Tel: 26182568

WESEE
Ministry of Defence
West Block-V, Wing - 1
R K Puram
New Delhi - 110 066

SCS/192/TFCS/Procurement

02 Jul 18

To,

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(As per approved vendor list for LTE)

REQUEST FOR TECHNICAL AND COMMERCIAL PROPOSAL FOR PROCUREMENT OF HARDWARE FOR TORPEDO FIRE CONTROL SYSTEM (TFCS)

REQUEST FOR PROPOSAL (RFP) NO. SCS/192/TFCS/PROCUREMENT DATED 02 JUL 18

1. Bids in sealed cover are invited for supply of items listed in Part II of this RFP. Please super-scribe the above mentioned title, RFP number and date of opening of the Bids on the sealed cover to avoid the bid being declared invalid.

2. The address and contact numbers for sending bids or seeking clarifications regarding this RFP are given below :–

(a) Proposal/queries to be addressed to:-

Director General
WESEE
West Block 5, RK Puram
New Delhi 110066

(b) Postal address for sending the Proposal:-

Director General
WESEE
West Block 5, RK Puram
New Delhi 110066

(c) Name/designation of the contact personnel: Cdr Vaishno AS Chauhan, Senior System Manager

(d) Telephone numbers of the contact personnel: 011-26182568

(e) E-mail id of contact personnel: **weseehodscs-navy@nic.in**
(**Note**: e-mail is not considered means of official correspondence)

(f) Fax number: 011-26182568/ 011-26101143

3. This RFP is divided into five Parts as follows:

(a) **Part I**. The first part contains General information and instructions for the bidders about the RFP such as the time, place of submission and opening of tenders, validity period of tenders, etc.

(b) **Part II**. The second part consists of essential details of items, technical specifications, delivery period, consignee details etc.

(c) **Part III**. The third part contains standard conditions of RFP such as Liquidated Damages (LD), duties, taxes etc. which would form part of Contract with the successful Bidder.

(d) **Part IV**. The fourth part of the RFP consists of the commercial aspects of the procurement like payment terms, performance guarantees, and guarantees against warranty services etc., to be performed by the Seller.

(e) **Part V**. The fifth part of the RFP defines the criteria for evaluation and acceptance of commercial proposal.

4. This RFP is being issued with no financial commitment and this office reserves the right to withdraw the RFP and change or vary any part thereof or foreclose the procurement case at any stage. This office also reserves the right to disqualify any vendor should it be so necessary at any stage on grounds of national security.

5. It is requested that the receipt of this RFP be acknowledged.

Yours sincerely,

(Arjun Kalgan)
Commander
Senior Systems Manager
for Director General

Encls: As per Appendices

PART I – GENERAL INFORMATION

1. **Last date and time for depositing the Bids**. Not after **1200 hrs**, on **08 Aug 18 (Wednesday)**. The sealed Bids (both Technical and Commercial) should be deposited/reach by the due date and time. The responsibility to ensure this lies with the Bidders.

2. **Manner of depositing the Bids**. Separately sealed Technical and Commercial Bids should be either dropped in the Tender Box marked as **WESEE TENDER BOX** or, sent by registered post at the address given above so as to reach by due date and time. Late tenders will not be considered. No responsibility will be taken for postal delay or non-delivery/ non-receipt of Bid documents. Bids sent by FAX or e-mail will not be considered (unless they have been specifically called for by these modes due to urgency).

3. **Time and date for opening of Bids**. At **1500 hrs, 08 Aug 18 (Wednesday).** (If due to any exigency or the due date for opening of the Bids is declared a closed holiday, the Bids will be opened on the next working day at the same time or on any other day/time, as intimated by the Buyer).

4. **Location of the Tender Box**. Ground Floor, West Block 5, RK Puram, New Delhi. Only those Bids that are found in the WESEE tender box will be opened. Bids dropped in the wrong Tender Box will be rendered invalid.

5. **Place of opening of the Bids**. WESEE, Ground Floor, West Block 5, RK Puram, New Delhi. The Bidders may depute their representatives, duly authorised in writing, to attend the opening of Bids on the due date and time. Rates and important commercial / technical clauses quoted by all Bidders will be read out in the presence of the representatives of all the Bidders. This event will not be postponed due to non-presence of your representative.

6. **Type of Tender and Bid**. This is a **Limited Tender Enquiry (LTE) and no unsolicited bids will be accepted** by this office in accordance with GFR 2017. This enquiry is on Two Bid system. However, only Technical Bid would be opened on the time and date mentioned above. Date of opening of the Commercial Bid will be intimated after acceptance of the Technical Bids. The Technical Bid will be evaluated by a Technical Evaluation Committee (TEC) to confirm that the system being offered meets all essential parameters. The TEC will examine compliance of vendors as per the stated requirements of RFP. Commercial Bids of only those firms would be opened, whose Technical Bids are found complaint/ suitable during Technical evaluation.

7. **Forwarding of Bids**. Bids should be forwarded by Bidders under their original memo / letter pad inter alia furnishing details like TIN number, VAT/CST/GST number, Bank address with EFT Account if applicable, etc and complete postal & e-mail address of their office.

8. **Clarification regarding contents of the RFP**. A prospective bidder who requires clarification regarding the contents of the bidding documents shall notify to the Buyer in writing about the clarifications sought not later than 02(two) weeks prior to the date of opening of the Bids. A pre bid meeting if required will be scheduled at WESEE to clarify any queries w.r.t. the RFP. Copies of the query and clarification by the purchaser will be sent to all prospective bidders who have received the bidding documents.

9. **Modification and Withdrawal of Bids**. A bidder may modify or withdraw his bid after submission provided that the written notice of modification or withdrawal is received by the Buyer prior to deadline prescribed for submission of bids. A withdrawal notice may be sent by fax but it should be followed by a signed confirmation copy to be sent by post and such signed confirmation should reach the purchaser not later than the deadline for submission of bids. No bid shall be modified after the deadline for submission of bids. No bid may be withdrawn in the interval between the deadline for submission of bids and expiration of the period of bid validity specified. Withdrawal of a bid during this period will result in Bidder's forfeiture of bid security.

10. **Clarification regarding contents of the Bids**. During the evaluation and comparison of bids, the Buyer may, at its discretion, ask the bidder for clarification of his bid. The request for clarification will be given in writing and no change in prices or substance of the bid will be sought, offered or permitted. No post-bid clarification on the initiative of the bidder will be entertained.

11. **Rejection of Bids**. Canvassing by the Bidder in any form, unsolicited letter and post-tender correction may invoke summary rejection with forfeiture of EMD. Conditional tenders will be rejected.

12. **Unwillingness to quote**. Bidders unwilling to quote should ensure that intimation to this effect reaches before due date and time of opening of the Bid, failing which the defaulting Bidder may be delisted for the given range of items as mentioned in this RFP.

13. **Validity of Bids**. The Technical and Commercial Bids should remain valid till 06 months from the last date of submission of the Bids.

14. **Earnest Money Deposit**. Bidders are required to submit Earnest Money Deposit (EMD) for amount of **Rs 2,50,000 /-(Rupees Two Lakh Fifty Thousand only)**. The EMD may be submitted in the form of an Account Payee Demand Draft, Fixed Deposit Receipt, Banker's Cheque or Bank Guarantee from any public sector banks or private sector bank authorized to conduct government business as per Form DPM-16 (Available in MoD website and can be provided on request). EMD is to be valid for a period of forty-five days beyond the final bid validity period. EMD of the unsuccessful bidders will be returned to them at the earliest after expiry of the final bid validity and latest on or before the 30th day after the award of the contract. The Bid Security of the successful bidder would be returned, without any interest whatsoever, after the receipt of Performance Security from them as called for in the contract.

PART II – ESSENTIAL DETAILS OF ITEMS/SERVICES REQUIRED

1. **Schedule of Requirements**. The items/ services required for Torpedo Fire Control System (TFCS) are as follows:-

Sl. No.	Item	Quantity
(a)	Dual Monitor Multi-Function Console (DMFC)	01 No.
(b)	Network Switching Unit (NSU)	01 No.
(c)	Torpedo Tube Interface Box(TTIB)	02 Nos.
(d)	Torpedo Fire Control Panel (TFCP)	01 No.
(e)	Power Supply Conversion Unit (PSCU)	01 No.
(f)	Mating connectors (Mil Grade), Power Supply Cables (industrial grade) and accessories required to energise the DMFC, NSU, TTIBs, TFCP and PSCU as required.	01 Set
(g)	Installation Material and accessories required for installation of TFCS units including Shock mounts.	01 Set
(h)	Documentation including Technical Manuals for the delivered hardware (in both Hard and Soft copies)	03 Sets
(j)	Operator and Maintainer Training	06 days in two phases

2. The Supplier shall be responsible for design, development, engineering and manufacturing of **One (01) DMFC, One(01) NSU, Two(02) TTIBs, One (01) TFCP and One (01) PSCU** along with accessories, as per Buyer specified requirements as mentioned at para 1 above, and the deliver the same at WESEE, West Block-5, RK Puram, New Delhi-110066 for integration activities, followed by transportation and delivery to the ultimate consignee at Visakhapatnam for installation onboard the platform.

3. The integration of the hardware/ units of the TFCS will be coordinated by WESEE. The Supplier of the hardware shall participate in integration process at WESEE followed by onboard the platform during Setting to Work (STW) and Harbour Acceptance Trials (HATs). The Supplier shall provide all installation material and accessories for installation.

4. The Supplier shall associate with WESEE for proving of physical interfaces. Any modifications in the hardware configuration, if required, for satisfactory integration of the system units shall be carried out by the Supplier.

5. Supplier shall ensure continuous comprehensive support for the delivered segments during the period of warranty. He shall also provide hardware updates as and when required and necessary during this support period.

6. Supplier shall provide documentation including technical manuals for the delivered hardware. Any handouts/ documents/ supporting/ reference technical literature issued by the OEM, should also be provided by the Supplier. The supplier should submit the design document for approval to the buyer.

7. Supplier shall ensure provision of lifting hooks, eye plates and supports as necessary is to be made on the equipment for its handling during transportation and installation.

8. The system schematic is placed at **Appendix 'A'**. The hardware for units marked from 1 to 5 is part of deliverables for this RFP.

9. **List of Deliverables**.

(a) **Main Equipment**. One DMFC, One NSU, Two TTIBs, One TFCP and One PSCU including Mating and Equipment end connectors as required.

(b) **Installation Material**. The material and accessories required for fitment of the TFCS units including Shock mounts.

(c) **Documentation for Hardware**. Hardware documents as per JSS-0251 (03 Hard copies and 03 soft copies). The various documents to be submitted will be as follows:-

(i) Technical description
(ii) Binding Data Document (BDD) and Interface Control Document (ICD)
(iii) Assembly Drawings
(iv) Procedure for handling, installation and inspection
(v) Routine maintenance instructions
(vi) Part list
(vii) List of spares
(viii) Setting to work procedures
(ix) Repair documents

(d) **Training**. Operator and maintainer training for 06 days in two phases at site. The training should cover the operations and maintenance aspects of the hardware delivered by the Supplier. The training material for the same *viz.* handouts and presentations will be provided by the Supplier. The operator and maintainer training will be scheduled post installation of the equipment onboard and prior to HATs of the system.

10. **Technical Details**. The Technical details of the of the deliverables are as follows:-

(a) **Dual Monitor Multi-Function Console (DMFC)**. DMFC console will comprise of two monitors vertically one above the other for man machine interface, full size keyboard, tracker ball etc. It will have provision to install under-mentioned items with AC Power supply, forced cooled with fan tray, Anti Condensation Heaters (ACH), Dual redundant power supply modules with input 230 V, 50 Hz single phase AC(Mains), built in 88 key back lit keyboard and track ball mounted on a foldable and lockable front desk. The overall dimensions of non-dismantlable and non-folding frame of DMFC should be such that it can pass through a circular hatch of diameter 60 cms. The overall dimensions of the DMFC with its appendages and front desk laid open should not exceed 180 cms X 50 cms X 70cms (Height X Width X Depth). The Weight of DMFC with all electronics and accessories should not exceed 200 Kgs. The technical specifications of the components within the DMFC are as follows:-

Sl. No.	Item	Technical Description	Qty
(i)	21" Rugged Display	Size : Minimum 21 " (4:3) Resolution : Atleast 1600 x 1200 with 256 colors Output : DVI/HDMI Type : TFT LCD/ LED Displays should have night mode feature	02 Nos.
(ii)	VME Chassis	6U Removable 5 slot VME Back plane based chassis with provision to install two SBC, one serial card, one Graphics card and one HDD	01 No.
(iii)	Single Board Computer	Intel® Core™ i7 processor, Quad-Core up to 2.6 GHz or higher, 6MB or higher L3 cache. 16GB or higher dual channel DDR3L SDRAM, 32GB or higher onboard memory SLC NAND Flash on a dedicated SATA NAND Flash module	02 Nos.
(iv)	Hard Disk (HDD) with mounting kit	256 GB or higher HDD connected to Processor Board with SATA Kit	01 No.
(v)	Graphics Card	XMC High Performance Graphics Card. 2 GB or higher GDDR5 SDRAM, 8-lane PCI Express Gen 2.0 capable, 2 channels.	01 No.
(vi)	Serial Interface Card	Full duplex RS422 Serial Interface Number of Serial Ports : Eight RS422 Ports Physical Levels Supported : RS-232, RS-422/485	01 No.

