Date: 18/02/2025

Design, Development, Fabrication, Wiring, Integration, Testing and Installation of Mission Management & Display Computer Software Test Rig.
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, the date of acceptance of the Supply Order would be the effective date. The firm should check the supply order and convey acceptance of the same within seven days of its receipt. If such an acceptance or communication conveying firm's objection to certain parts of the supply order is not received within the stipulated period, the supply order will be deemed to have been fully accepted by the firm. 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 during negotiations. The performance of the Contract shall commence from the Effective Date of the Contract/Supply Order.

   Note: If any discrepancy is there, it should be brought to the notice within 7 days from the date of Contract/Supply order else it will be presumed as Contract/Supply Order is accepted.

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 provision.

   Option-1: 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 as amended.

   (OR)

   Option-2: 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, as amended.

   (OR)

   Option-3: 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 as amended.

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% above MCLR (Marginal Cost of Funds based Lending Rate) declared by RBI pertaining to State Bank of India for Indian bidders. The Buyer will also have the right to recover any such amount from any contracts in vogue with the Government of India.

<div align="center">Or</div>

The Seller confirms and declares in the Techno-Commercial bid that they have engaged an agent, individual or firm, for promotion of their product. In such case, following details are to be submitted in the Techno-Commercial bid:
   a) Name of the Agent
   b) Agency Agreement between the seller and the agent giving details of their contractual obligation
   c) PAN Number, name and address of bankers in India and abroad in respect of Indian agent
   d) The nature of services to be rendered by the agent and
   e) Percentage of 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 Para 4 and/or Para 5 above 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 unauthorised 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, as agreed, liquidated damages at the rate of 0.5% per week/part thereof, of basic cost of the delayed stores/services which the vendor has failed to deliver within the period agreed for delivery in the contract. LD shall also be levied on the basic cost of the stores supplied partially within the scope of the Order/Contract that could not be put to use due to late delivery of the remaining stores. The maximum Quantum of LD would be 10% of the total order value.

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.
    <div align="center">Or</div>
    The delivery of the store/service is delayed for causes not attributable to Force Majeure for more than 3 months after the scheduled date of delivery and the delivery period 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 (Use of Undue Influence) and/or Para 5 (Employment of Agent) above to obtain the Contract.
    v)   The Buyer is entitled at their option, to cancel the order or a portion thereof, due to not meeting any of the terms and conditions of the order / delayed execution of the order by the Seller beyond reasonable time as may be considered by the Buyer, without prejudice to the terms and conditions of this order.
    vi) As per decision of the Arbitration Tribunal.
    vii) ADA reserves the right to cancel the procurement process at any stage and accept or reject any bid, fully or partially, without assigning any reasons.

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**
    In respect of Indigenous Bidders
    A) General
    a) If the quoted prices exclude GST / Local Tax or any other Statutory Duties/Taxes, the same must be specifically stated with applicable rates. In the absence of same, it will be presumed that the prices include all such charges and no claim for the same will be entertained.
    b) If reimbursement of any Duty/Tax is intended as extra over the quoted prices, the Bidder must specifically say so. In the absence of any such stipulation, it will be presumed that the prices quoted are firm and final and no claim on account of such duty/tax will be entertained after the opening of tenders.
    c) If a Bidder chooses to quote a price inclusive of any duty/tax and does not confirm that duty/tax so included is firm and final, he should clearly indicate the rate of such duty/tax and quantum of such duty/tax included in the price. Failure to do so may result in ignoring any request for change of duty/tax at a later date due to any reason whatsoever.
    d) Any addition to duty/tax and change in any duty/tax upward/downward as a result of any statutory variation in duty/tax taking place within contract terms shall be allowed to the extent of actual quantum of such variation of duty/tax paid by the supplier. Similarly, in case of downward revision in any 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.
    e) TDS as per Income Tax Rules and GST Rules will be deducted and a certificate to that effect will be issued by the Buyer/ Buyer's paying authority. GST TDS as applicable would also be deducted.
    B) Customs Duty
    • ADA is a public funded research institution and has been exempted from the payment of Customs Duty, as per the description of stores and conditions thereon, under Customs Notification No.19/2019 as amended on HSS basis. Hence, all manufacturers are requested to forward their offer directly without involving any Agents, Representative and Distributors, etc. Only direct offers addressed to ADA can be considered to avail the duty benefit granted by Government of India, Ministry of Defence. Custom Duty if any which will be paid by the Supplier shall be reimbursed by ADA on production of requisite documents. Supplier is responsible to clear the material at their cost from Customs Authority based on the Duty Exemption Certificate provided by ADA and forward a copy of Bill of Entry confirming utilization of the Certificate, at the time of Delivery.
    • The successful bidder would be issued a Customs Duty Exemption Certificate (CDEC) under the said notification at the time of import clearance for the goods being imported against the Contract. Bidder would be required to submit a copy of their order to principal along with principal's acceptance and proforma invoice at least four weeks in advance from the expected date of arrival of goods to this office for issuance of CDEC.
    • Bidders may note that CDEC would be issued ONLY in favour of beneficiary of the Contract.

17. **Denial Clause:** Denial clause informs Seller that the Buyer reserves the right to admit additional payment due to upward revision of statutory levies beyond the original delivery schedule in case Seller fails to deliver the goods as per schedule. 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. **Undertaking from the Bidders:** The Bidder/Firm/Company will submit an undertaking 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.

19. **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."

20. **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.

21. **Liability Clause:**
    a. Any damage caused to the property or suffered by the personnel of Buyer during the execution of Contract shall remain the liability of the Buyer. Such liability shall be fixed on Seller in case of grossly negligent act or omission on the part of Seller.
    b. This provision is limited to the relations between the Parties. It is without prejudice to the rights and actions to which the victims of damage, or any Social Security Organizations could prevail themselves legally.
    c. Either party would provide reasonable assistance to resolve the claim of other Party to mitigate loss or damage.
    d. Neither, the Seller shall be liable to the Buyer, nor shall the Buyer be liable to the Seller for any immaterial, punitive, indirect, special, incidental, or consequential loss or damage. This will hold good irrespective of whether such liability is based or claimed to be based on any breach of a Party's obligation under the Contract, or any negligent act or omission of a Party, its employees, servants, appointed representatives, sub-contractor or professional consultants, or such liability arises otherwise out of or in connection with the Contract.
    e. The Buyer shall not be liable for any compensation in any manner to the Seller for whatsoever reason.
    f. The Seller shall be liable to the Buyer for any compensation in any manner for whatsoever reasons for a sum not exceeding value of the Contract.

22. **Purchase Preference Policy:**
    - **Make in India:** This RFP complies with Public Procurement (Preference to Make in India), order 2017 by Department of Industrial Policy and Promotion, Ministry of Commerce and Industry Government of India issued vide letter No. P-45021/2/2017- B.E-II dated 15th June 2017 and as amended (for updated details please refer to www.dipp.gov.in).
    - Purchase preference to Micro and small enterprises (MSEs) will be given to MSEs as per provisions of Public Procurement Policy for Micro and Small Enterprises (MSEs) Order, 2012 as amended (for details please refer www.dcmsme.gov.in)

23. Risk and Expense Purchase:

In case the vendor fails to honor the contractual obligations within the stipulated delivery period and as amended, Buyer may procure the said contracted goods/services through a fresh Service Order/contract and the defaulting vendor has to bear the excess cost incurred, if any.

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. **Performance Security:**
    The Seller may be required to furnish a Performance Security in the form of Insurance Surety Bonds, Account Payee Demand Draft, Fixed Deposit Receipt, Banker's Cheque or Indemnity Bond/Bank Guarantee (including e- Bank Guarantee) from any of the scheduled commercial banks or payment online in favour of Aeronautical Development Agency, payable at Bangalore, for a sum equal to **5%** of the Contract value (including taxes and duties) within **14 days** from the date of the Order valid upto 60 days beyond completion of all the Contractual obligations including warranty, if any. The specimen of BG is attached at *Annexure-A*. Bank Guarantee is to be issued through SFMS by Applicant's Bank to ADA's Bank details as indicated below:

    Name : ADA; A/c No. :10461037271; IFSC Code : SBIN0004815
    Bank : State Bank of India, NAL Branch, Bangalore

    Note : While submitting the Bank Guarantee, Vendor should ensure that Bank Details such as Name of the Bank, Branch Name, Fax Number, Contact Person, E-mail ID, etc. shall be sent along with the Bank Guarantee.

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

2. **Guidelines for Submission of Bank Guarantee:**
    a) Bank Guarantee/IB should be submitted by Bidders/Vendor in the specified format (as per *Annexure 1A*). Bidders should comply with prevailing formats and guidelines of ADA with respect to BGs at the time of issue of BGs.

    b) All Bank Guarantee/IB should be submitted to ADA directly by the Issuing Bank under Registered Post (A.D.) / Speed Post / Courier.

    c) Bank Guarantee/IB shall be free from all typographical error / deletions / inclusions, riders etc., and requires to be authenticated by Bank's signatory with official seal.

    d) The name, designation and code numbers of the Bank officer / officers signing the BGs should be incorporated under the signature(s) of the officials signing the BGs along with the complete postal address and email ID.
    Note: Bank Guarantee should be issued from a Scheduled Commercial Bank in India. All charges connected with issue/extension of BG shall be borne by bidders/vendor.

3. **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 days from the completion of the activity/supply and acceptance.

4. **Payment Terms:**
    Payment according to milestone, as mentioned in table below, will be released upon successful completion of each Milestone and Deliverables acceptance by A.D.A Project co-ordinator & approved by TD.

Sl.No	Activity/Milestone	Payment in (%)	Remarks
1.	Successful completion of PDR (T0 + 18 weeks)	30%	Submission of PDR Minutes of Meeting by Supplier
2.	Delivery of complete test rig at ADA campus – 2 (T0 + 45)	20%	Submission of Delivery Challan by Supplier
3.	Installation, Commissioning and Final acceptance as per approved ATP. (T0+50)	50%	Submission of Acceptance Test Report by Supplier duly approved by ADA QASEG

5. **Mode of Payment**
   It will be mandatory for the Bidders to indicate their bank account numbers and other relevant e-payment details to facilitate payments through ECS / NEFT. If payment to vendor is being made for the first time, vendor is advised to provide their ECS details in Original duly attested by their Bankers.

6. **Terms of Delivery**
   The delivery of goods shall be FOR ADA, Bangalore.

7. **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, transhipment, 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.

h) Any other special specific packing requirement to be specified clearly depending upon nature of the stores.

8. **Warranty:**

   a) 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/spares would continue to conform to the description and quality for a period of **5 years** from the date of acceptance of the said goods stores/articles. If during the aforesaid period of 5 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.

   b) If the defective part / subsystem / system needs to be taken by the Seller outside Buyer's premises to rectify the defect, Seller shall provide a comprehensive **(during transit & storage insurance for repair period)** insurance cover of the equivalent amount to the Buyer to cover for the time taken to rectify the defective goods and deliver the repaired or replaced goods at the same location without any financial implications on Buyer.

   c) In cases of procurement of Software/Seller shall issue/provide upgrades of the Software free of cost during the warranty period.

9. **Evaluation and Acceptance Criteria of Bids:** The bid will be considered and selected based on instructions contained in RFP for further evaluation of bids as per sequence given below:

   i) **Techno-Commercial Bid Evaluation:** Bids will be evaluated based on vendor qualification criteria of RFP and SOW and bids of the qualified bidders will be considered for further evaluation.
   The bidders hereby agrees to respond to the "techno-commercial queries" sent by TCEC (if any) via e-mail / Fax (as provided by Bidder) within the time limit, failing which the Bidder's offer will be rejected summarily without any further communication.

   ii) **Price Bid Evaluation:** The Price bid of those bidders whose Techno-Commercial bid 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. The ultimate cost to ADA would be the deciding factor for ranking of Bids. ADA reserves the right to call the lowest acceptable bidder for techno-commercial negotiations, if the cost indicated is beyond the budgeted estimate. **The basis for evaluation of Price bid will be LOT WISE.**

10. **Documents to be furnished for Claiming Payment**
    Indigenous Sellers: The payment of bills will be made on submission of the following documents (wherever applicable) by the Seller to the Buyer:

    a) Original Ink-signed / Digitally Signed Invoice/Electronically Signed Invoice/ System generated Invoice
    b) Performance Security Bank Guarantee & Advance Bank Guarantee
    c) Installation & Acceptance Certificate duly certified by Project Co-ordinator
    d) Details for electronic payment as per ECS Mandate Form viz. Bank name, Branch name and address, Account Number, IFS Code, MICR Number, duly certified by your banker
    e) Any other document / certificate that may be provided for in the SOW/Contract.
    f) Warranty Certificate

11. **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 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.

12. **Intellectual Property Rights (IPR):**

   ADA shall have IPR for the product developed (H/w & S/w) with ADA funding. The background IP Rights will be with IP holders for any component used in product.

13. **Earnest Money Deposit:** Bidders are required to upload scanned copy of the Earnest Money Deposit (EMD), in favour of **Aeronautical Development Agency, Bangalore**, in the currency of their quote for amount equivalent to **Rs. 6,00,000 [Rupees Six Lakhs only]** along with their bid. The EMD may be submitted by Indigenous bidder in the form of Insurance Surety Bonds/ Account Payee Demand Draft/ Fixed Deposit Receipt/ Banker's Cheque or Bank Guarantee (including e-Bank Guarantee) from any of the scheduled commercial banks or payment online (format enclosed at *Annexure-B*). EMD is to remain valid for a period of **45 days** beyond the final bid validity period. EMD of the unsuccessful bidders will be returned to them, without any interest whatsoever, at the earliest after expiry of the final bid validity and latest on or before the thirtieth day after the award of the Contract.

   EMD of the successful bidder would be returned without any interest whatsoever after the receipt of Performance Security Bank Guarantee from them as called for in the Contract. EMD is not required to be submitted by those Bidders who are registered with the National Small Industries Corporation (NSIC), Departments of MoD, other DRDO labs, MSEs and as per the policy of Government of India in vogue. Such bidders shall be required to furnish the relevant documents in their Techno-Commercial bid in support of the claim. The EMD will be forfeited if the Bidder withdraws, amends, impairs or derogates from the tender in any respect within the validity period of their tender.

   Following categories of Sellers shall however, be exempted from furnishing Bid Security:

   i) Micro and Small Enterprises (MSEs) who are holding valid Udyam Registration and are manufacturer of the offered Product or Service (Primary Product / Service - in case of bunch bid with total value wise evaluation) and give specific confirmation to this effect at the time of bid submission and claim EMD exemption and whose credentials are validated online through Udyam Registration website of Ministry of MSME and also through supporting document uploaded during bidding process and validated by the Buyer. State Government Buyers may, however, choose to exempt only MSEs from the State of Bid Inviting Authority by specifying the same in ATC of the Bid. In case no such ATC is included, eligible MSEs of all states are exempted.

ii) Start-ups as recognized by Department for Promotion of Industry and Internal Trade (DPIIT), holding valid Startup Recognition Certificate which is to be uploaded while bidding and claiming EMD exemption and to be validated by the Buyer. Bidder to ensure that turnover for any of the financial years has not exceeded beyond limits prescribed in the certificate / Start Up scheme of DPIIT.

iii) KVIC, ACASH, WDO, Coir Board, TRIFED and Kendriya Bhandar.

iv) Sellers who have got their credentials verified through the process of Vendor Assessment by Vendor Assessment Agencies for the Primary Product / Primary Service for which Bid / RA has been invited and holding valid Vendor Assessment or Vendor Assessment Exemption Report / confirmation (Seller to upload VA report / VAE confirmation to be validated by the Buyer).

v) Sellers / Service Provider having annual turnover of INR 500 Crore or more, at least in one of the past three completed financial year(s)

vi) Sellers / Service Providers holding valid BIS License for the Primary Product Category whose credentials are validated through BIS database and through uploaded supporting documents to be validated by the buyer.

vii) Central / State PSUs.

viii) Seller / Service Provider registered with designated Agency / Authority as specified in the bid document by the Buyer – such bidder shall have to upload scanned copy of relevant valid registration document in place of Bid Security document while bidding.

Note:

1. Original **EMD instrument** should be sent by post in an envelope, addressed to **Director [Materials Management]**, Aeronautical Development Agency, P.B.No.1718, Vimanapura Post, Bangalore – 560017. The cover of envelope should clearly mention "EMD", Gem number, Description and Bid due date.

2. In case **EMD instrument** (if applicable) is not received on or before "**techno-commercial bid opening date and time**", bid of such vendors will summarily be rejected.

General:
Compliance for the Terms & Conditions is mandatory without which the offer will not be considered.
Bidders are requested to sign all pages of SOW, RFP and all the enclosure and annexures along with company stamp (at the bottom of pages) and submit the same along with their quotation (along with Techno-Commercial bid in case of Two Bid System)
The bidder should be registered in India. GST Registration Number and its validity should be indicated. Documentary evidences should be supplied/attached to the Bid Proposal documents.
The Bidder must have PAN/TAN for Income Tax Department and the same may be quoted.
The technical bid should contain supporting documents to prove all claims of the company.
Price details are to be furnished only in the price Bid. Technical Bids, if contain prices will summarily be rejected.
ADA reserves the right to accept or reject any or all offers in part or in full without assigning any reasons.

14. Inspection Authority:

Supplier will provide ATP and ATR documents. After installation and commissioning of the test rig at ADA, MMS team along with ADA-QASEG will perform acceptance tests.

15. Vendor Qualification Criteria:

a. Supplier may participate in the pre-bid meeting.

b. Those who have interest to participate in the pre-bid meeting can send request mail to Project coordinator: satishshetty.ada@gov.in.

c. The supplier should have the right technically skilled manpower including System Engineers, Engineers, Junior Engineers & Technicians.

d. Supplier should have 1 System engineer as a permanent employee of the company with relevant experience of 10 years in avionics test rigs with electronics or relevant engineering discipline. This engineer is responsible for all the activities of this project. The resume of the engineer may be required to produce at any phase of this project from pre-bid meeting onwards.

e. Supplier should have technician of minimum 5-10 years of experience in the field of avionics looms/harness preparation with *WHMA/IPC A-620-certificate* (standard for requirements and acceptance of cable & wire harness assemblies).

f. Supplier shall present project execution plan and team composition to Technical Evaluation Committee (TEC). Supplier shall present detailed plan of executing the project in this specification than presenting their experience and educational qualifications with resume **(clearly mentioned year of passing, name of educational institutes, specialization, skills, work experience etc.)** in the respective field.

g. The supplier should have handled similar project with purchase order value of 50% of proposed estimated cost of this project. In TEC-CEC meeting supplier shall present any **previous project** (50% of proposed estimated cost and relevant to avionics).

h. The project for which supplier refers in previous point required to be presented to TEC-CEC including phases of the project completion with reports, and such documents should have signed by the acquirer of that project.

i. The TEC-CEC may visit the supplier office/factory on need basis to evaluate the operational capacity of the company.

j. All electrical interface and other restricted documents of MMDC and Test Rig shall be given after the issue of PO.

k. This specification provides overall requirements of the Test Rig. However, supplier should accept any changes/enhancement in the specification after the issue of the PO which does not impact the cost and schedule of the test rig development.

l. Supplier shall sign Non-Disclosure Agreement with ADA.

m. Supplier shall maintain highest level security for the items developed and for the development environment for this project.

n. During Final Installation and Acceptance supplier shall deploy team at ADA Campus-2 on need basis.

o. Supplier should provide 5 years of warranty and maintenance from the date of acceptance. This warranty should cover all the modules of MMDCSTR.

p. During warranty period supplier should replace/repair faulty systems/components. However defective storage systems (HDD/SSD) of workstations shall not be returned to supplier during replacement.

q. The system being developed by the supplier during the contract period would be proprietary of the M/s ADA and subsequently the supplier does not have any rights on the systems/products being developed.

16. Installation & Commissioning:

Supplier shall install and commission the test rig at ADA campus 2 and acceptance tests will be carried out. Supplier required to depute the team at ADA during this process and provide support for rig certification.

17. Acceptance Criteria:

Installation, Commissioning and satisfactory completion of acceptance tests as per approved ATP by ADA QASEG.

