministry of Defence/ DGS&D as an Indian agent of OEM prior to evaluation of their Price bid, failing which their bid also would be disqualified.~~

6. **Validity of Bids:** The Bids should remain valid for **180** days from the last date of submission of the Bids.

7. **Modification and Withdrawal of Bids:** A bidder may modify or withdraw his Bid after submission provided that the written notice of modification or withdrawal is received by the Buyer prior to deadline prescribed for submission of bids. A withdrawal notice may be sent by fax, however, it should be followed by a signed confirmation copy to be sent by post and such signed confirmation should reach the purchaser not later than the deadline for submission of bids. No bid shall be modified after the deadline for submission of bids. No bid may be withdrawn in the interval between the deadline for submission of bids and expiration of the specified period of bid validity. **As per the provisions given in the e-procurement module, the modifications and withdrawal of bids may be followed.**

8. Earnest Money Deposit: Bidders are required to submit a Bid Security Declaration in the enclosed format. The Bid will be considered invalid if Bid Security Declaration is not submitted.

9 Clarification Regarding Contents of the Bids: During evaluation of bids, the Buyer may, at his discretion, ask the bidder for clarification on his Bid. The request for clarification will be given in writing. No clarification on the initiative of the bidder will be entertained after opening of bid.

10. Rejection of Bids: Canvassing by the Bidder in any form, unsolicited letter and post-tender correction may invoke summary rejection with forfeiture of EMD. Conditional tenders will be rejected. Non-compliance of applicable General Information will disqualify your Bid.

11. Unwillingness to Quote: Bidders unwilling to quote should ensure that intimation to this effect reaches before the due date and time of opening of the bid, failing which the defaulting bidder may be de-registered for the range of items in this RFP, as per the policy in vogue.

12. Bidders must submit Quotation pertaining to themselves only except in cases covered under Para 11 above.

13. Bids of debarred / blacklisted firms will not be considered for evaluation.

Part II – Standard Terms and Conditions

The Bidder is required to give confirmation of their acceptance of the Standard Terms and Conditions of the RFP mentioned below which will automatically be considered as part of the Contract concluded with the successful Bidder as selected by the Buyer. Failure to do so may result in rejection of the Bid submitted by the Bidder.

1. **Effective Date of the Contract :** : In case of placement of a supply order, one month from the date of supply order would be deemed as effective date (or) as agreed by both the parties. This one month includes intimation about the readiness of the order along with a copy of the order to the successful bidder, submission of Performance cum Warranty Bond and order acceptance letter by the successful bidder. In case a contract is to be signed by both the parties, the Contract shall come into effect on the date of signatures of both the parties on the Contract (Effective Date) or as agreed by both the parties. The deliveries and supplies and performance of the services shall commence from the effective date of the Contract
2. **Law:** The Contract shall be considered and made in accordance with the laws of the Republic of India and shall be governed by and interpreted in accordance with the laws of the Republic of India.
3. **Arbitration:** All disputes or differences arising out of or in connection with the Contract shall be settled by bilateral discussions. Any dispute, disagreement or question arising out of or relating to the Contract or relating to product or performance, which cannot be settled amicably, shall be resolved by arbitration in accordance with the following applicable provision:
 - a) For Central and State PSEs: The case of arbitration shall be referred to the Department of Public Enterprises for the appointment of sole arbitrator by the Secretary to the Government of India in-charge of the Department of Public Enterprises. The Arbitration and Conciliation Act, 1996 shall not be applicable to arbitration under this clause.
 - b) For Defence PSUs: The case of arbitration shall be referred to the Secretary Defence (R&D) for the appointment of arbitrator(s) and proceedings.
 - c) For other Firms: Any dispute, disagreement or question arising out of or relating to the Contract or relating to product or performance, which cannot be settled amicably, shall be resolved by arbitration in accordance with either of the following provisions:

“The case of arbitration may be referred to respective CFA or a person appointed by him who will be sole arbitrator and the proceedings shall be conducted in accordance with procedure of Indian Arbitration and Conciliation Act, 1996.”

Or

“The case of arbitration may be referred to International Centre for Alternative Dispute Resolution (ICADR) for the appointment of arbitrator and proceedings shall be conducted in accordance with procedure of Indian Arbitration and Conciliation Act, 1996.”

Or

“The case of arbitration may be conducted in accordance with the rules of Arbitration of the International Chamber of Commerce by one or more arbitrators appointed in accordance with the said rules in India. However, the arbitration proceedings shall be conducted in India under Indian Arbitration and Conciliation Act, 1996.”

4. **Penalty for Use of Undue influence:** The Seller undertakes that he has not given, offered or promised to give, directly or indirectly, any gift, consideration, reward, commission, fees, brokerage or inducement to any person in service of the Buyer or otherwise in procuring the Contract or forbearing to do or for having done or forborne to do any act in relation to the obtaining or execution of the Contract or any other contract with the Government of India for showing or forbearing to show favour or disfavour to any person in relation to the Contract or any other contract with the Government of India. Any breach of the aforesaid undertaking by the Seller or anyone employed by him or acting on his behalf (whether with or without the knowledge of the Seller) or the commission of any offers by the Seller or anyone employed by him or acting on his behalf, as defined in Chapter IX of the Indian Penal Code, 1860 or the Prevention of Corruption Act, 1986 or any other Act enacted for the prevention of corruption shall entitle the Buyer to cancel the contract and all or any other contracts with the Seller and recover from the Seller the amount of any loss arising from such cancellation. A decision of the Buyer or his nominee to the effect that a breach of the undertaking had been committed shall be final and binding on the Seller. Giving or offering of any gift, bribe or inducement or any attempt at any such act on behalf of the Seller towards any officer/ employee of the Buyer or to any other person in a position to influence any officer/ employee of the Buyer for showing any favour in relation to this or any other contract, shall render the Seller to such liability/ penalty as the Buyer may deem proper, including but not limited to termination of the contract, imposition of penal damages, forfeiture of the Bank Guarantee and refund of the amounts paid by the Buyer.

5. **Agents / Agency Commission:**

The Seller confirms and declares to the Buyer that the Seller has not engaged any individual or firm, whether Indian or foreign whatsoever, to intercede, facilitate or in any way to recommend to the Government of India or any of its functionaries, whether officially or unofficially, to the award of the contract to the Seller; nor has any amount been paid, promised or intended to be paid to any such individual or firm in respect of any such intercession, facilitation or recommendation. The Seller agrees that if it is established at any time to the satisfaction of the Buyer that the present declaration is in any way incorrect or if at a later stage it is discovered by the Buyer that the Seller has engaged any such individual/firm, and paid or intended to pay any amount, gift, reward, fees, commission or consideration to such person, party, firm or institution, whether before or after the signing of this contract, the Seller will be liable to refund that amount to the Buyer. The Seller will also be debarred from entering into any contract with the Government of India for a minimum period of five years. The Buyer will also have a right to consider cancellation of the Contract either wholly or in part, without any entitlement or compensation to the Seller who shall in such an event be liable to refund all payments made by the Buyer in terms of the Contract along with interest at the rate of 2% per annum above (i) Prime Lending Rate of State Bank of India for Indian bidders, and (ii) London Inter Bank Offered Rate (LIBOR) for the foreign bidders. The applicable rates on the date of opening of bid shall be considered for this. The Buyer will also have the right to recover any such amount from any contracts in vogue with the Government of India.

Or

The Seller confirms and declares in the Techno-Commercial bid that they have engaged an agent, individual or firm, for performing certain services on their behalf. The Seller is required to disclose full details of any such person, party, firm or institution engaged by them for marketing of their equipment in India, either on a country specific basis or as a part of a global or regional arrangement. These details should include the scope of work and responsibilities that have been entrusted with the said party in India. If there is non-involvement of any such party then the same also be communicated in the offers specifically. The information is to be submitted as per the format at DRDO.SA.01. Without prejudice to the obligations of the vendor as contained in various parts of this document, appointment of an Agent by vendors will be subjected to the following conditions:

- a) Details of all Agents will be disclosed at the time of submission of offers and within two weeks of engagement of an Agent at any subsequent stage of procurement.

b) The Seller is required to disclose termination of the agreement with the Agent, within two weeks of the agreement having been terminated.

c) Buyer /MoD reserves the right to inform the Seller at any stage that the Agent so engaged is not acceptable whereupon it would be incumbent on the Seller either to interact with Buyer / MoD directly or engage another Agent. The decision of Buyer / MoD on rejection of the Agent shall be final and be effective immediately.

d) All payments made to the Agent 12 months prior to tender submission would be disclosed at the time of tender submission and thereafter an annual report of payments would be submitted during the procurement process or upon demand of the Buyer / MoD.

e) The Agent will not be engaged to manipulate or in any way to recommend to any functionaries of the Govt of India, whether officially or unofficially, the award of the contract to the Seller or to indulge in corrupt and unethical practices.

f) The contract with the Agent will not be a conditional contract wherein payment made or penalty levied is based, directly or indirectly, on success or failure of the award of the contract.

g) On demand, the Seller shall provide necessary information/inspection of the relevant financial documents/ information, including a copy of the contract(s) and details of payment terms between the Seller and the Agent engaged by him.

h) If the equipment being offered by the Seller has been supplied /contracted with any organization, public/ private in India, the details of the same may be furnished in the technical as well as commercial offers. The Sellers are required to give a written undertaking that they have not supplied/is not supplying the similar systems or subsystems at a price lower than that offered in the present bid to any other Ministry/ Department of the Government of India and if the similar system has been supplied at a lower price, then the details regarding the cost, time of supply and quantities be included as part of the commercial offer. In case of non disclosure, if it is found at any stage that the similar system or subsystem was supplied by the Seller to any other Ministry/Department of the Government of India at a lower price, then that very price, will be applicable to the present case and with due allowance for elapsed time, the difference in the cost would be refunded to the Buyer, if the contract has already been concluded.

Following details are also to be submitted in the Techno-Commercial bid:

- i) Name of the Agent
 - ii) Agency Agreement between the Seller and the agent giving details of their contractual obligation
 - iii) PAN Number, name and address of bankers in India and abroad in respect of Indian agent
 - iv) The nature and scope of services to be rendered by the agent and
 - v) Percentage of agency commission payable to the agent
6. **Access to Books of Accounts:** In case it is found to the satisfaction of the Buyer that the Bidder/Seller has violated the provisions of use of undue influence and / or employment of agent to obtain the Contract, the Bidder/Seller, on a specific request of the Buyer, shall provide necessary information/ inspection of the relevant financial documents/information/Books of Accounts.
7. **Non-disclosure of Contract Documents:** Except with the written consent of the Buyer/ Seller, other party shall not disclose the Contract or any provision, specification, plan, design, pattern, sample or information thereof to any third party.