Sl. No.	Item	Technical Description	Qty
(vii)	Ethernet Switch	Fully managed Layer 2/ 08 port Ethernet switch with 10/100/1000 BaseT IPv6 switching/routing. Each switch to be connected to both the processor cards internally and to I/O port on the DMFC. Switches will not be connected to each other.	02 Nos.
(viii)	Accessories	All internal Connecting cables and accessories for Processor Boards and other daughter cards/HDD	01 Set
(ix)	Input/ Output ports	**I/O MIL Grade interface Terminations on top of DMFC:** 02 Ethernet connectors (hardwired to Ethernet Switches) 06 RS-422 Serial Connectors (Hardwired to Serial Card) 01 Main Power Supply 01 ACH **I/O interface Terminations on front desk:** 02 USB hardwired to SBC internally from Front I/O's 01 Ethernet Port (Hard wired to one of the Ethernet switches) Power ON/Off switch	As Specified

(b) The schematic of the DMFC is placed at Fig 1 below:-

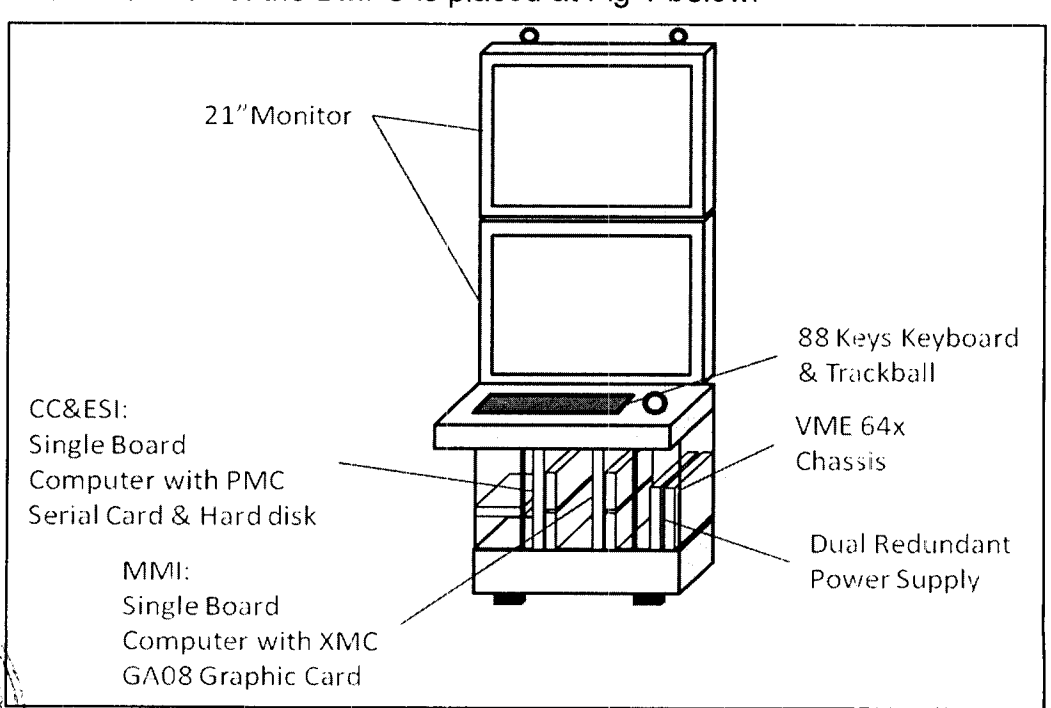


Figure 1. Schematic of Dual Monitor Multi-Function Console (DMFC)

(c) **Network Switching Unit (NSU)**. The Network Switching Unit (NSU) will have two Ethernet Switches which will inter connect all the equipment of the TFCS system on dual redundant Ethernet LAN. In addition, the sensors which provide data on Ethernet will get interfaced to TFCS system through the NSU. The technical specifications of the components within the NSU are as follows:-

Ser	Item	Technical Description	Qty
(i)	NSU Cabinet	NSU cabinet will have provision to install 02 in number independent 08 port layer 2 Ethernet switches stacked vertically. Dual redundant power supply module with input 230V, 50Hz AC(Mains) Mains input 230V, 50 Hz AC, Single Phase	01 No.
(ii)	Ethernet Switch	Fully managed Layer 2/ 08 port Ethernet switch with 10/100/1000 BaseT IPv6 switching/routing. Switches will not be connected to each other.	02 Nos.
(iii)	Input/ Output ports	I/O interface Terminations on NSU:- 16 Ethernet connectors (Standard MIL grade connectors) (08 connected to each Ethernet switch internally) 01 Main Power Supply	As Specified
(iv)	Accesso ries	Internal connecting cables and accessories	01 Set

(d) The schematic of Network Switching Unit is placed below at Fig 2:-

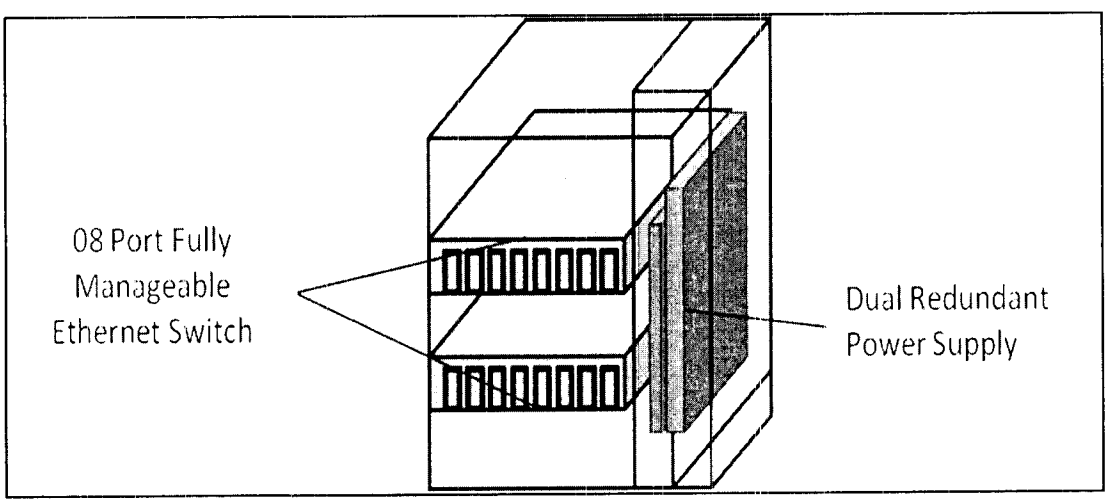


Figure 2. Schematic of Network Switching Unit (NSU)

(e) **Torpedo Tube Interface Box(TTIB)**. There will two TTIBs (Port and Stbd) in the system fitted at separate locations. The TTIBs will have to be manufactured on the basis of 'Build to Print' design provided by the Buyer. The Technical specifications and details of TTIBs are placed at **Appendix 'B'.**

(f) **Torpedo Fire Control Panel (TFCP)**. The TFCP will have to be developed by the Seller based on the requirements (Hardware & Software) provided by the Buyer. Software for interaction with Application software and for control of relays/switches, LEDs and audio visual alarm will also have to be developed by Seller. The technical requirements of TFCP are placed at **Appendix 'C'**.

(g) **Power Supply Conversion Unit (PSCU)**. The Power Supply Conversion Unit should be designed to cater for all the Power Supply requirements of the TFCS units and redundancy. The PSCU will work on Main and Stand-by input supply of 220-290 V DC and will be required to generate 230V/50 Hz, 230V/400Hz and 110 V DC for functioning of the TFCS units. The technical requirements of the Power Supply Conversion Unit are placed at **Appendix 'D'**.

11. **Design Features**. The main design features of the TFCS equipment are to be as follows: -

(a) Engineering of System segments to comply with their respective size & dimensional requirements and Environmental specifications for the overall system.

(b) Modular design approach for ease of maintainability.

(c) Interconnecting cables to have sufficient green to meet the bending radius specifications.

(d) Ergonomic design for ease of operation and minimal strain and fatigue.

(e) Maintenance and repair access from the front.

(f) In case of use of COTS items, the enclosures are to be ruggedised to meet specified Environmental specifications.

(g) Conformal coating on all PCB assemblies.

(h) Powder coating epoxy finish on consoles

(j) Gel coating on transformers

12. **Environment Specifications**. The Units shall be able to comply with following Environmental Tests as per tests mentioned in JSS 55555(2012):-

Ser	Test	Specifications
(a)	Vibration	5 to 33 Hz, ± 0.125 mm constant displacement
(b)	High Temp	Operation at 55°C ± 3 °C followed by storage at 70°C ± 3 °C
(c)	Damp Heat	Temperature and RH to be 40°C ± 2 °C and not less than 95 % respectively, over a period of not less than one hour
(d)	Low Temp	10°C ± 3 °C over a period of not less than 16 hrs
(e)	Drip Proof	Clean tap water shall fall vertically downwards from the nozzle of dispenser on to equipment surface from 1 mtr height for 15 mins. Distance between two dispensers shall be 25 mm and distance between water level and dispenser level shall be 76 ± 1.6 mm. Total level of water shall be 300 mm.
(f)	Tropical Exposure	EUT introduced into chamber at 20°C ±5°C; Temp & RH then be raised to 35°C ±2 °C and upto 95 % respectively over 3 hrs and condition maintained for 12 hrs; Temp lowered to 20°C ±5°C over 3 hrs and condition maintained for 6 hrs. 7 such cycles to be undertaken
(g)	Mould Growth	EUT placed in Humid chamber for 28 days. RH to be maintained greater that 90%
(h)	Corrosion	EUT exposed to salt mist for 2 hrs followed by storage for 7 days at temp 35°C ±2 °C and RH 90-95%. 4 such cycles to be undertaken
(j)	Shock	120 g, 08 msec(vertical)/70g, 8 ms (lateral) half sine wave.

13. **EMI/EMC Test Specification**. All electrical equipment should provide satisfactory operation in presence of electromagnetic emission prevalent in the vicinity of the equipment. The equipment will have to be designed to comply with MIL STD 461F or IEC 61000 series EMI/EMC standards/ any other commercial EMI/EMC standards for COTS/COTS based equipment.

14. All units of the TFCS system should meet the Environment and EMI/EMC specifications as mentioned at Para 12 and Para 13 above. The system would be accepted on the basis of Certificate of Compliance from the SELLER w.r.t. compliance to Environment and EMI/EMC specifications.

15. **Delivery Period**. Delivery period for supply of items would be **07 months** from the date of Supply Order. Please note that the Buyer can cancel the tender unilaterally in case, item is not received within the contracted delivery period. Extension of delivery period will be at the sole discretion of the Buyer, with applicability of Liquidated Damages (LD) clause.

16. **Two-Bid System**. Bidders are required to furnish **clause by clause compliance of specifications mentioned in RFP** bringing out clearly the deviations from RFP, if any. The Bidder is advised to submit the compliance statement in the format placed at **Appendix 'E'**.

17. **Consignee details**.

Director General
WESEE,
West Block 5, RK Puram
New Delhi-110066

18. **Ultimate Consignee details**.

The Ultimate consignee will be located at Visakhapatnam, Andhra Pradesh. The details of the same will be provided in the Supply Order.

Part III – Standard Conditions of RFP

The Bidder is required to give confirmation of their acceptance of Standard Conditions of the Request for Proposal (RFP) mentioned below. Failure to do so may result in rejection of Bid submitted by the Bidder.

1. **Law**. The Contract shall be considered and made in accordance with the laws of the Republic of India. The contract shall be governed by and interpreted in accordance with the laws of the Republic of India.

2. **Effective Date of the Contract**. The contract shall corne into effect on the date of issue of Supply order (Effective Date) and shall remain valid until the completion of the obligations of the parties under the contract. The deliveries, supplies and performance of the services shall commence from the effective date of the contract.

3. **Arbitration**. All disputes or differences arising out of or in connection with this tender shall be settled by bilateral discussions. Any dispute, disagreement or question arising out of or relating to the tender or relating to construction or performance, which cannot be settled amicably, may be resolved through arbitration. The standard clause of arbitration is as per Forms DPM-7, DPM-8 and DPM-9 (Available in MoD website and can be provided on request).

4. **Secrecy.** The Seller shall ensure that all persons employed on any work in connection with this Contract have noted that the Indian Official Secrets Act, 1923 (XIX of 1923) applies to them and will continue to so apply even after the termination or expiry of the Contract. These conditions shall also apply to the Sub-contractor(s) of the Seller, if any.

5. **Publicity.** The Seller shall not permit or allow any information regarding the contracted work to be published in any Scientific, Engineering Journal or Newspaper, Periodicals and Publications without first obtaining the written consent of the Buyer.

6. **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 tender or forbearing to do or for having done or forborne to do any act in relation to the obtaining or execution of the present tender or any other tender with the Government of India for showing or forbearing to show favour or disfavor to any person in relation to the present tender or any other tender with the Government of India. Any breach of the aforesaid undertaking by the Seller or any one 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 tender and all or any other tender 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 tender imposition of penal damages, forfeiture of the Bank Guarantee and refund of the amounts paid by the Buyer.

7. **Agents / Agency Commission**. The Seller confirms and declares to the Buyer that the Seller is the original manufacturer of the stores/provider of the services referred to in this Contract and 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 supply 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 will be liable to refund all payments made by the Buyer in terms of the Contract along with interest at the rate of 2% per annum above LIBOR rate. The Buyer will also have the right to recover any such amount from any contracts concluded earlier with the Government of India.