Details of Stores/Services Required

1. List of Deliverables:

SL NO.	ITEM NAME	DESCRITIPON	Quantity	REMARKS
1.	DCDM	a. DCDM BOX along with Harness cables and mating connectors.	1	➢ Refer Appendix-A.
2.	DCU UNIT	a. DCU BOX with two Harness cables (MMDC Ch1 & Ch2)	1	➢ Refer Appendix-B.
3.	VGA TO STANAG 3350 Converter	a. VGA TO STANAG 3350 Converter with Harness cables	1	
4.	Desktops	a. PC Setup	1	➢ Refer Appendix-F.
5.	Workstations	a. PC Setup	5	➢ Refer Appendix-F.
6.	Industrial PC	a. PC Setup	1	➢ Refer Appendix-F.
7.	Rack	a. 19 U Rack	4	➢ 4 Racks for rig setup.
8.	TSN Ethernet Switch	a. TSN 24 Port Switch with Power Cable	4	As per Mk2 avionics architecture.
	Managed Ethernet Switch	a. 16 Port Switch with Power Cable	2	For RT server & simulation systems communication
9.	KVM Switch	a. USB Type	5	
10.	MOXA	a. USB - 4 Port -1 no's	1	Electrical Isolated
11.	28V Power Supply	a. 28V Power Supply Box-1 with Harness Cables	1	
12.	Video Interface Panel	a. Video Interface Panel with Harness Cables	1	
13.	Debug Interface Panel	a. Debug Interface Panel with Harness Cables	1	
14.	Bus Interface Panel	a. Bus Interface Panel with Harness Cables	1	
15.	Cockpit Interface Panel	a. Cockpit Interface Panel with Harness Cables	1	
16.	Discrete Input and Output Interface Panel	a. Discrete I/O Interface Panel with Harness Cables	1	
17.	ARNIC 818 video generator and analyzer	For SVP DMG sensor video simulation.	1	
18.	1553B DDC card	2 Channel Multifunctional PCI card **[DDC 1553B P/N: BU-67210F200L-2A0]**.	2	
19.	RT server bus interface	Four bus connection from bus system to RT server	4 pair	3 pair for bus connection 1 pair for spare.
20.	Bus Coupler	a. Bus Couplers with Labeled	4 pairs	1 spare bus coupler and 4 spare terminators.
		b. Terminators	16 no's	

SL NO	ITEM NAME	DESCRITIPON		Quantity	REMARKS
21.	MMDC looms and Connectors	a.	Looms	1 set	➢ Electrical wiring Requirements and refer Appendix-C.
		b.	Looms with Circular Connectors	MMDC 6 Circular Connecto r	
22.	LADs	a.	Looms	2	➢ Electrical wiring Requirements and refer Appendix-D.
		b.	Looms with Circular Connectors		
23.	SSHUD	a.	Looms	1	Electrical wiring Requirements and refer Appendix-E.
		b.	Looms with Circular Connectors		
24.	Final Documents	a.	Technical Specification	1 set	➢ Each Document contains separate section for each subsystem or units of MSTR. ➢ Supplier shall provide all document in PDF format and original document format (*.docx, *.dwg, etc as applicable).
		b.	System Development Plan		
		c.	Quality Assurance Plan		
		d.	Bill of Material(BOM)		
		e.	Design Document and wiring drawings with signature		
		f.	MDI(Master Drawing Index document)		
		g.	Statement of Preparation (SOP)		
		h.	ATP and ATR		
		i.	User Manual		
		j.	Certificate of Conformance		
		k.	Warranty Certificate		

2. 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 i) **Technical** and ii) **Techno-commercial 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)

3. Vendors to upload the SOW in entirety and provide compliance without fail.

SUMMARY OF ADA's COMMERCIAL TERMS AND CONDITIONS

Sl. No.	Terms	Description	Confirmation of Bidders to ADA Terms	Remarks
1.	EMD Details	As per Clause 14 of Special Terms and Conditions.	Yes/No	
2.	Currency of payment	INR	Yes/No	

3.	Delivery Period (Including Acceptance)	As per Clause 14 of Details of Stores/Services Required.	Yes/No	
4.	Customs Duty	As per Clause 16 of Standard Terms and Conditions	Yes/No	
5.	Payment Terms	As per Clause 4 of Special Terms and Conditions)	Yes/No	
6.	GST percentage	18% on Indigenous Content	Yes/No	
7.	Performance Security Bank Guarantee	10% of the order value (including taxes & duties) in the form of Bank Guarantee/Indemnity Bond valid till 60 days beyond the completion of all the contractual obligations including warranty should be submitted within 14 days of date of PO.	Yes/No	
8.	Inspection & Acceptance	At ADA, Bangalore	Yes/No	
9.	Liquidated Damages (LD)	As per Clause 10 of Standard Terms and Conditions		
10.	Warranty	As per Clause 11 of Special Terms and Conditions.	Yes/No	
11.	Ordering Information	(Indicate Name and Address of Firm on whom the Order is to be placed)		
12.	Validity of quote	90 Days	Yes/No	
13.	Warranty	As per Clause 11 of Special Terms and Conditions.	Yes/No	
14.	GeM Unique Seller ID (Mandatory)	As per GeM		
15.	Price Breakup in Percentage (Total 100% of Basic Cost)	% of Import Content	Import _ %	
		% of Indigenous Content including Services	Indigenous_%	
16.	MSE	Kindly indicate if Vendor is a MSE. if so, confirm whether Manufacturer/Trader/Service Provider. Copy of latest relevant MSE certificate to be enclosed	Mandatory	
17.	MII	Kindly indicate if the vendor is a MII Class I – Local content 50% and above MII Class II – Local Content 20 to 50% Non-Local – Local Content lessthan 20% OEM Declaration stating local content should be furnished. To be duly certified by CA	Mandatory	
18.	Price	Basic Cost excludes Custom Duty and IGST	Yes/No	
19.	HSN Code(s) for the Imported Items and percentage of Custom Duty + IGST percentage if any	Details Furnished	Yes/No	

20.	Contact Details	Contact Person: Phone No: Email Id:		

For Commercially-Off-The-Shelf (COTS) items, it is mandatory to enclose catalogue/technical brochure to support the claims of compliance.

4. **Delivery Period:** Expected Delivery Period, for supply of items would be **50 Weeks** from the date of placement of PO. 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.

5. **Consignee details:**
   - Name   : Joint Director [MM]
   - Address   : Aeronautical Development Agency,
                     P.B.No.1718, Vimanapura Post,
                     Bangalore - 560017
   - Contact details : 080 2508 7030

6. **Technical Co-ordinator:**
   - Name   : Shri. Satish Shetty K
   - Contact details : 080-2508 7865/ 9880821898
   - Email   : satishshetty.ada@gov.in

TENDER ACCEPTANCE LETTER
(To be filled by Bidder and uploaded in Techno-Commercial Bid)
(To be given on Company Letter Head)

<div align="right">Date:</div>

To,

_____

_____

Sub: Acceptance of Terms & Conditions of Tender.
RFP / Tender Reference No: _____
Name of Tender/Supply/Work: _____

Dear Sir,

1. I / We have downloaded / obtained the tender document(s) for the above mentioned 'Tender/Work' from the website(s) namely:

_____

as per your advertisement, given in the above mentioned website(s).

2. I / We hereby certify that I / we have read the entire terms and conditions of the tender documents from Page No. _____ to _____ (including all documents like annexure(s), schedule(s), etc.,), which will form part of the contract agreement and I / we shall abide hereby by the terms / conditions / clauses contained therein.

3. The corrigendum(s) issued from time to time by your department/ organizations related to this tender too have also been taken into consideration, while submitting this acceptance letter.

4. I / We hereby unconditionally accept the tender conditions of above mentioned tender document(s) / corrigendum(s) in its totality / entirety.

5. I / We hereby undertake to respond to the "techno-commercial queries" (if any) which will be communicated by TCEC/ADA to our email id _____ or to our Fax No: _____ within the time limit set by TCEC without fail. I / We hereby agree that failure to respond for queries raised by TCEC within the set time limit will call for rejection of our bid/offer apart from I / We will be treated as "Default-Bidder".

6. I / We do hereby declare that our firm/company has not been blacklisted / debarred by any Govt. Department/Public Sector undertaking.

7. I / We hereby agree that the Terms & Conditions of SO / Contract will be followed without any deviation, in case SO / Contract is placed on us after due procurement process, failing which I / We will be treated as "Default-Bidder". I / We also aware that the detail of such Default-Bidder is being uploaded in the "Defaulter Vendor Data Base". Once the Bidder/Vendor becomes **three times** default, then such Bidder/Vendor will become **in-eligible** to receive any kind of tender enquiries for a period of **one (1)** year.

8. I / We certify that all information furnished by the our firm/company is true & correct and in the event that the information is found to be incorrect/untrue or found violated, then your department/organization shall without giving any notice or reason therefore or summarily reject the bid or terminate the contract, without prejudice to any other rights or remedy including the forfeiture of the full said earnest money deposit absolutely.

<div align="right">Yours faithfully,</div>

<div align="right">(Signature of the Bidder, with Official Seal)</div>

Annexure to Order No.COM/IND/___/___/2023-2024 dated _____

Format of Bank Guarantee for Performance Security
(To be issued by any Scheduled Commercial Bank on non-judicial stamp paper as applicable)

GUARANTEE No.................

Date:............

To:
Aeronautical Development Agency
Min. of Defence, Govt. of India
P.B. No. 1718, Vimanapura post,
Bangalore – 560 017, India

Dear Sirs,

Sub: Your PO No. COM/IND/___/___/2023-2024 dated _____

1.   You have placed a PO vide Number as given above with .... (hereinafter referred to as the Supplier) for the Supply of .... (hereinafter referred to as Products) for the price and on the terms and conditions contained in the said PO.

2.   In accordance with the terms of the said PO, you have agreed on the Supplier furnishing you with an acceptable Bank Guarantee for Rs.................... (Rupees ....), being ___% (.... percent) of the total PO Value (including taxes and duties) valid from the effective date of the PO till completion of contract in fulfillment of the obligations under the said PO. For this purpose, you have agreed to accept our guarantee.

3.   In consideration thereof, we hereby at the request of the Supplier, expressly, irrevocably and unconditionally undertake and guarantee to refund to you on demand and without demur and without reference to the Supplier the said payment of Rs.......................... (Rupees ....) on receipt of your intimation that the Supplier has not fulfilled the conditions of the PO.

4.   This guarantee shall not be revoked without your express consent and shall not be affected by your granting any indulgence to the Supplier, which shall include but not be limited to postponement from time to time of the exercise of any powers vested in you or any right which you may have against the Supplier and to exercise the same in any manner at any time and either to enforce or forbear to enforce any covenant contained or implied in the said PO or any other course or remedy or security available to you, and our Bank shall not be released from its obligations under this guarantee by your exercising any of your rights with reference to matters aforesaid or any of them or by reason of any other act or forbearance or other acts of omission or commission on your part or any other indulgence shown by you or by any other matter or thing whatsoever which under law would , but for this provision, have the effect of relieving our Bank from its obligation under this guarantee.

5.   We also agree that you shall be entitled to your option to enforce this guarantee against our Bank as a principal debtor by a mere demand in writing from you which shall be conclusive evidence to us that such repayment is due and payable to you under the terms of the said PO and shall be binding on us not withstanding any other security, or guarantee that you may have in relation to the Supplier's liabilities in respect of the premises. This guarantee shall not be affected by any change in the constitution of our Bank or the Supplier or for any other reason whatsoever.

6.   This bank guarantee shall expire, unless extended, on .... The bank will, however, honor claims submitted by you upto 60 working days after the expiry date.

7.   Not withstanding anything herein contained, our liability under this guarantee is restricted to Rs.. (Rupees ....). This guarantee in original shall be returned to us duly discharged upon final expiry of the validity.

8.   Payment by us to you will be made within 15 working days from receipt of your written request making reference to this guarantee and on demand.

Date:

Authorized Signatory
Seal of the Bank

Annexure-B

EMD Bank Guarantee Format
[To be issued by Scheduled Commercial Bank]

Guarantee No..............................

Date..

To

M/s. Aeronautical Development Agency
Min. of Defence, Govt. of India
P.B. No.1718, Vimanapura Post
Bangalore – 560 017, India

Dear Sirs,

1. Whereas .... (hereinafter called the 'Bidder') has submitted their offer Ref..dated.............. for the supply of .... (hereinafter called the 'Bid') against the Buyer's Request for proposal No. ....

2. KNOW ALL MEN by these presents that WE .... of .... having our registered office at .... are bound unto M/s. Aeronautical Development Agency, Min. of Defence, Govt. of India, P.B.No.1718, Vimanapura Post, Bangalore – 560 017 (hereinafter called the "Buyer") in the sum of .... for which payment will and truly to be made to the said Buyer, the Bank binds itself, its successors and assigns by these presents.

3. Sealed with the Common Seal of the said Bank this .... day of .... 20........

4. The conditions of obligations are –

(1) If the Bidder withdraws or amends, impairs or derogates from the Bid in any respect within the period of validity of this tender.

(2) If the Bidder having been notified of the acceptance of his tender by the Buyer during the period of its validity.

   a) If the Bidder fails to furnish the Performance Security for the due performance of the contract.

   b) Fails or refuses to accept / execute the contract.

WE undertake to pay the Buyer up to the above amount upon receipt of its first written demand, without the Buyer having to substantiate its demand, provided that in its demand the Buyer will note that the amount claimed by it is due to it owing to the occurrence of one or both the two conditions, specifying the occurred condition or conditions.

5. This guarantee will remain in force up to and including 45 days after the period of tender validity and any demand in respect thereof should reach the Bank not later than the above date.

....
(Signature of the authorized officer of the Bank)
Name and designation of the officer
Seal, name & address of the Bank address of branch

Non-Disclosure Agreement

This Agreement is made effective this   ("Effective Date")

Between

    (i)   ; and

    (i) .

Both ------------ and --------------------------- are hereinafter referred to collectively as "the Parties" and individually referred to as a "Party".

1. Definitions

1.1   For the purposes of this Agreement:

    (a)   "Confidential Information" shall mean this Agreement and all information of a commercial, technical or financial nature which is directly or indirectly disclosed by the Disclosing Party (or a member of its Group or another person on behalf of the Disclosing Party as applicable) (whether before, on or after the date of this Agreement) Confidential Information includes, without limitation, any information relating to, or materials of whatever nature embodying, the Disclosing Party's products, services, operations, plans or intentions, product information, protocols, intellectual property, data, know-how, secret formulae, processes, designs, photographs, drawings, specifications research and development, trade secrets, opportunities, business affairs, customer and clients, business plans, software code, listings, holdings, alliances, investments and transactions, regardless of form, format or media and whether communicated or obtained through meetings, documents, correspondence or inspection of a tangible item that is in each case either (i) by its very nature confidential; (ii) is marked as such; or (iii) it is reasonable to assume to be confidential from the context;

    (b)   "Disclosing Party" means the Party disclosing Confidential information to the Receiving Party;

    (c)   "Group" shall mean in relation to a Party, that Party, each and any subsidiary or holding company of that Party, and each and any subsidiary of such holding company;

    (d)   "Purpose" means discussions and exchange of information related to [...];

    (e)   "Receiving Party" means the Party who receives Confidential Information from the Disclosing Party; and

    (f)   **"Representatives" shall mean** employees, agents, contractors, directors and other professional advisers of the Receiving Party and the Receiving Party's Group.

2. Term and Termination

2.1   This Agreement shall continue in full force and effect for a period of one (1) year from the Effective Date unless earlier terminated by either Party upon the provision of thirty (30) days' notice in writing to the other. Each Party hereby undertakes to keep confidential all of the other Party's Confidential Information that it may acquire in any manner for a period of five (5) years after the termination or expiration of this Agreement.

2.2   At the expiration or in the event of early termination of this Agreement, or at any time on receipt of a written request from the Disclosing Party, the Receiving Party shall:

(a) immediately discontinue all use of the Disclosing Party's Confidential Information disclosed under this Agreement;

(b) return forthwith all documents and/or other materials (whether in paper, electronic or other form) bearing or incorporating the said Confidential Information or any of it, or certify that same have been destroyed; and

(c) ensure that each of its Representatives who have been given access to the Confidential Information pursuant to the terms of this Agreement are aware that the continued use of same for the Purpose is no longer permitted.

2.3 The obligations in Clause 2.2(b) to return or destroy Confidential Information shall not apply to:

(a) minutes or papers of any meeting of the Receiving Party's board of directors, or to those of a duly appointed committee of such a board; or

(b) the retention of Confidential Information by the Receiving Party and its Representatives to comply with applicable law, rule, regulation, professional record-keeping obligations, internal compliance procedure and internal document retention policies or any competent judicial, governmental, supervisory or regulatory body.

3. Undertakings and Acknowledgements

3.1 In consideration of each Party disclosing its Confidential Information to the other, each Party hereby undertakes to:

(a) keep the Confidential Information strictly confidential, including, without limitation, taking the measures set out in Clause 5;

(b) use the other Party's Confidential Information exclusively for the Purpose;

(c) not disclose the other Party's Confidential Information to any person, and prevent any such disclosure, except as expressly permitted by the terms of this Agreement; and

(d) keep the fact of the existence of this Agreement, the circumstances surrounding its creation, and the transaction contemplated by it confidential and not disclose same in any way whatever, whether by way of public announcement, individually to any third party, or otherwise, without the prior written approval of the other Party.

3.2 Parties acknowledge and agree that:

(a) nothing in this Agreement shall be construed as a waiver by either Party of its proprietary rights in any of the Confidential Information it discloses hereunder;

(b) no warranty is given by either Party that the Confidential Information supplied by it will be complete and accurate and fit for any particular purpose, including the Purpose;

(c) nothing in this Agreement shall be construed as a grant by one Party to the other of any form of licence to use any of the Confidential Information it discloses hereunder other than for the Purpose, or to deal in any way with any of the intellectual property rights therein; and

3.3 The Disclosing Party warrants that it has the right to disclose the Confidential Information to the Receiving Party and to authorise the Receiving Party to use the Confidential Information for the Purpose.

4. Exceptions

4.1 The restrictions on the Parties under Clause 3.1 shall not apply to Confidential Information that:

(a) is or becomes generally available to the public through no act of default on the part of the Receiving Party or any of its Representatives; provided that, for the avoidance of doubt, disclosure to a governmental entity, domestic or foreign, shall not be considered to be "generally available to the public"; or

(b) the Receiving Party can prove by documentary evidence produced to the Disclosing Party that the Confidential information was already in the Receiving Party's

possession and at its free disposal before the disclosure made pursuant to this Agreement; or

(c) is independently developed by the Receiving Party; its officers, employees, agents or contractors, without reference to the Disclosing Party's Confidential Information; and/or

(d) is subsequently disclosed to the Receiving Party without any obligations of confidence by a third party who has not derived it directly or indirectly from either Party to this Agreement.

4.2 The Receiving Party may disclose Confidential Information that it is required to disclose by law, by any governmental or other regulatory authority   or by a court or other authority of competent jurisdiction provided that, to the extent it is legally permitted to do so, it gives the Disclosing Party as much notice of this disclosure as possible.

5. Confidentiality Measures:

5.1   In order to secure the confidentiality attaching to the Confidential Information, each Party shall:

(a) subject to Clause 5.2, ensure that access to the other Party's Confidential Information is allowed exclusively to those of its Representatives who are under a written agreement (which may be as part of their employment or contract for work) to preserve as confidential any information and knowledge which is entrusted to their employer or, in the case of a contractor, their client;

(b) keep separate all of the other Party's Confidential Information and all information generated by it based thereon from all of its other documents and records;

(c) not make or retain any copies of the other Party's Confidential Information or create any documents or other material of whatever nature containing or reflecting any of the other Party's Confidential Information except as necessary for the Purpose;

(d) use the same security measures and degree of care to preserve and safeguard the other Party's Confidential Information as they use to preserve and safeguard their own Confidential Information and in any case no less than reasonable care; and

(e) comply with all other reasonable requirements imposed by the Disclosing Party in relation to the protection of its Confidential Information.

5.2 For the avoidance of doubt, each Party further acknowledges and agrees that it shall be wholly responsible for breaches of this Agreement arising from the acts and/or omissions of its respective Representatives.