8. **Handling of Classified Information by Indian Licensed Defence Industry:** Any classified document/ information/ equipment being shared with Indian Licensed Defence Industries will be protected/ handled to prevent unauthorized access as per provisions of Chapter 5 of Security Manual for Indian Licensed Defence Industries issued by MoD (Department of Defence Production).
9. **Withholding of Payment:** In the event of the Seller's failure to submit the Bonds, Guarantees and Documents, supply the stores/goods and conduct trials, installation of equipment, training, etc. as specified in the Contract, the Buyer may, at his discretion, withhold any payment until the completion of the Contract.
10. **Liquidated Damages:**
“The Buyer may deduct from the Seller, liquidated damages / penalty at the rate of 0.25% per week or part thereof, of the basic cost of the delayed stores, which the Seller has failed to deliver/ carry out within the period, as agreed, in the contract. LD can also be levied on the Seller on the basic cost of the stores supplied done partially within the scope of the order/ contract that could not be put to use due to late delivery / execution of the remaining stores. The maximum quantum of LD would be 10% of the total cost of contract value (excluding taxes & duties).”
11. **Termination of Contract:** The Buyer shall have the right to terminate the Contract in part or in full in any of the following cases :-
- i) The store/service is not received/rendered as per the contracted schedule(s) and the same has not been extended by the Buyer.
 - ii) The delivery of store/service is delayed due to causes of Force Majeure by more than 6 months provided Force Majeure clause is included in the contract and the delivery period has not been extended by the Buyer.
 - iii) The Seller is declared bankrupt or becomes insolvent.
 - iv) The Buyer has noticed that the Seller has violated the provisions of Para 4 and/or Para 5 above to obtain the Contract.
 - v) As per decision of the Arbitration Tribunal.
12. **Notices:** Any notice required or permitted by the Contract shall be written in English language and may be delivered personally or may be sent by FAX or registered pre-paid mail/ airmail, addressed to the last known address of the party to whom it is sent.
13. **Transfer and Sub-letting:** The Seller has no right to give, bargain, sell, assign or sublet or otherwise dispose of the Contract or any part thereof, as well as to give or to let a third party take benefit or advantage of the Contract or any part thereof without written consent of the Buyer.
14. **Use of Patents and other Industrial Property Rights:** The prices stated in the Contract shall be deemed to include all amounts payable for the use of patents, copyrights, registered charges, trademarks and payments for any other Industrial Property Rights. The Seller shall indemnify the Buyer against all claims from a third party at any time on account of the infringement of any or all the rights mentioned in the previous paragraphs, whether such claims arise in respect of manufacture or use. The Seller shall be responsible for the completion of the supplies including spares, tools, technical literature and training aggregates irrespective of the fact of infringement of the supplies or any or all the rights mentioned above.
15. **Amendments:** No provision of the Contract shall be changed or modified in any way (including this provision) either in whole or in part except when both the parties are in written agreement for amending the Contract.

16. Taxes and Duties

i) **In respect of Foreign Bidders: Not Applicable.**

ii) **In respect of Indigenous Bidders**

a) **General**

- Bidders must indicate separately the relevant GST likely to be paid in connection with delivery of completed goods specified in RFP. In absence of this, the total cost quoted by them in their bids will be taken into account in the ranking of bids.
- If a Bidder is exempted from payment of any GST up to any value of supplies from them, he should clearly state that no such duty/ tax will be charged by them up to the limit of exemption which they may have. If any concession is available in regard to rate/ quantum of any duty / tax, it should be brought out clearly. In such cases, relevant certificate will be issued by the buyer later to enable the seller to obtain exemptions from taxation authorities.
- Any changes in levies, GST levied by Central/ State/ Local governments ~~such as excise duty, VAT, Service tax, Octroi/entry tax, etc~~ on final product upward as a result of any statutory variation taking place within contract period shall be allowed reimbursement by the Buyer, to the extent of actual quantum of such duty/ tax paid by the Seller. Similarly, in case of downward revision in any such duty/tax, the actual quantum of reduction of such duty/tax shall be reimbursed to the Buyer by the Seller. All such adjustments shall include all reliefs, exemptions, rebates, concession etc., if any, obtained by the Seller. Section 64-A of Sales of Goods Act will be relevant in this situation.
- Levies, GST levied by Central/ State/ Local governments ~~such as excise duty, VAT, Service tax, Octroi/entry tax, etc~~ on final product will be paid by the Buyer on actuals, based on relevant documentary evidence, wherever applicable. Taxes and duties on input items will not be paid by Buyer and they may not be indicated separately in the bids. Bidders are required to include the same in the pricing of their product.
- TDS as per Income Tax Rules will be deducted and a certificate to that effect will be issued by the Buyer.

b) **Customs Duty**

- a) Custom Duty Exemption Certificate (CDEC) will not be provided for imported items.

Note : As per Government of India procedure in vogue, the following concessional rate of taxes are permissible towards supply of equipments/goods for Research and Development activities of DRDO, Ministry of Defence.

- (i) Notification No. 45/2017 Central Tax (Rate) Dt. 14th Nov 2017
- (ii) Notification No. 47/2017 Integrated Tax (Rate) Dt. 14th Nov 2017
- (iii) Notification No. G.O.No. 161, Commercial Taxes and Registration (B1) Dt. 14th Nov 2017 vide No.II(2)/CTR/917 (e-5)/2017.

c) **Concessional GST** certificate will not be extended for **jobs and services**.

17. **Denial Clause** -“Variations in the rates of statutory levies within the original delivery schedule will be allowed if taxes are explicitly mentioned in the contract/ supply order and delivery has not been made till the revision of the statutory levies. Buyer reserves the right not to reimburse the enhancement of cost due to increase in statutory levies beyond the original delivery period of the supply order/ contract even if such extension is granted without imposition of LD.”

18. **Pre-Integrity Pact Clause:** **Not Applicable.**

19. **Undertaking from the Bidders:** An undertaking will be obtained from the Bidder/firm/company/vendor that in the past they have never been banned/debarred for doing business dealings with Ministry of Defence/Govt. of India/ any other Govt. organization and that there is no enquiry going on by CBI/ED/ any other Govt. agency against them.

Part III – Special Terms and Conditions

The Bidder is required to give confirmation of their acceptance of Special Terms and Conditions of the RFP mentioned below which will automatically be considered as part of the Contract concluded with the successful Bidder as selected by the Buyer. Failure to do so may result in rejection of Bid submitted by the Bidder.

1. **Apportionment of Quantity: Not Applicable**

2. **Performance Security Bond:**

i) Indigenous Bidder:

The Seller may be required to furnish a Performance Security Bond by way of Fixed Deposit Receipt / Bank Guarantee (BG, in favour of **“The Director, CVRDE, Avadi, Chennai – 54”** for a sum equal to **3% (As per office memorandum bearing no. F.9/4/2020 – PPD dated 12.11.2020 a Bank Guarantee / Fixed deposit)** of the Contract value (including taxes). The Bond submitted by way of Fixed Deposit Receipt/ Bank Guarantee (BG) should be valid up to 60 days beyond the date of completion of all contractual obligations. The specimen of bond can be provided on request.

“The Performance Security Bond will be forfeited by the Buyer, in case the conditions regarding adherence to delivery schedule and/or other provisions of the Contract/ SO are not fulfilled by the Seller.”

ii) Foreign Bidder: **Not Applicable**

3. **Option Clause: Not Applicable**

4. **Repeat Order Clause: Not Applicable**

5. **Tolerance Clause: Not Applicable**

6. **Purchase Preference Clause: Not Applicable**

7. **Transfer of Technology (ToT): Not Applicable**

8. **Permissible Time Frame for Submission of Bills:** To claim payment (part or full), the Seller shall submit the bill(s) along with the relevant documents within **30 / 45** days from the completion of the activity/supply.

9. **Payment Terms :**

a) **For Indigenous Seller :**

The payment will be made as per the following terms:-

Milestone Payment / Schedule	Activities to be completed	% of Payment
Mile stone - I T0 + 8 months	Delivery of 1 st prototype, automated test equipment (ATE), Rugged data logger cum debugger , lambda power supplies Acceptance of 1 st prototype using ATE	20 % payment with relevant taxes will be paid
Mile stone - II T0 + 12 months	Completion of ESS, QT, EMI/EMC and acceptance of 2 nd unit (R&QA shall clear ESS, QT and EMI/EMC report)	20 % payment with relevant taxes will be paid
Mile stone – III T0 + 18 months	Development and acceptance of 3 units using ATE * Delivery of documents	60% payment with relevant taxes will be paid

*** Special terms: E-TLB shall be integrated with AGMS**

If AGMS is developed and available before PDC of ETLB development :

- E-TLB shall be accepted after integration and evaluation with AGMS on bench and on tank
- If AGMS is not available not developed E-TLB shall be accepted using ATE and payment shall be made.
- Vendor has to support integration and evaluation of E-TLB with AGMS on bench and on tank, if AGMS is available with in the warranty period of E-TLB (3 years from the date of acceptance of unit)

b) **For Foreign Seller : Not Applicable**

10. **Advance Payments: Not Applicable**

11. **Part Supply: Applicable as per delivery schedule**

12. **Mode of Payment**

- a) **For Indigenous Sellers:** It will be mandatory for the Bidders to indicate their bank account numbers and other relevant e-payment details to facilitate payments through ECS/EFT mechanism instead of payment through cheque, wherever feasible.
- b) **For Foreign Seller: Not Applicable**

13. **Documents to be Furnished for Claiming Payment**

i) **Indigenous Sellers:**

The payment of bills will be made on submission of the following documents by the Seller to the Buyer:

- a) Ink-signed copy of Contingent Bill.
- b) Ink-signed copy of Commercial Invoice / Seller's Bill.
- c) Bank Guarantee for Advance, if applicable.
- d) Guarantee/ Warranty Certificate.
- e) Details for electronic payment viz. Bank name, Branch name and address, Account Number, IFS Code, MICR Number (if these details are not already incorporated in the Contract).
- f) Original copy of the Contract and amendments thereon, if any.
- g) Income Tax PAN No along with the Xerox copy of the PAN card
- h) Copy of GST registration certificate
- i) Self certification from the Seller that the GST received under the contract would be deposited to the concerned taxation authority. In this regard, extant Government orders will be applicable as communicated by DRDO HQ.
- j) Material Test Certificate/Certificate of Conformance from OEM if applicable.
- k) Any other document/ certificate that may be provided for in the Contract.

ii) **Foreign Sellers: Not Applicable**

14. **Exchange Rate Variation (ERV) Clause: Not Applicable**

15. **Force Majeure Clause:**

- i) Neither party shall bear responsibility for the complete or partial non-performance of any of its obligations, if the non-performance results from such Force Majeure circumstances as Flood, Fire, Earth Quake and other acts of God as well as War, Military operations, blockade, Acts or Actions of State Authorities or any other circumstances beyond the parties control that have arisen after the conclusion of the present contract.

- ii) In such circumstances the time stipulated for the performance of an obligation under the Contract is extended correspondingly for the period of time commensurate with actions or circumstances and their consequences.
- iii) The party for which it becomes impossible to meet obligations under the Contract due to Force Majeure conditions, is to notify in written form to the other party of the beginning and cessation of the above circumstances immediately, but in any case not later than 10 (Ten) days from their commencement.
- iv) Certificate of a Chamber of Commerce (Commerce and Industry) or other competent authority or organization of the respective country shall be considered as sufficient proof of commencement and cessation of the above circumstances.
- v) If the impossibility of complete or partial performance of an obligation lasts for more than 6 (six) months, either party hereto reserves the right to terminate the Contract totally or partially upon giving prior written notice of 30 (thirty) days to the other party of the intention to terminate without any liability other than reimbursement on the terms provided in the agreement for the goods received.

16. Buy-Back: Not Applicable

17. Export License: The Bidder is required to furnish full details and formats of End Use Certificate required for obtaining export clearance from the country of origin. This information will be submitted along with Techno-Commercial bid. In the absence of such information, it would be deemed that no document is required from the Buyer for export clearance from the country of origin.