8. **Access to Books of Accounts**. In case it is found to the satisfaction of the Buyer that the Seller has engaged an Agent or paid commission or influenced any person to obtain the contract as described in clauses relating to Agents/Agency Commission and penalty for use of undue influence, the Seller, on a specific request of the Buyer, shall provide necessary information/ inspection of the relevant financial documents/information.

9. **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.

10. **Liquidated Damages**. 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 this contract for reasons attributable to the

SELLER, the Buyer may, at his discretion, withhold any payment until the completion of the contract. The BUYER may also deduct from the SELLER as agreed, **liquidated damages to the sum of 0.5% of the contract value for every week of delay or part thereof, subject to the maximum value of 10% of the contract value**.

11. **Cancellation of Order**. The Buyer shall have the right to cancel the order in any of the following cases:-

(a) The delivery of the material is delayed for causes not attributable to Force Majeure for more than 02 (two) months after the scheduled date of delivery.

(b) The Seller is declared bankrupt or becomes insolvent.

(c) The delivery of material is delayed due to causes of Force Majeure by more than 06 (six) months provided Force Majeure clause is included in RFP.

(d) The Buyer has noticed that the Seller has utilised the services of any Indian/Foreign agent in getting this tender and paid any commission to such individual/company etc.

(e) Unsatisfactory response of SELLER with respect to meeting scheduled milestones as agreed after placement of Supply order.

12. **Notices**. Any correspondence/clarification required or shall be written in the English language and may be delivered personally or may be sent by FAX or registered mail, 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 present Contract or any part thereof.

14. **Patents and other Intellectual Property Rights (IPR)**. All IPR of the TFCS equipment will be of the Buyer. The prices stated in the present 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, irrespective of the fact of infringement of any or all the rights mentioned above.

15. **Amendments**. No provision of present Contract shall be changed or modified in any way (including this provision) either in whole or in part except by an instrument in

writing made after the date of this Contract and signed on behalf of both the parties and which expressly states to amend the present Contract.

16. **Taxes and Duties**. Taxes and duties will be payable at actuals as per extant rules. HSN code as per GST to be mentioned.

(a) **General**

(i) If Bidder desires to ask for excise duty or taxes extra, the same must be specifically stated. In the absence of any such stipulation, it will be presumed that the prices include all such charges and no claim for the same will be entertained.

(ii) If reimbursement of any Duty/Taxes 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.

(iii) If a Bidder chooses to quote a price inclusive of any duty/taxes and does not confirm inclusive of such 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 of such offers summarily.

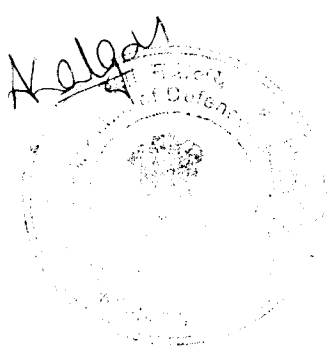
(iv) If a Bidder is exempted from payment of any duty/tax up to any value of supplies from them, he should clearly state that no such duty/tax will be charged by him up to the limit of exemption which he may have. If any concession is available in regard to rate/quantum of any duty/tax, it should be brought out clearly. Stipulations like, the said duty/tax was presently not applicable but the same will be charged if it becomes leviable later on, will not be accepted unless in such cases it is clearly stated by a Bidder that such duty/tax will not be charged by him even if the same becomes applicable later on. In respect of the Bidders, who fail to comply with this requirement, their quoted prices shall be loaded with the quantum of such duty/ tax which is normally applicable on the item in question for the purpose of comparing their prices with other Bidders.

(v) Any change in any duty/tax upward/downward as a result of any statutory variation in excise taking place within contract terms shall be allowed to the extent of actual quantum of such 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 Seller by the Buyer. All such adjustments shall include all reliefs, exemptions, rebates, concession etc. if any obtained by the Seller.

(b) **Taxes**

(i) If it is desired by the Bidder to ask for Taxes to be paid as extra, the same must be specifically stated. In the absence of any such stipulation in the bid, it will be presumed that the prices quoted by the Bidder are inclusive of all taxes.

(ii) On the Bids quoting taxes extra, the rate and the nature of taxes applicable at the time of supply should be shown separately. Taxes will be reimbursed to the Seller at the rate at which it is liable to be assessed or has actually been assessed provided the transaction of sale is legally liable to taxes and the same is payable as per the terms of the contract.



PART IV – SPECIAL CONDITIONS OF RFP

(The Bidder is required to give confirmation of their acceptance of Special Conditions of the RFP mentioned below. Failure to do so may result in rejection of Bid submitted by the Bidder.)

1. **Performance Guarantee**. The Bidder will be required to furnish a Performance Guarantee by way of Bank Guarantee through a public sector bank or a private sector bank authorized to conduct government business (ICICI Bank Ltd., Axis Bank Ltd or HDFC Bank Ltd.) for a sum equal to **10% of the quoted price within 30 days of receipt of the confirmed order. Performance Bank Guarantee should be valid up to 60 days beyond the date of warranty**. The specimen of PBG is given in Form DPM-15 (Available in MoD website and can be provided on request).

2. **Payment Terms**. It will be mandatory for the Bidders to indicate their bank account numbers and other relevant e-payment details so that payments could be made through ECS/EFT mechanism instead of payment through Cheque, wherever feasible. A copy of the model mandate form prescribed by RBI to be submitted by Bidders for receiving payments through ECS is at Form DPM-11 (Available in MoD website and can be given on request). The payment will be made as per the following terms subject to negotiations during CNC:-

(a) **1st Stage Payment**. 30% of total value of contract against acceptance of BDD and ICD of the units and placement of Supply orders by the SELLER for procurement of entire hardware.

(b) **2nd Stage Payment**. 50% of the total contract value on delivery and acceptance of Hardware/Software as per Supply Order to Ultimate Consignee at Visakhapatnam, Andhra Pradesh.

(c) **3rd Stage Payment**. 20% payment on successful completion of Setting to Work and Harbour Acceptance Trials (HATs) of the system onboard the nominated platform.

3. **Advance Payments**. No advance payment(s) will be made.

4. **Paying Authority**. The payment of bills will be made through DCDA (Navy), New Delhi on submission of the following documents by the Seller to the Paying Authority along with the bill:

(a) Ink-signed copy of contingent bill / Seller's bill.

(b) Ink-signed copy of Commercial invoice / Seller's bill.

(c) Copy of Supply Order

(d) CRVs in duplicate.

(e) Claim for statutory and other levies to be supported with requisite documents / proof of payment.

(f) Exemption certificate for Excise duty / Customs duty, if applicable.

(g) Bank guarantee for advance, if any.

(h) Guarantee / Warranty certificate.

(j) Details for electronic payment viz Account holder's name, Bank name, Branch name and address, Account type, Account number, IFSC code, MICR code (if these details are not incorporated in supply order/contract).

(k) Any other document / certificate that may be provided for in the Supply Order.

(l) User Acceptance certificate.

(n) Xerox copy of PBG.

5. **Fall clause**. The following Fall clause will form part of the tender placed on successful Bidder:-

(a) The price charged for the items supplied under the contract by the Seller shall in no event exceed the lowest prices at which the Seller sells the items or offer to sell items of identical description to any persons/ Organization including the purchaser or any department of the Central government or any Department of state government or any statutory undertaking the central or state government as the case may be during the period till performance of all supply Orders placed during the currency of the rate contract is completed.

(b) If at any time, during the said period the Seller reduces the sale price, sells or offer to sell such items to any person/organization including the Buyer or any Deptt, of central Govt. or any Department of the State Government or any Statutory undertaking of the Central or state Government as the case may be at a price lower than the price chargeable under the contract, the Seller shall forthwith notify such reduction or sale or offer of sale to the Director general of Supplies & Disposals and the price payable under the contract for the items of such reduction of sale or offer of the sale shall stand correspondingly reduced. The above stipulation will, however, not apply to:-

(i) Exports by the Seller.

(ii) Sale of items as original equipment at price lower than the prices charged for normal replacement.

(iii) Sale of items at lower price on or after the date of completion of sale/placement of the order of goods by the authority concerned under the existing or previous Rate Contracts as also under any previous contracts entered into with the Central or State Govt. Depts, including their undertakings excluding joint sector companies and/or private parties and bodies.

6. **Risk & Expense clause**.

(a) Should the item not be delivered within the time or times specified in this RFP, or if defective delivery is made in respect of the item, the Buyer shall after granting the Seller 45 days to cure the breach, be at liberty, without prejudice to the right to recover liquidated damages as a remedy for breach of supply order, to declare the tender as cancelled either wholly or to the extent of such default.

(b) Should item not perform in accordance with the specifications / parameters provided by the SELLER during the check proof tests to be done in the BUYER's establishment, the BUYER shall be at liberty, without prejudice to any other remedies for breach of contract, to cancel the tender wholly or to the extent of such default.

(c) In case of material breach that was not remedied within 45 days, the BUYER shall, having given the right of first refusal to the SELLER be at liberty procure from any other source as he thinks fit, other stores of the same or similar description to make good :-

(i) Such default.

(ii) In the event of the contract being wholly determined the balance of the stores remaining to be delivered there under.

(d) Any excess of purchase price, cost of manufacture, or value of any stores procured from any other Supplier as the case may be, over the contract price appropriate to such default or balance shall be recoverable from the SELLER. **Such recoveries shall not exceed 5% (Five) of the value of the contract.**

7. **Force Majeure clause**.

(a) Neither party shall bear responsibility for the complete or partial nonperformance of any of its obligations (except for failure to pay any sum which has become due on account of receipt of goods under the provisions of the present contract), 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 operation, 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.

(b) In such circumstances the time stipulated for the performance of an obligation under the present tender is extended correspondingly for the period of time of action of these circumstances and their consequences.

(c) The party for which it becomes impossible to meet obligations under this contract due to Force Majeure conditions, is to notify in written form the other party of the beginning and cessation of the above circumstances immediately, but in any case not later than 10 (Ten) days from the moment of their beginning.

(d) Certificate of a Chamber of Commerce (Commerce and Industry) or other competent authority or organization of the respective country shall be a sufficient proof of commencement and cessation of the above circumstances.

(e) If the impossibility of complete or partial performance of an obligation lasts for more than 06 (six) months, either party hereto reserves the right to terminate the order 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.

8. **Specification**. The following specification clause will form part of the contract placed on successful Bidder - The Seller guarantees to meet the specifications as per Part-II of RFP and to incorporate the modifications to the existing design configuration to meet the specific requirement of the Buyer. All technical literature and drawings of the Modem shall be amended as the modifications by the Seller before supply to the Buyer. The seller in consultation with the Buyer may carry out technical up gradation/alterations in the design, drawings and specifications due to change in manufacturing procedures. This will, however not in any way, adversely affect the end specifications of the equipment. Changes in technical details, drawings repair and maintenance techniques along with necessary tools as a result of up gradation/alterations will be provided to the Buyer free of cost within 30 days of affecting such up gradation/alterations.

9. **OEM Certificate**. In case the Bidder is not the OEM of the items, the bidder should attach the supporting documents as an authorized dealer/Valid partner certificate from the OEM authorizing the firm to undertake supply of above items.

10. **Earliest Acceptable Year of Manufacturing**. 2018. Quality/ Life certificate will need to be enclosed with the bill.

11. **Transportation**. The following Transportation clause will form part of the contract placed on successful bidder:-

The TFCS units shall be delivered to the Consignee at WESEE, New Delhi for integration followed by transportation to Ultimate Consignee at Visakhapatnam, Andhra Pradesh. Seller will bear all the costs and freight necessary for transportation of items to Consignee and Ultimate Consignee. The seller has to procure Road Transport insurance against the Buyer's risk of loss or any damage to items during the transportation to the Buyer. The Seller will contract for insurance and pay the insurance premium. No part-shipment and trans-shipment of items would be permitted. In case it becomes inevitable to do so, the seller shall not arrange part-shipment and/or trans-shipment without the express/prior written consent of the Buyer.

12. **Packing and Marking**. The following Packing and Marking clause will form part of the contract placed on successful Bidder:-

(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, trans-shipment, storage and weather hazards during transportation, subject to proper cargo handling.

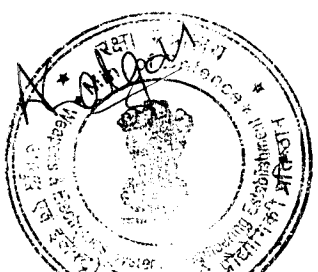
(b) The packing of the equipment and spares/goods shall conform to the requirements of specifications and standards in force in the territory of the Seller's country.

(c) The Seller shall mark each package with in the English language as follows:-

(i) Supply order No. ----------
(ii) Consignee ----------
(iii) Ultimate consignee ----------
(iv) SELLER ----------

(d) 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 the damage of deterioration during transportation by land, air or sea. In this case the Buyer shall finalize the marking with the Seller.

13. **Quality**: The quality of the items delivered according to the present Contract shall correspond to the technical conditions and standards valid for the deliveries of the same items for in Seller's country or specifications enumerated as per RFP and shall also include therein modification to the item suggested by the Buyer. Such modifications will be mutually agreed to. The Seller confirms that the stores to be supplied under this Contract shall be new and shall incorporate all the latest improvements and modifications.