6. General:

6.1 The Parties acknowledge and agree that the Confidential Information is of significant commercial value to the relevant owners and that any breach by one Party of the terms of this Agreement could cause irreparable damage to the other Party's business. Accordingly, without prejudice to any other rights or remedies available to either Party, whether at law or in equity, each Party acknowledges and agrees that damages alone may not be an adequate remedy for a breach of this Agreement and that each Party shall be entitled to seek the remedy of injunction in the event of any actual, threatened or anticipated breach by the other of any of the terms of this Agreement.

6.2 This Agreement is personal to the Parties and shall not be assigned or otherwise transferred, in whole or in part, by either Party without the prior written consent of the other.

6.3 Neither Party shall describe itself or hold itself out as an agent of the other and nothing in this Agreement shall be construed as creating the relationship of partnership or principal and agent between the Parties.

6.4   This Agreement constitutes the entire understanding and agreement between the Parties relating to the protection and use of Confidential Information disclosed hereunder and supersedes any and all prior agreements (whether written or oral) or understandings relating thereto. No Party shall be bound by any additional or other representation, condition or promise unless expressly agreed in writing and signed by a duly authorized representative of that Party.

6.5   All non-legal notices, approvals, consents and other communications required or permitted under this Agreement will be in writing and delivered by email with confirmation of delivery, by courier or reputable international delivery service with written verification of receipt, or by registered mail, return receipt requested, postage prepaid, and in each instance will be deemed given upon receipt. All such notices, approvals, consents and other communications will be addressed to the address set forth in this Agreement or to such other address as may be specified by either Party to the other in accordance with this Clause.

6.6   All legal notices under this Agreement will be in writing and delivered by courier or reputable international delivery service with written verification of receipt, or by registered mail, return receipt requested, postage prepaid, and in each instance will be deemed given upon receipt. All legal notices will be addressed to the address set forth in this Agreement or to such other address as may be specified in writing by either Party to the other from time to time

6.7   If any provision of this Agreement is found to be unenforceable, the remainder shall be enforced as fully as possible and the unenforceable provision shall be deemed modified to the limited extent required to permit its enforcement in a manner most closely representing the intention of the Parties as expressed herein.

6.8   This Agreement may be executed in counterparts, each of which will be deemed an original, but all of which together will constitute one and the same instrument. Transmission of the executed signature page of a counterpart to this Agreement by email or other electronic means shall take effect as delivery of an executed counterpart of this Agreement.

6.9   The construction, validity and performance of this Agreement and all matters arising from or connected with it shall be governed in all respects by Laws of Republic of India.

6.10 Save for any application for injunctive relief made by either Party pursuant to Clause 6 herein (which may be made in any court of competent jurisdiction), each Party irrevocably agrees that any dispute or claim of any kind whatever arising under, out of, or in connection with this Agreement shall be subject to the exclusive jurisdiction of the courts at Bangalore.

6.11 Any claims, differences or disputes under or in relation to this Agreement shall be resolved amicably by mutual discussion failing which the same shall be referred to the Sole Arbitrator appointed by consent of both the parties. Any claims, differences or disputes under or in relation to this Agreement will be referred to Arbitration in accordance with Arbitration and Conciliation Act 1996 and the venue of arbitration will be Bangalore. The language of the arbitration shall be English. The decision/award of such an arbitrator shall be binding on the parties hereto and enforceable in any court of competent jurisdiction.

Signed by a duly authorised representative of the Parties

Signature: Signature:

Name: Name:

Title: Title:

Date: Date:

Development, Fabrication, Wiring, Integration, Testing and Installation of Mission Management and Display Computer Software Test Rig

Contents

LIST OF FIGURES

LIST OF TABLES

Document Revision History

Date	Revision Number	Changes	Remark
23/02/2024	1.0	First Draft Version	------------------
12/08/2024	1.1	• LADs added • SSHUD added	LADs: ADA/AWSD/LAD/EID, VER:1, DEC-21 SSHUD: ADA/AWSD/HUD/EID, VER:1, DEC-22
21/08/2024	1.2	• DCU Technical Specification added. • DCDM Technical Specification added.	MMDC EID Discrete
27/08/2024	1.3	• SVP & DMG actual unit loom requirements removed. • BDU actual unit loom requirements removed.	
04/09/2024	1.4	• SVP & DMG Video Generator and Analyzer added • TSN switch added	
21/09/2024	1.5	• 1553B DDC card added	Along with industrial computer [RT SERVER]
13/11/2024	1.6	• Comments updated given from Mk2 PMG office	

1.   Introduction

The Avionics architecture of LCA-Mk2 is centered on Mission Management and Display Computer with two channels for hot backup. (MMDC-CH1 and MMDC-CH2) with threedual redundant MIL-STD-1553B buses which are used for data exchange between MMDC and various onboard avionics systems, sensors, reversionary displays, computing systems and recording systems. MMDC is the manager of LCA Mk2 avionics which acts as a bus controller. In the event of MMDC-CH1 failure, all functionalities of MMDC-CH1 will switch over to MMDC-CH2 and it will act as the bus controller. Mission Management and Display Computer Software Test Rig (MMDCSTR) is used for the development, testing and certification of Mission Management and Display Computer (MMDC) Software for LCA-Mk2.

1.1   Purpose of the Document

The scope of the document is to describe the technical specification of **Mission Management and Display Computer Software Test Rig (MMDCSTR)**. This document defines the functional, hardware, software, mechanicaland electrical requirements of Mission Management and Display Computer(MMDC) Software Test Rig for LCA-Mk2 aircraft.

1.2   Scope of Work

The scope of work includes:
> ➢ Design, development and fabrication of MMDCSTR facility.
> ➢ Development/Procurement and installation of Electronics & Electrical Systems of MMDCSTR.
> ➢ Procurement and installation of Workstations and Desktops for Avionics Simulation Suite of MMDCSTR.
> ➢ Pre-dispatch acceptance tests at vendor's place.
> ➢ Commissioning, Final acceptance testing of MMDCSTR at ADA, Bangalore.

1.3   MMDC Test Facilities Overview

The MMDCSoftware Test Rig shall be developed as a standalone rig and to be used for only development activities at fixed place inside permanent building under controlled lab environment. The MMDC is the manager of LCA-Mk2avionics which controls all three 1553B dual redundant avionics buses of Mk2. It is connected to various line replaceable units (LRUs) of the avionics system through 3 dual redundant MIL-STD 1553B Bus. The test rig shall provide the ground based functional testing environment for the MMDC.

- Interfaces listed in subsequent sections shall be connected to the MMDC.
- Simulated RT interfaces to the MMDC on MIL-STD-1553B bus. Some of these simulated RTs are listed in the subsequent sections.
- A Digital I/O control unit providing discrete signals to the MMDC.
- Twodisplay unitsLLAD and RLAD connected to MMDC on TSN Ethernet, SVP&DMG on ARNIC818 dual redundant & RS422.
- Sleek Smart HUD is connected to the MMDC on TSN Ethernet, SVP&DMG on ARNIC818 video.
- The Rig also consists of the following units:
  1. Power distribution units
  2. Wiring harness
  3. Control units
  4. Cooling units

To verify/test the MMDC software functionality, the LRUs in the Mk2 avionics are to be simulated at data communication level, so as to stimulate the MMDC in realistic conditions. The MMDC software test rig architecture shall be configurable for variants of aircraft configurations like Fighter.

1.4   Abbreviation

Table 1 : List of Abbreviation

Name	Description
AESA	Active Electronically Scanned Array
RADAR	Radio Detection and Ranging
AMS	Aircraft Memory Server
ARINC	Aeronautical Radio Incorporation
BDU	Backup Display Unit
BC	Bus Controller
BIFU	Bus Interface Unit
BHEEM	Brake Control, Hydraulic, Electrical and Engine Monitoring
CDS	Cockpit Display System
CIU	Cockpit Interface Unit
DCU	Discrete Input and Output Control Unit
DCDM	Direct Current Distribution and Measurement Unit
DFCC	Digital Flight Control Computer
DI Camera	Daily Inspection (DI) Camera
DMG	Digital Map Generator
ECMR	Electronic Counter Measure - RWR

Name	Description
ECFM	Environment Control and Fuel Management
ES	Electrical System
FADEC	Full Authority Digital Electronic Control
FDG	Flight Data Generator
FDM	Flight Dynamic Model
FSDU-FF	Function Selection Display Unit-Front Function
FSDU-FS	Function Selection Display Unit- Front Selection
FSDU-RF	Function Selection Display Unit- Rear Function
FSDU-RS	Function Selection Display Unit-- Rear Selection
FSP	Functional Selection Panel
HMDS	Helmet Mounted Display and Sight
IASS	Integrated Avionics Simulation Suite
INS-GPS	Inertial Navigation System-Global Positioning system
IRST	Infrared Search and Track Systems
IPC	Institution of printed circuits
KVM	Keyboard Video Mouse
LAD	Large Area display
L-LAD	Left Side Large Area Display
LDP	Laser Designation Pod
LRU	Line Replaceable Unit
LSS	LRU Simulation System
MAWS	Missile Approach Warning System
MMDC	Mission Management and Display Computer
MMDC &ES	Mission Management and Display Computer &Electrical System
MRT	Monitoring Remote Terminal - Virtual RT (not LRU in Aircraft) used to send MMDC debug messages on 1553B bus.
RDI	REUTECH DEFENCE INC...
RT	Remote Terminal
RADAR	Radio Detection And Ranging
R-LAD	Right Side Large Area display
SEIB	Smart Electronics Interface Box
SIB	Stores Interface Box
SVP	Sensor Video Processor
SSP	Sensor Selection Panel
TACAN	Tactical Air navigation
VDR	Video Cum Digital Recorder

Name	Description
VOR-ILS	Very high frequency Omni directional Range- Instrument Landing Systems
UEWS	Unified Electronic Warfare Suite
CIT	Combined Interrogator and Transponder
UVDR	Unified Video and Data Recorder
WHMA	Wiring Harness Manufacturing Association

1.5   Document Overview

This document describes specifications for MMDC Software Test Rig which shall be designed and developed through outsourcing mode. This document further addresses the detailed requirements of hardware and software of the Test Rig. **ADA hereafter referred to as the acquirer and subcontractor referred to as supplier.**

- Section 2 describes System Overview.
- Section 3 describes Hardware requirements.
- Section 4 describes Engineering requirements.
- Section 5 describes LRU'S Software requirements.
- Section 6 describes Support Software requirements.
- Section 7 describes Project Schedule and Milestone.
- Section 8 describes General requirements.
- Section 9 describes Deliverables.

2.   System Overview

Mission Management and Display Computer Software Test Rig consists of four modules:

1. Mission Management and Display Computer& Electrical Systems– MMDC&ES
2. Cockpit Display System- CDS
3. Integrated Avionics SimulationSuite –IASS
4. Utility & Support System - USS

Below figure shows the block diagram of MMDCSTR Modules.
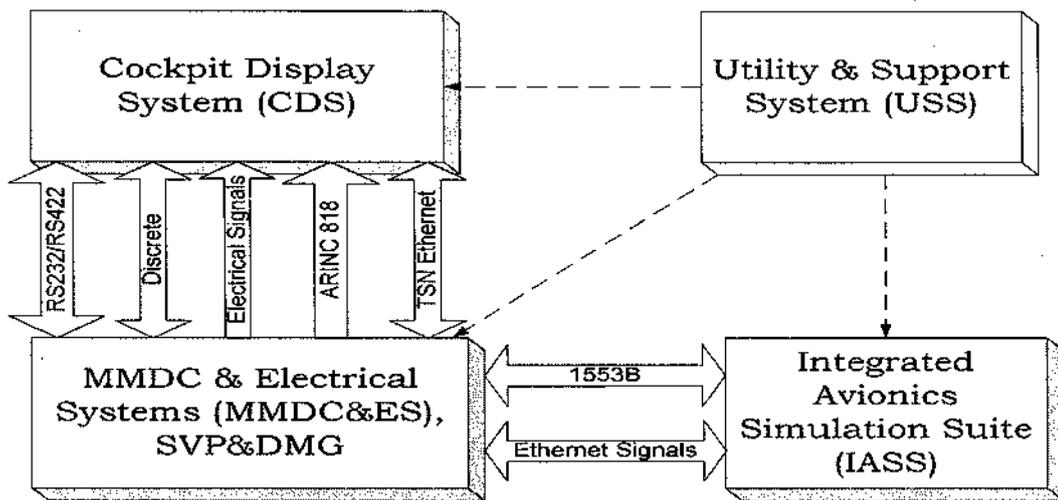
Figure 1: Block Diagram of MMDCSTR Modules

2.1   Mission Management and Display Computer & Electrical System (MMDC&ES)

The MMDC&ES developed to cater the electrical interface requirements of MMDC of LCA Mk2. The system is single independent 19" Rack which facilitates to connect MMDC (CH1 and CH2) along with all electrical interfaces of MMDC like DCU Box, VGA to STANAG 3350B Converter, 28V Power Supply, trays for MMDC and DCDM required to provide 28V power supply forMMDC (CH1 and CH2).

The MMDC&ES also provides 28V for all other LRU's and display systems which are required at test facilities. These LRU's are optional and connected on need basis. The Cockpit Display Systems, BDU, INSGPS, UVDR etc. are few examples of such LRUs.

2.2   Cockpit Display System (CDS)

The CDS is the collection of cockpit LRUs. These include SLAD's, Sleek Smart HUD and UFCP. The Front CDS will be connected to MMDC & ES through communication channels and MMDC & ES also provides 28V supply to all these LRUs.The CDS contains the following actual LRU's of LCA-Mk1A cockpit:

    A. **LAD'S**: LAD (Large Area Display) Units are interfaced to Smart Electronics Interface Box (SEIB) only. LAD's signal interfaces are RS422/STANAG, Discrete, Electrical Signal and ARINC818. Two LADs are connected as LLAD (Left LAD) &RLAD (Right LAD) to MMDC, SVP&DMG through above mentioned interfaces. The selection of MMDC-CH1 or MMDC-CH2 to drive LADs depends on channel select discrete input to the LADs.

    B. **UFCP**: UFCP (Up Front Control panel) units are connected to MMDC-CH1 and MMDC-CH2 through HUD (digital interface) and Power from DCDB.

C. **Smart Sleek HUD**: In LCA AF MK-2 fighter aircraft, HUD (Head-Up Display) is interfaced to SVP&DMG with ARINC818 optical interface and Ethernet channelsA&B with TSN interface. Other interfaces are RS232, Discrete and JTAG. HUD has provision for physical mounting & electrical interface for Up Front Control Panel (UFCP).

D. **BDU**:The Backup Avionics System provides standby Avionics capability in the aircraft in the event of failure of both MMDC channels. It consists of Backup Avionics Computer (BAC) and Backup Display Unit (BDU).

2.3   Integrated Avionics Simulation System (IASS)

The IASS is the collection of simulation software's which simulates Mk2 avionics connected to 1553B buses and TSN Ethernet. This contains two or more desktops to host simulation software's and a designated 1553B interface desktop system. The 1553B interface system is connected to MMDC (CH1 and CH2)through 1553B bus system. The 1553B interface system is named as Remote Terminal Server (RTS) as it provides 1553B-RT service to all LRU simulation software's. The TSN Ethernet is connected to MMDC through TSN Ethernet switches. Each LRU is simulated through independent application software which provides graphical user interface to set/reset the parameters of outgoing messages and display/view the parameters of incoming messages as per the respective ICD.

COMPACT MMDC S/W TEST FACILITY
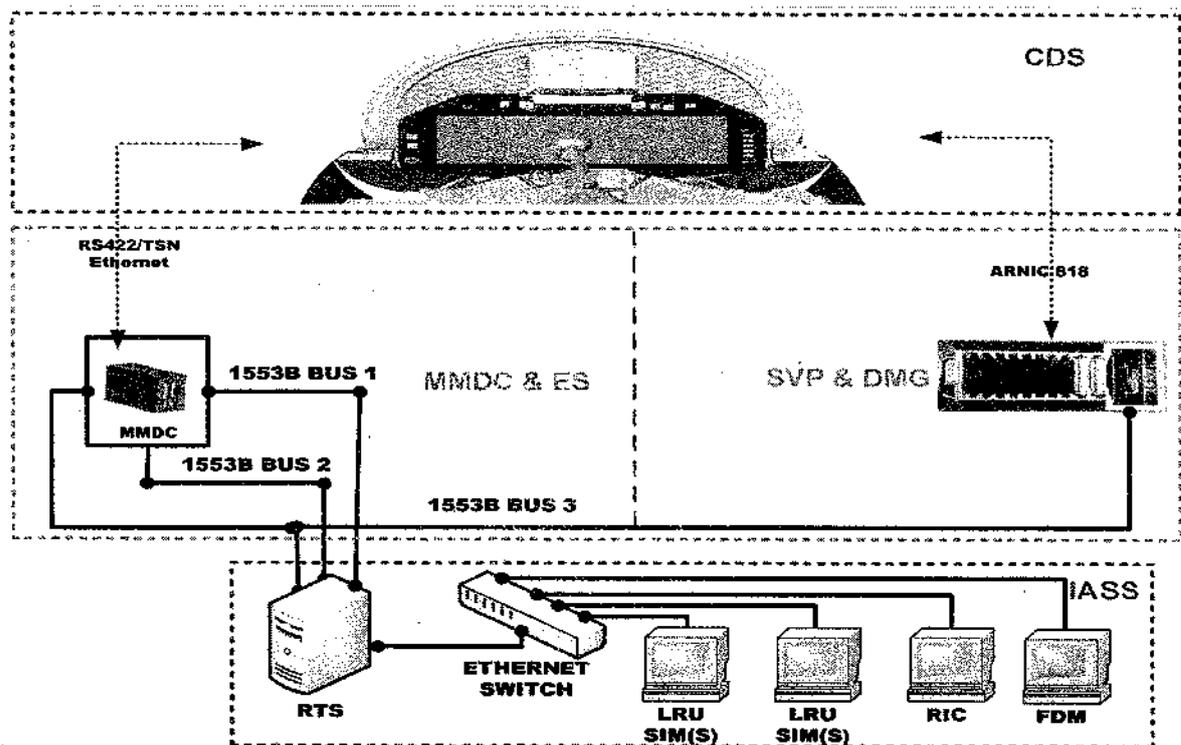
Figure 2: Mission Management and Display Computer Software Test RigArchitecture

3.   Hardware Requirements

This section describes the hardware components and specifications of the MMDC software test rig. This hardware shall provide the necessary interfaces and environment to simulate the realistic test conditions.

The list of the hardware components is given below.