18. Free Issue of Material (FIM): Not Applicable

19. Terms of Delivery

- **For Foreign Bidder: Not Applicable**
- **For Indigenous Bidder:** The delivery of goods shall be on F.O.R (**CVRDE, Avadi, Chennai-54**) basis.

20. Packing and Marking Instructions:

- a) The Seller shall provide packing and preservation of the equipment and spares/goods contracted so as to ensure their safety against damage in the conditions of land, sea and air transportation, transshipment, storage and weather hazards during transportation, subject to proper cargo handling. The Seller shall ensure that the stores are packed in containers, which are made sufficiently strong. The packing cases should have provisions for lifting by crane/fork lift truck. Tags with proper marking shall be fastened to the special equipment, which cannot be packed.
- b) The packing of the equipment and spares/goods shall conform to the requirements of specifications and standards in force in the territory of the Seller's country.
- c) A label in English shall be pasted on the carton indicating the under mentioned details of the item contained in the carton. The cartons shall then be packed in packing cases as required.
 - i) Part Number :
 - ii) Nomenclature :
 - iii) Contract annex number :
 - iv) Annex serial number :
 - v) Quantity contracted :
- d) One copy of the packing list in English shall be inserted in each cargo package, and the full set of the packing lists shall be placed in Case No.1 painted in a yellow colour.

- e) The Seller shall mark each package with indelible paint in English language as follows:-
- i) Contract No. _____
 - ii) Consignee _____
 - iii) Port / airport of destination _____
 - iv) Ultimate consignee _____
 - v) Package No. _____
 - vi) Gross/net weight _____
 - vii) Overall dimensions/volume _____
 - viii) The Seller's marking _____
- f) If necessary, each package shall be marked with warning inscriptions: <Top>, <Do not turn over>, category of cargo etc.
- g) Should any special equipment be returned to the Seller by the Buyer, the latter shall provide normal packing, which protects the equipment and spares/goods from damage or deterioration during transportation by land, air or sea. In such case the Buyer shall finalize the marking with the Seller.

21. Inspection Instructions:

- i) Raw material inspection
 - ii) Part inspection
 - iii) Stage/Subsystem inspection
 - iv) Pre Delivery Inspection-
 - v) Factory Acceptance Test
 - vi) Post Delivery inspection on receipt of store
 - vii) **Inspection Authority:** The Inspection will be carried out by a representative of the Lab/Estt duly nominated by the Director, CVRDE.
- } **As per QT/AT document**

22. Franking Clause:

- i) **In Case of Acceptance of Store(s):** "The fact that the goods have been inspected after the delivery period and passed by the Inspecting Officer will not have the effect of keeping the contract alive. The goods are being passed without prejudice to the rights of the Buyer under the terms and conditions of the Contract".
- ii) **In Case of Rejection of Store(s):** "The fact that the goods have been inspected after the delivery period and rejected by the Inspecting Officer will not bind the Buyer in any manner. The goods are being rejected without prejudice to the rights of the Buyer under the terms and conditions of the contract."

23. Claims:

- i) The quantity claims for deficiency of quantity and/ or the quality claims for defects or deficiencies in quality noticed during the inspection shall be presented within 45 days of completion of inspection.
- ii) The Seller shall collect the defective or rejected goods from the location nominated by the Buyer and deliver the repaired or replaced goods at the same location, within mutually agreed period, under Seller's arrangement without any financial implication on the Buyer.

24. Warranty:

The Seller will declare that the goods, stores articles sold/supplied shall be of the best quality and workmanship and new in all respects and shall be strictly in accordance with the specifications and particulars contained/mentioned in the contract. The Seller will guarantee that the said goods/stores/articles would continue to conform to the description and quality for a period of, **3 years** from the date of acceptance / installation of the said goods stores/articles. If during the aforesaid period of **3 years**, the said goods / stores are discovered not to conform to the description and quality aforesaid, not giving satisfactory performance or have deteriorated, the Buyer shall be entitled to call upon the Seller to rectify the goods/stores/articles or such portion thereof as is found to be defective by the Buyer within a reasonable period without any financial implication on the Buyer.

- 24.1** Warranty of the Equipment would be extended by such duration of downtime. Record of the down time would be maintained by user in logbook
- 24.2** If the defective Part/Subsystem/System needs to be taken by the SELLER to their premises to rectify defective Goods, SELLER shall provide a Bank Guarantee of the equipment amount to the BUYER to cover for the time taken to rectify the defective Goods. If the defective Part/Subsystem/System needs to be replaced. The time taken to process and submit the Bank Guarantee shall not be added to the downtime provided such time does not exceed seven 7 days.
- 24.3** The SELLER also undertakes to diagnose, test, adjust, calibrate and repair/replace the goods/equipment arising due to accidents by neglect or misuse by the operator or damage due to transportation of the goods or any other reason attributable to the BUYER, during the Warranty period, at the cost mutually agreed to between the BUYER and the SELLER. The SELLER shall intimate the assignable cause of the failures.
- 24.4** SELLER hereby warrants that necessary service and repair back up during the warranty period of the equipment shall be provided by the SELLER and he will ensure that the downtime is within 30% of the Warranty period.
- 24.5** SELLER shall associate Technical Personnel of Maintenance Agency and QA Of BUYER during warranty repair and shall also provide the details of complete defects, reasons and remedial actions for defects.
- 24.6** If a particular equipment/goods fails frequently and/or, the cumulative Down time exceeds 30% of the warranty period, the complete equipment shall be replaced free of cost by the SELLER within a stipulated period of 45 days of receipt of the notification from the BUYER duly modified/upgraded through design improvement in all equipment supplied/yet to be supplied and Engineering Support Package (ESP) supplied and yet to be supplied. Warranty of the Replaced Equipment would start from the date of acceptance after JRI by the BUYER/date of installation and commissioning.
- 24.7** In case the complete delivery of ESP is delayed beyond the period stipulated in this Contract, then SELLER undertakes that the warranty period for the Goods/stores shall be extended to that extent.
- 24.8 Warranty Bond** for an amount of 3 percent of the contract value should be submitted from the seller prior to return of performance security bond by the buyer (submitted earlier by the seller as per Part III Sl.No 2 (i)). In case of Indian bidder, Warranty Bonds may be accepted in the form of Fixed Deposit Receipt or a Bank Guarantee. For foreign bidders, It may be accepted in the form of Bank Guarantee or Stand-by Letter of Credit. It should remain valid for a period of sixty days beyond the date of completion of all warranty obligations. Warranty Bond would be returned to the Seller on successful completion of warranty obligations, under the contract

25. Product Support:

The Seller agrees to provide Product Support for the stores, assemblies/sub-assemblies, fitment items, Spares and consumables, Special Maintenance Tools (SMT)/Special Test Equipments (STE) / Softwares for a minimum period of **30** years including **36** Months of warranty period after the delivery / end date of contract period.

26. Annual Maintenance Contract (AMC) Clause: Not Applicable

27. Price Variation (PV) Clause: Not Applicable

28. Intellectual Property Rights (IPR): The rights of intellectual property, developed under this contract shall be the property of Government of India

PART IV- Vendor Qualification Criteria

Firms who are registered against their respective domain in the relevant branches viz., mechanical, electrical, electronics etc., related to the said supply & services can submit their bids in their appropriate area. If the firms registration differs with the title of tender or does not relevant to the nature of tender, such firms bid will not be considered and liable for rejection. For manpower contracts vendors exclusively registered for the said purpose only with the entertainment.

Note : While submitting the undertaking for end exemption during the tendering process vendors are requested to ensure that they are directly related with the title of the tender whether it is manufacturing, supply service etc.

Since e-TLB is highly critical system vendor has to qualify for the following

Sl.N o.	Description	Compliance/Not Compliance	Remarks
1.	<p><u>Hardware:</u></p> <ul style="list-style-type: none">• Vendor shall have developed customized processor boards based on microcontroller/microprocessor and FPGA and delivered to any of DRDO lab/DPSUs. It shall support mil CAN, USB and Ethernet interfaces in addition to UART, analog and discrete signals.• The electronic unit which consists of customized processing boards shall have qualified for ESS (as per MIL-STD-2164A), QT (as per JSS55555:2012 Rev3) and EMI/EMC (as per MIL-STD-461F/G), power supply compatibility test (MIL-STD-1275D)• PCB Bare Board Test: Bare Board Test as per MIL-PRF-55110G• PCB design: Vendor has to perform SI, PI, thermal, EMI/EMC analysis, MTBF, signal		<p>Vendor has to submit the copy of the acceptance of the unit by the concerned DRDO lab/DPSUs.</p> <p>CVRDE shall confirm about micro-controller/micro-processor and FPGA, interfaces (mil CAN, USB, Ethernet) used in the board and qualification tests performed from the concerned DRDO lab/DPSUs.</p> <p>If any deviation found between the information from the concerned DRDO lab/DPSUs and vendor compliance, vendor shall be disqualified in technical evaluation and concerned vendor's commercial bid shall not be opened.</p> <p>Vendor has to submit Group 'B' certificate along with micro-sectioning reports</p> <p>Vendor has to submit test reports</p>

	<p>compatibility analysis</p> <ul style="list-style-type: none"> • Mil grade components shall be used for the development of the board • Conformance of workmanship • MTBF/Life estimation; vendor shall conduct MTBF for the board 		<p>Vendor shall use mil grade components (including connectors) Vendor shall use automotive/AEC – Q100 level2 components if mil grade component is not available at all. The same shall be confirmed by producing COC.</p> <p>Should confirm to IPC-J STD-001D requirements and IPC-A-610D for acceptability</p> <p>Vendor shall submit the MTBF/Life estimation test report.</p>
2.	<p><u>Software:</u></p> <p>Vendor has to compliance with the processes, procedures and guidelines given in the “DRDO Standard for Software Development (DSSD)” standard for software development. CVRDE shall share DSSD document</p> <p><u>Software documentation:</u></p> <p>Vendor has to prepare and submit the software documents in appropriate time as per “DSSD”.</p>		<p>Vendor shall have developed the software as per IEEE 12207:2008. Standard. It shall be confirmed by CVRDE from the concerned DRDO lab/DPSUs.</p> <p>Vendors should have submitted software documents as per IEEE 12207: 2008. Standard.</p> <p>If any deviation found between the information from the concerned DRDO lab/DPSUs and vendor compliance, vendor shall be disqualified in technical evaluation and concerned vendor’s commercial bid shall not be opened.</p>
3.	<p>In case of any failure during qualification testing (QT), the vendor shall carryout necessary design modifications and implementation on the QT unit and other units, and shall ensure successful completion of qualification tests.</p>		
4.	<p>Product support: Vendor has to provide product support for spares, consumables, assemblies/sub-assemblies.</p>		<p>Vendor has to maintain the stockpile of components for product</p>

	STE,SMT, software for a period of 30years, which includes 3 years warranty period.		support .
5.	Documentation: Vendor has to submit following documents: MIL-STD-2164A test reports JSS55555:2012 Rev3 test reports MIL-STD-461F/G test reports MIL-STD-1275D test reports ATP document PDR document CDR document Comprehensive documentation for ESP and MET		
6.	<p>Trial support: Vendor shall support integration and functional evaluation of e-TLB on tank at CVRDE for a period of 5 days</p> <p>Vendor shall support DRDO, User performance and trial evaluation of e-TLB at MFFR, Suratgarh for a period of 15 days</p> <p>Vendor shall support DRDO, User performance and trial evaluation of e-TLB at PFFR, Pokhran for a period of 15 days</p>		<p>Vendor has to nominate a hardware and a software engineer for supporting tank integration</p> <p>Vendor has to nominate a hardware and a software engineer for supporting performance and trial evaluation e-TLB at firing ranges.</p>
7.	<p>Training: vendor has to provide training on following for a period of 5 days for CVRDE officers/Staffs at free of cost:</p> <ul style="list-style-type: none"> • Training on schematics of e-TLB and ATE • Training on device drivers, BSP and application software of e-TLB and ATE • Training on microcontroller , FPGA, flash, mil-CAN, Ethernet and USB • Training on ATE • Training on troubleshooting • Training on periodic maintenance 		Vendor has to nominate a hardware and a software engineer to conduct training.