14. **Quality Assurance**. The item should be of the latest manufacture, conforming to the current production standard and having 100% defined life at the time of delivery.

15. **Inspection Authority**. The inspection will be carried out by Buyer.

16. **Inspection**.

(a) **Pre-Dispatch Inspection**. The Buyers representative will carry out Pre-Dispatch Inspection(PDI)/ Factory Acceptance Tests (FATs) of stores/ equipment in order to check their compliance with specifications in accordance with its usual standard procedures. Upon Successful completion of PDI/FATs, the Seller and Buyer will issue and sign a certificate of Conformity as per specimen at Form DPM-21 (Available in MoD website and can be given on request).

(b) **Joint Receipt Inspection and Acceptance Testing**. Joint Receipt Inspection(JRI) would be conducted at Buyers premises post receipt of equipment. JRIwill be scheduled and conducted by the Buyer within four (04) weeks of receipt of equipment. Seller is to nominate its member for JRI. JRI will be followed by Acceptance Testing at the Buyers premises. JRI proceedings and acceptance certificate shall be signed by the Buyers representative only and the same shall be binding on the Seller. Copy of JRI proceedings and Acceptance Certificate shall be dispatched to the Seller within 30 days of completion of JRI and Acceptance Test. In case of deficiencies in quality and quantity or defects, details of these shall be recorded in JRI proceedings, Acceptance Certificate shall not be issued and claims to be raised as per contract. In case of claims, Acceptance Certificate shall be issued by Buyer's representative after all claims raised during JRI are settled.

17. **Certificate of conformance**. The bidder is required to give "Certificate of conformance" of the item issued by OEM. The firm is required to prove the technical specifications stipulated in the RFP at the user premises also. Non-compliance of specifications will result in termination of order.

18. **Franking clause**. The following Franking clause will form part of the contract placed on successful Bidder:-

(a) **Franking Clause in the case of Acceptance of Goods**: "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".

(b) **Franking Clause in the case of Rejection of Goods**: "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."

19. **Claims**. The following claims clause will form part of the contract placed on successful Bidder:-

(a) The claims may be presented either: on quantity of the items, where the quantity does not correspond to the quantity shown in the Packing List/Insufficiency in packing, or on quality of the items, where quality does not correspond to the quality mentioned in the contract.

(b) The quantity claims for deficiency of quantity shall be presented within 45 days of completion of acceptance of goods. The quantity claim shall be submitted to the Seller as per Form DPM-22 (Available in MoD website and can be given on request).

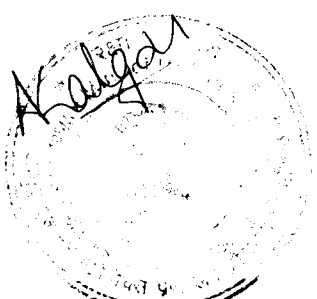
(c) The quality claims for defects or deficiencies in quality noticed during the acceptance shall be presented within 45 days of completion of acceptance of goods. Quality claims shall be presented for defects or deficiencies in quality noticed during warranty period earliest but not later than 45 days after expiry of the guarantee period. The quality claims shall be submitted to the Seller as per Form DPM-23 (Available in MoD website and can be given on request).

(d) The description and quantity of the stores are to be furnished to the Seller along with concrete reasons for making the claims. Copies of all the justifying documents shall be enclosed to the presented claim. The Seller will settle the claims within 45 days from the date of the receipt of the claim at the Seller's office, subject to acceptance of the claim by the Seller. In case no response is received during this period the claim will be deemed to have been accepted.

(e) 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 under Seller's arrangement.

(f) Claims may also be settled by reduction of cost of goods under claim from bonds submitted by the Seller or payment of claim amount by Seller through demand draft drawn on an Indian Bank, in favour of Principal Controller/Controller of Defence Accounts concerned.

(g) The quality claims will be raised solely by the Buyer and without any certification/countersignature by the Seller's representative.



20. **Warranty:**

(a) The supplied item shall carry a warranty of **12 months** from the date of acceptance of item at ultimate consignee or date of commissioning onboard, whichever is later. The item supplied under the supply order and each component used in the item should be free from all types of defects/failures.

(b) The Seller shall warrant that the item supplied conform to technical specifications prescribed and shall perform according to the said Technical Specifications in this RFP.

(c) If within the period of warranty, the item reported by the Buyer to have failed to perform as per the specifications, the Seller shall either replace or rectify the same free of charge, maximum **within 15 days** of notification of such defect received by the Seller. Warranty of the equipment would be extended by such duration. Record of the down time would be maintained by user in log book.

(d) Seller shall warrant that necessary service and repair back up during the warranty period of the equipment shall be provided by the Seller and he will ensure that the downtime is not more than three days of the warranty period.

(e) Seller shall associate technical personnel of Maintenance agency and Quality Assurance Agency of the Buyer during warranty repair and shall also provide the details of complete defects, reasons and remedial actions for defects.

(f) If the product fails frequently and the cumulative down time exceeds 50% of the warranty period, the complete equipment shall be replaced free of cost by the Seller within a stipulated period of 30 days of receipt of the notification from the Buyer. Warranty of the replaced equipment would start from the date of acceptance after Joint Receipt Inspection by the Buyer/date of installation and commissioning.

21. **Product Support**. The Seller shall provide product support in terms of maintenance activities, rectification of bugs/deficiencies and repairs free of cost during the warranty period. Post warranty period, support will be provided in form of an AMC which will be separately concluded on completion of Warranty period.

22. **Technical Documentation.** All necessary documentation (Technical and Operators manual) for operating the product has to be provided by the bidder.

23. **Price Variation (PV) Clause.** The techno commercial offer must be firm and valid at least 06 months from the date of opening of tender.

24. **Engineering Support Package (ESP)/ Annual Maintenance Contract (AMC).** After the specified warranty period, the Seller's technicians would be required to

repair and maintain the equipment during its life cycle under terms and conditions of an AMC. AMC may be concluded, as required from the date of completion of warranty phase of the system, for the maintenance and will be renewed subsequently if required. To enable this process, an appropriate Engineering Support Package (ESP) would be required to be provided by the SELLER. SELLER may recommend his Repair and Maintenance Philosophy in his technical proposal separately. The AMC will be given as a separate order post completion of the warranty period. The SELLER is required to provide itemized Spare Parts Price List along with itemized cost with part number/ pattern number, list of optional equipment, and the likely consumption rate of the spares based on the exploitation pattern of the equipment and experience of the SELLER. The SELLER has to clearly indicate suggested spares separately. The SELLER will have to provide the Lifetime Product Support in his Technical Proposal.

25. The firm is required to submit a 'Malicious Code Certificate' (only for Electronic items and Software) along with the Technical Proposal. The format is placed at **Appendix 'F'**.

PART V – EVALUATION CRITERIA & PRICE BID ISSUES

1. **Evaluation Criteria** - The broad guidelines for evaluation of Bids will be as follows:

(a) Only those Bids will be evaluated which are found to be fulfilling all the eligibility and qualifying requirements of the RFP, both technically and commercially.

(b) The Technical Bids forwarded by the Bidder will be evaluated by the Technical Evaluation Committee at WESEE with reference to the technical characteristics of the equipment as mentioned in the RFP. The compliance of Technical Bids would be determined on the basis of parameters specified in the RFP. The Price Bids of only those Bidders will be opened whose Technical Bids would qualify the Technical Evaluation.

(c) The Bidder is required to spell out the rates of taxes and duties in unambiguous terms. If there is a discrepancy between words and figures, the amount in words will prevail for calculation of price.

(d) The Lowest Bid will be decided upon the Lowest price quoted by the particular Bidder as per Price Format given at Para 2 below.

(f) The Lowest Acceptable Bid will be considered further for placement of Supply Order after complete clarification and price negotiations as decided by the Buyer.

2. **Price Bid Format**: The Price Bid Format is given below and Bidders are required to fill this up correctly with full details:-

(a) Basic cost of the items:

	Item	Unit price	Qty	Total
(ii)	A			
(iii)	B			
(iv)	C			
(v)	Total of Basic Price			

(b) Taxes / Duties / Overheads / Other costs

(c) **Grand Total**:

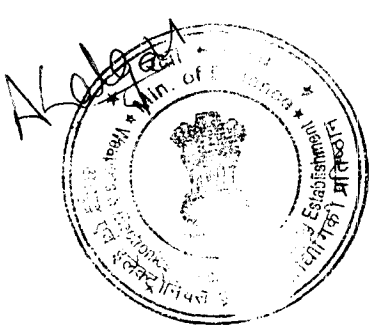
Note: Break up price should also be indicated.

3. **Validity of quote**. The prices should be firm and fixed and be valid for at least six months from date of opening of tender.

Appendices. As above

LIST OF APPENDICES

A	-	System Schematic of TFCS
B	-	Technical Requirements of Torpedo Tube Interface Box (TTIB)
C	-	Technical Requirements of Torpedo Fire Control Panel (TFCP)
D	-	Technical Requirements of Power Supply Conversion Unit (PSCU)
E	-	Compliance Matrix
F	-	Malicieuse Code Certificate



Appendix A

(Refers to Para 10(b) of Part II of WESEE letter No. SCS/192/TFCS/Procurement dated 02 Jul 18)

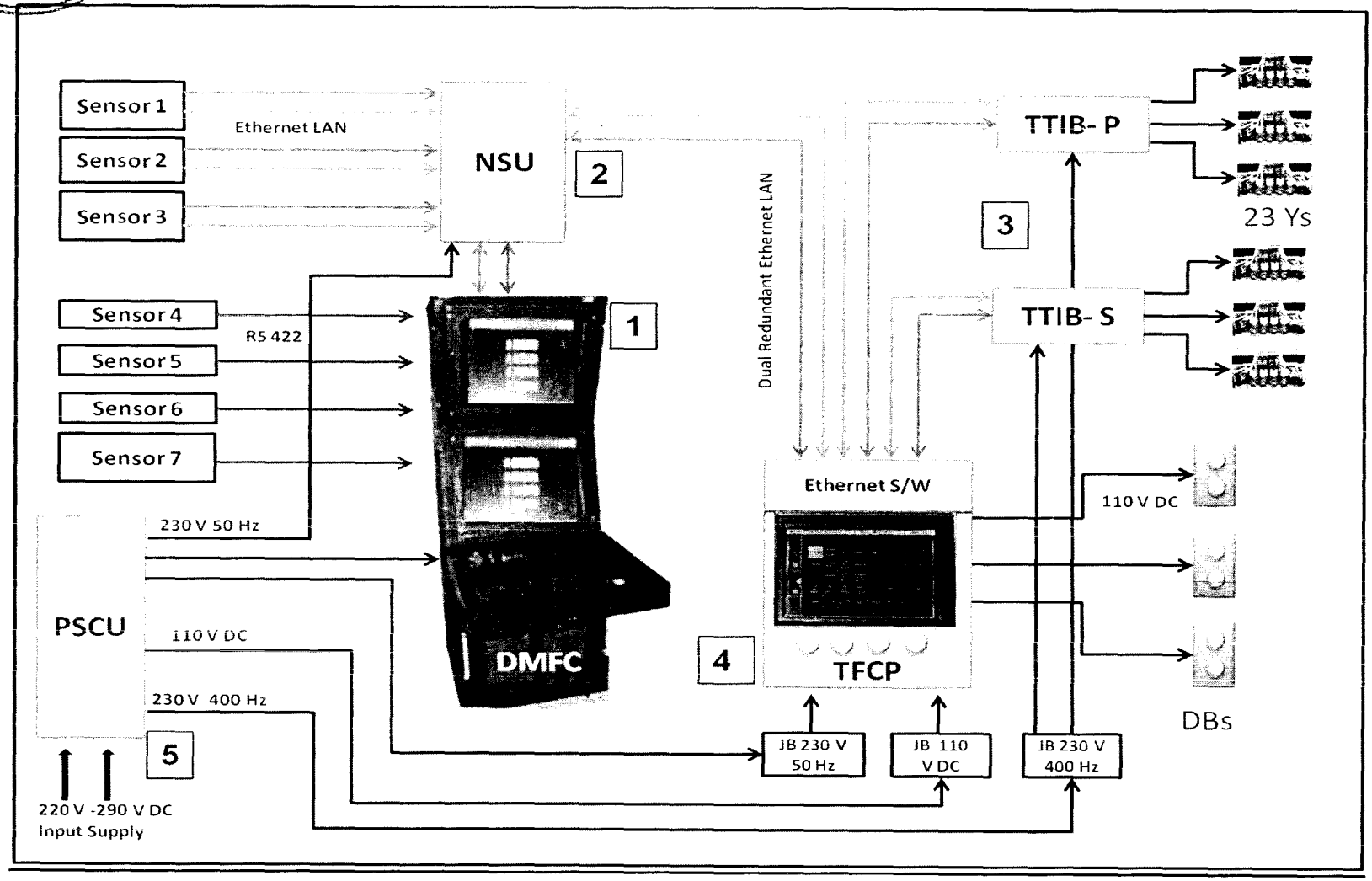


Figure. System Schematic of TFCS

Appendix B
(Refers to Para 10(e) of Part II of WESEE letter No. SCS/192/TFCS/Procurement dated 02 Jul 18)

TECHNICAL SPECIFICATIONS FOR TORPEDO-TUBE INTERFACE BOX (TTIB)

1. **Introduction**.

(a) TTIBs (Torpedo Tube Interface Box) are required to integrate Indigenous Torpedo Fire Control System (TFCS) with the Torpedo Tube (TT) actuators.