- MMDC & ES Systems.
- CDS Systems.
- IASS Desktops and Workstations.
- LRUs Interface.
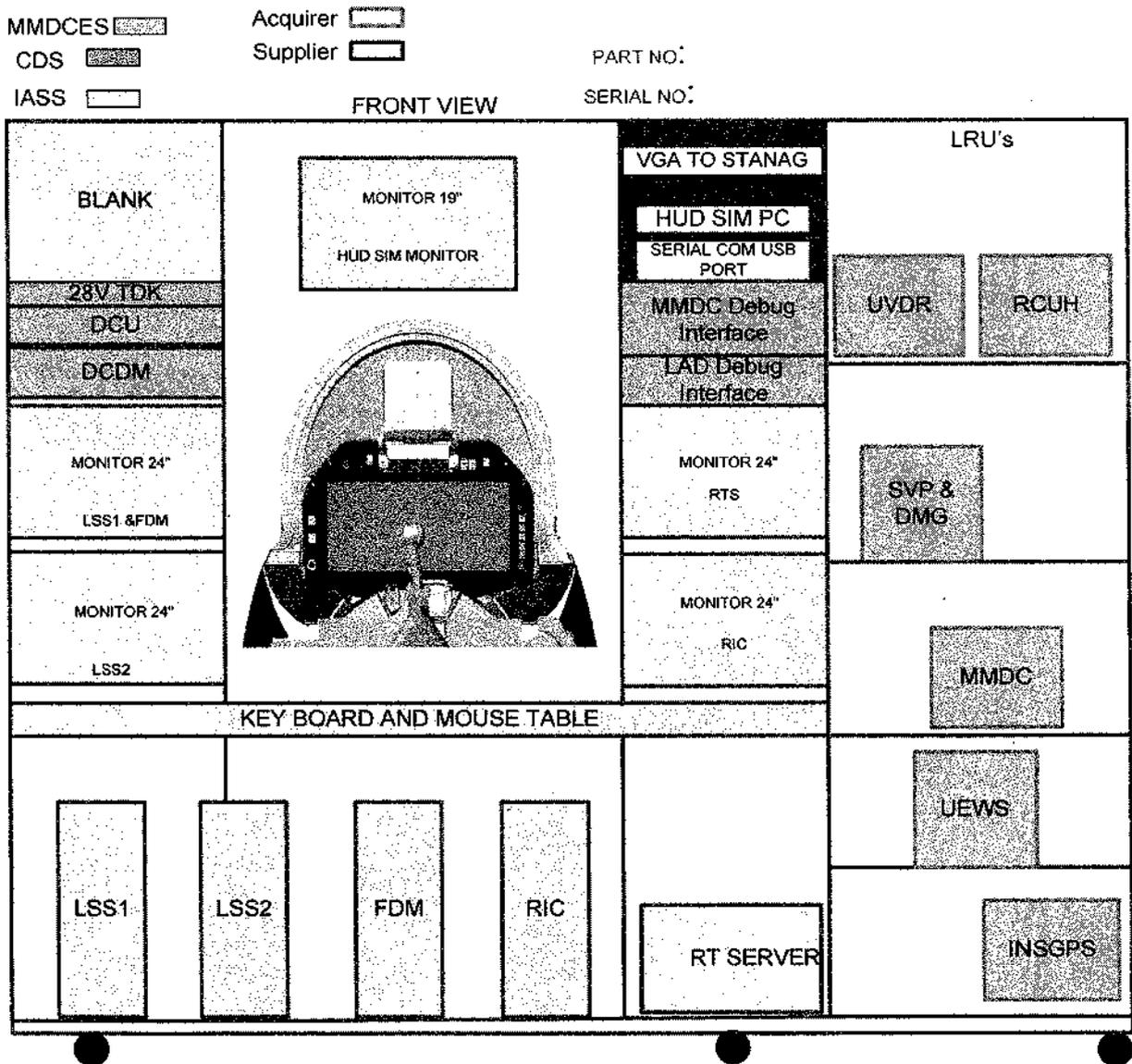
Figure 3: Front View MMDCSTR-MK2 Rig

3.1   Mission Management and Display Computer &Electrical Systems

The Electrical Systemconsists of following subsystems.

A. **Acquirer** provides the following subsystems
- Mission Management and Display Computer (MMDC)
- SVP & DMG, UVDR, INS-GPS, UEWS, RCUH.

B. **Supplier**provides the following subsystems
- 28V DCpower supply
- DC Distribution and Measurement Unit
- Discrete Input and Output Control Unit
- Video Interface panel
- DebugInterfacepanel
- BusInterface panel
- Cockpit Interface panel
- 1553B Bus Network
- Serial Communication Network
- Managed Ethernet Communication Switches
- TSN Ethernet Communication Switches
- MMDC Looms
- SLADs Looms.
- Smart Sleek HUD Looms
- HyperTerminal/Flashing Desktop
- For SVP & DMG simulation ARNIC 818 Video Generator and Analyzer

3.1.1   Mission Management and Display Computer

MMDC is a LRU which is unit under test. It is connected to various LRUs of the LCA Mk2 avionics systems through different interfaces such as 3dual redundant MIL-STD 1553B bus, RS232/RS422, TSN Ethernet and Discrete. Initially MMDC-CH1 will be active (acts as Bus Controller), MMDC-CH2 is the redundant unit of MMDC-CH1 (acts as Remote Terminal) and will take over from MMDC-CH2 if any failure has occurred in MMDC-CH1.

3.1.2   SVP & DMG

SVP& DMG acquires all videos in the aircraft & generates digital map for aircraft navigation, flight planning, tactical operations and enhancing situational awareness. SVP&DMG provides video outputs to SSHUD andLAD. LAD receives sensors (LDP/ RADAR/ IRST) video or digital map video, HUD camera video from SVP & DMG unit. SSHUD receives FLIR sensors (IRST or LDP) video from SVP & DMG unit. MMDC unit

controls the video switching by SVP & DMG unit and enabling/disabling of video overlay/ underlay by LAD and SHUD.

DMG performs rendering of 2D and 3D maps and supports various display map modes such as Raster maps, Terrain shading maps, Vector maps, Threat/Nav overlays and Perspective 3D maps. SVP &DMG is integrated on switched Ethernet/ Mil-Std-1553B (bus B3) for exchange of Navigation data with MMDC. On command of Emergency erase signal from the MMDC through Mil-Std-1553B, DMG performs the deletion of all the databases from the Memory.

3.1.3   28V DC power supply

This system receives 230V input power from single phase AC sourceand it will supply fixed DC 28V to DCDM. Detailed Specification refers below table.

Table 2 : 28V Power Supply Specifications

Sl. No.	Parameter	Specification
1.	Input	220V - 380V 50Hz Single phase AC power supply.
2.	Output	Voltage: 28VDC±10% Adjustable (25.2VDC - 30.8VDC) Current Rate: 0-60A
3.	Digital Voltmeter Indicator	28.0V
4.	Digital Ammeter Indicator	60.0A
5.	Protection	Over-Voltage, Over-Current, Over-temperature, Short-circuit protection
6.	Cooling system	Air Forced Fan
7.	Size	1U-Rack mountable or Smart Size

3.1.4   DC Distribution and Measurement unit

The DCDM provides 28V fixed power supply to all LRU units and CDS. The Circuit Breakers (CB), Toggle switches are power inputs of units and LEDs to display status of power. The DCDM unit operated in manual mode. The unit gives power inputs to both LRU units and CDS. The unit shall provide two switches first one is CB (Circuit Breaker) to protect from over current and second one is toggle switches for open & close the circuit. Appendix-A.

3.1.5   Discrete Input and Outputs

The DCU provides switches to simulate discrete input of MMDC and LEDs to display status of discrete output of MMDC. The control panel operated in manual mode and test shall be done with the help of manual switches. The panel stimulates discrete inputs to both MMDC-CH1 and MMDC-CH2 and display status of discrete output from

both MMDC-CH1 and MMDC-CH2. The unit shall provide broadly two types of toggle switches viz. 28V/GND and Open/GND.DIO panel with switches to generate discrete signal like Weight on Wheels (WOW), Operation/Maintenance, etc. For simulation of the discrete signals for MMDC-CH1 and MMDC-CH2, an I/O panel is provided to simulate discrete signals.

Refer Appendix-B.

3.1.6   Video Interface Panel

Video interface panel is used to connect different videos input from SVP and DMG to provide testing flexibility. Following are the video inputs to SVP and DMG from different sensors/systems.

- AESA RADAR
- LDP
- HMDS
- DI Camera (optional)
- IRST (optional)
- MAWS (optional)

Following are the video outputs of SVP and DMG.

- LAD-L
- LAD-R
- SSHUD

Note: overall design/pin details of video interface panel will be provided as per EICD at the PDR stage of the project.

3.1.7   Debug Interface Panel

Debug interface panel used to connect debug/test channels of MMDC/LADs for software up-gradation through RS232interface. Overall design/pin details of debug interface panel will be provided as per EICD at the PDR stage of the project.

3.1.8   . 1553B Bus System

This system is required for Bus communication between MMDC to IASS and other interconnected LRU's. In MMDC-CH1 and MMDC-CH2 each having around 3buses so we required separate to bus panel for connecting the bus cables to RT-Server and other LRU's. 1553b System contains the below panels.

- Bus System Panel
- Bus Extender panel

In each bus contains two channels like A & B. following are the bus interface ofMMDC-CH1 and MMDC-CH2.

- Bus 1, Bus 2 and Bus3 from MMDC-CH1-J1
- Bus 1, Bus 2 and Bus3 from MMDC-CH2-J2
- Bus 4 is spare

Note: Refer MMDC_EID (J1,J2)

Below figure shows the requirements of 1553B bus system.
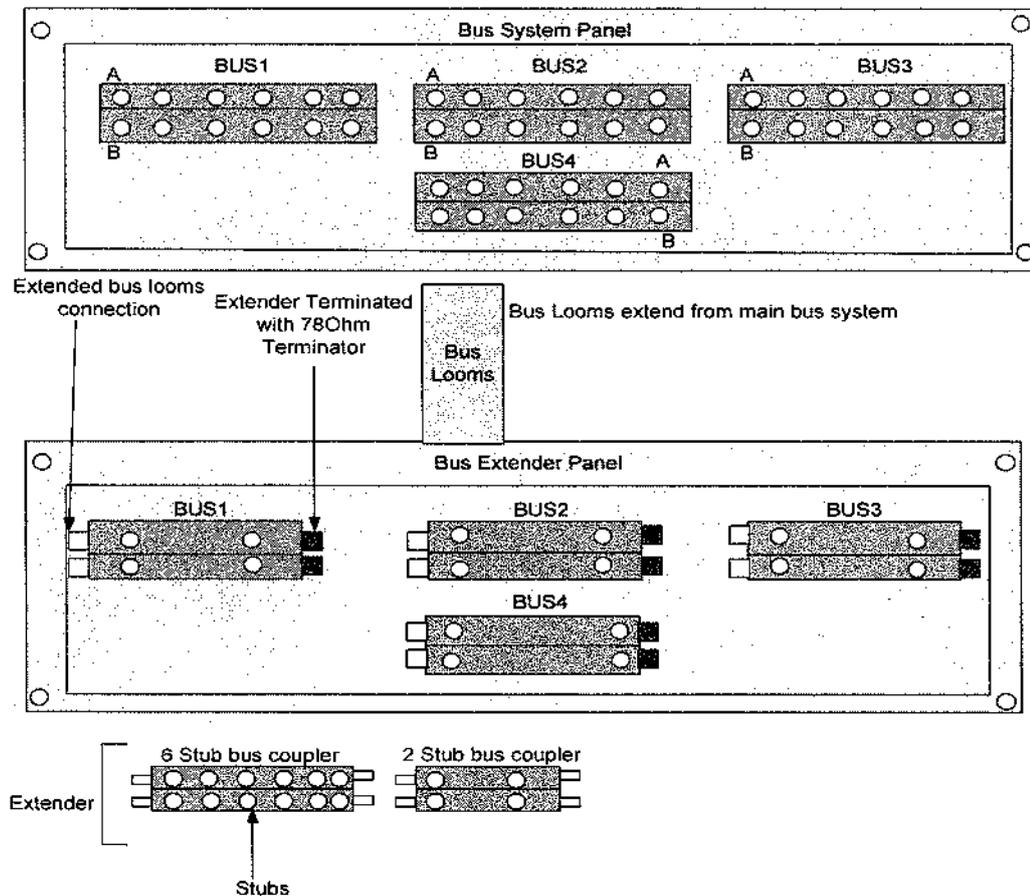
Figure 4: Bus Interface Panel

The MIL-STD-1553B bus network consists of 1553B standard shielded twisted pair cables, Data Bus Couplers (DBC) and Terminators. LRU's and actual units are connected to couplers through cables. Cables are also used to extended connection between couplers. The bus network is terminated by using terminators at both ends.

Table 3 : 1553B bus network specifications

Sl. No.	Item	Specification
a.	MIL-STD-1553B bus coupler	Four number of 2 stub bus coupler
b.	MIL-STD-1553B bus coupler	Four number of 6 stub bus coupler
c.	MIL-STD-1553B bus terminator	78-ohm terminator
d.	MIL-STD-1553B connectors	BJ77 female connector
e.	Terminal connection method	Transformer coupled method

3.1.9   Cockpit Interface Panel

This panel is required for STANAG/RS422, Electrical signals, Ethernet and ARINC818 communication to CDS. Cockpit display contains SSHUD, LAD's, and UFCP.Detailed design/pin details of cockpit interface panel will be provided as per EICD details at the PDR stage of the project.

3.1.10   Discrete Input and Output Interface Panel

Discrete I/O Interface panel is used for the connection between MMDC CH1 and CH2 to Discrete Input and Output Control Unit (DCU). This Interface Panel contains the both MMDC CH1 and MMDC CH2discrete signals interface connections. Refer Appendix B.

3.1.11   Serial Communication Network

The Serial interface shall be used to connect host computer to MMDC through RS232/422/485 interfaces which will be connected to the output of USB to Serial converter. Serial communication network is used for software up-gradation of MMDC/LADs on need basis.

Table 4 : Serial Communication Networks Specifications

Sl. No.	Parameter	Specification
1.	No. of Ports	4
2.	Serial Standard	RS-232, RS-422, RS-485
3.	Speed	12 Mbps, 480 Mbps
4.	USB Connector	USB Type B
5.	Device Driver support for OS	Windows 10 (x86/x64) Windows 7 (x86/x64) Windows XP (x86/x64)
6.	Operating temperature	0 to 55°C (32 to 131°F)
7.	Quantity	1

Sl. No.	Parameter	Specification
8.	Electrically Isolated	Yes – 2kV isolation protection
9.	Brand	MOXA (1450I)

3.1.12   Ethernet Communication Network

Managed Ethernet Switch is a device, which allows several computers to be networked over Ethernet. All computers in the test Rig, as well as the MMDC-CH1and MMDC-CH2 will have an Ethernet card. It will be connected to the Managed Ethernet Switch. Specification of the Managed Ethernet Switch is as follows:

Table 5: Ethernet switch

Sl. No.	Parameter	Specification
1.	No of ports	16 no's
2.	Interface	10/100/1000Mbps RJ-45 ports
3.	Indication LED's	Power per unit Activity/link, speed(one/port)
4.	Mounting	1U-Rack mountable
5.	Quantity	2
6.	Network Name	MMDC Network

3.1.13   TSN Ethernet Switch

TSN (Time Sensitive Network) full Gigabit managed Ethernet switch is a device, which allows several computers to be network over Ethernet. All computers in the test Rig, as well as the MMDDC, LAD, SHUD and Other LRUS's will have an Ethernet card. It will be connected to the Managed Ethernet Switch.

Features and Benefits

- Compact and flexible housing design to fit into confined spaces

- Web-based GUI for easy device configuration and management

- Supports Time-sensitive Networking (TSN) technology

Specification of the TSN Managed Ethernet Switch is as follows:

Table 6: TSN Ethernet Switch Specification

Sl. No.	Parameter	Specification
1.	Standards	IEEE 802.3 for 10BaseT IEEE 802.3u for 100BaseT(X) IEEE 802.3ab for 1000BaseT(X) IEEE 802.3z for 1000BaseX IEEE 802.1Q for VLAN Tagging

Sl. No.	Parameter	Specification
		IEEE 802.1p for Class of Service
		IEEE 802.1D-2004 for Spanning Tree Protocol IEEE 802.1w for Rapid Spanning Tree Protocol
		IEE 1588v2 PTP Precision Time Protocol (hardware-based)
		IEEE 802.1 AS for Time Synchronization
		IEEE 802.1 Qbv for Time-aware Shaper
2.	Ports • Auto negotiation speed. • Full/Half duplex mode • Auto MDI/MDI-X connection	• 10/100/1000BASE TX / RJ45. • 100/1000Mbit/s fiber. • SFP Slot (100/1000 Mbit/s). • SFP Slot (100/1000 Mbit/s).
3.	Mounting	• 1U-Rack mountable. • DIN-rail mounting Wall mounting (with optional kit)
4.	Operating Temperature	• 0 to 40°C
5.	Quantity for 24 ports switch	4 numbers as per latest Mk2 avionics architecture.
6.	Network Name	Aircraft Network

3.1.14   MMDC looms

Looms from MMDC for different interfaces such as 1553B, RS232/ RS422, Discrete Signal, Power, Ethernet, Analog, STANAG, ARINC 818 and all connectors' details (D38999 connectors) at both ends, refer document **ADA/LCA/MMDC/EID/02 dated 10/10/2023 or Latest EID.**

3.1.15   Smart LAD looms

Looms from Smart LAD for interface RS422, Discrete Signal, Power, Ethernet, Analog, STANAG, and ARINC 818 for all connector's details (D38999 connectors) at both ends, refer document **ADA/AWSD/LAD/EID dated Dec 2021 or Latest EID.**

3.1.16   SSHUD looms

Looms from SSHUD for interface RS232, Discrete Signal, Power, Ethernet, Analog, STANAG, and ARINC 818 for all connector's details (D38999 connectors) at both ends, refer document.**ADA/AWSD/HUD/EID dated Dec 2022 or Latest EID.**

3.2   Cockpit Display Systems

The CDS of following actual LRU's of LCA-Mk2 cockpit:

- LLAD
- RLAD
- SSHUD
- UFCP
- BDU

3.2.1   SLAD'S

Single 20" ×8" Large Area Display (LAD) with touch screen capability is envisaged in LCA AF MK2.Smart LAD is a large format Active Matrix LCD based display with built-in graphics generation and NVG compliance. It receivesA661 data for page composition from MAS & BAS on switched Ethernet interface. It interfaces withSVP&DMG through ARINC 818 video interface for displaying sensor video (LDP, AESA RADAR, IRST, HUD camera and digital map etc.) and fused display pages. The main functions of LAD are as follows:

- Symbol generation and display of the pages
- Overlay of symbology and key legends over the external video
- Management of man/machine interface through bezels keys
- Compression of displayed page video and sending it to UVDR on a direct Ethernet interface for recording.

3.2.2   Sleek Smart HUD

Cockpit display in LCA AF Mk-2. It provides Instantaneous FOV of 20 degrees Azimuth & 18 degrees Elevation. Smart HUD electronics includes ARINC661 Cockpit Display System based rendering engine to generate graphical information as per Definition File and ARINC 661 runtime data received over redundant Ethernet port. ARINC 661 UA data will be sent to SHUD by MMDC. Raster video will be sent to SHUD by SVP & DMG. Conventional analog X, Y, Z interface, Raster Video interface, discrete selection lines and RS422 interface between SHUD and MMDC will be replaced by ARINC-818 optical interface to SVP-DMG& Switched Ethernet interface to MMDC. This will reduce

the cabling and increase reliability and is inherently lightning protection compliant. The main functions of SHUD are as follows:

- SHUD will be interfaced to Sensor Video Processor (SVP) over redundant ARINC 818 optical link for Raster video input.

- SHUD will be having 720p resolution Front mounted HD camera, the synthetic symbology will be overlaid over outside view captured by camera. Uncompressed Video will be sent to SVP&DMG over A818 optical link, H.264 compressed video will be sent to UVDR & FTI through switched Ethernet.

- SHUD will be having control switches for power, brightness, contrast, standby sight depression and provision for UFCP data entry panel.

3.2.3   UFCP

UFCP is a data entry panel with few keys and/or multi-function rotary switch. Its main purpose is to serve as an interface between pilot and Avionics system through its various key controls. The unit is an attachment to SHUD and is connected to both MMDC1 & MMDC2 through SHUD on Ethernet.

3.2.4   BDU & BAC

BAC is the main computer in backup avionics mode. BAC interfaces with BDU, LAD and SHUD for display of backup avionics symbology. BAC interfaces with SHUD & LAD on switched Ethernet and BDU on RS422 / Ethernet. BAC has RS422 interface with DFCC (all 4 channels) and IRAM. It has switched Ethernet interface to Standby INS. Some of the critical parameters are sent on analog interface to SSCDR for recording purpose. BAC interfaces with USMS (ECFM, BHEEM) on switched Ethernet. It also acquires engine related critical analog / discrete parameters from FADEC. It computes vertical speed and Baro altitude and displays vertical speed, Mach no, Indicated Air Speed, Baro Altitude, Pitch, Roll, Magnetic Heading, Angle of Attack, Barosetting. It also acquires /computes essential engine parameters such as compressor rotor speed (N2), turbine discharge temperature (T5), variable exhaust nozzle area (NOZ) for the engine system and fuel parameters like F1 tank fuel contents, fuel quantity remaining, internal fuel and rate of fuel to engine from the fuel system. With BAC, RT channel control is possible through switched Ethernet interface to SDRs using LAD / BDU;communication control is possible through switched Ethernet I/f to DACS; frequency selection for VOR-ILS / TACAN, mode & squawk code change for IFF transponder is possible through switched Ethernet interface to VOR-ILS, TACAN and CIT. BAC shall interface with CMDS through switched Ethernet for self-defense in backup avionics mode. BAC also interfaces with WMC through Ethernet for standby

A/A & A/G weapon capability. BAC will provide limited health status & warning generation capability in backup avionics mode. BAC is also connected to MMDC-CH1, MMDC-CH2 through switched Ethernet.