Part V – Essential Details of Items Required

1. **Schedule of Requirements:** List of items required are as follows :-

Sl. No.	Description of article(s) / Service(s)	Qty Reqd
1.	Electronic Turret Log Book (ETLB)	5 nos.
2.	Automated Test Equipment	1 no.
3.	Harnesses – 4 nos	5 sets
4.	Rugged data logger cum debugger	2 nos
5.	Lambda power supply (0-40VDC, 40A)	5 nos
6.	ESS, QT & EMI / EMC	1 job

2. **Technical Details:**

- a) **Specifications/Drawings:** Refer Appendix 'A'
- b) Technical details with technical parameters : Refer Appendix 'A'
- c) Requirement of training/on-the-job training : **Applicable**
- d) Requirement of installation/commissioning : **Not Applicable**
- e) Full Inspection details as per provisions made in Para 21 of Part III of the RFP
- f) Requirement of Technical Documentation : **Refer Appendix 'A'**
- g) Nature of assistance required after completion of warranty as per provisions made in Para 24 of Part III of the RFP : **Not Applicable**
- h) Requirement of pre-site inspection : **Not Applicable**
- i) Any other details, as considered necessary : **for SI.No 1 & 2 NRE cost is applicable**

3. Bidders are required to furnish clause by clause compliance of specifications bringing out clearly the deviations from specification, if any. Bidders are advised to submit compliance statement for the technical parameters separately in the following format along with the Techno-Commercial Bid.

Para of RFP specifications (item-wise)	Specifications of item offered	Compliance to RFP specifications – whether Yes / No	Remarks (In case of non-compliance, deviation from RFP to be specified in unambiguous terms. In case of compliance, catalogue/brochure reference, if available, to be indicated)

4. **Delivery Period:** Expected Delivery period for supply of items/rendering of services would be **18 months** from the Effective Date of the Contract. Please note that the Contract can be cancelled unilaterally by the Buyer in case items are not received within the contracted delivery period. Extension of contracted delivery period with/ without LD clause will be at the sole discretion of the Buyer. **For detailed delivery schedule please refer payment terms.**

5. **INCOTERMS for Delivery and Transportation (for Foreign Bidders only):** **NA**

6. **Consignee details:**

- Name: The Director
- Address: CVRDE, Avadi, Chennai-600 054, Tamil Nadu
- Contact details:

(i) For Technical Queries :- Contact Person

Shri LAKSHMINARAYANA KS, SCIENTIST 'E', Phone No. 044 – 26364167,

E-mail : lakshminarayana.ks@cvrde.drdo.in

(ii) For Commercial Queries :- Contact Person

Shri. K .SIVAKUMAR, SCT'F', Phone No. 044 – 26364010, E-mail : sivakumar.k@cvrde.drdo.in

Part VI – Evaluation Criteria of Bids

1. **Evaluation and Acceptance Process:** The bid will be considered and selected based on instructions contained in Part I of the RFP for further evaluation of bids as per sequence given below:
 - i) **Techno-Commercial Bid Evaluation:** Bids will be evaluated based on vendor qualification requirement as per Part IV of RFP, if applicable, and bids of the qualified bidders will be considered for further evaluation as mentioned in Part V of the RFP.
2. **Price Bid Evaluation:** The Price bid of those bidders whose Techno-Commercial bid (if applicable) has been accepted will be opened and comparative statement will be prepared. The best acceptable bid will be decided upon the lowest price quoted by the particular Bidder as per the Price Format given at Part VII of the RFP **(Lot wise)**. The comparison of the bids would be done on the principle of the total cash outgo from procuring entity's pocket. The financial bids of the qualified bidders would be compared on the basis of the total cost (FOR destination basis – consignment to buyers premises) of the deliverables and services including statutory levies, taxes and duties on final product/service which are to be paid extra as per actual
3. **Procedure for Cost Comparison:** The basis for comparison of cost in different situations would be as follows:
 - a) If competition is only among Indian bidders, the financial implication should be considered on the basis of FOR prices at destination, **including** the GST levied by Central / State / Local government ~~such as excise duty, VAT, service Tax, octroi / entry tax etc.~~, on final product payable by the DRDO Lab/Estt after availing various benefits of exemptions from taxes/duties as applicable to DRDO.
 - b) ~~In import cases, all the foreign quotes will be brought to a common denomination in Indian Rupees by adopting the exchange rate as BC selling rate of the State Bank of India on the date of the opening of Price Bids.~~
 - c) ~~If competition is among foreign bidders, the basis for comparison should be the landed price at the destination (designated port) in accordance with Para 19 of Part III of the RFP.~~
 - d) ~~If competition is amongst Indian and foreign bidders, the CIP/CIF cost quoted by the foreign bidders would be the basis for comparison with the basic cost (FOR) offered by Indian bidders, after off loading the applicable taxes and levies. The term Indian bidders would also include DPSUs and Indian Ordnance Factories.~~
 - e) ~~The Buyer reserves the right to evaluate the offers received by adopting Discounted Cash Flow (DCF) method with a discounting rate in consonance with the existing Government borrowing rate. DCF method would be used for evaluation of bids in the following cases:~~
 - i) ~~To compare different payment terms, including advance payments and progressive stage payments so as to bring them to a common denomination for determining lowest bidder.~~
 - ii) ~~To deal with cases where entering into AMC for period in excess of one year is a part of the contract for evaluation of the bid.~~

- f) ~~**Net Present Value (NPV):** NPV method is a variant of DCF method which may be used for evaluation of tenders. The NPV of a contract is equal to the sum of the present values of all the cash flows associated with it. When choosing among the various bids, the bid with the lowest NPV will be selected. The following formula may be used for calculating NPV of a bid:~~

$$\text{NPV} = \sum_{t=0}^N \frac{A_t}{(1+i)^t}$$

~~Where~~

~~A_t : Expected cash flow at time t~~

~~t : Time of expected cash flow~~

~~N : Total period~~

~~i : Discount rate~~

- g) ~~Discount rate to be used under the method is to be the Prime Lending Rate of State Bank of India on the Date of Opening of Price Bids.~~
- h) If there is a discrepancy between the unit price and the total price that is obtained by multiplying the unit price and quantity, the unit price will prevail and the total price will be corrected accordingly.
- i) If there is a discrepancy between words and figures, the amount in words will prevail for calculation of price.
3. The best acceptable bid will be considered further for placement of the Contract after price negotiation as decided by the Buyer.

Part VII – Price Bid Format

Price bid to be uploaded as per the prescribed format (i.e BoQ_xxxx.xls) provided in the E-Procurement Module

Note: All fields of BOQ should be entered. Taxes are to be indicated as per Govt order in force.

Concessional CGST will be extended for equipments and goods.

Concessional CGST is not applicable for jobs and services.

If GST is not applicable, necessary exemption certificate is to be uploaded by the firm alongwith the techno commercial bid.

COMPLIANCE SHEET**Part I : Technical Specification**

Sl. No.	Name / Description of Item(s) / Service(s)	Qty
1.	Electronic Turret Log Book (ETLB)	5 nos.
2.	Automated Test Equipment	1 no.
3.	Harnesses – 4 nos	5 sets
4.	Rugged data logger cum debugger	2 nos
5.	Lambda power supply (0-40VDC, 40A)	5 nos
6.	ESS, QT & EMI / EMC	1 job

Part II: Techno-Commercial Terms

SI No	Description of the item	Complied /Not Complied
1	Validity of bid - 180 days from the date of tender opening.	
2	a) Performance Security Bond : 3% of the contract value as per SI.No. 2 (i) of Part III of the RFP. (For PSUs : Indemnity Bond is acceptable in lieu of FDR/BG) b) Advance BG as per SI.No 9 (a) of Part III	
3	Payment terms: as per SI .No. 9 (a) of Part III of the RFP.	
4	Warranty period : 3 years, Warranty bond: 3% as per SI.No 24.8 of Part III of RFP	
5	LD Clause as per SI. No. 10 of Part II of the RFP.	
6	Registration status / EMD b) If you are registered firm, please mention the registration details, also attach a copy of the registration certificate	
7	Delivery period-Within 18 months from the effective date of contract.	
8	Acceptance of General Terms and conditions as per Part II of RFP	
9	Acceptance of Special Terms and conditions as per Part III of RFP	

(Authorized Signatory)
Seal

Please note that duly filled in Appendix 'Z' signed by Authorized signatory with seal to be enclosed along with technical bid.

Document Approval Sheet (Electronically Approved Through PLM)

	<p>Number: ATP-002121 Version: A.7 Date: 2021/02/13 12:11:34 IST</p>	 
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ATP-002121 A.7 Approved

QT/AT Document for e-TLB

Approval Information:

Name/Role:	Vote:	Date:	Signature:
PALANIVEL G (A00540 / RNQA)	Approve	2021/02/22 10:11:46 IST	



QT / AT Document

Electronic Turret Log Book (e-TLB)

Document No.CV/FCS/ATP/e-TLB

Revision No. : 1.0

With Date : 20.01.21

Issue No. : 1.0

No of Pages :

ATP-002121 A.7 Approved

Prepared by

Reviewed by

(K S Lakshminarayana)
Sct 'E'

(V JAYASRI)
Sct 'F'

Approved by

AD(FCS)

Issue authorized by R&QA

QT/AT DOCUMENT

- 1. Introduction:** Electronic turret log book (e-TLB) which records the status of fire control system related parameters. Scope of the current system (e-TLB) shall be limited to interfacing with newly developed AGMS. After successful completion of this activity, in NGMBT e-TLB shall be interfaced with other tank electronic systems like Gun Control System, Auto Loader, Advanced Weapon Station, Situation Awareness System, Active Protection System, Battery Health Management System and Navigation System.

The data from various electronic systems from a tank are collected, sorted, and stored in e-TLB. This data can be accessed by using a external rugged laptop via Ethernet port. Also, the e-TLB will run a maintenance scheduler at the background that will correlate the system data stored in the e-TLB and shall generate the maintenance alert to the crew.