(b) 02 in numbers TTIBs will be integrated with 06 Torpedo Tubes through TT Actuators named Device 23-Y. The TTIB that will be used for handling Starboard side TTs (i.e. TT-1, TT-3 and TT-5) is designated as TTIB-S and that to be used for handling Port side TTs (i.e. TT-2, TT-4 and TT-6) is designated as TTIB-P. Interaction of TTIBs with other associated systems/ subsystems is shown in Figure 1.

(c) Both the TTIBs are similar in their hardware/ software composition.

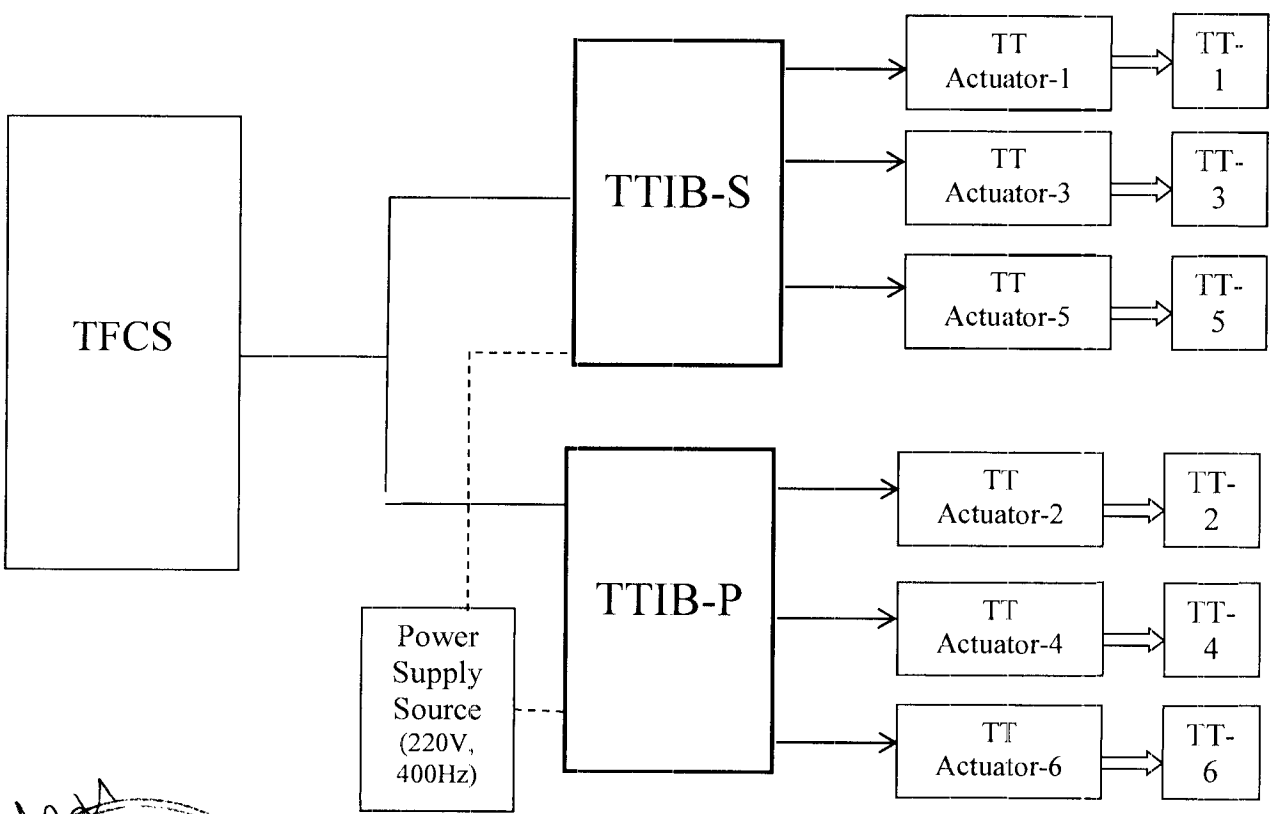


Figure 1. Interaction of TTIB-P and TTIB-S with associated systems

2. **Power Supply Requirement.** Input power supply for each of the TTIBs is 220V, 400 Hz. This would be used by TTIBs to generate the following supplies as given below:-

(a) 5V DC (25W) [for TTIB Card's internal requirement]
(b) 12V DC (25W) [for TTIB Card's internal requirement]
(c) 24V AC (50W) [for lamps]
(d) 24V DC (25W) [for motor speed control]
(e) Transformer Pri: 220V 400 Hz, Sec: 9-0-9 V (500mA) [for generating Clutch Control signals]
(f) 24V DC (2 A) [for RS422-Ethernet Converter]
(g) 5V DC (700 mA) [for Network Switch]
(h) 5V DC (1A) [for Display]

3. **Hardware Components of TTIBs.** Hardware components in TTIB-P and TTIB-S are similar. Cards and other components used in TTIB-x are described as follows:-

(a) **Tube Control Card**. There are 03 cards of this type inside each TTIB-x. This microcontroller based cards are responsible for controlling motor and clutch mechanism of its associated TT Actuator using relays based on the commands received from TFCS.

(b) **Signal Distribution Card**. There is 01 in No. Signal Distribution Card in each TTIB. This microcontroller based card receives commands from TFCS and distributes this information internally to all the Tube control cards. It is also responsible for generation of required Feedback message.

(c) **RS422-Ethernet Converter**. This component is used to convert Ethernet packets received from TFCS to Serial format on RS422 links to be used by TTIB's cards. Serial packets generated by Signal Distribution card of TTIB are also converted to Ethernet format by this component. Each TTIB consists of one of these converters.

(d) **Connectors.** Each TTIB will have the following connectors (includes Chassis mounted and its mating connectors):-

(i) 37 Pin Chasis mount MIL STD Circular Connectors - 06 Nos.
(ii) 37 Pin Cable mount MIL STD Circular Connectors - 06 Nos.
(iii) 14 Pin Chasis mount MIL STD Circular Connectors - 06 Nos.
(iv) 14 Pin Cable mount MIL STD Circular Connectors - 06 Nos.
(v) 14 Pin Chasis mount MIL STD Circular Connectors - 06 Nos.

(vi) 14 Pin Cable mount MIL STD Circular Connectors - 06 Nos.
(vii) 03 Pin Chasis mount MIL STD Circular Connectors - 02 Nos.
(viii) 03 Pin Cable mount MIL STD Circular Connectors - 02 Nos.

(e) **Display.** A rugged 7 inch LCD Display with a resolution of 800x480 and the corresponding Display Control Card (01 No).

(f) **Power Supply**. 220V, 400Hz would be provided to TTIB from external source. All the required supplies, as indicated at Para 2, would have to be generated and housed inside TTIBs.

(g) **Enclosure.** The enclosure should meet the Environmental specifications as mentioned in the Statement of Requirement.

4. **Functional Requirements**. TTIB is required to cater for the following functionalities:-

(a) **Receive Firing Solution from TFCS**. Each TTIB will receive Firing solution generated by TFCS in the form of UDP multicast packets. Relevant TTIB (TTIB-P or TTIB-S for which the Firing solution is intended) is required to extract information about the fire control parameters (ω, $\lambda 1$, $\lambda 2$ and eT) from the received data packets.

(b) **Read Present Parameters Values (dial angles)**. Each TTIB is required to read the current values of all the four dials of all the 03 assigned TTs. These angles are obtained from shaft encoders (KPBKs) that are fitted inside Device 23-У. TTIB-x is required to decode these Gray-Barker codes for getting the current values of the Torpedo parameters. Each Tube Card fitted inside a TTIB, reads the current values of parameters set inside the TT after every 10 millisecond.

(c) **Set Firing Parameters Values.** TTIB-x is required to set the four dials in the relevant Device 23-У to desired values. To perform this operation, TTIB-x should be able to control the speed of the motor inside Device 23-Y and should be able to control direction of rotation of the attached spindles by engagement/ dis-engagement of relevant clutches inside the Device 23У.

5. **Modes of Operation.** TTIB is required to support two modes of operation, viz. Normal Mode and Diagnostic Mode. Selection between these mutually exclusive modes of operation will be performed using a switch. The two modes are described as follows:-

(a) **Normal Mode**. This is the default mode of operation in which TTIB waits for receiving commands from TFCS on Ethernet interface and accordingly, controls the corresponding TT Actuator.

(b) **Diagnostic Mode**. In this mode of operation, TTIB locally generates predefined values and forwards them to corresponding Tube Control Cards for operating the TT Actuator.

6. **Input-Output Requirement of TTIB.** Various signals/ data packets transacted between TTIBs, FCS and TT Actuators (Device 23Y) are shown in Figure 2. Input and output requirements of TTIBs are given as follows:-

(a) Input to TTIB

(i) Power Supply : 220V, 400Hz

(ii) Firing Data (from TFCS to TTIBs):
Interface Type : Ethernet
Periodicity : Periodic with a periodicity of 1Hz when the packet contains 'Feed Data'. 'Confirm Data' and 'Reset Command' are aperiodic messages.

Byte No	Field	Values	Remarks
1.	Start of Message	0x5A	Fixed Value
2.	Message Type	0x30	Fixed Value
3.	Message Length	0x0D	Length of Msg Body (13 Bytes) from Byte No 4 to Byte No 16
4.	TNo	1 to 6	
5.	Omega (Sign Value)	0x00 – Sign Value (+1) 0x01 – Sign Value (-1)	Omega (Deg) = Sign Value* (Decimal Value + (After Decimal Value*0.01)) Range = -180 to 180 deg
6.	Omega (Before Decimal Value)	0 to 180	
7.	Omega (After Decimal Value)	0 to 99	
8.	Lambda 1 (Sign Value)	0x00 – Sign Value (+1) 0x01 – Sign Value (-1)	Lambda 1 (Deg) = Sign Value* (Decimal Value + (After Decimal Value*0.01)) Range = -90 to 90 deg
9.	Lambda 1 (Before Decimal Value)	0 to 90	
10.	Lambda 1 (After Decimal Value)	0 to 99	

Byte No	Field	Values	Remarks
11.	Lambda 2(Sign Value)	0x00 – Sign Value (+1) 0x01 – Sign Value (-1)	Lambda 2 (Deg) = Sign Value* (Decimal Value + (After Decimal Value*0.01)) Range = -180 to 180 deg
12.	Lambda 2 (Before Decimal Value)	0 to 180	
13.	Lambda 2 (After Decimal Value)	0 to 99	
14.	eT (Before Decimal Value)	0 to 30	eT (Km) = (Before Decimal Value + (After Decimal Value*0.01)) Range = 0.5 to 30Km
15.	eT (After Decimal Value)	0 to 99	
16.	Packet Category	0x00: Feed Data 0x22: Confirm Data 0x11: Reset Command	For Reset Command the following values should be transmitted by TFCS:- $C\omega = \lambda 1 = \lambda 1 = 0$, $e_T = 0.5$ Km
17.	End of Message	0xFF	

(iii) Feedback signals from Dev 23-Y

Feedback signals from Device 23-Y are fed to TTIB. These signals are encoded in Gray-Barker code. Gray-Barker code uses both Gray and Barker code. Information on 19 lines (representing 19 bits in Gray-Barker code) is received from Device 23Y. Bit 1 to bit 7 are in Gray code. Decoding of Gray code is as per the following relation:-

$$X_n = Y_n \wedge X_{n+1}$$

Where X: Value In binary code.
Y: Value In Grey code.
n:digit place.
^: Xor Operator

Bit 8 to Bit 19 uses Barker code. This 12 bit Barker code contains both +ve and –ve components and thus actually represents a 6 bit binary value. Decoding of Barker code is as per the following relation:-

$$X_n = X_{n-1} . Y_n^{-ve} + X_{n-}$$

Where X: Value In binary code.

Y: Value In Barker code.
N: digit place.
. : AND operator
+: OR Operator

(b) Output from TTIB to Device 23-Y

(i) Motor power supply (220V, 400 Hz): Power supply to Motor inside 23-Y is provided by TTIB.

(ii) Motor Speed Relay supply (24V, DC): Each Device 23Y contains a pair of relays (P1 and P2) that can be operated with 24V DC. Using these relays speed of the motor can be controlled as given below:-

P1	P2	SPEED
OFF	OFF	0
ON	OFF	Low
OFF	ON	Medium
ON	ON	High

(iii) Power supply for KPBK (5V, DC)

(iv) Clutch Supply (14V Peak, Half-Rectified (unfiltered) signals)
Two half wave-rectified (unfiltered) signals (each of 14V Peak) on two lines (The signals are 180 deg out of phase) are generated from 220V 400Hz signal. Each Device 23-Y has 04 pairs of EM clutches. Each pair is used to control rotation of a shaft inside Device 23-Y in Clockwise/ Anticlockwise direction. The shaft is mechanically coupled to the TT and is used to transfer angular values to a Torpedo inside the TT. Engagement and disengagement of clutches are to be controlled electrically so as to transfer the correct value to the TT.

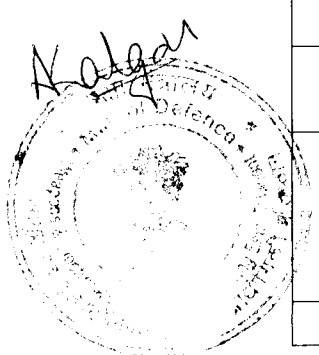
(v) TTIB-P Status Message (from TTIB-P to FCS) :

Interface Type : Ethernet
Periodicity : Periodic with a periodicity of 0.5 Hz.