BDU is a smart Active Matrix Liquid Crystal Display (AMLCD) for use in Backup Avionics mode. It is interfaced to BAC on RS422. It generates & displays symbology for backup avionics mode based on the data received from BAC.

3.2.5   VGA TO STANG 3350 CONVERTER

VGA to STANAG 3350B Converter Unit is a 2RU size DIN Rack mountable stand-alone equipment operated with 230V AC input. The unit accepts VGA input and provide RGB Output. Optional Gain Box is also built into the unit. These STANAG 3350B video output signals are connected to Video Interface panel which is used to interface these signals to SVP and DMG connectors.

Features:
1. 2 RU size DIN Rack mountable unit, operated with 230V AC Supply.
2. Accepts VGA input and also monitor the VGA input at the same time.
3. The unit shall provide output 2Nos STANAG 3350b Video S1 (G+Sync) Differential Signals.
4. The unit shall provide output 2Nos STANAG 3350b Video S2 (G+Sync) Differential Signals.
5. The unit shall provide output 2Nos STANAG 3350b Video RGB Differential Signals.
6. Video Interface panel used to interface the above-mentioned signals to MMDC Ch-1 and Ch-2, in Mk2 signals and interface panel will be designed as per SVP&DMG EICD.

Inputs   **Outputs**

VGA I/P → ... → Provision for monitoring input VGA signal

VGA I/P → S1 (G+Sync)2Vp-pDifferential Signal (2Nos)

230V AC → S2 (G+Sync)2Vp-pDifferential Signal (2Nos)

Gain Preset → R+/- G+/- B+/- Differential Signal (2Nos)

Gain Box Enable Connection → S1+ (G+Sync) 4Vp-pDifferential Signal

[VGA TO STANAG CONVERTER] → S2+ (G+Sync) 4Vp-pDifferential Signal
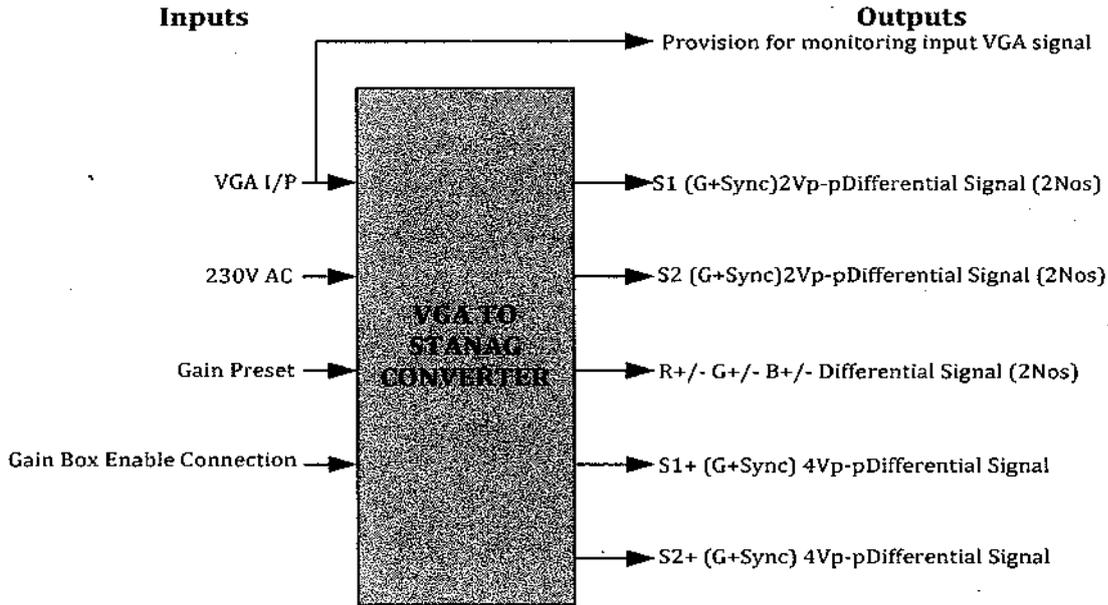
Figure 5: VGA to STANAG Converter Block Diagram

3.2.6   SVP & DMG Simulation - ARNIC 818 Video Generator and Analyzer

SVP-DMG (Sensor Video Processor - Digital Map Generator) is one of the Line Replaceable Unit (LRU) for LCA AF Mk2 fighter aircraft avionics systems. Sensors video Processing, sensors data processing, Generation of Digital Map are the main functional requirements of SVP-DMG. Generated Video from SVP-DMG in ARINC-818- 2 format is to be displayed in display surfaces in the cockpit so as to aid pilot to accomplish tactical mission by reducing pilot workload and with ease. SVP-DMG is identified as one of the mission critical LRU.

To simulate SVP-DMG at MMDC software test rig, ARINC-818 video generator and analyzer is required to test functionalities such as RADAR/IRST or LDP or, POD or MAWS sensor video overlay with Tactical Situational Display Page composition for display on LAD.

Table 7: ARINC 818 tester specifications

Sl. No.	Parameter	Specification
1.	Data-rate to be streamed	Minimum4.25 Gbps
2.	No of Input channels	8
3.	Resolution	1280 X 1024 @ 50 fps.
4.	Data Split ratio	1:4
5.	Video data latency	One line delay
6.	Portable enclosure standard	Industrial standard
7.	Interface	Optical fiber (with provision of adapter to switch

Sl. No.	Parameter	Specification
		between different interfaces)

3.3   IASS Desktops and Workstations

The system shall have minimum five or more desktops/workstations installed with necessary hardware and operating system torun, control and simulate modules. These desktops consist of high-end configuration to provide the realistic performance for the simulated simulators.

3.3.1   RT Server Industrial Computer and 1553B DDC card

This Server is used for run the remote terminal applicationAlong with 2 number 2 Channel Multifunctional PCI card[**DDC 1553B P/N: BU-67210F200L-2A0**].Total 4 pair of bus cable required for bus connection. The detailed specification of the desktops refer Appendix-F.

3.3.2   LRU Simulation (LSS1 and LSS2) Workstation-1 & 2

These Workstations are used for model simulation and testing. Detailed specifications of the desktops for LRU simulators refer Appendix-F.

3.3.3   Flight Simulation (FDM) Workstation-3 and SVP & DMG simulator Workstation-4

The workstation-3 used for LCA Mk2 flight simulation to test MMDC software through limited avionics dynamic mission simulation andworkstation-4 used for video controller. The detailed specifications of the workstation-3 & 4refer Appendix-F.

3.3.4   Desktop-1 (Rig Interface Computer)

These Desktops used for data sharing and load the applicable/latest software into the MMDC. The detailed specificationsof the desktops for data sharing and Flashing refer Appendix-F.

3.4   LRU'SInterface Requirements

MMDCSTR Test Rig required to provide interface for the following LRU's on need basis to test the MMDC software.

3.4.1   UVDR

UVDR (Unified Video and Data Recorder) is connected to MMDC through Video link (for recording), Ethernet & MIL-STD-1553B and to MMDC-CH2 through Video link (for recording), Ethernet & MIL-STD-1553B. The Data loading of cartridge data to MMDC-CH1 is done through Ethernet (the data loading to MMDC-CH2 is done through the Ethernet link between MMDC-CH1 and MMDC-CH2.

3.4.2   INSGPS

Inertial Navigation System-Global Positioning system(INGPS) is connected to MMDC through discrete link & MIL-STD-1553B. It is a primary navigation sensor and computing unit is interfaced on BUS 3.

3.4.3   RIS Simulator

Radar Interface Simulator (RIS) is connected to MMDC-CH1 and MMDC-CH2 through Video link & 1553B bus link. It is to provide ARNIC818 and STANG Video output to MMDC-CH1 and MMDC-CH2.

3.4.4   UEWS

Unified electronic warfare suite required Power, Ethernet and Bus interface at MMDC software test rig, therefore provision shall be available to connect actual UEWS.

4.   Engineering requirements

This section describes the engineering components and specifications of the MMDC software test rig. The list of the engineering requirements is given below.

Supplier provides the following subsystems

- Racks and Consoles (design depends on requirements)
- Electrical Wiring requirements
- Power Supply Requirements
- MMDC [CH1&CH2] Tray
- KVM switch
- Grounding, Bonding and Insulation
- Safety Requirements

4.1   Racks and Consoles

a. Racks and Consoles shall house avionics LRUs, LRU and sensor simulator, DASS, monitors, video interface panel, bus interface panel, debug interface panel, cockpit interface panel, testing and measuring instruments, DCDM, DCU, 28V Power supply. Etc.

b. Conforms to DIN 41494 OR Equivalent EIA/ISO/EN/CEA Standard.

c. Adjustable Mounting depth.

d. 4 No adjustable, 19" verticals with punched 10 mm Square Hole and Universal 12.7mm 15.875mm-15.875mm alternating hole pattern offers greater mounting flexibility, maximizes usable mounting space.

e. State-of-the-art manufacturing methods provide the best product quality and fastest delivery in the industry.

f. 100% assured compatibility with all equipment's conforming to DIN 41494 (General industrial standard for equipment's).

g. Powder coated finish with seven tank pretreatment process meeting ASTM standard.

h. Grounding & Bonding Options.

i. Fan module Mount provision on top cover.

j. Racks shall be of industrial Standard of 19" width & depth with height of approximately 72" (40U). Overall height of rack including wheels should not exceed 76". All below listed racks should be same size

- Rack for MMDC & ES
- Rack/Console for Front Cockpit (CDS)
- Rack for ASS
- Rack for LRU's

Vendors shall provide the design of the Rack/ Console.

k. Rack technical specification refer **Appendix-H.**

l. LRUs shall be installed in the rack using trays (rear mounted). Dimension and weight details are provided in the **Appendix-G.** Vendors shall provide suitable mounting platform for actual LRUs except SHUD.

m. Console for CDS should be in proper dimension.

n. The LRU mounting platform shall be of sliding type. The LRU mounting platform color shall be Matt finish and power coated Black/Grey.

o. The AC and DC power distribution rack shall have rack temperature indicator.

p. Each rack and console shall have suitable number of hooks for lifting/shifting purposes.

q. The rack and console doors at rear side shall have suitable locking mechanism.

r. Sufficient number of noise-free cooling shall be fitted on top of each rack and console with protective mesh/grill. Separate switch required to on/off the rack cooling.

s. The Racks and Consoles shall have wheels with wheels lock mechanism.

t. Rig shall have KVM switch for sharing display and input device resources of software porting IPC, and shall meet the specification.

u. Rig shall have Ethernet switch for interfacing between the IPCs and shall meet the specification mentioned in section 3.1.13 Ethernet communication network.

v. The Rig shall have minimum 05 numbers of 230 V, 50Hz power extension output with minimum five sockets of 5A (at least 2 sockets of 15A) rating in each box with fuse and spike protection feature for powering the external computers, monitors and instruments.

4.2 Electrical wiring requirements

a. Rig design shall cater for switching of signals between simulated and actual LRUs through relay boards/cards.

b. Cable insulation resistance between conductors within cable and between conductor and back-shell of connector shall be >=50Mohm at 500V DC.

c. Bonding between the body of test rigand panels / unit mounting tray shall be resistance requirement of max <10 milliohm.

d. The separate grounding scheme shall be adapted for AC and DC, Signal and Chassis for avoiding interface.

e. The Electrical loom shall be according to LRUs. Reference document **ADA/LCA/MMDC/EID/02. SVP & DMG,SHUD, SLADs.**

f. The AC supply lines, DC supply lines, signal and data buses shall be bundled and routed separately to avoid interference.

g. Standard cables/wires shall be used for rig wiring.

h. Each cable shall have identification sleeves.

i. Each loom shall have sleeves, wire ties and identification sleeves and to be routed neatly and secured properly.

j. Vendors shall use following items of aircraft standard/grade.

 I. MIL-STD-1553B bus cable, all the connectors, circuit breakers (CBs).

 II. Power supply controls and protection (CBs and Switches) for actual LRUs.

k. Electrical wiring design, fabrication and integration for the Rig shall be carried out by vendor.

l. Electrical ICDs will be provided to vendor during Rig development stage.

m. The Rig shall have necessary industry standard electrical/safety protections to protect its own resources, LRUs and human operators.

n. All MIL-STD-1553B bus connectors, bus couplers and bus terminators in the rig shall meet the specification as per 1553B communication network.

4.3   **Power Supply Requirements and Distribution**

a. The Rig shall operate on Uninterrupted Power Supply (UPS) 230V, 50Hz, single phase AC for the Rig resources.

b. The Rig consists of AC and DC power supplies to distribute the power in different parts of it. The AC power supply shall be used to power up the all desktops, workstations, monitors and cooler. System to provide 230V/50 Hz AC Power supply

c. 28V/50A Power Supply takes 230V AC Supply and gives fixed 28V supply to the DCDM power supply unit and Regulated 28V DC power supply to power the DC loads on the Rig.

d. Short Circuit protection shall be provided.

e. Scheme of distributing the electrical power to Rig and its systems shall be designed by vendor.

f. Digital Voltmeter and Ammeter for 28V DC main supply.

4.4   **MMDC Tray**

Tray is required to placeand provide the cooling to MMDC unit. The tray shall contain a cooling fan to maintain the temperature of the MMDC unit. Provision for automatic turn ON/OFF of the cooling fan shall be provided based on certain temperature levels.

4.5   **KeyboardVideo Mouse (KVM) Switch**

KVM switch is a device that allows one keyboard and mouse to be shared among separate computers, by switching between the couplers. Each switch is capable of handling four computers.

Specification of the KVM switch is as follows:

- Controls up to four computers
- Keyboard and mouse connections
- Status LEDs
- Switching indication through audio beep
- No external power required (bus powered)
- Plug and Play
- Switching control

- USB Type
  1. Hot Keys
  2. Port Select Plus Button

Table 8: KVM switch

Sl. No.	Parameter	Specification
1.	No of KVM ports	04 port USB
2.	Control	4 PCs using 1 Monitor, 1 Keyboard and 1 Mouse
3.	Support	DP/HDMI
4.	Size	1U-Rack mountable
5.	Video resolution support	1024x768 or better
6.	Features	Hot plug and play Auto scan mode for monitoring PC's
7.	Connection Type	USB Type
8.	Quantity	5

4.6   Grounding, Bonding and Insulation

- Racks are interconnected with copper strips and carried to earth pit to maintain equalPotential.
- Rig grounding shall be similar to aircraft and all returns shall be connected at the nearest ground terminal of the rig.
- All the chassis grounds of LRUs shall be brought out to a terminal block and shorted with eachother.
- It is equivalent to connecting all the chassis ground to a single point which is shortedwith rig chassis and earth.
- All the SGRPs of LRUs shall be brought out to a terminal point and shorted with each other.
- It is equivalent to connecting all the SGRPs to a single point which is shorted to earth.
- Resistance between LRU mounting tray and rig chassis shall be less than 2.5 mΩ.
- Insulation resistance of all the wires in a harness with respect to all the other wires in theharness and back shell of the respective connector shall not be less than 50 MΩ at 500 V DC.

Grounding Schematic

ES	CDS	IASS	MMDC and LRU's Rack

28V Power Supply Box
DC Distribution and Measurement Box
Interface Panels
LRU'S Simulators

LAD's
MFUFCP
Sleek SHUD
BDU, MFD

RT SERVER
LSS
FDM, FDG
LVTS, RVTS

MMDC
SVP&DMG
UVDR&RCUH
UEWS
INSGPS

RACK1	RACK2	RACK3	RACK4

Copper Strip

Common Earth Pit
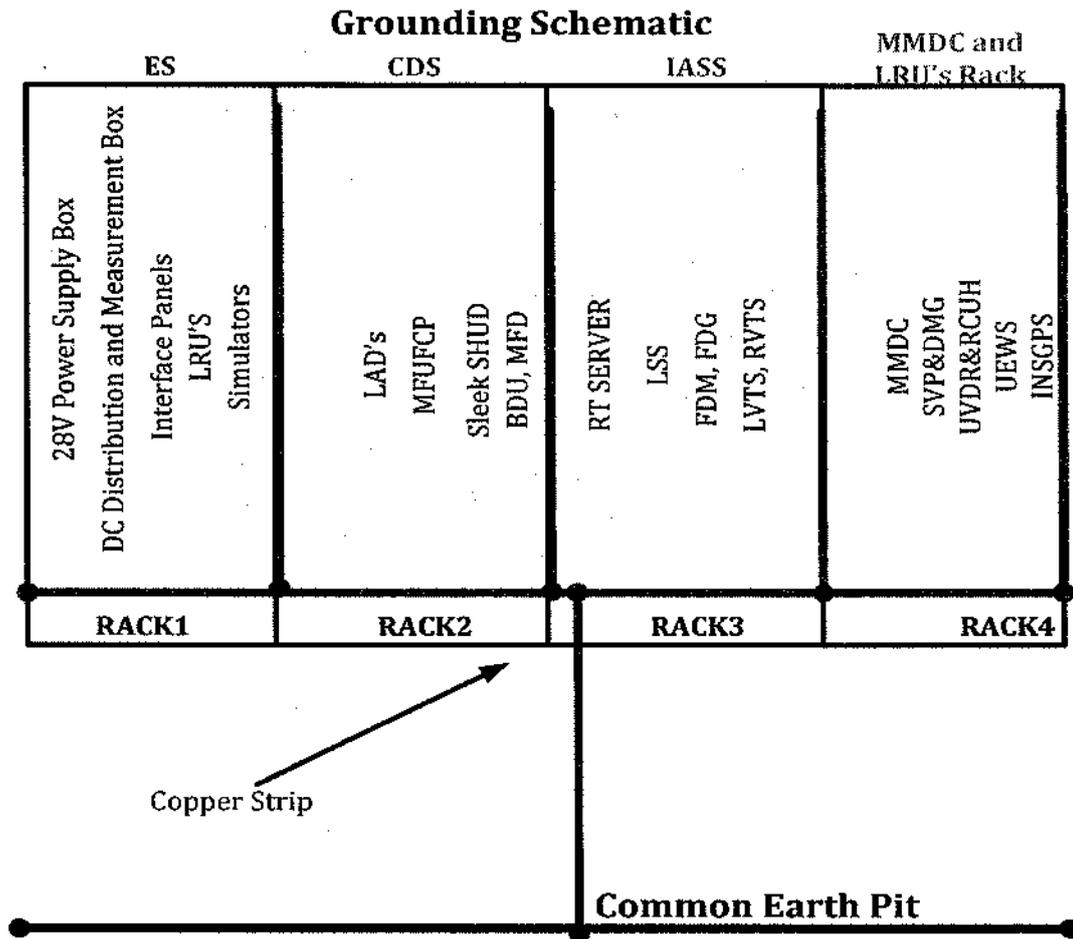
4.7   Safety Requirements

- All exposed metal parts of the equipment shall be adequately earthed.

- Power return wires are not to be used as grounding wires.

- The equipment, which is designed to use the chassis, as the signal common shall have provisions to isolate the signal common from normally, grounded chassis.

- Personnel protection from hazards may be provided by use of guards, enclosure or shields.

- Sharp projections and edges which could cause injury to personnel shall be avoided.

- Meters shall have provision for overloaded bypass or alternate protection to eliminate high voltage at the meter terminals in the event of failure.

- Wheels of Racks shall have provision to lock with the base.

4.8   Packaging (Plug and Play Type)

Packaging of Rig unit

- In Rack all modules like CDS, IASS and MMDC & ES should be plug and play type.
- Easy maintainability of the looming.
- Each loom shall be identified with printed label.
- Each LRU Units, Simulators, CDS, IASS connected with MMDC through Interface panels and D-type connectors.
- Suitable mounting brackets shall be designed and fabricated to mounting the couplers, Interface panels, KVM switches, Ethernet switch, LRU'S, USB ports &Simulators and securing to the structure.
- Each bus network shall be identified with proper color code and printed label including couplers and stubs.