- 2. Specification:** As Per Appendix - 'A'
- 3. Technical description:** As Per Appendix - 'A'
- 4. List of drawings:** NA
- 5. List of deliverables:** As per Appendix – 'B'
- 6. Component level (mechanical):** NA
- 7. Component level (electrical & electronics equipments):** NA
- 8. Sub system level**

S.No	Description	Remarks
8.1	Ease of Assembly	Applicable
8.2	Form Fit Clearance	Applicable
8.3	Interchange ability	NA
8.4	Bench level test	
8.5	Functional Test	
8.6	Performance Test	
8.7	Endurance Test	
8.8	EMI/EMC Test	
8.9	Environmental test	
8.10	ESS Tests(PCB Screening Tests)	As per Appendix – '3'
8.11	Power supply test	NA
8.12	Reliability test	NA



	MTBF/ Life Estimate Test	
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9. SYSTEM LEVEL

S.No	Description	Remarks
9.1	Fitment checks	Applicable
9.2	Functional checks	As per Appendix – 'D'
9.3	Performance checks	
9.4	Endurance Test	NA
9.5	Environmental test	As per Appendix – '4'
9.6	EMI/EMC test	As per Appendix – '4'
9.7	Reliability Test MTBF/Life Estimation	Applicable
9.8	Trial evaluation (As required)	As per Appendix – 'D'

ATP-002121 A 7 Approved

OVERALL BRIEF INSPECTION REPORT (OBIR)

Document no: CV/FCS/7.3/e-TLB Division: FCS Date: 22/01/21
 Component/Subsystem/System Nomenclature : Electronic turret log book (e-TLB)
 Component/Subsystem/System Drawing No : NA
 Component/Subsystem/System serial No : Shall be provided after receipt of system
 Acceptance criterion : Refer relevant section of QT / AT

Sl. No	DECRPTION	PARAMETER	OBSERVATIONS Accepted / Acceptable with deviation /Rejected	REMARKS
1	COMPONENT LEVEL	Raw Material Specification	NA	
2		Process Specification	NA	
3		Visual inspection	NA	
4		Dimensional Inspection	NA	
5		Confirmation Tests	NA	
6	SUB SYSTEM LEVEL	Ease of Assembly	NA	
7		Form Fit Clearance		
8		Interchangeability		
9		Bench level test		
10		Functional Test		
11		Performance Test		
12		Endurance Test		
13		EMI/EMC Test		
14		Environmental test		
15		ESS Tests(PCB Screening test)		
16	Power supply test	NA		
17	Reliability test/MTBF/ Life Estimate Test	NA		
18	SYSTEM LEVEL	Fitment checks	NA	
19		Functional checks	As per Appendix D	
20		Performance checks	As per Appendix D	
21		Endurance Test	NA	
22		ESS tests	As per Appendix 3	
23		Environmental test	As per Appendix 4	
24		EMI/EMC test	As per Appendix 4	
25		Reliability Test MTBF/Life Estimation	NA	
26		Trial evaluation (As required)	NA	

Over all Observations & Remarks: **Accepted / Acceptable with deviation / Rejected**

Designer

R&QA

R&QA Rep.

Addl Director-Division

Addl. Director R&QA

TEMPLATE FOR INSPECTION REPORT

Description : Electronic turret log book (e-TLB) Parameter:
 Component/Assembly Nomenclature: Electronic turret log book (e-TLB)
 Work centre: CVRDE
 Component /Assembly Drawing No : NA Date:
 Component /Assembly Unit serial No: Shall be provided after receipt of system

Title of the test
 (Ref: QT / AT Document No./ Test procedure No.)

Test instruments used : Shall be provided after receipt of system
 Test set-up calibration details : Shall be provided after receipt of system
 Acceptance criterion : Refer relevant section of QT / AT

Parameter	Max value with units	Min value with units	Measured value	Remarks

Observations: Passed /Not passed

Designer Work centre R&QA Rep
 Date: Date: Date:

ATP-002121 A Approved

1. SCREENING TESTS PROCEDURE FOR ASSEMBLED PCB WITH COTS COMPONENTS (As per CEMILAC Directive No. 81/2003)

a. High Temperature Storage (Stabilization Bake) Test

Title of Test	Test Details	Requirements
High Temperature Storage (Stabilization Bake Test)	As per the Test Number 22 of JSS 50101, after introduction of PCBs, increase the chamber temperature to +85°C with tolerance +5°C/-0°C. Expose the assembled PCB for 24 Hours continuously at +85°C	Visual Examination and Functional checks at ambient temperature. Record failure observation, if any

Note: Incase of failure, Repair/Replace components as required using fresh components. The new components must undergo stabilization Bake test before assembly & Retest as per a.

b. Thermal Shock Test

Title of Test	Test Details	Requirements
Thermal Shock Test	As per Test Number 20 of JSS 50101: Low Temperature: -40°C with tolerance of +0°C/-5°C High Temperature: +85°C with tolerance of +5°C/-0°C Period of Exposure: 30 Minutes Transfer Time : 2 Minutes No of Cycles : 10 Operation : OFF Condition	PCB assembly must be free from any visual damage or distortions namely cracking and delaminating of finishes. Cracking and crazing of embedded and encapsulating components, opening of thermal seals and case seams, leaking of filling materials, rupturing or cracking of hermetic seals and changes in electrical characteristics due to mechanical displacement

		or rupture of conductors or of insulating materials
Visual Examination	On Completion of 10 Cycles carryout the visual examination using magnifying glass with magnification factor of 30 for detection of failure	
Electrical Measurements	Carryout Performance checks as per the ATP	

Note: In case of failure, analyze the defects in consultation with Certification/ Quality Assurance Agency Failed Component(s) shall be replaced and the new components shall undergo stabilization bake and thermal shock before assembly repeat, visual examination and performance check

c. Burn in Test

Title of Test	Test Details	Requirements
Burn-In Test	<ol style="list-style-type: none"> 1) PCB Shall be placed in a chamber. All the arrangements shall be made externally to carry out Functional checks on the PCB at every Five hours period. This constitutes one cycle of 5 Hrs 2) The Temperature of the chamber shall be raised to maximum rated operating temperature (55°C), the populated PCB is designed to perform with tolerance of +5°C/-°C 3) PCB shall be maintained at this temperature continuously for 48 Hours in Power ON Condition 4) In case of failure, the component(s) shall be replaced by components which have undergone and passed high temperature storage and thermal shock before assembly and continue the test for remaining hours. If the failure occurs after the 46th/47th/48th hour, expose the PCB for further 3 hours to confirm the adequacy of the repair work 5) On completion of the Burn-In test switch of the Chamber 6) Take out the PCB assembly for conducting visual examination. PCB assembly shall be free from any visual damage or distortion stipulated at 2 and 4 above 7) Carry out the performance checks as per the ATP on the PCB 	Visual Examination and Functional checks at ambient temperature. Record failure observation, if any

d. Post Burn-In

Subject the PCB assembly for complete performance check as per the ATP document. If the PCB assembly cannot be tested independently insert it in the system / test rig and check for the performance. Any non-conformity found during functional check are to be recorded for further analysis and initiate appropriate corrective action

e. Marking

The assembled PCB on passing the above test shall be marked suitably for ease of identification to avoid mixing up of screened and unscreened PCBs

f.Storage

Preserve the screened PCB assembly (Duly marked for Identification) in anti-static pouches safely and controlled environment for further integration with the equipment.

g.Record

Keep a record of all stage inspection and performance check on the PCB identified with its serial number for later verification and traceability

2.LABORATORY PERFORMANCE CHECKS.

Performance Checks will be as per ATP(Which involves bench testing with ATE). The test Equipment has to be developed and to be ready before the 1st LRU ready for testing.

3. ENVIRONMENTAL SCREENING TESTS (AS PER MIL-STD-2164A)**Vibration - Temperature Cycling - Vibration:**

Sl. No.	TEST NAME	PARAMETER & DESCRIPTION	ACTION
01	Vibration	1. Vibration Spectrum Density profile as per FIG.1. 2. Duration 5 minutes/axis in all 3 axis	1. Equipment ON and continuous performance checks.
02	Temperature Cycling	1. Ten cycles as per profile in FIG.2. 2. Last Four cycles shall be defect free 3. Rate of change of temperature not less than 5°C/min	1. Equipment 'ON' During the test 2. Performance Check Last 30 minutes at 55 and -20 degree Celsius of each cycle
03	Vibration	1. Vibration Spectrum Density profile as per FIG.1. 2. Duration 5 minutes/axis	1. Equipment ON and continuous performance checks

		in all 3 axis	
04	Final Visual / Physical and Functional Tests.	1. During visual examination Test, check for any physical damages and record the observations.	Complete Performance checks at ambient conditions.

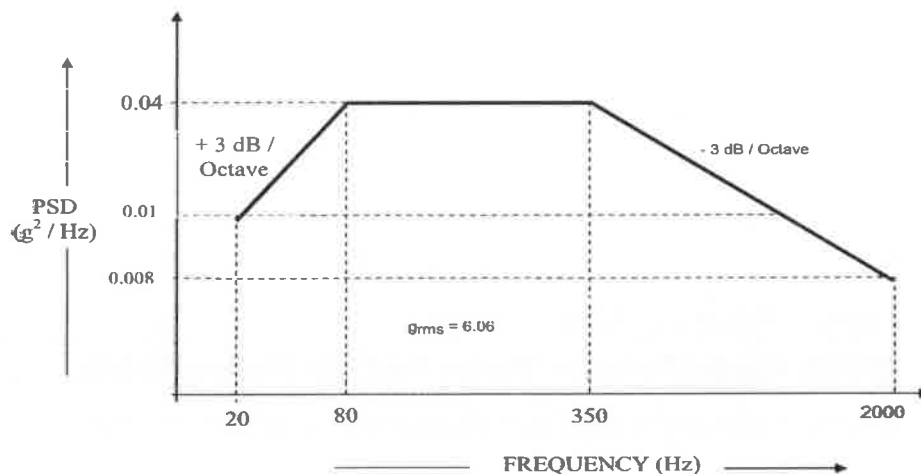


Figure-1: ESS – Random Vibration Test Profile

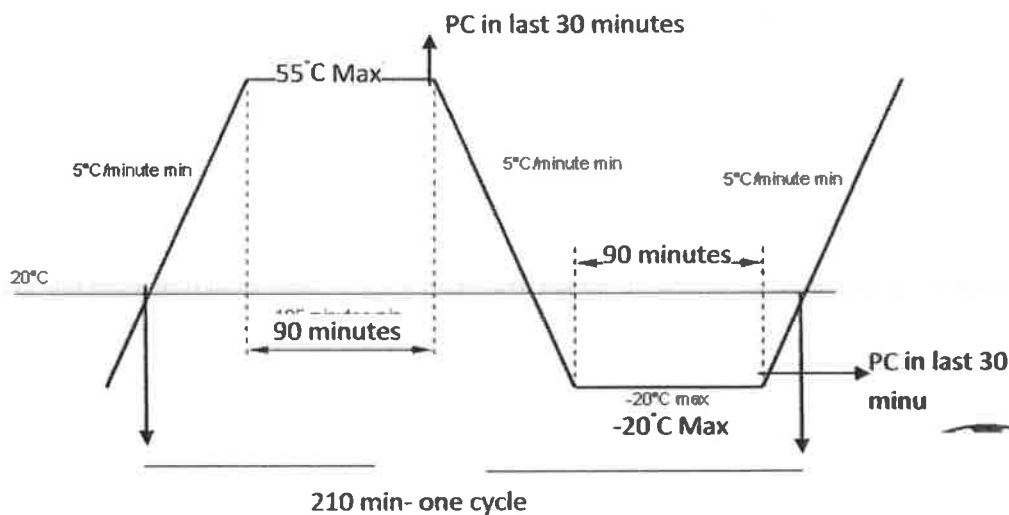


Figure-2: ESS - Thermal Cycling Test Profile

1. QUALIFICATION TESTS

One no. of E-TLB unit should undergo Qualification test procedures as given below:

a. EMI/EMC TESTS

The following tests are to be conducted as per Mil STD- 461F, applicable for Ground vehicles, Army. Tests to be done for Individual unit, as system and as installed in tank .