Byte No	Field	Values	Remarks
1.	Start of Message	0x5A	Fixed Value
2.	Message Type	0x32	Fixed Value
3.	Message Length	0x21	Length of Msg Body (33 Bytes) from Byte No 4 to Byte No 36

Byte No	Field	Values	Remarks
4.	TT2-> Omega (Sign Value)	0x00 – Sign Value (+1) 0x01 – Sign Value (-1)	Omega (Deg) = Sign Value* (Decimal Value + (After Decimal Value*0.01)) Range = -180 to 180 deg
5.	TT2-> Omega (Before Decimal Value)	0 to 180	
6.	TT2-> Omega (After Decimal Value)	0 to 99	
7.	TT2-> Lambda 1 (Sign Value)	0x00 – Sign Value (+1) 0x01 – Sign Value (-1)	Lambda 1 (Deg) = Sign Value* (Decimal Value + (After Decimal Value*0.01)) Range = -90 to 90 deg
8.	TT2-> Lambda 1 (Before Decimal Value)	0 to 90	
9.	TT2-> Lambda 1 (After Decimal Value)	0 to 99	
10.	TT2-> Lambda 2(Sign Value)	0x00 – Sign Value (+1) 0x01 – Sign Value (-1)	Lambda 2 (Deg) = Sign Value* (Decimal Value + (After Decimal Value*0.01)) Range = -180 to 180 deg
11.	TT2-> Lambda 2 (Before Decimal Value)	0 to 180	
12.	TT2-> Lambda 2 (After Decimal Value)	0 to 99	
13.	TT2-> eT (Before Decimal Value)	0 to 30	eT (Km) = (Before Decimal Value + (After Decimal Value*0.01)) Range = 0.5 to 30Km
14.	TT2-> eT (After Decimal Value)	0 to 99	
15.	TT4-> Omega (Sign Value)	0x00 – Sign Value (+1) 0x01 – Sign Value (-1)	Omega (Deg) = Sign Value* (Decimal Value + (After Decimal Value*0.01)) Range = -180 to 180 deg
16.	TT4-> Omega (Before Decimal Value)	0 to 180	

Byte No	Field	Values	Remarks
17.	TT4-> Omega (After Decimal Value)	0 to 99	
18.	TT4-> Lambda 1 (Sign Value)	0x00 – Sign Value (+1) 0x01 – Sign Value (-1)	Lambda 1 (Deg) = Sign Value* (Decimal Value + (After Decimal Value*0.01)) Range = -90 to 90 deg
19.	TT4-> Lambda 1 (Before Decimal Value)	0 to 90	
20.	TT4-> Lambda 1 (After Decimal Value)	0 to 99	
21.	TT4-> Lambda 2(Sign Value)	0x00 – Sign Value (+1) 0x01 – Sign Value (-1)	Lambda 2 (Deg) = Sign Value* (Decimal Value + (After Decimal Value*0.01)) Range = -180 to 180 deg.
22.	TT4-> Lambda 2 (Before Decimal Value)	0 to 180	
23.	TT4-> Lambda 2 (After Decimal Value)	0 to 99	
24.	TT4-> eT (Before Decimal Value)	0 to 30	eT (Km) = (Before Decimal Value + (After Decimal Value*0.01)) Range = 0.5 to 30Km
25.	TT4-> eT (After Decimal Value)	0 to 99	
26.	TT6-> Omega (Sign Value)	0x00 – Sign Value (+1) 0x01 – Sign Value (-1)	Omega (Deg) = Sign Value* (Decimal Value + (After Decimal Value*0.01)) Range = -180 to 180 deg
27.	TT6-> Omega (Before Decimal Value)	0 to 180	
28.	TT6-> Omega (After Decimal Value)	0 to 99	
29.	TT6-> Lambda 1 (Sign Value)	0x00 – Sign Value (+1) 0x01 – Sign Value (-1)	Lambda 1 (Deg) = Sign Value* (Decimal Value + (After Decimal Value*0.01))
30.	TT6-> Lambda 1	0 to 90	



Byte No	Field	Values	Remarks
	(Before Decimal Value)		Range = -90 to 90 deg
31.	TT6-> Lambda 1 (After Decimal Value)	0 to 99	
32.	TT6-> Lambda 2(Sign Value)	0x00 – Sign Value (+1) 0x01 – Sign Value (-1)	Lambda 2 (Deg) = Sign Value* (Decimal Value + (After Decimal Value*0.01)) Range = -180 to 180 deg
33.	TT6-> Lambda 2 (Before Decimal Value)	0 to 180	
34.	TT6-> Lambda 2 (After Decimal Value)	0 to 99	
35.	TT6-> eT (Before Decimal Value)	0 to 30	eT (Km) = (Before Decimal Value + (After Decimal Value*0.01)) Range = 0.5 to 30Km
36.	TT6-> eT (After Decimal Value)	0 to 99	
37.	End of Message	0xFF	

(vi) TTIB-S Status Message (TTIB-S to FCS):

Interface Type : Ethernet

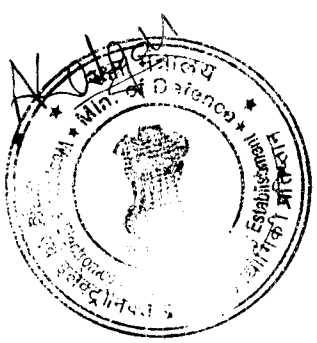
Periodicity : Periodic with a periodicity of 0.5 Hz.

UDP Multicast IP Address	TBD
UDP Port	TBD

Byte No	Field	Values	Remarks
1.	Start of Message	0x5A	Fixed Value
2.	Message Type	0x34	Fixed Value
3.	Message Length	0x21	Length of Msg Body (33 Bytes) from Byte No 4 to Byte No 36
4.	TT1-> Omega (Sign Value)	0x00 – Sign Value (+1) 0x01 – Sign Value (-1)	Omega (Deg) = Sign Value* (Decimal Value + (After Decimal Value*0.01)) Range = -180 to 180
5.	TT1-> Omega (Before Decimal Value)	0 to 180	

6.	TT1-> Omega (After Decimal Value)	0 to 99	deg
7.	TT1-> Lambda 1 (Sign Value)	0x00 – Sign Value (+1) 0x01 – Sign Value (-1)	Lambda 1 (Deg) = Sign Value* (Decimal Value + (After Decimal Value*0.01)) Range = -90 to 90 deg
8.	TT1-> Lambda 1 (Before Decimal Value)	0 to 90	
9.	TT1-> Lambda 1 (After Decimal Value)	0 to 99	
10.	TT1-> Lambda 2(Sign Value)	0x00 – Sign Value (+1) 0x01 – Sign Value (-1)	Lambda 2 (Deg) = Sign Value* (Decimal Value + (After Decimal Value*0.01)) Range = -180 to 180 deg
11.	TT1-> Lambda 2 (Before Decimal Value)	0 to 180	
12.	TT1-> Lambda 2 (After Decimal Value)	0 to 99	
13.	TT1-> eT (Before Decimal Value)	0 to 30	eT (Km) = (Before Decimal Value + (After Decimal Value*0.01)) Range = 0.5 to 30Km
14.	TT1-> eT (After Decimal Value)	0 to 99	
15.	TT3-> Omega (Sign Value)	0x00 – Sign Value (+1) 0x01 – Sign Value (-1)	Omega (Deg) = Sign Value* (Decimal Value + (After Decimal Value*0.01)) Range = -180 to 180 deg
16.	TT3-> Omega (Before Decimal Value)	0 to 180	
17.	TT3-> Omega (After Decimal Value)	0 to 99	
18.	TT3-> Lambda 1 (Sign Value)	0x00 – Sign Value (+1) 0x01 – Sign Value (-1)	Lambda 1 (Deg) = Sign Value* (Decimal Value + (After Decimal Value*0.01)) Range = -90 to 90 deg
19.	TT3-> Lambda 1 (Before Decimal Value)	0 to 90	
20.	TT3-> Lambda 1 (After Decimal Value)	0 to 99	
21.	TT3-> Lambda 2(Sign Value)	0x00 – Sign Value (+1) 0x01 – Sign Value (-1)	Lambda 2 (Deg) = Sign Value* (Decimal Value + (After Decimal Value*0.01))

22.	TT3-> Lambda 2 (Before Decimal Value)	0 to 180	Range = -180 to 180 deg.
23.	TT3-> Lambda 2 (After Decimal Value)	0 to 99	
24.	TT3-> eT (Before Decimal Value)	0 to 30	eT (Km) = (Before Decimal Value + (After Decimal Value*0.01)) Range = 0.5 to 30Km
25.	TT3-> eT (After Decimal Value)	0 to 99	
26.	TT5-> Omega (Sign Value)	0x00 – Sign Value (+1) 0x01 – Sign Value (-1)	Omega (Deg) = Sign Value* (Decimal Value + (After Decimal Value*0.01)) Range = -180 to 180 deg
27.	TT5-> Omega (Before Decimal Value)	0 to 180	
28.	TT5-> Omega (After Decimal Value)	0 to 99	
29.	TT5-> Lambda 1 (Sign Value)	0x00 – Sign Value (+1) 0x01 – Sign Value (-1)	Lambda 1 (Deg) = Sign Value* (Decimal Value + (After Decimal Value*0.01)) Range = -90 to 90 deg
30.	TT5-> Lambda 1 (Before Decimal Value)	0 to 90	
31.	TT5-> Lambda 1 (After Decimal Value)	0 to 99	
32.	TT5-> Lambda 2(Sign Value)	0x00 – Sign Value (+1) 0x01 – Sign Value (-1)	Lambda 2 (Deg) = Sign Value* (Decimal Value + (After Decimal Value*0.01)) Range = -180 to 180 deg
33.	TT5-> Lambda 2 (Before Decimal Value)	0 to 180	
34.	TT5-> Lambda 2 (After Decimal Value)	0 to 99	
35.	TT5-> eT (Before Decimal Value)	0 to 30	eT (Km) = (Before Decimal Value + (After Decimal Value*0.01)) Range = 0.5 to 30Km
36.	TT5-> eT (After Decimal Value)	0 to 99	



7. **Embedded Software.** Embedded software for programmable devices in Tube Cards and Signal Distribution Cards would be developed by WESEE. These software would be ported onto these cards during Lab trials of TTIB at WESEE.

8. **Indicative External Housing.** A preliminary external housing drawing of TTIB-P (or TTIB-S) is shown in Figure 2. Overall dimension of TTIB-P (or TTIB-S) must not exceed 560 x 400 x 300 mm. The vendor is required to make draft Engineering Drawings and submit the same to WESEE for approval.

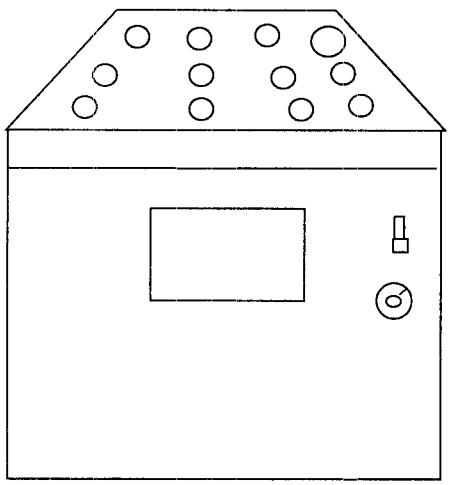


Figure 2a. Indicative drawing of TTIB-P (or TTIB-S) [External View]

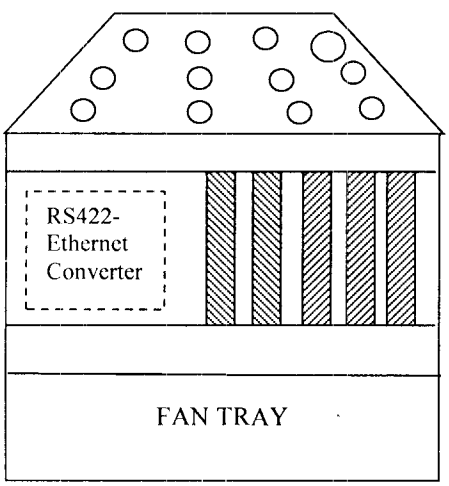


Figure 2b. Indicative drawing of TTIB-P (or TTIB-S) [Open Door View]

9. Details of build to print design in pdf/ Gerber format would be shared with the Supplier post placement of Supply Order. Bill of Material of TTIBs (i.e. 01 TTIB-P + 01 TTIB-S) is placed at Annexure-I. Schematic Diagrams of Tube Card and Signal Distribution Card are placed at Annexure-II.