5.   LRU's Software Requirements

This section describes the software components of the MMDC test rig. The software components of MMDC test Rig are LRU simulators of Mission Software Test Rig. Acquirer shall provide LRU Simulators and support software of the MMDC test rig.

6.   Support Software Requirements

This section describes the software/application tool for desktops and workstation PC's. List of support software required from the supplier are listed in Appendix-F.

7.   Project schedule and Milestone

This section describes the system development cycle. T0 will start from Purchase Order release date to the supplier. The total time for the completion of project including final acceptance by acquirer is 50 weeks from the issue of Purchase Order.

Table 9: Project schedule and Milestone

Sl No	Milestone	Duration (Weeks)	Supplier Task	Acquirer Task	Milestone Review Location
1.	Project Start Meet.	T0 + 6	➢ Discussion on SOW ➢ Team Composition (all team members should present) ➢ Resume and Experience of Team	➢ Conduct Project Start Meeting	Acquirer

Sl No	Milestone	Duration (Weeks)	Supplier Task	Acquirer Task	Milestone Review Location
			Members		
2.	System Design Review	T0+11	➢ Quality assurance plan ➢ System Development Plan ➢ System Test Plan ➢ System Architecture	➢ Conduct the SDR Meeting	Acquirer
3.	Preliminary Design Review	T0+18	➢ Hardware Design Document ➢ Bill of Materials	➢ Conduct the PDR Meeting. ➢ Verify the supplier provided documents	Acquirer
4.	Critical Design Review	T0+28	➢ Detailed Design Document ➢ Master Drawing Index Document ➢ Detailed Acceptance Test Procedure ➢ Detailed Acceptance Test Report Template	➢ Conduct the CDR Meeting. ➢ Verify the supplier provided documents	Acquirer
5.	Assembling, Fabrication and Integration	T0+38	➢ Statement of Preparation ➢ Physical Inspection	➢ Visiting the supplier location for Manual Verification	Supplier
6.	Standalone and Limited Integration Testing	T0+43	➢ Testing at Supplier Place	➢ Witness testing and limited ATP at supplier location.	Supplier
7.	Delivery of complete test rig	T0+45	➢ Complete test rig shall be delivered to ADA Campus 2	➢ Verification of delivery challan.	Acquirer
8.	Final Installation and Acceptance Testing	T0+50	➢ Integration, Installation and Testing at Acquirer Place	➢ Final acceptance test.	Acquirer

8.   General Requirements

Supplier required to meet below listed general requirements.

   a. Supplier should participate in the pre-bid meeting. The proposal from the supplier will be rejected in case of non-participation in pre-bid meeting.

   b. Those who have interest to participate in the pre-bid meeting can send request mail to Project coordinator: satishshetty.ada@gov.in.

   c. The supplier should have the right technically skilled manpower including System Engineers, Engineers, Junior Engineers & Technicians.

   d. Supplier should have 1 System engineer as a permanent employee of the company with relevant, experience of 10 years in avionics test rigs with electronics or relevant engineering discipline. This engineer is responsible for all the activities of this project. The resume of the engineer may be required to produce at any phase of this project from pre-bid meeting onwards.

   e. Supplier should have technician of minimum 5-10 years of experience in the field of avionics looms/harness preparation with **WHMA/IPC A-620-certificate** (standard for requirements and acceptance of cable & wire harness assemblies).

   f. Supplier shall present project execution plan and team composition to Technical Evaluation Committee (TEC). Supplier shall present detailed plan of executing the project in this specification than presenting their experience and educational qualifications with resume **(clearly mentioned year of passing, name of educational institutes, specialization, skills, work experience etc.)**in the respective field.

   g. The supplier should have handled similar project with purchase order value of 50% of proposed estimated cost of this project. In TEC-CEC meeting supplier shall present any **previous project** (50% of proposed estimated cost and relevant to avionics).

   h. The project for which supplier refers in previous point required to be presented to TEC-CEC including phases of the project completion with reports, and such documents should have signed by the acquirer of that project.

   i. The TEC-CEC may visit the supplier office/factory on need basis to evaluate the operational capacity of the company.

   j. All electrical interface and other restricted documents of MMDC and Test Rig shall be given after the issue of PO.

   k. This specification provides overall requirements of the Test Rig. However, supplier should accept any changes/enhancement in the specification after the issue of the PO which does not impact the cost and schedule of the test rig development.

   l. Supplier shall sign Non-Disclosure Agreement with ADA.

m. Supplier shall maintain highest level security for the items developed and for the development environment for this project.

n. During Final Installation and Acceptance supplier shall deploy team at ADA Campus-2 on need basis.

o. Supplier should provide 5 years of warranty and maintenance from the date of acceptance. This warranty should cover all the modules of MMDCSTR.

p. During warranty period supplier should replace/repair faulty systems/components. However defective storage systems (HDD/SSD) of workstations shall not be returned to supplier during replacement.

q. The systems being developed by the supplier during the project period would be proprietary of the M/s ADA and subsequently the supplier does not have any rights on the products/systems being developed.

9. Deliverables

Table 10: Deliverables Items

SL NO	ITEM NAME	DESCRITIPON	Quantity	REMARKS
1.	DCDM	a. DCDM BOX along with Harnesscables and mating connectors.	1	➢ Refer Appendix-A.
2.	DCU UNIT	a. DCU BOX with two Harness cables (MMDC Ch1 & Ch2)	1	➢ Refer Appendix-B.
3.	VGA TO STANAG 3350 Converter	a. VGA TO STANAG 3350 Converter with Harness cables	1	
4.	Desktops	a. PC Setup	1	➢ Refer Appendix-F.
5.	Workstations	a. PC Setup	5	➢ Refer Appendix-F.
6.	Industrial PC	a. PC Setup	1	➢ Refer Appendix-F.
7.	Rack	a. 19 U Rack	4	➢ 4 Racks for rig setup.
8.	TSN Ethernet Switch	a. TSN 24 Port Switch with Power Cable	4	As per Mk2 avionics architecture.
	ManagedEthernet Switch	a. 16 Port Switch with Power Cable	2	For RT server & simulation systems communication
9.	KVM Switch	a. USB Type	5	
10.	MOXA	a. USB - 4 Port -1 no's	1	Electrical Isolated
11.	28V Power Supply	a. 28V Power Supply Box-1 with	1	

SL NO	ITEM NAME	DESCRITIPON	Quantity	REMARKS
		Harness Cables		
12.	Video Interface Panel	a. Video Interface Panel with Harness Cables	1	
13.	Debug Interface Panel	a. Debug Interface Panel with Harness Cables	1	
14.	Bus Interface Panel	a. Bus Interface Panel with Harness Cables	1	
15.	Cockpit Interface Panel	a. Cockpit Interface Panel with Harness Cables	1	
16.	Discrete Input and Output Interface Panel	a. Discrete I/O Interface Panel with Harness Cables	1	
17.	ARNIC 818 video generator and analyzer	For SVP DMG sensor video simulation.	1	
18.	1553B DDC card	2 Channel Multifunctional PCI card **[DDC 1553B P/N: BU-67210F200L-2A0]**.	2	
19.	RT server bus interface	Four bus connection from bus system to RT server	4 pair	3 pair for bus connection 1 pair for spare.
20.	Bus Coupler	a. Bus Couplers with Labeled	4 pairs	1 spare bus coupler and 4 spare terminators.
		b. Terminators	16 no's	
21.	MMDC looms and Connectors	a. Looms	1 set	➢ Electrical wiring Requirements and refer Appendix-C.
		b. Looms with Circular Connectors	MMDC 6 Circular Connector	
22.	LADs	a. Looms	2	➢ Electrical wiring Requirements and refer Appendix-D.
		b. Looms with Circular Connectors		
23.	SSHUD	a. Looms	1	Electrical wiring Requirements and refer Appendix-E.
		b. Looms with Circular Connectors		

SL NO	ITEM NAME	DESCRIPTION	Quantity	REMARKS
		b. Looms with Circular Connectors		
24.	Final Documents	a. Technical Specification	1 set	➤ Each Document contains separate section for each subsystem or units of MSTR.
		b. System Development Plan		
		c. Quality Assurance Plan		
		d. Bill of Material(BOM)		➤ Supplier shall provide all document in PDF format and original document format (*.docx, *.dwg, etc as applicable).
		e. Design Document and wiring drawings with signature		
		f. MDI(Master Drawing Index document)		
		g. Statement of Preparation (SOP)		
		h. ATP and ATR		
		i. User Manual		
		j. Certificate of Conformance		
		k. Warranty Certificate		

Appendix-A

DCDM Power Supply Technical Specifications

1. **Introduction**

Mission Management and Display Computer Software Test Rig (MMDCSTR) is designed to test Mission Software of Mission Management and Display Computer (MMDC). Test Rig requires fixed power for the units. The Direct Current Distribution and Measurement Unit (DCDM) shall be used to Power up the Cockpit Display System (CDS) and Line Replaceable Unit (LRU'S) of the MMDCSTR.

1.1   **Scope**

The scope of the document is to describe the technical specification of Direct Current Distribution & Measurement Unit (DCDM) and for MMDCSTR.

1.2   **List of abbreviations**

Table 11 : List of abbreviations

Name	Description
AC	Alternate Current
BDU	Backup display unit
CB	Circuit Breaker
CDS	Cockpit Display System
DC	Direct Current
DCDM	Direct current distribution and Measurement Unit
I/O	Input/output
L	Length
LED	Light Emitting Diode
LRU	Line Replaceable Unit
mm	Millimeter
MMDC	Mission Management and Display Computer
MS	Mild Steel
H	Height
W	Width

2.   Overview

The DCDM unit is operated in manual mode and unit provides 28V fixed power supply to all LRU units and CDS. The DCDM contains different types of switches like CB's (Thermal/Electronic) and Toggle switches for power on and LED's are used to display status of power ON/OFF.

3.   Technical Specifications

The DCDM is a mechanical and electrical box. Which shall contain Toggle Switches, CB's, LED's, socket circular connectors and pin circular connectors.

The total requirements of the DCDM is classified into below listed groups.

a) General Requirements
b) Interface Requirements
c) Functional Requirements

3.1   General Requirements

General requirements of the DCDM are as follows:

3.1.1   Rugged Enclosure

The enclosure shall be rugged and portable.

a) Label and Name should be printed on Front and Back panel of DCDM.

Table 12 : Physical Parameters

Parameter	Description of DCDM box
Dimension	19" standard rack 5U
Weight	<30kg
Dimension of the rugged enclosure	482.6mm (W) X 470mm (L) X222.5mm (H)
Rugged Enclosure finish	Aluminum Alloy
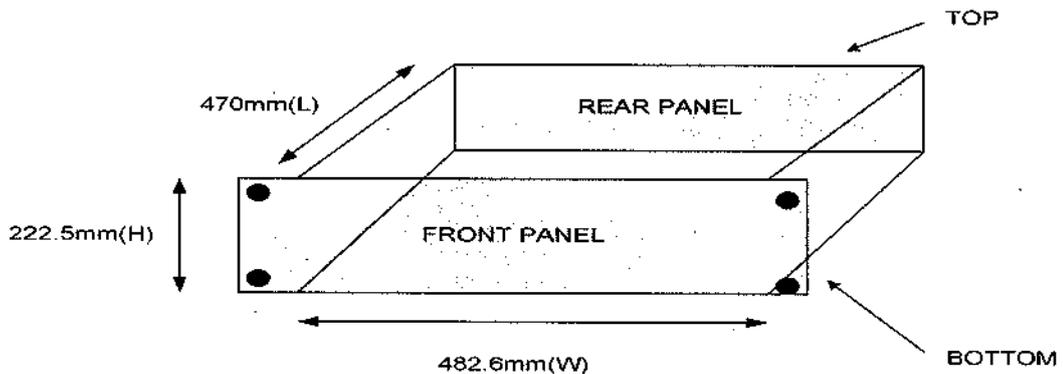
Figure 6: Rugged Enclosure for DCDM

3.1.2   Power supply

- The unit shall be powered on by 28V DC power from 28V Power supply unit.
- A Toggle switch shall be provided at the back panel to ON/OFF the unit.
- A Power status indicator shall be provided on back panel. Refer fig no 3.
- CDS and LRU's required power details refer table number 8.

3.1.3   Grounding scheme

Communication between DCDM and the all LRU's & CDS shall be through allied connectors. The shield grounds for these communications interfaces shall be connected to ground at the source end in the interconnecting looms.

3.2   Interface Requirements

DCDM provides 28V power to MMDC-CH1, MMDC-CH2, CDS and LRU's. Interface connection of DCDM as shown below.
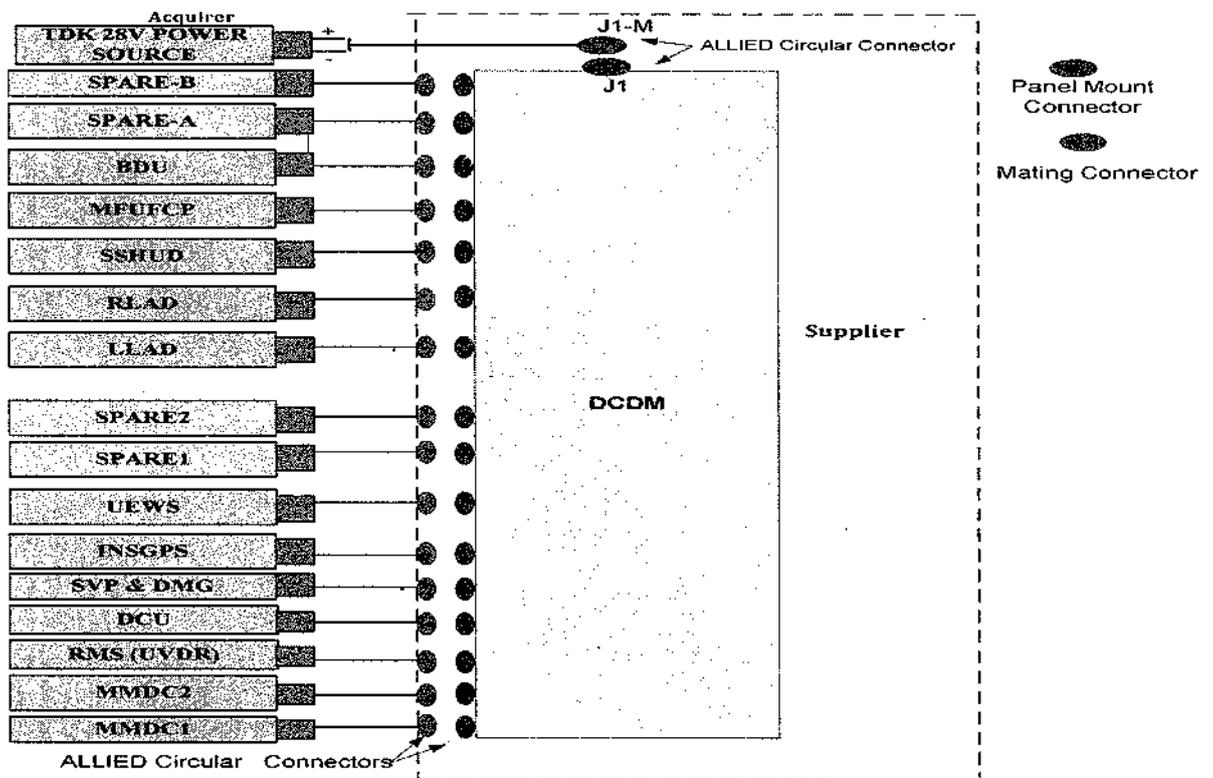
Figure 7: Basic Interface Block Diagram of DCDM

3.2.1   Rear Connectors Details

a) The Rear connectorsof DCDM

• Allied connector. Refer below tables and fig 8.

Table 13 : Input Connector details of DCDM

Sl. No	Panel Mount connector of DCDM	Mating Connectors of DCDM
1.	J1 Allied Circular Connector MS3102R-20-19P	J1-M# Allied Circular ConnectorMS3106F-20-19S

Note: #:- J1-M connector is used for looming purpose. J1-M connector is mating connector of DCDM-J1 and others side wires are crimped with boot lugs. Crimped wires are connected with 28V power supply units.

Table 14 : Output Connector details of DCDM

Sl. No	Panel Mount connector of DCDM	Mating Connectors of DCDM
2.	All 16 Allied Circular Connector (SOCKET type)	All 16 Allied Circular Connector (PIN type)
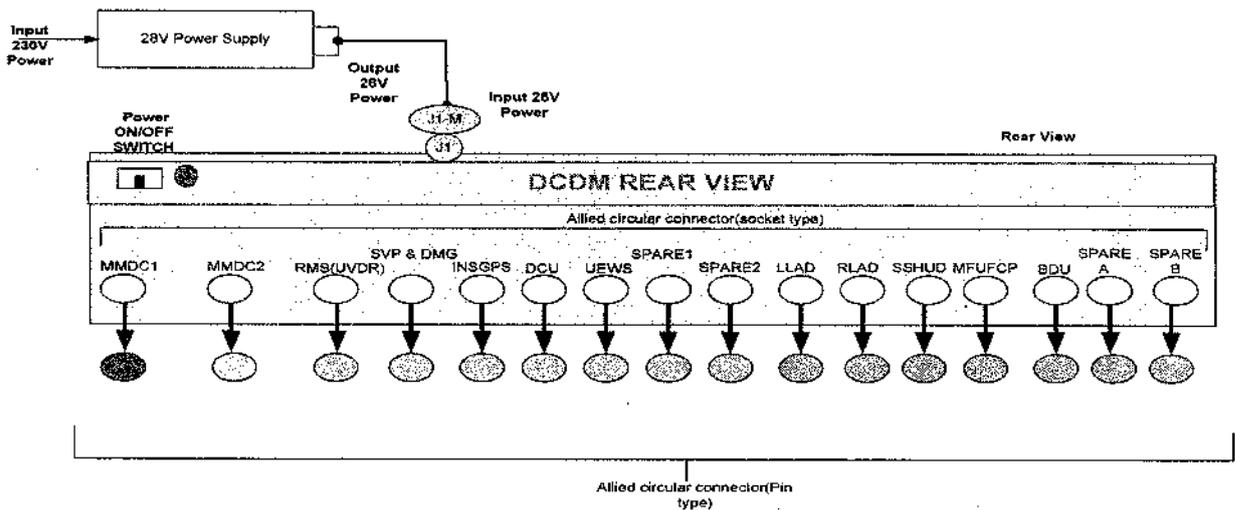
Figure 8: Rear View of DCDM

3.2.2   Cable Harness

The DCDM shall be connected to 28V Power Supply Box through one harness cable.

a) This harness cable terminated with allied circular connector (PIN type) at one end.

b) The length of the cable shall be 2.5 meters.

c) LCSO approved industrial grade wires.

Allied circular connector shall be used to interface DCDM with 28V power supply.

Note: Refer figure no: 2.

3.3   Functional Requirements

DCDMshall cater for the following Requirements

3.3.1   Front Panel Circuit Breaker (CB), Toggle Switch & Indicators of DCDM

a) Front panel of DCDM

- Cockpit Display System shall have 7 Outputs (Status indicators) & 7 Inputs (Toggle Switch), 7 Inputs (CB). Refer below table 5.
- LRU'S shall have 9 Outputs (Status indicators) & 9 Inputs (Toggle Switch), 9 Inputs (CB) Refer below table 6.
- Rotary Switch shall have 16 Selections.
- Status Indicators shall have 16 status outputs (both LRU's and Cockpit display status).Refer below table 7.
- DCDM unit power ON/OFF Status. Refer below table 7.
- Refer fig no 4.