- 1) CE 102: Conducted Emissions, Power Leads, 10 kHz to 10 MHz.
- 2) CS 101: Conducted Susceptibility, Power Leads, 30 Hz to 150 kHz.
- 3) CS 114: Conducted Susceptibility, Bulk Cable Injection, 10 kHz to 200 MHz.
- 4) CS 115: Conducted Susceptibility, Bulk Cable Injection, Impulse Excitation.
- 5) CS 116: Conducted Susceptibility, Damped Sinusoidal Transients, Cables and Power Leads, 10 kHz to 100 MHz.
- 6) RE 102: Radiated Emissions, Electric Field, and 10 kHz to 18 GHz.
- 7) RS 103: Radiated susceptibility , Electric field 2 MHz to 40 GHz.

b. ENVIRONMENTAL QUALIFICATION TESTS TEMPLATE FOR ARJUN MBT LRUs (As per JSS 55555:2012 Rev3)

Srl No.	Type of Test	Severities / Brief of the Test		
01	Vibration 			

Srl No.	Type of Test	Severities / Brief of the Test			
		Sweep rate: 1 Octave/min			
02	Shock	Performed on Three Perpendicular Axis with Half Sine Pulse			
	M*	Category of Item	Acceleration (g)	Pulse Duration (ms)	Nos of Impacts in each
		Mounted on Ordnance	150	15 - 20	3 in + direction 3 in - direction
		Other Articles	15	10 - 15	3 in + direction 3 in - direction
		To be followed by Visual Inspection and Performance Checks			
03	High Temperature M*	JSS 55555, Test No 17, Procedure 6, Condition K (L2J Clause)		<u>Operation</u> <ul style="list-style-type: none"> Temp: $55 \pm 3^{\circ}\text{C}$ for 16 hrs. Functional checks during Last 30 minutes. 	
				<u>Storage</u> <ul style="list-style-type: none"> Raise temp to $85 \pm 3^{\circ}\text{C}$ and maintain for 16 hrs Recovery 2 to 4 hrs followed by Performance checks 	
		JSS 55555, Test No 25, Procedure 1 (L3 Clause)		<u>Solar Radiation</u> NA	
04	Damp Heat M*	JSS 55555, Test No 10 (L2J Clause)		<ul style="list-style-type: none"> Temp: $40 \pm 2^{\circ}\text{C}$ with RH: $93 \pm 5\%$ for 16hrs. Functional checks during Last 30 min / Last one Hour. Recovery 2 to 4 hrs followed by Performance 	

Srl No.	Type of Test	Severities / Brief of the Test	
			checks.
05	Low Temp M*	JSS 55555, Test No 20, Procedure 4, Condition J (L2J Clause)	<ul style="list-style-type: none"> • Temp: -20 ± 3 °C for 16 hrs. • Functional checks during Last 30 min of 16th Hour. • Recovery 2 to 4 hrs followed by Performance checks.
06	Rapid Temperature Cycle M*	JSS 55555, Test No 22, Procedure 1 (L2J Clause)	<ul style="list-style-type: none"> • 3 Cycles:- <ul style="list-style-type: none"> (i) 55 ± 3 °C and RH not more than 30% for 3 hrs. (ii) Drop Temp to -20 ± 3 °C then maintain for 3 hrs. (iii) Change of Temp shall be within 15 min (iv) Functional checks during Last 30 min of 3rd Cycle. (v) At the end of 3rd cycle the UUT removed from cold chamber and subjected for recovery. • Recovery 2 hrs followed by Performance checks.
07	Dust M*	JSS 55555, Test No 14 (L2J Clause)	<ul style="list-style-type: none"> • Temp 40 ± 3 °C RH $\leq 50\%$, exposed to steam of dust laden air for 1 hr. • Visual and Functional checks anytime during the test. • Recovery 2-4 hrs followed by Visual and Performance checks.

Srl No.	Type of Test	Severities / Brief of the Test	
08	Tropical Exposure M*	JSS 55555, Test No 27, Condition C (L2J Clause)	<ul style="list-style-type: none"> • 14 Cycles / 28 cycles (for Pilot /Advance Samples) Acceptance:- (i) Initial Temp 20 ± 5 °C. (ii) Raise Temp to 35 ± 2 °C, RH 95% over a period of 3hrs. (iii) Duration of 12 hrs to be maintained. (iv) Back to Initial Temp in 03 hrs. (v) Duration of 6 hrs to be maintained. • Visual and Functional checks during first 02 hrs of 35 °C period of 7th, 14th, 21st and 28th cycles. • Visual checks and Functional checks during last 30 minutes of 14th and 28th cycles. • Recovery 2-4 hrs followed by Visual and Performance checks.
09	Mould growth (Fungus) M*	JSS 55555, Test No 21 (L2J Clause)	<ul style="list-style-type: none"> • Duration 28 days. • To be visually observed with 10^X Magnification immediately after taking out of chamber. • Recovery 2-4 hrs followed by Performance checks.
10	Corrosion (Salt)	<u>Salt</u> JSS 55555 Test No 9	<ul style="list-style-type: none"> • 03 Consecutive Cycles:-

Srl No.	Type of Test	Severities / Brief of the Test	
	M*	Procedure 2 (L3 Clause)	(i) Salt Spray for 2 hrs. (ii) Storage in Temp 35 ± 2 °C, RH:90-95% for 22 hrs <ul style="list-style-type: none"> • UUT removed from chamber after 3rd cycle and examined for corrosion and deterioration of metal parts, finishes, materials and components • Recovery 2-4 hrs followed by Visual and Performance checks.
11	Contamination M*	JSS 55555, Test No 6 (for Pilot or Advance Sample) (L2J Clause)	<ul style="list-style-type: none"> • Duration 48 hrs Temp 50 °C. • Recovery to attain temperature stability followed by Visual and Performance checks
12	Drop M*	JSS 55555, Test No 13, Test condition F (for Pilot or Advance Sample) (L2J Clause)	<ul style="list-style-type: none"> • Free fall from 1000 mm height in a concrete floor. 5 no of Drops. • Performance Checks after test
13	Bump M*	JSS 55555, Test No 5 (for Pilot or Advance Sample) (L2J Clause)	<ul style="list-style-type: none"> • 25 g @4000 \pm 10 bumps with 6 ms pulse duration • Performance Checks after test

M* - Mandatory test for all Units

1.0 VISUAL AND DIMENSION INSPECTION

Sr. no.	TEST	EXPECTED RESULT	TEST RESULT	REMARKS
1.	Visual inspection of electronic turret log book (e-TLB)	Check for any visual/physical damages		
2.	Check for dimension of electronic turret log book (e-TLB)	The dimension shall be finalized during CDR		

2.0 HARDWARE TEST

Electronic turret log book (e-TLB) unit shall be connected to the automated test equipment (ATE) of e-TLB. ATE shall generate analog signals, discrete signals, CAN bus signals, Ethernet signals, and other interface signals. These signals shall be similar to signals generated from the turret electronic systems in the Tank. e-TLB shall be connected to the ATE through circular connector.

ATE shall provide the power supply and necessary signals for e-TLB. Once the e-TLB has been powered ON, GUI based simulator in the ATE shall be used to test the following:

1. Serial Link Test.
2. Analog Inputs Test.
3. Discrete Inputs Test.
4. CAN Link Test
5. Ethernet Interface Test.
6. Data Log Test.

After completion of above mentioned tests, e-TLB shall be checked for the data log details. It shall be downloaded using Ethernet and analyzed using GUI based software loaded in the laptop.

2.1 SERIAL LINK TEST

The ATE shall initiate the serial link test by simulating RS 485 signals and transfer the data to e-TLB. Once e-TLB receives the data it starts storing the same, and updates the hours of

operation, alerts crew for maintenance of the system if it reaches the threshold. The status of each system shall be monitored by connecting the e-TLB to a laptop

Note: The various serial links to be tested are as follows:

- RS485 Link.
- UART Link.

2.2 ANALOG INPUT TEST

ATE shall generate 8 analog signals to simulate the analog signals of turret electronic systems. Simulated analog signals shall be applied to e-TLB. The voltage levels, frequency of operation, signal shapes shall be finalized during CDR. The analog signals stored in the e-TLB shall be tested using GUI based software stored in the laptop.

2.3 DISCRETE INPUT TEST

ATE shall generate 16 discrete signals to simulate the turret electronic system discrete signals. Simulated discrete signals shall be applied to e-TLB. The voltage levels shall be finalized during CDR. The discrete signals stored in the e-TLB shall be tested using GUI based software stored in the laptop.

2.4 CAN LINK TEST

In order to test the CAN bus of the e-TLB unit, a CAN bus analyser shall be used. The ATE shall generate the CAN bus signals, and the same shall be transferred to e-TLB. ATE shall simulate CAN bus signals of multiple sub-systems of tank turret, the same shall be checked at e-TLB using CAN bus analyzer.

2.5 ETHERNET INTERFACE TEST

The Ethernet interface of the e-TLB unit shall be tested using ATE. The user will set the remote IP address for ATE. The e-TLB will have a predefined static IP address. The ATE will ping on the IP address of the e-TLB unit. The accurate functioning of the Ethernet interface of the e-TLB unit can be verified by observing the response message on the display of the ATE.

2.6 DATA LOG TEST

e-TLB shall store the information from different sub-systems. It updates the information about the existing systems and provides the user alert, whenever the threshold is reached. It starts a new record for the new system. These data log information shall be transferred to a laptop using GUI based software.

3.0 BENCH LEVEL FUNCTIONAL TEST

The Functional Test of the e-TLB shall be verified using ATE. ATE shall be connected to e-TLB using circular connector. ATE shall simulate the electronic sub-systems of tank turret. It shall have GUI based software, where the different signals (analog, discrete, digital, CAN bus signals) shall be simulated by the user. ATE shall provide power supply to e-TLB, and all the signals similar to tank sub-systems.

e-TLB shall collect the data, sort and stores it. This data can be accessed by using a external rugged laptop via Ethernet port.

4.0 ACCEPTANCE TEST

PCBs of all 5 units of e-TLB shall undergo ESS tests as per Appendix – '3', and one of e-TLB shall undergo EMI/EMC, and qualification tests as per Appendix – '4'.

5.0 Trial evaluation

After successful completion of functional tests on bench level, e-TLB shall be interfaced in Tank with AGMS. Typically, after power on, each of the electronic sub-systems of AGMS is expected to independently execute the 'Power-On-Self-Test' (POST). The outcome of this POST will sent over the CAN bus to the eTLB and recorded. Subsequently, each LRU will be performing the allotted tasks and also continuously checking the status of its modules. In case of normal operation the status from LRUs will be broadcasted. However, in case of any malfunction or failure of sub-system, this information will be broadcasted within 40mS interval to eTLB. In both cases, the information pertaining to ach system will be recorded in the NAND flash memory.

Complete details stored in the eTLB shall be extracted based on commands from an external rugged laptop (with GUI) using Ethernet port. Critical information shall be viewed based on commands from the Commander's display. Alerts related to scheduled maintenance shall be automatically flashed on the Commander display.