Annexure - I

TTIB Bill of Material

SNO	Item Name	Specs/ Part No.	Qty
TUBE CARD (6 NOS) for TTIB-P and TTIB-S			
1	Capacitor	0.1uF	24
2	Capacitor	33pF	24
3	Capacitor	10uF	12
4	Diode	1N4007	48
5	Diode	1N5408	12
6	Euro Connector pair (M/F)	EURO-64	6
7	Resistance pot 200E	POT 201	48
8	Leone Relay	LT2S-12VDC-T	48
9	O/E/N Relay	46-05-2CE	6
10	Transformer (500mA)	9-0-9	6
11	Transformer (1A)	9-0-9	6
12	Resistance Sip	10K	24
13	Resistance	10K	42
14	Resistance Sip (5 Pin)	10K	6
15	Resistance pot 10K	POT 103	18
16	Resistance pot 200E	POT 201	48
17	Resistance Sip (5 Pin)	4.7K	6
18	Op-amp	LM324N	36
19	Microcontroller_ Dallas	DS89C450_MC	12
20	RS422 to TTL IC vice versa	LT1791	6
21	Driver IC	ULN2804A	12
22	Mux/Demux IC	4052	6
23	Crystal Oscillator	22.1184	12
SIGNAL DISTRIBUTION CARD (2 NOS)			
SNO	Item Name	Specs/ Part No.	Qty
24	Euro Connector pair (M/F)	EURO-64	2
25	RS422 to TTL IC	AM26LS32	2
26	Crystal Oscillator	22.1184	2
27	Mux/Demux IC	4051	2
28	Buffer IC	74HCT244	2
29	TTL to RS422 IC	AM26LS31	4
30	Microcontroller_ Dallas	DS89C450_MC	2
31	Resistance	10K	2
32	Resistance	5k	6
33	Capacitor	10uF	2
34	Capacitor	33pF	4
35	Capacitor	0.1uF	6

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TTIB ENCLOSURES (2 NOS)			
SNO	**Item Name**	**Specs/ Part No.**	**Qty**
36	Power Supply (5V 7A, 12V 2A)	LDC-60F-1	2
37	MS3102R-28-21P (37-Pin, Chasis Mount)		6
38	MS3106F-28-21S (37-Pin, Cable Mount)		6
39	MS3102R-20-27P (14-Pin, Chasis Mount)		6
40	MS3106F-20-27S (14-Pin, Cable Mount)		6
41	MS3102R-20-27S (14-Pin, Chasis Mount)		6
42	MS3106F-20-27P (14-Pin, Cable Mount)		6
43	Ethernet/Serial Convertor		2
44	Transformer (5A)	12-0-12	2
45	3 pin MS Connector Chasis M		2
46	3 pin MS Connector Cable F		2
47	RJFTV-2PEM-1-N		2
48	RJFTV-6M-N		2
49	Fan	AC, 220V	4
50	Fan Net		4
51	Fan Sponge		4
52	ON/OFF Switch (make : Gillardz)	20 Amp	2
53	Power Chord	16 Amp	2
54	Box (Size:560x365x350mm)		2
55	Rotary Sw - 3 way		2
56	Led		2
57	Led Holder		2
58	FUSE	15 Amp	2
59	FUSE Holder	15 Amp	2

Appendix C
(Refers to Para 10(f) of Part II of WESEE letter No. SCS/192/TFCS/Procurement dated 02 Jul 18)

TECHNICAL REQUIREMENTS FOR TORPEDO FIRE COeNTROL PANEL (TFCP)

1. **Introduction**. The Torpedo Fire Control System would comprise of the following five units and accessories:-

(a) One Dual Monitor Multi-Function Console (DMFC)

(b) One Network Switching Unit (NSU)

(c) Two Torpedo Tube Interface Boxes (TTIB)

(d) One Torpedo Fire Control Panel (TFCP)

(e) One Power Supply Conversion Unit (PSCU)

2 **Configuration of Torpedo Fire Control Panel**. The TFCP will broadly consist of the following:-

Sl. No.	Item	Technical Description	Qty
(a)	Rugged Touch screen Panel PC	Size : Minimum 12 " (4:3) Resolution : 1280 X 800 Processor : Intel® Core i5/i7, 2.6 GHz or more Output : DVI/VGA, HDMI Type : TFT LCD/ LED LAN Port : 02 Serial Pot :01 (RS232/ RS 422)	01
(b)	Ethernet Switch	Fully managed Layer 2/ 08 port Ethernet switch with 10/100/1000 BaseT IPv6 switching/routing. Switches will not be connected to each other.	02
(c)	Microcontrollers	Micro controllers to control relays for routing of 110 V DC supply	02
(d)	Relays	MIL Grade software controlled relays and contacts. Voltage : 110-220 V DC Current : 1- 10 Amps	01 Set

Sl. No.	Item	Technical Description	Qty
(e)	Audio Visual Alarm	Microcontroller controlled audio and visual alarm Independent control of Audio alarm and Visual Alarm	01
(f)	Manual Interlock Switches	MIL grade hard interlock switches in form of Toggle Switches	06

3. **Power Supply Requirement**. The TFCP will receive two Power supplies from Power Supply Conversion Unit(PSCU) as mentioned below:-

(a) **230V, 1 Phase, 50Hz**. This supply is required for operation of the Control Panel.

(b) **110 V DC**. This supply is required energizing solenoids of an external system. The supply will be received by TFCP from the PSCU and will be passed on to the selected solenoid, depending on the commands received from the DMFC. Only one solenoid will be required to be energised at a time and will require approximately 6-8 Amps for its operation.

4. **Functional Requirements**. The TFCP is required to cater to the following functional requirements: -

(a) Receive system commands from DMFC on Ethernet and provide Operator the function to Acknowledge the commands.

(b) Display the received system commands on the Display of Control Panel.

(c) Operate Audio and Visual Alarm on Control Panel receipt of specific system commands from DMFC.

(d) Provide Operator the function to send the status message w.r.t. system commands to DMFC on Ethernet.

(e) Provide Operator the function to Acknowledge the commands received from DMFC, and Switch OFF the Audio Alarm once the Operator Acknowledges the command.

(f) Route110V DC supply for Light Indication on the external Distribution Board(DB) and to the selected solenoids through the DBs on receipt of commands from Operator/DMFC.

(g) Provision to Remove 110 V DC Supply and reset Interlock Switches from the 110 V DC Supply line of the selected solenoid on receipt of command from DMFC.

(h) Provide provision to institute multiple interlocks in the 110 V DC supply line which shall operate on receipt of system commands from Operator on TFCP/DMFC.

(i) Provide six hard interlock switches in form of Toggle Switches on Control Panel (one each for six 110 V DC supply lines of six solenoids).

5. **Front Panel Indications/ Switches**. The following front panel indications and switches will be provided to facilitate operation of TFCP:-

(a) TFCP Switching ON/OFF Switch.

(b) LEDs indicating availability of input supplies.

(c) LEDs indicating TFCP state (ON/OFF).

(d) Touch screen panel for indicating commands received from DMFC, Acknowledging of commands and entering of Status by Operator.

(e) Six hard Toggle Switches with cover for providing Manual Interlocks in six 110 V DC Supply lines.

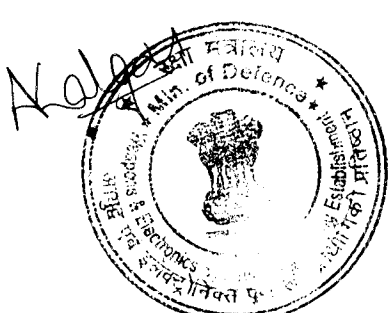
(f) Audio and Visual Alarm Test Switch.

(g) Audio and Visual Alarm Reset Switch.

6. **Inputs to Control Panel from DMFC**. The TFCP will receive system specific commands from DMFC on dual redundant Ethernet LAN which will be displayed on the touch screen panel of the TFCP. The TFCP on receipt of such commands from DMFC will thereafter activate(depending upon internal interlocks) 110V DC supply to the designated solenoid of the external system.

7. **Outputs from Torpedo Fire Control Panel**. The TFCP will have following outputs:-

(a) The TFCP will send the status of system commands (as manually fed by the operator) to DMFC on Ethernet LAN.



(b) The TFCP will also route 110V DC supply for Light Indication on the external Distribution Board(DB) and to the selected solenoid through the DBs on receipt of commands from Operator/DMFC. The TFCP will be connected to the Six solenoids through three external Distribution Boards (DBs). Each DB caters to two solenoids and has two light indications, one for each of the two solenoids connected through that particular DB. A representational circuit diagram for routing of 110 V DC supply for two solenoids is placed at Fig 1 below:-

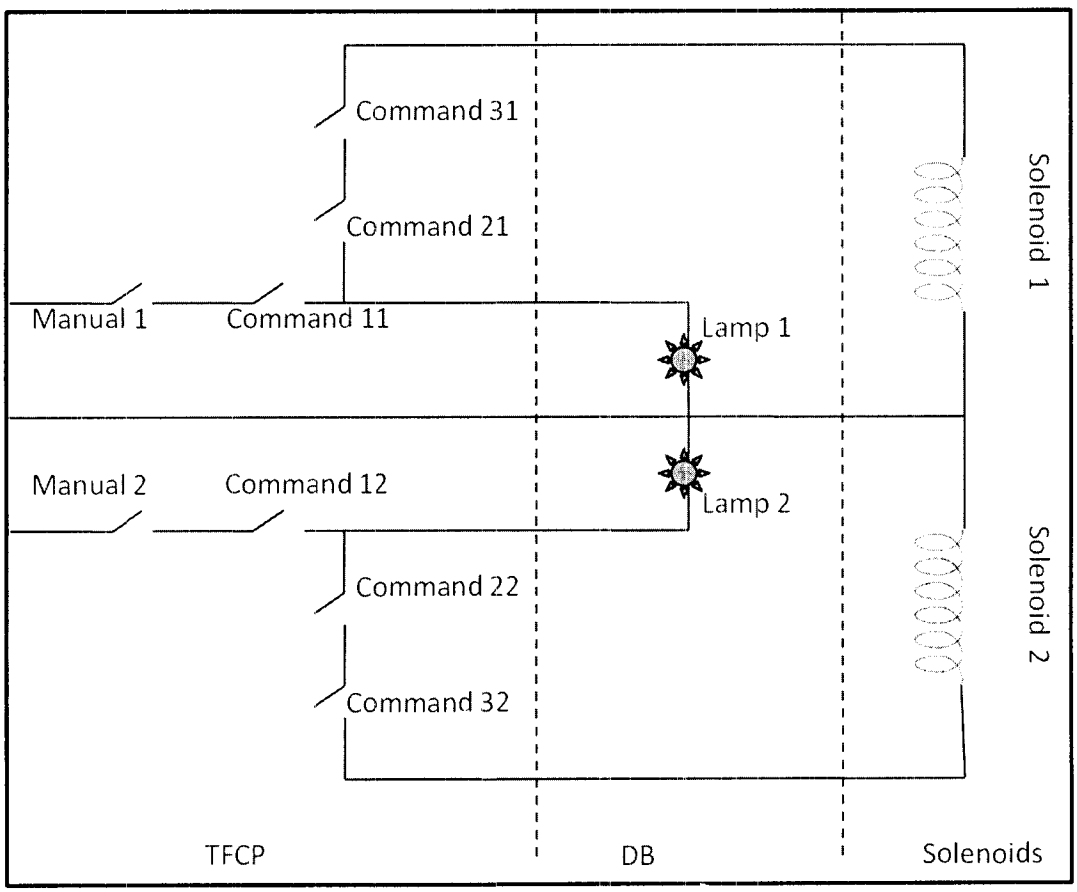


Figure 1. Routing of 110 V DC Supply from TFCP

7. **Design Criterion**. Size, weight, power, heat dissipation and cable laying are some of the constraints which are often encountered onboard naval platforms. TFCP design should evolve under the above constraints. **The overall dimensions of the TFCP unit should not exceed 55X43X22 (Height X Width X Depth in cms).** Control Panel will provide adequate maintenance envelope for repair and replacement of various cards. To remove the local hot spots in the cabinet, proper cooling mechanism is to be installed. The following design factors will be considered while implementing the solution:-

(a) Design of cabinets/units and placement of connectors should be such that operation and maintenance onboard is not cumbersome. Sufficient access should be provided for replacement of defective modules/ cards.

(b) The proposed system should be rugged and capable of maintaining full data flow, even under shock and vibrations of ship-borne conditions. The unit will All power supply modules/ units in the TFCP should be ruggedized.

(c) The chassis should be made of metallic material suitable for marine environment with sufficient corrosion resistance.
be of convenient form factor to allow passage through doors and hatches. The unit will be bulkhead mounted with suitable shock mounts.

(d) TFCP should conform to existing EMI/EMC norms as also specified for the overall Indigenous TFCS system.