Table 15 : Cockpit Display

Name	I/O	Status Indicators	Toggle Switch	CB
LLAD	Input		1	1
	Output	1		
RLAD	Input		1	1
	Output	1		
UFCP	Input		1	1
	Output	1		
SSHUD	Input		1	1
	Output	1		
BDU	Input		1	1
	Output	1		
SPARE-A	Input		1	1
	Output	1		
SPARE-B	Input		1	1

Name	I/O	Status Indicators	Toggle Switch	CB
	Output	1		.
Total		7	7	7

Table 16 : LRU'S Inputs and Outputs

Name	I/O	Status Indicators	Toggle Switch	CB
MMDC-CH1	Input		1	1
	Output	1		
MMDC-CH2	Input		1	1
	Output	1		
RMS(UVDR)	Input		1	1
	Output	1		
INSGPS	Input		1	1
	Output	1		
SVP &DMG	Input		1	1
	Output	1		
DCU	Input		1	1
	Output	1		
UEWS	Input		1	1
	Output	1		
SPARE-1	Input		1	1
	Output	1		
SPARE-2	Input		1	1
	Output	1		
Total		9	9	9

Table 17 : Status Indicators

Name	I/O	Status Indicators	Location
LLAD	Output	1	Cockpit Display
RLAD	Output	1	Cockpit Display
SSHUD	Output	1	Cockpit Display
UFCP	Output	1	Cockpit Display
BDU	Output	1	Cockpit Display
SPARE-A	Output	1	Cockpit Display
SPARE-B	Output	1	Cockpit Display
RMS(UVDR)	Output	1	LRU'S

Name	I/O	Status Indicators	Location
SVP &DMG	Output	1	LRU'S
DCU	Output	1	LRU'S
MMDC-CH1	Output	1	LRU'S
MMDC-CH2	Output	1	LRU'S
INSGPS	Output	1	LRU'S
UEWS	Output	1	LRU'S
SPARE-1	Output	1	LRU'S
SPARE-2	Output	1	LRU'S
Total		16	

b) Other details of DCDM

- Rotary Switch for selecting LRU's status.

- Voltmeter for display the Voltage of LRUs selected by rotary switch.

- Ammeter for display the Current of LRUs selected by rotary switch.

- Power Status indicator shows the DCDM unit power ON/OFF status.

- Refer fig-8.
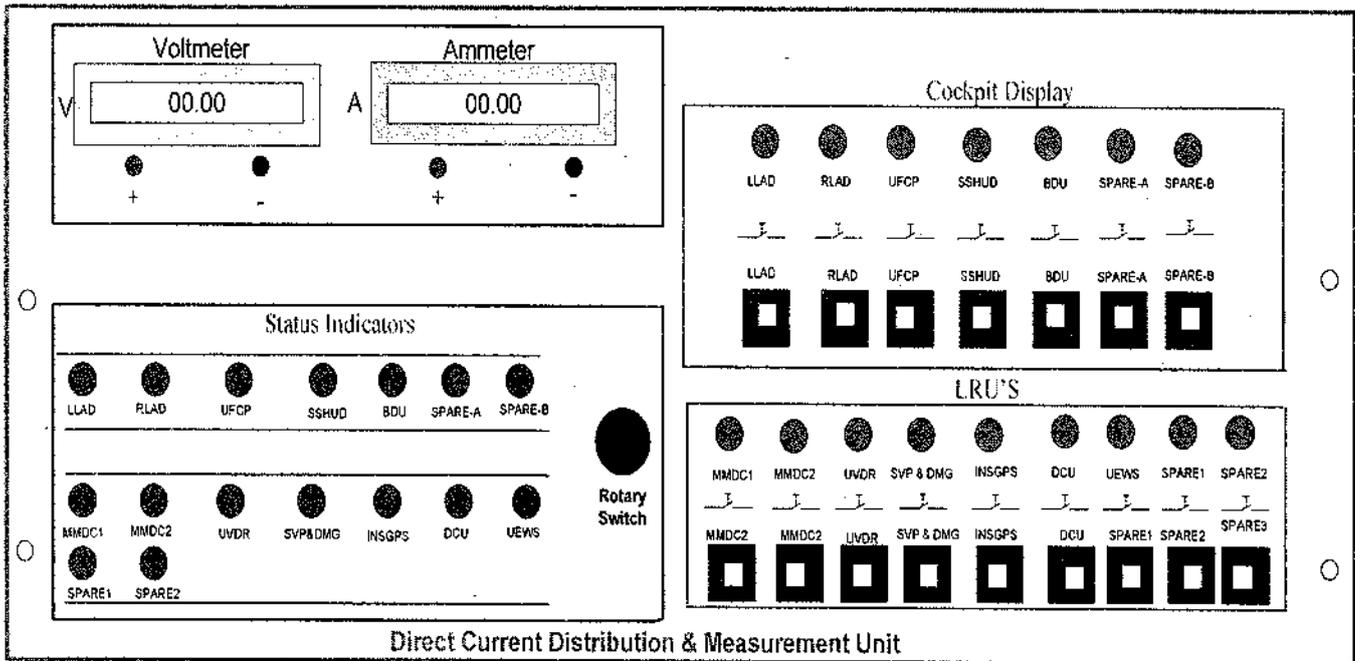
Figure 9: Front Panel of DCDM

3.3.2   Rear view of DCDM

a) Rear view of DCDM

- J1, CDS and LRU's shall have 16 numbers of socket type panel mount connector. Refer table number 16.

- J1, CDS and LRU's shall have 16 numbers of pin type allied connector. Refer table number 16.

- Refer fig no 8.

Note: Vendors should provide the suitable pin type allied connector to acquirer for wiring purpose.

Table 18 : Outputs of DCDM

Name	DC Voltage	DC Current	Circuit Break (CB) cut-off current	Panel Mount Circular Connectors (SOCKET)	Mating Circular Connectors (PIN)
J1	-	-		1	
J1-M	-	-			1
LLAD	28V			1	1
RLAD	28V			1	1
SSHUD	28V			1	1
UFCP	28V			1	1
BDU	28V			1	1
SPARE-A	28V			1	1
SPARE-B	28V			1	1
INSGPS	28V			1	1
SVP & DMG	28V			1	1
DCU	28V			1	1

UVDR	28V			1	1
MMDC-CH1	28V			1	1
MMDC-CH2	28V			1	1
UEWS	28V			1	1
SPARE1	28V			1	1
SPARE2	28V			1	1
Total				17	18

Note: DC current and CB current details are provides on preparation time.

4.   Acceptance Test Procedure (ATP)

The unit shall be cleared independently before testing with MMDC. The ATP shall be conducted for its requirements compliance at the following stages.

a) Continuity Check:

- The Continuity check involves verifies the end to end continuity of Wires (conductors) in the harness.

- Continuity &Insulation resistance tests will be carried out & test results will be captured.

ACCEPTANCE CRITERIA: For every conductor of Allied connectors the beep should be heard.

b) Power Supply checks

- The 28V power checks at DCDM break connector.

ACCEPTANCE CRITERIA: For every conductor of break connectors the 28V supply should be display on DMM.

c) Physical Identification checks

- Verification of the Product Name

- Part Number

- Serial Number

- Mechanical dimension

- Ensuring Calibration of meters available

d) Functional tests will be carried out & test results will be captured.

- Power ON test

- Functional check as per the circuit design & ATP requirements

- Conducting Reverse polarity check test

e) At ADA as Lab verification of the unit using simulation to ensure the complete functionality and safety.

The unit shall be accepted only after it passes the tests at above stages.

5.   Name Plate

Nomenclature	: DC Distribution and Measurement Unit
Designed by Part No	: Aeronautical Development Agency (ADA)
Name Plate	: DCDM-MK2-MMDC

Appendix-B

DCU Technical Specifications

1. Introduction

Mission Management and Display Computer Software Test Rig (MMDCSTR) is designed to test Mission Software of Mission Management and Display Computer (MMDC). Test Rig create test environment to MMDC through simulation of LRU Data and other control signals which includes Discrete Inputs and Outputs etc. The Discrete Input and Output Control Unit (DCU) shall be used to simulate discrete input of MMDC and display status of discrete output from MMDC. The single DCU shall be connected to both main MMDC-CH1 and MMDC-CH2.

1.1 Scope

The scope of the document is to describe the technical specification of **Discrete Input and Output Control Unit (DCU)** for Mission Management and Display Computer.

1.2 List of abbreviations

Table 19: List of abbreviations

Name	Description
MMDC	Mission Management and Display Computer
DCU	Discrete input and output control unit
AC	Alternate Current
A/C	Aircraft
DC	Direct Current
I/O	Input/output
LED	Light Emitting Diode

2. Overview

The DCU provides switches to simulate discrete input of MMDC and LED's to display status of discrete output of MMDC. The control panel operated in manual mode and test shall be done with the help of manual switches. The panel stimulates discrete inputs to both MMDC-Ch1 and MMDC-CH2 and display status of discrete output from both MMDC-CH1 and MMDC-CH2. The unit shall provide broadly two types of toggle switches viz. 28V/GND and Open/GND.

3.   Technical Specifications

The DCU is a mechanical box, which shall contain Toggle Switches, Push buttons and LED status indicators. The total requirements of the DCU are classified into below listed groups.

   a) General Requirements
   b) Interface Requirements
   c) Functional Requirements

3.1   General Requirements

General requirements of the test DCU are as follows:

3.1.1   Rugged Enclosure

The enclosure shall be rugged and portable.

   a) Label and Name should be printed on Front and Back panel of DCU.

Table 20: DCU Physical Parameters

Parameter	Description
Dimension	19" standard rack 3U
Weight	<25kg
Dimension of the rugged enclosure	482.6mm (W) X 350mm (L) X133.4mm (H)
Rugged Enclosure finish	Aluminum Alloy
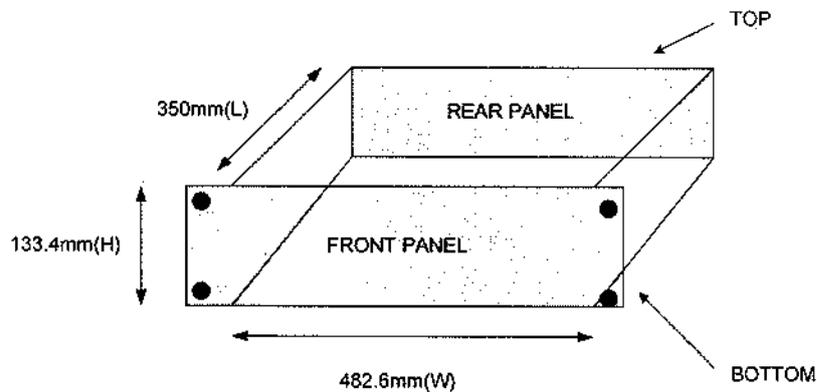
Figure 10: Rugged Enclosure

3.1.2   Power supply

- The unit shall be powered on by 230V / 50 Hz AC power source.
- Input power status indicator shall be provided on rear panel.
- A Toggle switch shall be provided at the front panel to ON/OFF the unit.
- ON/OFF status of the unit shall be given at front panel.

3.1.3   Grounding scheme

Communication between DCU and the MMDC shall be Through Circular Connectors. The Shield Grounds for these communications Interfaces Shall be connected to ground at the Source end in the interconnecting looms.

3.2   Interface Requirements

DCU Communicate with MMDC-CH1 and MMDC-CH2 through harness cable. The Interface connection of MMDC and DCU as shown below.
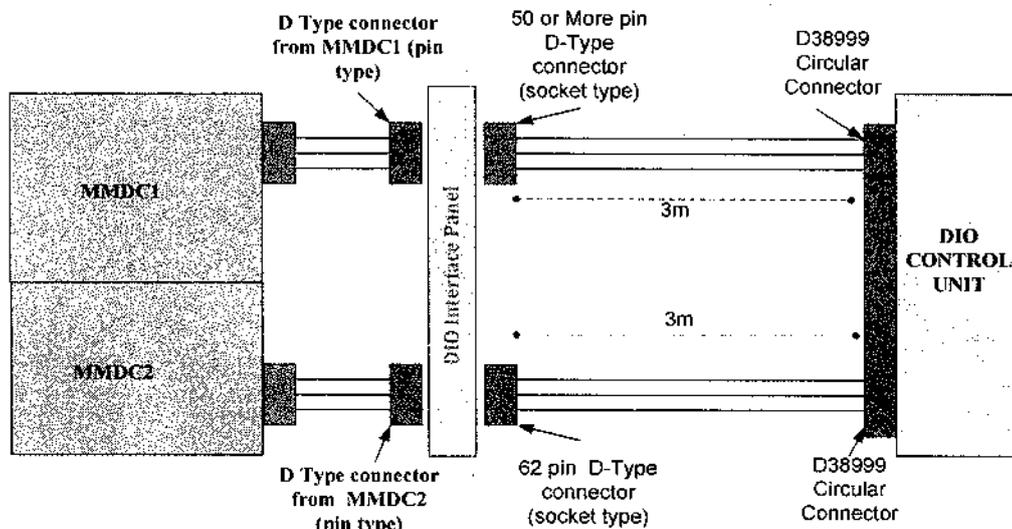
Figure 11: Basic Interface Block Diagram

3.2.1   Rear Panel Connectors Details

a) The Rear panel

- One circular connector and break connector (MMDC-CH1 and MMDC-CH2)

Table 21: Rear Panel Connector details

| Sl. No	Break Connector of DCU	Circular Connectors of DCU
3.	50 & 62 Pin D Type Connector (Socket type)	Circular Connector- (D38999 or Similar product)

- Wall mount input power connector

    J1: MS 31202R-10SL-4S (13Amp, 2 pin) Socket type.

    Make: allied connector.

- Mating Connector:

    J1-M: MS 3106F-10SL-4P (13 Amp, 2pin) Plug.

    Make: allied connector. Refer figure 3.
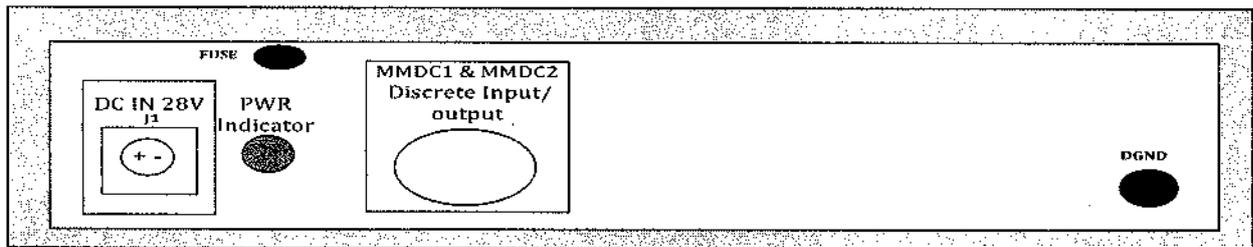
Figure 12: Rear Panel of DCU

3.2.2   Cable Harness

The DCU shall be connected to MMDC-CH1 and MMDC-CH2 through two harness cable with one for each MMDC channels.

a) The DCU will be connected to MMDC-CH1 and MMDC-CH2 through 1:2 Harness Cable.

b) This harness cable terminated with single D38999 Circular connector at one end (DCU) and 50 pin & 62 pin D-Type connector (Socket type) at other end.

c) The length of the cable shall be 3 meters.

d) D-Type connector shall be used to interface DCU with MMDC-CH1and MMDC-CH2 though 50 & 62 pin D- type connector (pin type) provided from MMDC-CH1and MMDC-CH2 side.

3.3   Functional Requirements

DCU shall cater for the following Requirements

3.3.1   Front Panel Switches & Indicators

a) Front Panel

- Panel shall have 8 Output from **MMDC-CH1** (Status indicators) & 12 Input to MMDC-CH1 (Switch controls), Refer below table 12.
- Panel shall have 8 Output from **MMDC-CH2** (Status indicators) & 12 Input to MMDC-CH2 (Switch controls), Refer below table 13.

b) Spare details

- 4 Outputs and 4 Inputs required for **MMDC-CH1**.
- 4 Outputs and 4 Inputs required for **MMDC-CH2**.
- One 28V Spare push button input is required.

Table 22: MMDC-CH1 Inputs and Outputs

SIGNAL TYPE	I/O	MMDC-CH1	SPARE	TOTAL
OPEN/GND	Input	11	2	13
	Output	2	2	4
28V/GND	Input	1	2	3
	Output	6	2	8
Overall Inputs and Outputs				
INPUTS		OUTPUTS		TOTAL
16		12		28

Table 23: MMDC-CH2 Inputs and Outputs

SIGNAL TYPE	I/O	MMDC-CH2	SPARE	TOTAL
OPEN/GND	Input	11	2	13
	Output	2	2	4
28V/GND	Input	1	2	3
	Output	6	2	8
Overall Inputs and Outputs				
INPUTS		OUTPUTS		TOTAL
16		12		28

Note1 :One 28V Spare Pushbutton

c) Other details

- Power ON/OFF Toggle Switch and Indicator (Green LED) above switch.
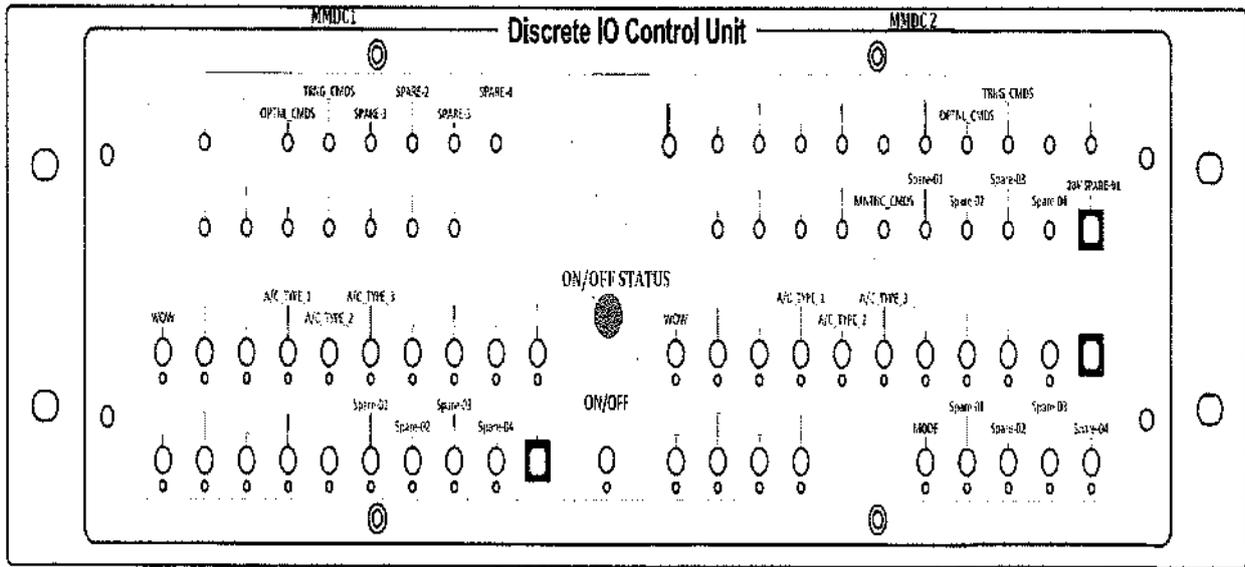
Figure 13: Front Panel of DCU

Note: all switches and LED's which are common in MMDC-CH1 and CH2 shall be kept in the same order for better usability (remaining switches and LED's including can be located at last). Kindly refer the figure above

4.   MMDC-CH1 and MMDC-CH2 Discrete interface

MMDC-CH1 and MMDC-CH2 discrete interface is required for MMDC configurations. Refer below diagram.
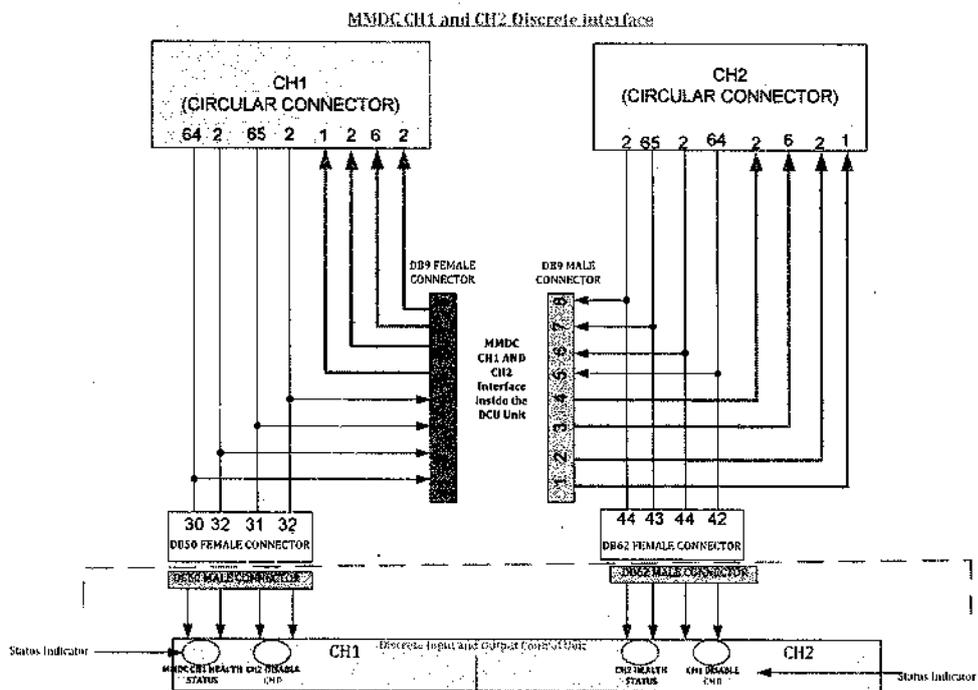
Figure 14: MMDC-CH1 and MMDC-CH2 discrete interface

5.   Acceptance Test Procedure (ATP)

The unit shall be cleared independently before testing with MMDC. The ATP shall be conducted for its requirements compliance at the following stages.

f)   Continuity Check:

*   The Continuity check involves verify the end to end continuity of Wires (conductors) in the harness.