The following list of faulty/alert parameters shall be tested in tank

Sr. No.	Designation
1.	GSEU faulty
2.	DGS faulty
3.	TI faulty
4.	LRF faulty
5.	TIB faulty
6.	PCM faulty
7.	FCC faulty

8.	data link faulty
9.	TI data link faulty
10.	DGS data link faulty
11.	FCC data link faulty
12.	Initial calibration required
13.	Preventive maintenance required

Above mentioned tests shall be carried out inside CVRDE and at trial facility available in Avadi.

Note: The integration of e-TLB on tank and interfacing with AGMS shall be possible only if tank and AGMS are available. If tank/AGMS is not available/not proved at the time of tank integration of e-TLB, then it shall be cleared only in bench level using ATE.

Electronic turret log book (ETLB)

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1. Introduction

CVRDE is in the process of design/developing electronic turret log book (ETLB), which records the status of fire control system and other tank electronic system related parameters. Tank electronic systems like Fire Control System, Gun Control System, Auto Loader, Advanced Weapon Station, Situation Awareness System, Active Protection System, Battery Health Management System and Navigation System are all connected to ETLB through MILCAN bus and Ethernet Bus. The data from various electronic systems from Arjun tank are collected, sorted, and stored in ETLB. This data can be accessed by using an external rugged laptop via USB/Ethernet port. Also, the ETLB will run a maintenance scheduler at the background that will correlate the system data stored in the ETLB and shall generate the maintenance alert to the crew. In a nutshell, the ETLB provides detailed system change history, regular and break down maintenance alert to the crew. Being a critical unit having all the sighting system related parameters, ETLB shall be designed to work at extreme environmental conditions without any failure. The ETLB can be configured to give the combat ready status of the tank, if networked with hull systems, auto loader and fuel level indicator.

2. Scope of the document

This document captures the basic functional details, hardware design, software development, ATE design, GUI design, ATP, and environmental/qualification tests.

3. System overview

Arjun MBT's fire control system consists of advanced gunner's main sight (AGMS), integrated commander's panoramic sight (ICPS) and other electronic systems like fire control computer (FCC), advanced turret interface box (ATIB), automatic target tracker (ATT), advanced gunner's sight electronics unit (AGSEU), gunner's control and display unit (GCDU) etc., are networked over a MIL CAN bus and is shown in Figure 1. Typically, after power on, each of the system is expected to independently perform the power on self test (POST) and its outcome is sent over the MIL CAN bus. Also, each sub-system such as thermal camera, LRF in AGMS could also be performing periodic built in test sequences and their outcome also be sent over the MIL CAN bus.

The results of POST and periodic test sequences of each system are to be logged in the ETLB, which is connected to the common MIL CAN bus and ETHERNET bus. The

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ETLB shall log the information coming from each system/sub-system such as serial number, installation date, hours of operation, elapsed time since power on, usage log, health status etc., against the serial number of each of the system/sub-systems. However, in case of any malfunction or failure of sub-system, this information will be broadcasted within 40mS interval to ETLB. In both cases, the information pertaining to each system will be recorded in ETLB.

In case a particular system/sub-system, for example, a LRF is sent for servicing and after service/re-fitment the parameters like number of days the unit is removed, the type of maintenance done with maintenance status against the serial number of system/sub-system to be recorded. However, if the system/sub-system is replaced with a new one, then the relevant parameters to be recorded against the new serial number with new installation date, and old system history to be maintained separately for reference.

The following Figure 1 provides a conceptual diagram showing the placement of the ETLB with respect to the other Fire control systems of Arjun MBT.

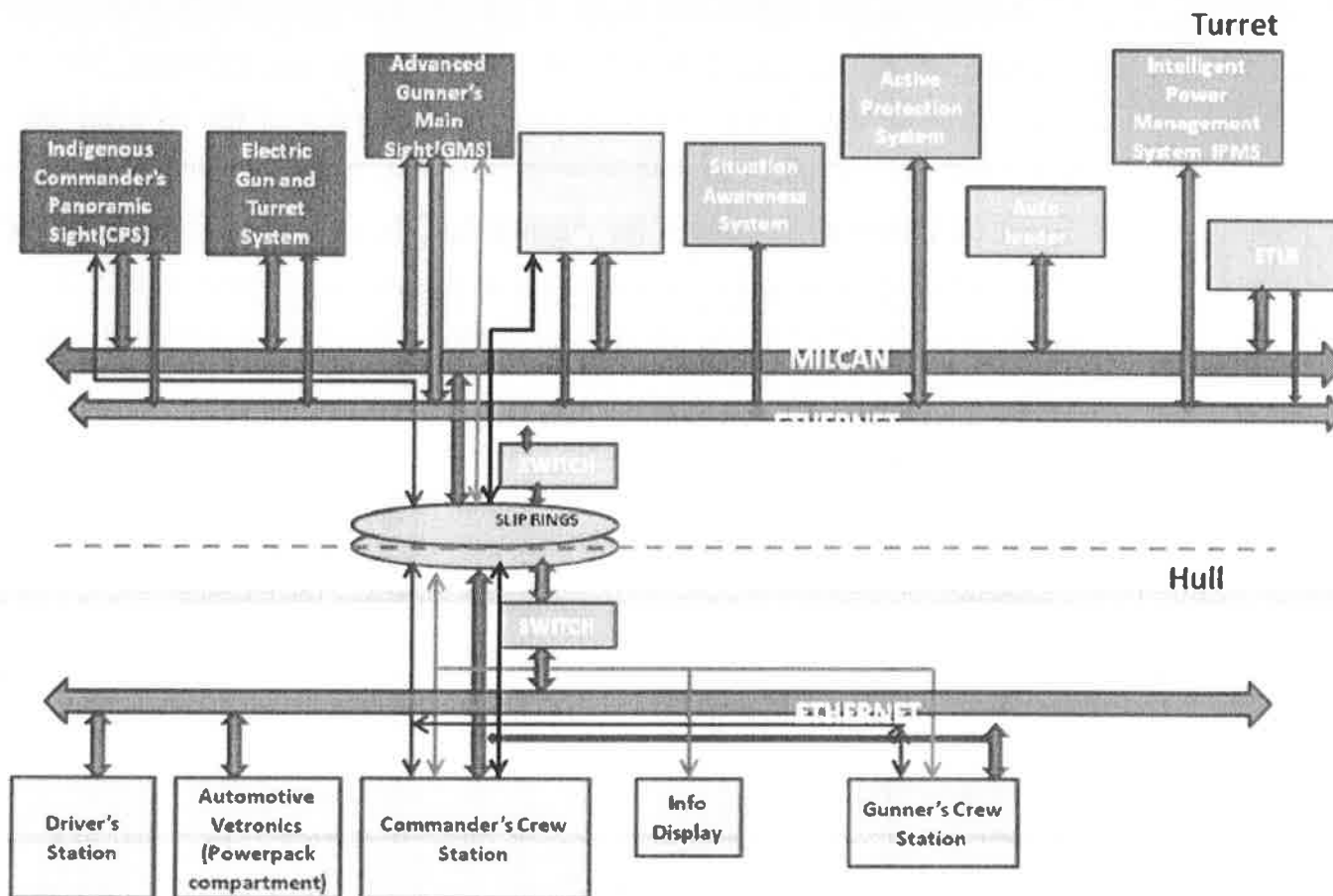


Figure 1: ETLB Overview

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Complete details stored in the ETLB shall be extracted based on commands from an external rugged laptop (with GUI) using Ethernet/USB ports. Critical information shall be viewed based on commands from the Commander's display. Alerts related to scheduled maintenance shall be automatically flashed on the Commander display.

3.1 Hardware design approach

As a LRU, ETLB consists of 2 numbers of PCBs namely processor PCB and power supply PCB. ETLB PCBs overview and PCBs inter connect details shown in Figure 3 and Figure 4 respectively. The processor PCB design shall be based on TI/Analog devices processor.

The ETLB processor PCB consists of a processor, FPGA, real time clock, external flash memory interfaces, power supply and a mechanical enclosure. The design is based on Analog devices or TI processor, Mil CAN bus controller, async serial controller and should have provision to interface with external display. Also, in system programmability of the system is required

A block diagram of ETLB is shown in Figure2. The data from sighting systems will be received, sorted and stored in external flash memory. The controller will run the necessary error correction algorithms for ensuring correctness of the recorded data. The controller will run maintenance scheduler routines and update the status to the crew. Also, PC based GUI shall be developed for downloading the data at tank level for analysis. Portable ATE shall be designed for simulating all the interface signals. This ATE shall be used for testing the ETLB in the lab and during the ESS/environmental/qualification tests. Also, this ATE shall be handed over to the user for functional testing of ETLB at tank level.

Component's Name	Specification
Processor	TI/Analog devices
FPGA	Artix 7 (preferable)
SRAM	512K X 16
FLASH	64GB NAND FLASH,4MBx32 NOR FLASH
USB	1 Channel
ETHERNET	1 Channel
UART	2 Channels
CAN	2 Channels
Mil CAN	2 Channels
RS422/485	4 Channels
Analog Inputs	8channels, 16 bit \pm 10V
Analog Outputs	8channels, 16 bit \pm 10V
Discrete Inputs	16 channels, 28V Opto isolated
Discrete Outputs	16 channels, 28V Opto isolated