8. The representational block diagram of the TFCP is shown at Fig 2 below:-

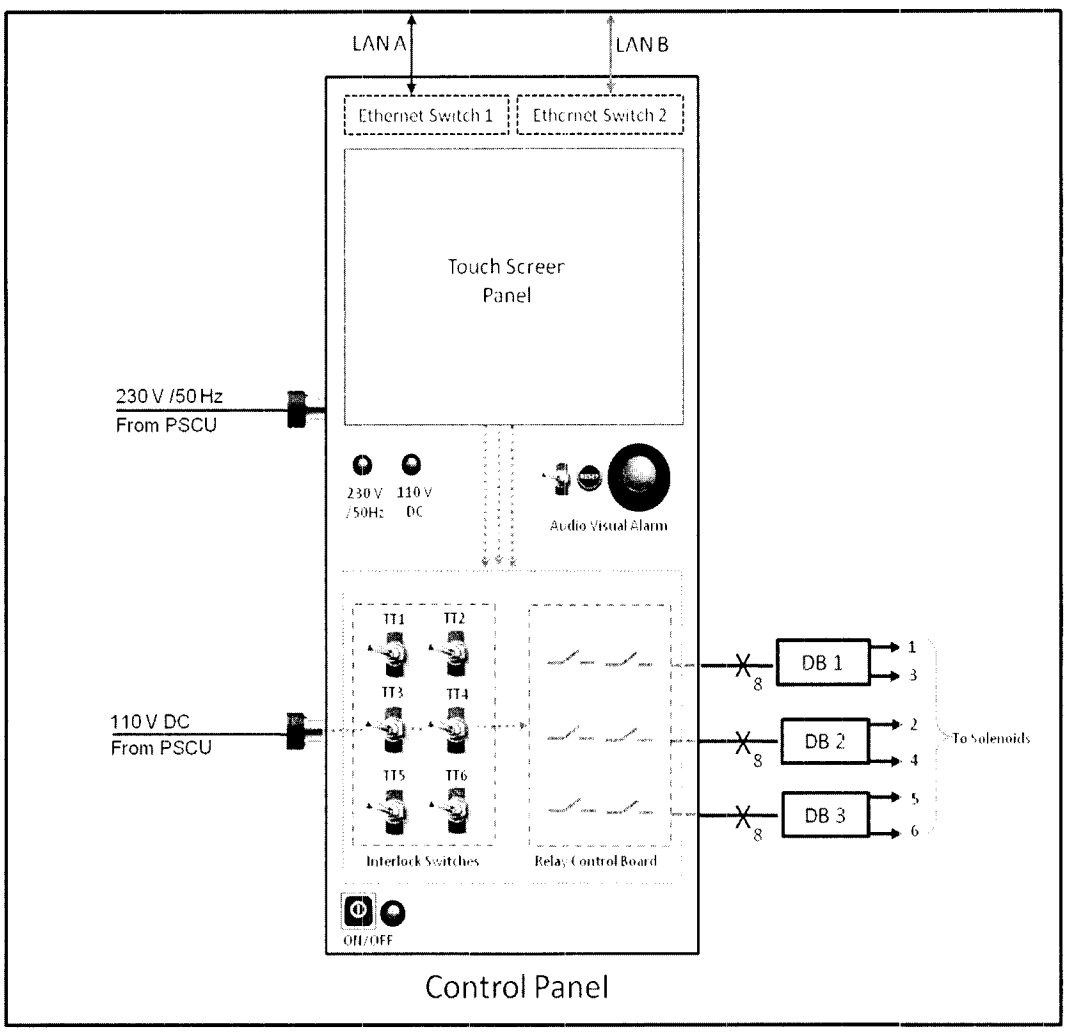


Figure 2. Block Diagram of TFCP

Appendix D
(Refers to Para 10(g) of Part II of WESEE letter No. SCS/192/TFCS/Procurement dated 02 Jul 18)

TECHNICAL REQUIREMENTS FOR POWER SUPPLY CONVERSION UNIT

1. **Introduction**. The Torpedo Fire Control System would comprise of the following five units and accessories:-

   (a) One Dual Monitor Multi-Function Console (DMFC)

   (b) One Network Switching Unit (NSU)

   (c) Two Torpedo Tube Interface Boxes (TTIB)

   (d) One Torpedo Fire Control Panel (TFCP)

   (e) One Power Supply Conversion Unit (PSCU)

The present document lays down the requirements of the Power Supply Conversion Unit(PSCU) which would cater for the Power Supply Requirements of all the units of the system.

2. **Input to PSCU**. The PSCU will receive main and standby input supply of 220-290 V DC from the platforms main supply network. The PSCU should have an internal Auto Change Over Switch(ACOS) to switch between the two input supplies depending upon the availability.

3. **Output from PSCU**. The PSCU will be required to convert the input supply into the under-mentioned outputs for consumption by various units of the system:-

Ser	Output Supply	Total Power Required	No. of Outputs Required	For Unit
(a)	230V,50Hz Single Phase	2 KVA	04 outputs with Individual breakers	DMFC, NSU&TFCP
(b)	230V,400Hz Single Phase	2.5 KVA	01 Output with individual breaker	TTIB(P) &TTIB(S)
(c)	110V DC	2 KVA	01 Output with individual breaker	TFCP

4. The approximate power requirements for each output supply are mentioned in the table above. However, the PSCU should be designed to cater for 1.5 times the

maximum load requirements of the units of TFCS. The PSCU should be designed so as to have efficiency of not less than 85 percent.

5. **Protection and Power Quality**. The PSCU should have inbuilt protection against Short Circuit, DC Overload, AC Overload, Over Temperature and Output Overload. The PSCU should meet the following power quality requirernents:-

(a) Voltage (Steady State) - Rated Voltage $\pm$ 1%

(b) Frequency:-

(i)	Nominal Frequency	-	50 Hz and 400 Hz as specified.
(ii)	Constant Load Tolerance	-	$\pm$ 1% of rated frequency
(iii)	Load Range Tolerance	-	$\pm$ 2% of rated frequency
(iv)	Transient	-	$\pm$ 2.5% of rated frequency
(v)	Modulation	-	$\pm$ 0.25% of rated frequency

6. **Front Panel Indications/ Switches**. The following front panel indications and switches will be provided to facilitate operation of PSCU:-

(a) PSCU ON/OFF Switch.

(b) LEDs indicating availability of input supplies.

(c) LED indicating availability of Output Supplies.

(d) Voltage and Ampere meters for Input and Output supplies

(e) Breakers for Input and Output Supply

7. **Design Criterion**. Size, weight, power, heat dissipation and cable laying are some of the constraints which are often encountered onboard naval platforms. PSCU design will evolve under the above constraints. The overall dimensions of the PSCU should not exceed 160X40X40 (Height X Width X Depth in cms). PSCU should provide adequate maintenance envelope for repair and replacement of various cards. To remove the local hot spots in the cabinet, proper cooling mechanism is to be installed. The following design factors will be considered while implementing the solution:-

(a) Design of cabinets/units and placement of connectors should be such that operation and maintenance onboard is not cumbersome. Sufficient access should be provided for replacement of defective modules/ cards.

(b) The PSCU should be rugged and capable of functioning, even under shock and vibrations of ship-borne conditions. The unit will be of convenient form factor to allow passage through doors and hatches. The unit will be mounted on deck with suitable shock mounts.

(c) All power supply modules/ units in the PSCU should be ruggedized.

(d) The chassis will be made of metallic material suitable for marine environment with sufficient corrosion resistance.

(e) PSCU will conform to the Environmental conditions and EMI/EMC norms as specified for the overall Indigenous TFCS system.

8. The representational block diagram of the PSCU is shown in Fig 1 below:-

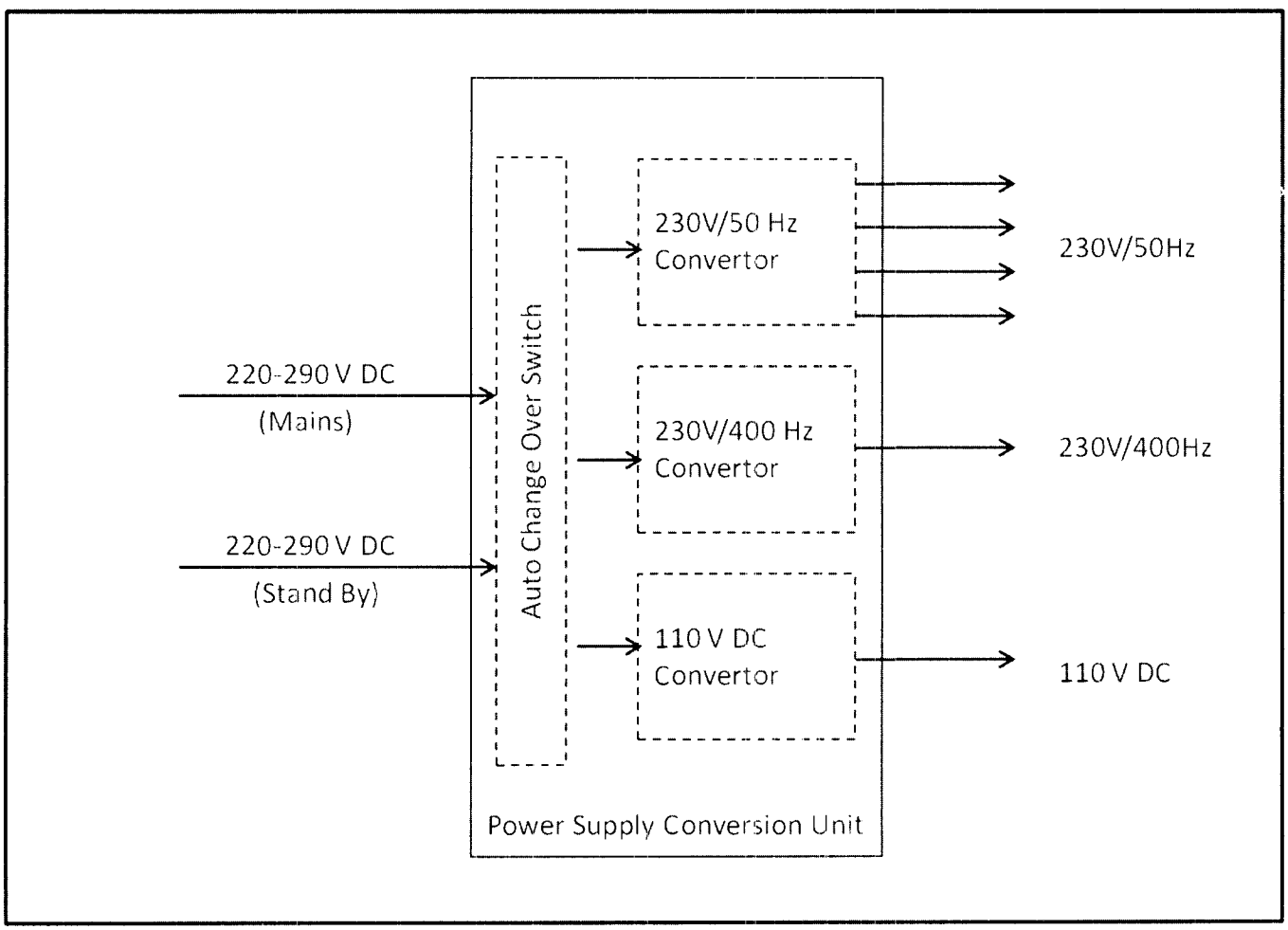


Figure 1. Schematic of Power Supply Conversion Unit (PSCU)

Appendix 'E'
(Refer to Para 16 at Part II of WESEE letter No. SCS/192/TFCS/Procurement dated 02 Jul 18)

COMPLIANCE TABLE FOR PROCUREMENT OF HARDWARE FOR TORPEDO FIRE CONTROL SYSTEM

RFP Para Reference	Requirement as per RFP	FC	PC	NC	Remarks
Part I - General requirements as per RFP					
1	Compliance to Date and Time for depositing Bids				
6	Compliance to Type of Tender and Bid				
14	Compliance to Submission of EMD				
Part II – Essential Details of Item/Services Required as per RFP					
1	Compliance to Schedule of Requirements				
2	Compliance to requirement of transportation and delivery to Consignee at WESEE, New Delhi, and Ultimate Consignee at Visakhapatnam, Andhra Pradesh.				
3	Compliance to participation of Seller for integration at WESEE, New Delhi and at Visakhapatnam				
9 and Appendix A, B & C	Compliance with Technical requirements of DMFC, NSU, TTIBs, TFCP and PSCU				
10	Compliance to General Design Features				
12	Compliance to Environmental Specifications				
13	Compliance to EMI/EMC Test Specifications				
14	Compliance to acceptance of system on Certificate of Compliance from Seller				
15	Compliance to Delivery period of 20 Weeks from placement of Supply Order				
Part III – Standard Conditions of RFP					
3	Compliance to standard clause of arbitration				
7	Compliance to non-disclosure of Contract Documents				

8	Compliance to applicability of LD				
Part IV – Special Conditions of RFP					
1	Compliance to Performance Bank Guarantee of 10% of the quoted price within30 days of receipt of confirmed order				
2	Compliance to Option clause				
3	Compliance to Repeat Order Clause				
4	Compliance to Tolerance Clause				
5	Compliance to Payment Terms for Sellers				
8	Compliance to Fall Clause				
9	Compliance to Risk & Expense Clause				
10	Compliance to Force Majeure Clause				
13	Compliance to Year of Manufacturing				
14	Compliance to Transportation requirements				
18	Compliance to requirement of Pre-Dispatch and Joint Receipt Inspection				
20	Compliance to Franking Clause				
22& 23	Compliance to Warranty conditions and Product Support during Warranty				
25	Compliance to Price Variation Clause				
26	Compliance to Engineering Support Package and AMC requirement				
Part V – Evaluation Criteria and Price Bid Issues as per RFP					
1	Compliance to Evaluation Criteria				
2	Compliance to Validity of Quote				

FC = Fully Complied
PC = Partially Complied
NC = Not Complied

Appendix F
(Refers to Para 28 of Part IV of WESEE letter No.SCS/192/TFCS/Procurement dated 02 Jul 18)

CERTIFICATE – MALICIOUS CODE

(To be rendered on the Company's Letter head)

1. This is to certify that the Hardware and the Software being offered, as part of the Contract, does not contain embedded malicious code that would activate procedures to:-

(a) Inhibit the desired function of the equipment.

(b) Cause physical damage to the user or his equipment during the operational exploitation of the equipment.

2. The firm is liable in case physical damage caused due to activation of any such malicious code in embedded software.

(Signed)
Desig/ Name