ACCEPTANCE CRITERIA: For every conductor of circular connectors the beep should be heard.

g)   Power Supply checks

*   The 28V power checks at DCU break connector.

ACCEPTANCE CRITERIA: For every conductor of break connectors the 28v supply should be display on DMM.

h)   At ADA as Lab verification of the unit using simulation to ensure the complete functionality and safety.

The unit shall be accepted only after it passes the tests at above stages.

6.   Name Plate

Nomenclature   : Discrete IO Control Unit for MMDC test facility
Designed by Part NO   : Aeronautical Development Agency (ADA)
Part no   : DCU- MK2 -MMDC
Sl. No   : 01
Year   : 2024-25

Appendix-C

MMDC Looms and Connectors Technical Specifications

1.   Introduction

The Mission Management and Display Computer (MMDC) of LCA-MK2 is the manager of avionics and weapon systems. MMDC is connected to various line replaceable units (LRUs) of the avionics through four (4) MIL-STB-1553B buses.

2.   Looms Design

TheMMDC-CH1 and MMDC-CH2 loom length is 7m and provide the break interface connector.

3.   MMDC Wires & Cables

The requirements of connection between MMDC-CH1 and MMDC-CH2 to Interface panel looms are given below. All cables and wires should be same as part number given in the table.

Table 24: MMDC wires and Cables

Connector	Signal Type	Cable Name	Part No	Channels (each channel/wire length is 7 meter)
P1	ETHERNET CABLE	CAT6	E50824	1 channel
	ANALOG/RS422	TWISTTED PAIR CABLE	M27500-A-22-WJ-2-S-06	2 channels
	DISCRETE	SINGLE WIRE	M22759/86-22-9	18 wires
	MIL 1553B	BUS CABLE	10614	6 channels
	DISCRETE	TWISTTED PAIR CABLE	M27500-A-22-WJ-2-S-06	9 channels
	GROUND	SINGLE WIRE	M22759/86-22-9	1 wire
	USB			
P2	ETHERNET CABLE	CAT6	E50824	1 channel
	ANALOG/RS422	TWISTTED PAIR CABLE	M27500-A-22-WJ-2-S-06	2 channels
	DISCRETE	SINGLE WIRE	M22759/86-22-9	18 wires
	MIL 1553B	BUS CABLE	10614	6 channels

Connector	Signal Type	Cable Name	Part No	Channels (each channel/wire length is 7 meter)
	DISCRETE	TWISTTED PAIR CABLE	M27500-A-22-WJ-2-S-06	9 channels
	GROUND	SINGLE WIRE	M22759/86-22-9	1 wire
	USB			
P3	ANALOG/RS422	TWISTTED PAIR CABLE	M27500-A-22-WJ-2-S-06	4 channels
	ETHERNET CABLE	CAT6	E50824	2 channels
P4	POWER	SINGLE WIRE	M22759/86-20-9	6 wires
P5	POWER	SINGLE WIRE	M22759/86-20-9	6 wires
P6(SPARE)	-	-	-	-

4.   MMDC (CH1 & CH2) Connectors

Table 25: Connectors list

Connector	CONN. Part Number	Qty	Make
P1	D38999/26FJ35PN	1	Amphenol
P2	D38999/26FJ35PA	1	Amphenol
P3	D38999/26FC35PN	1	Amphenol
P4	D38999/26FA35SN	1	Amphenol
P5	D38999/26FA35SA	1	Amphenol
P6	D38999/26FJ35PB	1	Amphenol

Table 26: MMDC Connectors Back Shell list

Note: **BELOW MENTIONED BACKSHELLS ARE BASED ON ONLINE PORTAL**

Back Shell Part Number	Quantity	Make
Straight Angle (St) Back shell		
M85049/38-25N	3	Amphenol
M85049/38-9N	2	Amphenol
M85049/38-13N	2	Amphenol

Note:

1. All Connector from the OEM (Original Equipment Manufacturer):-
   - BASIC SERIES: MIL-DTL-D38999 SERIES-III.
   - CONNECTOR PLATING: OLIVE DRAM CADMIUM.
   - CONTACT TYPE: SOCKET WITH CRIMP TERMINATION.
   - SHELL STYLE: PLUG TYPE WITH RFI SHELDING
   - MATERIAL: ALUINHIMUM SERIES.
   - ALL THE DIMENSIONS & THE ENVIRONMENTAL SPECIFICATION OF THE CONNECTORS MEETS TO D38999 SERIES-III Std.

2. Procedure / Standard followed for quality test of looms:-
   - Wire Harness Testing Check List
   - Accurate Ferrule Labeling.
   - Check for Damaged Insulation or Defective Wires.
   - Continuity.
   - Correct Wire Gauge.
   - Proper connectors and terminals.
   - Free of Moisture and Corrosion.
   - Optimum Wire Placement within Connectors.
   - Pull Testing.
   - Complete looms covered by nylon braid.
   - In loom source side, middle loom and destination side should be labeled (use transparent sleeve, yellow colour sleeve and black colour sleeve).

Appendix-D

LAD's Looms Technical Specifications

1.   Introduction

Single 20" ×8" Large Area Display (LAD) with touch screen capability is envisaged in LCA AF MK2 Aircraft cockpit instead of conventional multiple Head down Displays. LAD provides a large display area which is used to show larger amount of information in a more detailed manner. This largely augments the pilot situation awareness, thus enhancing operational capability. In LCA AF MK-2 fighter aircraft, LAD is interfaced to Smart Electronics Interface Box (SEIB) only.

LAD embedded two independent displays in a single 20" wide x 8" tall LCD. Each display has a 10.0" wide x 8" tall active area, SXGA resolution (1280 x 1024). Each display has an independent LED backlight for high availability.

2.   Looms Design

The RLAD and LLAD loom length is 7m and provide the break interface connector.

3.   LAD Wires & Cables

The requirements of connection between RLAD and LLAD to Interface panel looms are given below. All cables and wires should be same as part number given in the table.

Table 27: LAD wires and Cables

Connector	Signal Type	Cable Name	Part No	Channels (each channel/wire length is 7 meter)
J1(POWER-RLAD)	POWER	Unscreened Shielded 12 AWG		3 wires
J2(RS422/Discrete RLAD)	ANALOG/RS422	Screened Twisted Pair 24 AWG		2 channels
	DISCRETE	Screened Twisted Pair 24 AWG		4 wires
	POWER	Screened Twisted Pair 24 AWG		1 wire
J3 (Video, RLAD)	Optical	Fiber Optics		2 channels

Connector	Signal Type	Cable Name	Part No	Channels (each channel/wire length is 7 meter)
J4(POWER LLAD)	POWER	Unscreened Shielded 12 AWG		3 wires
J5(RS422/Discrete LLAD)	ANALOG/RS422	Screened Twisted Pair 24 AWG		2 channels
	DISCRETE	Screened Twisted Pair 24 AWG		4 wires
	POWER	Screened Twisted Pair 24 AWG		1 wire
J6(Video, LLAD)	Optical	Fiber Optics		2 channels

4.   LAD Connectors

Table 28: LAD connectors

Connector	CONN. Part Number	Qty	Make
J1, J4	D38999/26WE6SN	2	Amphenol
J2, J5	D38999/26WD35SN	2	Amphenol
J3, J6	Radial VPN R8W11N2F0SAA OR Amphenol P/N: CF-5A4611-02A	2	Amphenol

Note: **Back shell details will be update soon.**

Appendix-E

Sleek Smart HUD Looms Technical Specifications

1. **Introduction**

The Head-up Display (HUD) is airborne equipment fitted in the cockpit of a combat aircraft. The HUD displays flight information in collimated form so that pilot can view this information superimposed on the view of outside world without having to change his line of sight or visual accommodation. The pilot is thus able to fly the aircraft 'Head Up' thereby reducing workload and enhancing aiming capability.

HUD has provision for physical mounting & electrical interface for Up Front Control Panel (UFCP). In LCA AF MK-2 fighter aircraft, HUD is interfaced to SVP&DMG with ARINC818 optical interface and Ethernet Switch A& B with TSN interface.

2. **Looms Design**

The SSHUD loom length is 7m and provide the break interface connector.

3. **SSHUD Wires & Cables**

The requirements of connection SSHUD to Interface panel looms are given below. All cables and wires should be same as part number given in the table.

Table 29: SSHUD wires and Cables

Connector	Signal Type	Cable Name	Channels (each channel/wire length is 7 meter)
J1	POWER	22 AWG	5 wires
	SGRP	22 AWG	1 wires
	CHASSIS GROUND	22 AWG	3 wires
	DISCRETE SPARE	22 AWG	8 wire
	DISCRETE	22 AWG	11 wire
	ARNIC 818	Fiber	4 Optical
	TSN Ethernet	CAT6	2 channels
	RS232	22 AWG	2 wires
	JTAG	22 AWG	6 wires
J2	POWER	Screened Twisted Pair 16 AWG	2 wires

Connector	Signal Type	Cable Name	Channels (each channel/wire length is 7 meter)
	DISCRETE	Screened Twisted Pair 24 AWG	1 wires
	CHASSIS GROUND	Screened Twisted Pair 24 AWG	2 wire
	DIGITAL Interface		

4.   SSHUD Connectors

Table 30: SSHUD Connector

Connector	CONN. Part Number	Qty	Make
J1	ARNIC404	1	

Appendix-F

IASS Desktops and Workstations Technical Specifications

1.   RT Server Industrial Computer

Table 31 : RTS Specifications

Sl. No.	Component	Specification
1.	PC type	Industrial PC
2.	Processor	Intel® Core™ i9
3.	Processor Base Frequency	3.7GHz
4.	Processor Core Generation	16 or above
5.	Cache	20MB
6.	Architecture	2 PCI Slot, 5 PCI Express slot
7.	RAM	64 GB, 2666MHz DDR4 or better, Minimum 4 DIMM slots
8.	Storage	• 2.0TB RAID0 HDD • 512GB SATA 6Gb/s 2.5" NAND SSD
9.	Monitor	• 24" Wide Screen Monitor with LED Back Light (Resolution: 1920x1080) or better. • 1 VGA, 1 DP, 1 HDMI color monitor
10	Internal Speakers	• On board Speaker and 1 PC External Speaker
11	Keyboard and Mouse	One set USB type • Wired Keyboard (English). • Wired Optical, Scroll USB (3 buttons scroll) Black Mouse.
12	OS	Windows 10 Pro (64bit) English or above for workstation, CD's also required to be delivered
13	Ports and Connector	• Front: 2 USB 3.1 ports. • Rear: Minimum 5 USB 3.1 ports; 1 audio line in; 1 audio line out, 2-PS/2 ports or better, 1 headset connector or better • RJ45-Ethernet ports- 2 no's
14	Power Cord	System and Monitor Power Cord (for INDIA)
15	Power Supply	Supply: 230V +/- 10% single phase, 50 Hz AC
16	Chassis	Workstation chassis with suitable power supply and efficiency 85% or better
17	PC Quantity	1

2.   Workstation-1 & 2 (LSS1 and LSS2)

Table 32 : Workstation-1 & 2 Specifications

Sl. No.	Component	Specification
1.	PC type	Workstation
2.	Processor	Intel® Xeon® E series E5
3.	Processor Core Generation/Thread	32 thread
4.	Chipset	Intel(R) C612 chipset or better
5.	Cache	20MB
6.	RAM	32GB, 2666MHz DDR4 or better, Minimum 4 DIMM slots
7.	Storage	• 1TB SATA 7200 rpm 6Gb/s 3.5" HDD • 256GB SATA 6Gb/s 2.5" SSD
8.	Video Card (Monitor Expansion)	• MSI Gaming GeForce GTX 1650 Super 128-Bit DP Port 4GB GDRR6 or better
9.	Monitor	• Quantity 2 • 24" Wide Screen Monitor with LED Back Light (Resolution: 1920x1080) or better. • 1 VGA, 1 DP, 1 HDMI color monitor
10.	Internal Speakers	• On board Speaker and 1 PC Speaker
11.	Operating System Recovery Options	Windows 10 Pro DVD Media
12.	Keyboard and Mouse	One set USB type • Wired Keyboard (English). • Wired Optical, Scroll USB (3 buttons scroll) Black Mouse.
13.	OS	Windows 10 Pro (64bit) English or above for workstation, CD's also required to be delivered
14.	Ports and Connector	• Front: 4 USB 3.1 ports; 1 headset connector or better • Rear: Minimum 5 USB 3.1 ports; 1 audio line in; 1 audio line out, 2-PS/2 ports or better • RJ45-Ethernet ports- 2 no's
15.	Power Cord	System and Monitor Power Cord (for INDIA)
16.	Power Supply	Supply: 230V +/- 10% single phase, 50 Hz AC
17.	Chassis	Workstation chassis with suitable power supply and efficiency 85% or better
18.	Software	Latest version of MS-office 2021 and MS Visio#
19.	PC Quantity	2

3.   Workstation-3 & Workstation-4 (FDM AND SVP & DMG Simulator)

Table 33 : Workstation-3 Specifications

Sl. No.	Component	Specification
1.	PC type	Workstation
2.	Processor	Intel® Xeon® E series E5
3.	Processor Core Generation	16
4.	Chipset	Intel(R) C612 chipset or better
5.	Cache	20MB
6.	RAM	32GB, 2666MHz DDR4 or better, Minimum 4 DIMM slots
7.	Storage	• 2.0TB SATA 7200 rpm 6Gb/s 3.5" HDD • 512GB SATA 6Gb/s 2.5" NAND SSD
8.	Video Card	NVIDIA® Quadro® K4000 3GB (2DP) or better.
9.	Monitor	• 24" Wide Screen Monitor with LED Back Light (Resolution: 1920x1080) or better. • 1 VGA, 1 DP, 1 HDMI color monitor
10	Internal Speakers	• On board Speaker and 1 PC Speaker
11	Operating System Recovery Options	Windows 10 Pro DVD Media
12	Keyboard and Mouse	One set USB type • Wired Keyboard (English). • Wired Optical, Scroll USB (3 buttons scroll) Black Mouse.
13	OS	Windows 10 Pro (64bit) English or above for workstation, CD's also required to be deliver
14	Ports and Connector	• Front: 4 USB 3.1 ports; 1 headset connector or better • Rear: Minimum 5 USB 3.1 ports; 1 audio line in; 1 audio line out, 2-PS/2 ports or better • RJ45-Ethernet ports- 2 no's
15	Power Cord	System and Monitor Power Cord (for INDIA)
16	Power Supply	Supply: 230V +/- 10% single phase, 50 Hz AC
17	Chassis	Workstation chassis with suitable power supply and efficiency 85% or better
18	Software	Latest version of MS-office 2021 and MS Visio#
19	PC Quantity	2

4.   Desktop-1 (Rig Interface Computer)

Table 34: Desktop-1 Specifications

Sl. No.	Component	Specification
1.	Processor	Intel® Core™ i9 10900K @ 3.7GHz, 10 Core
2.	Cache	20MB
3.	Architecture	1 PCI Express slot
4.	RAM	32GB, 2666MHz DDR4 or better, Minimum 4 DIMM slots
5.	Storage	• 2.0TB SATA 7200 rpm 6Gb/s 3.5" HDD • 1TB SATA 6Gb/s 2.5" SSD
6.	Monitor	• 24" Wide Screen Monitor with LED Back Light (Resolution: 1920x1080) or better. • 1 VGA, 1 DP, 1 HDMI color monitor
7.	Internal Speakers	• On board Speaker and 1 PC Speaker
8.	Operating System Recovery Options	Windows 10 Pro DVD Media
9.	Keyboard and Mouse	One set USB type • Wired Keyboard (English). • Wired Optical, Scroll USB (3 buttons scroll) Black Mouse.
10	OS	Windows 10 Pro (64bit) English or above for workstation, CD's also required to be deliver
11	Ports and Connector	• Front: 4 USB 3.1 ports; 1 headset connector or better • Rear: Minimum 5 USB 3.1 ports; 1 audio line in; 1 audio line out, 2-PS/2 ports or better • RJ45-Ethernet ports- 2 no's • DVD RW-1
12	Power Cord	System and Monitor Power Cord (for INDIA)
13	Power Supply	Supply: 230V +/- 10% single phase, 50 Hz AC
14	Chassis	Workstation chassis with suitable power supply and efficiency 85% or better
15	Software	Latest version of MS-office 2021 and MS Visio*
16	PC Quantity	1

Appendix-G

Electrical Parameter and Mechanical Dimensions of LRU's

The below table contains electrical requirements and mechanical dimensions of LRU(s) which required to be considered while designing racks and DCDM of MMDCSTR. However supplier should finalize these metrics after the issue of the order.

Table 35: Electrical interface and dimension details of LRUs

Sl. No.	LRU	No. of LRUs	Voltage, Current	Circuit Break (CB) cut-off current	Dimension(L x W x H)cm	Weight/ LRU(kg)	Remark
1.	MMDC	1	Each 28V DC, 5A	6A	35 x 12.5 x 18.5	30	Each 15 kg
2.	LAD's	02	Each 28V DC, 4A	5.5A	27.5 x 15.5 x 19	45	Each 15 kg
3.	SVP & DMG						
4.	UFCP	1	28V DC, 1A	1.5A	13.8 (Breadth) x 13.3 (Height) x 2.13 (Depth)	1.8	
5.	BDU	1	28V DC, 1.5A	2A	35 x 24 x 11.5	<9	Location: Spare Rack
6.	INGPS	1	28V DC, 1.7A	2.5A	45 x 21 x 20	17	Location: Spare Rack
7.	DMG	1	28V DC, 4A	5A	35 x 12.5 x 18.5	12	Location: Spare Rack
8.	Sleek Smart HUD	1	28V DC, <6A	7A	72.02 x 16.5 x 39.84	18	

Appendix-H

Rack Technical Data

Table 36 : Rack Technical specification

SL NO	PARAMETER	DESCRIPTION
1.	Basic Frame	Steel folded
2.	Construction	Welded or CKD
3.	Top & Bottom Cover	Bolted to Frame with Cable entry exit cut outs
4.	Front Door	Lockable toughened glass door or lockable perforated steel door
5.	Rear Door	Lockable Steel Door - Plain / Vented / Perforated
6.	19" Mounting Angle	Formed Steel
7.	Std. Equipment Mounting	DIN Std. 10mm Sq. Slots
8.	Standard Finish	Powder Coated
9.	Standard Colour	Grey & Off White or Black
10.	Standard Mounting	Caster wheels (2 with Brake & 2 without Brake), Levelers and Plinth
11.	Rack Standard	Conforms to DIN 41494 or equivalent standard
12.	Static Load	750Kg with casters. 1250Kg with Levelers / Plinth
13.	Fixed Shelf (numbers)	6
14.	Overall height (mm)	1921
15.	Usable height (U)	40
16.	Overall width(mm)	600
17.	Usable width(inch)	19
18.	Overall depth(mm)	650
19.	Usable depth(mm)	550
20.	Caster Height(mm)	105
21.	Quantity	4