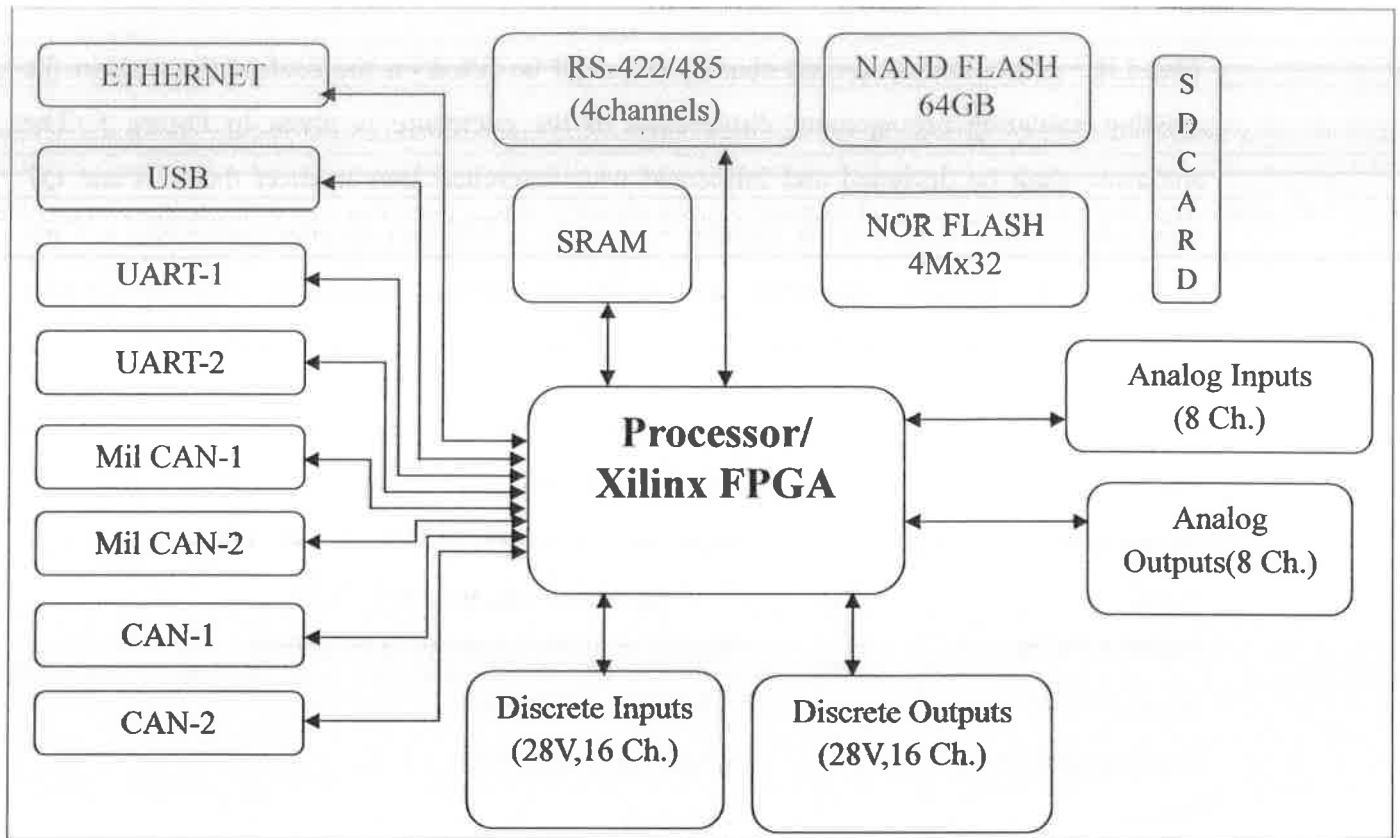


Figure 2: ETLB block diagram

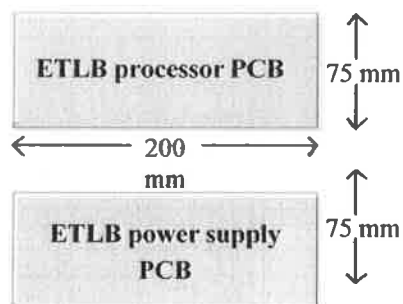


Figure 3: ETLB PCBs overview

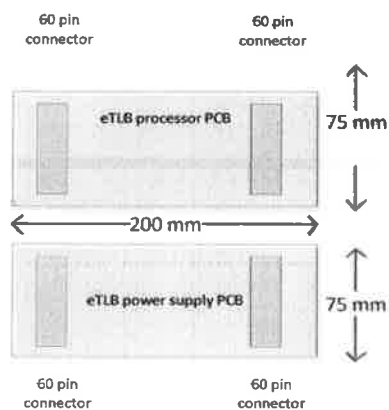


Figure 4: ETLB PCBs with interconnect

3.1.1 Mechanical enclosure:

This LRU is conduction cooled chassis and shall be fitted on the roof of the tank in the existing mounting arrangement dimensions of the enclosure is given in Figure 5. The enclosure shall be designed and fabricated with machined box to meet the ESS and QT standards. It shall have a USB circular connector, a Ethernet circular connector, a 5-pin power supply circular connector, and a 35-pin circular connector. All the circular connectors shall be of 38999 series. Brief technical specifications are listed below:

Material	: Al alloy, 61/6082/equivalent
Dimensions	: Approx. 225 x 90 x 90 mm (L x H x W)
Weight	: < 2 Kg without harness and PCBs
External finish	: Block or Ivory color powder coating
Internal finish	: Chromate conversion
Bonding surface	: Chromate conversion
Edges	: Curved
Legends	: Engraving
ESS / QT with EMI EMC	: As per CVRDE specs

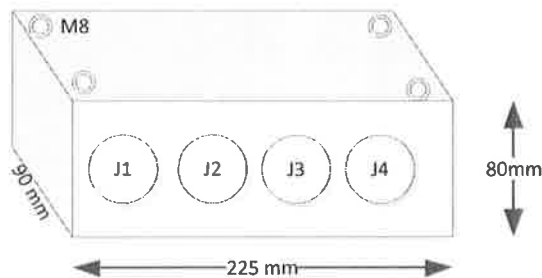


Figure 5: ETLB enclosure

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3.2 Software design approach

After power ON, ETLB performs power ON check of all the peripherals connected to the processor and then receives date and time from the real time clock. After 2ms time interval, ETLB starts receiving data from other systems via MIL CAN link in every predetermined interval in a predefined data format as given below. The draft flow chart and maintenance bit details is also given below. It shall be noted that maintenance bit details are generated by a dedicated FPGA mounted on each of the sub-system. Based on certain logic, ETLB generates maintenance alert such as nitrogen purging to the crew.

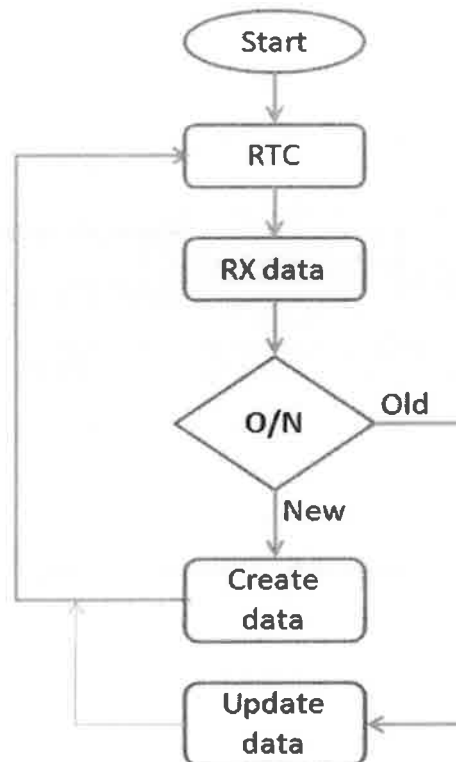


Figure 6: Flow chart

ATE :

Data Format

1. Device ID : DID : one time
2. Date of Manufacture : DOM : one time
3. Time and date of installation : TDOI
4. Maintenance status data : MSD : update based on SI no 3
5. Hours of operation : HROP : update 40 msec
6. Usage: US : update 40 msec
7. HSU : On/Off : once completion of post : first message

8. Time and date of last operation. TDLOP : up date 40 msec

Device ID	Date of Manufacture	Date of installation	Maintenance status	Hours of operation	Time / date of last operation	Future use	Future use
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Figure 7: Data format

0	0	0	New
0	0	1	Repair at regiment workshop
0	1	0	Repair at Brigade workshop
0	1	1	Repair at Corps zone workshop
1	0	0	Repair at Army Base Workshop
1	0	1	Factory Repair
1	1	0	Defective needs spare
1	1	1	Condemned

Figure 8: Maintenance bits

- i. Software shall be implemented using DDS as middleware with Linux/Windows OS
- ii. Software should be in Embedded C and VHDL language
- iii. Software should be modular along with the appropriate comments
- iv. Software development shall be followed as per DRDO standard for software development (DSSD) standard and the documents also to be submitted to CVRDE
- v. Source code shall be submitted to CVRDE

3.3 Testing of ETLB

Brief testing procedures of ETLB are given below.

- i. Complete schematics will be checked before PCB design
- ii. PCB design and layouts will be checked.
- iii. Board support package will be developed and tested
- iv. Software along with drivers will be developed and tested for its functionality.
- v. Software development for PC based GUI design and its functional testing.
- vi. ATE design and functional testing.

3.4 Automated Test Equipment (ATE) for ETLB - System description

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Automated Test Equipment (ATE) is designed to test the functionality of ETLB by providing requisites like Discrete I/O's & Analog I/O's, MIL CAN BUS signals, ETHERNET Signals and other interface signals. The voltage levels, signals types shall be finalized during CDR. ATE shall be developed using the Industrial PC in rack mounted. All the power supplies and signal conditioning shall be mounted on the same rack. Custom hardware shall be developed for input power regulation and to interconnect the PC with the ETLB. The mechanical construction of the ATE shall be made compact and portable.

ATE for ETLB has been designed to be used in following mode.

3.4.1 Calibration Mode

This mode is used to calibrate all the analog input and output channels with the help of calibrated source and measurement unit. During this mode, all the Discrete and Analog IO channels shall be tested against independent calibrated source.

3.4.2 Self-test mode

This mode is designed to test the ATE functionality in standalone mode. During this test, Analog IO's and discrete IO's will be looped back and response of all the channels will be monitored. Results will be displayed and logged. ATP mode tests shall be performed only after successful completion of this mode.

3.4.3 ATP mode

This mode is designed to test ETLB hardware with ATP software covering all the resources. In this mode, complete redundancy functions of ETLB are checked. In addition to positive checks, failure checks like external power supply fail (Load power Disconnected), Load fail (Load Disconnected) etc are performed and the response of ETLB peripherals are tested and recorded.

4.0 Scope of work

The scope of work of the vendor is as follows:

- i. Design, development, qualification and supply of 5(1 proto unit + 1 QT unit + 3 AT) units
 - a. Electronic hardware design, PCB design
 - b. Mechanical enclosure design and fabrication
 - c. BSP and application software development and testing, ATE design and testing

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- ii. PC based GUI design and testing
- iii. Harness design and fabrication
- iv. Functional testing in the lab using ATE
- v. ESS, environmental and qualification tests as per QT/AT document, refer Appendix-C
- vi. Tank level testing in CVRDE
- vii. Tank level testing and trial support in PFFR/MFFR/PXE
- viii. Vendor has to fabricate PCBs in MIL approved facility.
- ix. The vendor should carry out MIL approved rigid PCB fabrication as per MIL PRF 55110G, material classification Type -3, GF (FR-4) material.
- x. All the tests prescribed in MIL Group 'A' (MIL-STD), including micro sectioning along with specimen should be carried out on the PCBs, and the test reports and micro section samples shall be given to CVRDE
- xi. Test coupons and micro section given to CVRDE would be subjected to inspection and approval by R & QA of CVRDE.
- xii. The firm should also undertake to get Group 'B' tests carried out from DOD approved agency and provide certificate to CVRDE.
- xiii. Bare PCB Inspection of each PCBs shall be carried out by manufacturer and vendor's internal QA and the reports shall be submitted to CVRDE
- xiv. Vendor shall deliver the systems as per scope of supply, refer Appendix - B

Appendix - B**Scope of supply**

Sl.No.	Description of article(s) / Service(s)	Qty Reqd
1.	Electronic Turret Log Book (ETLB)	5 units
2.	Automated Test Equipment(ATE)	1 unit
3.	Harnesses – 4 nos	5 sets
4.	Rugged data logger cum debugger	2 nos
5.	Lambda power supply (0-40VDC, 40A)	5 nos
6.	ESS, QT and EMI/EMC test reports	2 Sets
7.	Mechanical Design Document	2 Sets
8.	Hardware Design Document	2 Sets
9.	Software documents as per DSSD	2 Sets
10.	Source code	2 Sets

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Combat Vehicles Research & Development Establishment (CVRDE)

AVADI, Chennai – 600 054

It is hereby confirmed that bid submitted against
RFP No: CVRDE/MMG/ENQ/22ATT028/2021-22 will not be withdrawn or modified
during the period of validity.

I / we accept that in case our bid is

a) Withdrawn or Modified during the period of validity.

or

b) If we are awarded the contract and fail to sign the contract.

or

c) We fail to submit performance security bond before the deadline defined in
the RFP

then our firm will be suspended for a period of **One Year** from being eligible to
submit Bid against RFPs issued by CVRDE.

(Authorized Signatory)

Name of the Firm: _____