Tele : 022 22751344

Naval Trials and Acceptance Authority
C/o Fleet Mail Office
Mumbai 400 001

NATAA/318/IMAT

07 Jan 22

Directors / Osi/C – DTTT(Vzg), ETMA, DTTT(Mbi), GTTT(Vzg), GTTT(Mbi), CBIU, MTU(Vzg), MTU(Mbi), MTU(Kol), HITU(Koc), MTU(Goa), HITU(Vzg), MTU(Koc), ETMU(Vzg), ETMU(Kol), ETT(Koc), CTT(Pbr), MSETT, HITU(Mbi), HITU(Pbr)

INTEGRATED MACHINERY ACCEPTANCE TRIALS OF EQUIPMENT AND SYSTEMS

1. **Introduction**. As *IN* has transgressed to Mission based deployments in a large navy construct, enhanced reliability and capability to operate the machinery with minimal defects and maximum availability, is an operational necessity. This has also necessitated revitalisation in maintenance and upkeep philosophy along with objective based inspections and materiel assessment of platforms, especially post refits. Posterity of such concepts relies on refining our acceptance processes for a naval platform post construction / major refits which are key milestones in its lifecycle. The entire process of acceptance also sets the momentum for combat effectiveness of the platform for subsequent Ops cycle. The functional and capability assessment of platforms is undertaken through inspection / trials of diverse Hull, Engineering and Electrical equipment and systems by various trials agencies independently.

2. **Gap Analysis**. A gap analysis of the present trials and acceptance methodology has revealed following shortcomings: -

(a) **Trial Status / Outcome**. The status of trials of machinery /equipment & associated systems along with its outcome is not known comprehensively to all the stakeholders, who maybe EO/ LO/ EXO onboard a ship, concerned trial units in case multiple trial units are involved in trials, DGM (E/L/HULL) in a Yard, FEO/FLO/FNAO in Fleet, CEO/CLO/ CCONO in HQs and DME/ DEE/DNA at IHQMoD(N). This is primarily due to the fact that all stakeholders are always handling only their relevant part of the equipment/ system. Hence, **operational status of complete equipment/ system remains ambiguous and not known to all stakeholders.** For example, in case of Diesel Alternator trials, multiple trial units viz DTTT, ETMU and MTU are involved who render their reports to respective counterparts in Command, Fleet and Yard. Hence, the complete status is not known to any one agency at the same time.

(b) **Multiple Trials of Equipment**. Ship staff offers multiple trials of the same equipment or system to various trial units leading to repeated running of machinery especially critical evolutions wherein equipment undergoes excessive stresses/strains and ship's staff gets overburdened.

(c) **Comprehensive and Holistic Assessment of Equipment / System.** As part of Post refit trials, individual trial agencies undertake checks of respective part of their equipment whereas the equipment/ system as a whole (in entirety) is not assessed. For example, HVAC system trials are undertaken by HITU, whereas, the trials of AC and chilled water system are undertaken by MTU and ventilation blower motor trials are by ETMA. Sub-optimal performance of either of these components (AC Plant, blowers, Instrumentation, chilled water pumps, etc.) has a cascading effect in the overall performance of the HVAC system irrespective of the fact that they may have been cleared by individual trial teams on an earlier date. The end aim of air conditioned spaces is not achieved since integrated trials are not undertaken.

(d) **Delay in Trials / Acceptance**. In certain cases, multi-disciplinary issues lead to undue delays due to multiple trial agencies undertaking inspections / trials independently.

3. **Integrated Machinery Acceptance Trials (IMAT)**. To overcome the above shortcomings, the philosophy of 'Integrated Machinery Acceptance Trials (IMAT)' has been conceptualised and is being implemented by NATAA. The salient aspects of IMAT are as follows: -

(a) Integrated trials of complete equipment/system, which includes equipment foundation, SV mounts, control system, ancillaries, pipelines, valves, instrumentation, load hangars, etc. by integrated team from multiple trial agencies, as required. Each equipment / system will have Lead / Assisting Trial agency so as to ensure single point accountability and an Integral trial report is to be rendered covering all aspects of performance of the equipment / system.

(b) Shift from 'Parametric' centric trials to 'Performance' centric trials to ensure requisite performance of equipment/ system post routines and trials. This includes parametric checks of equipment by various trial units along with performance analysis of the overall equipment with involvement of Lead and Assisting Trial units.

(c) Conduct of integrated trials of the equipment/ systems by all trial agencies, inspection of all components, functional checks of instrumentation and trials of all controls features so as to achieve the desired performance of each system. Also, IMAT will ensure single point accountability of the lead trial unit for integrated trials / inspections of each system.

(d) Evaluation of legacy, complex and recurring issues during pre-refit trials for setting performance datum and refinement of refit work package.

4. **IMAT Implementation on WNC Ships**. IMAT implementation is presently at a nascent stage. It has been implemented by NATAA on certain equipment and systems onboard a few ships at WNC during end phase of their refits (NR / MR) with the involvement of multiple trial units and results of the same have been encouraging. The concept has been adopted to a certain extent for undertaking trials of HVAC system onboard ships. The HVAC system trials onboard WNC ships are presently being undertaken by HITU, MTU and ETMA wherein, HITU acts as the Lead trial unit thereby co-ordinating with the other *two* trial teams towards smooth conduct of the trial. The performance of AC plants, including number of plants required to be exploited based on ship's operation mode, is assessed in conjunction with measurement of temperature and flow rate in all air conditioned spaces.

5. **Implementation of IMAT**. IMAT needs to be implemented by all trial units under NATAA for ships entering/ completing NR / MR. List of equipment and systems indicating **'Lead'** and **'Assist'** trial units for **Talwar / Teg class of ships** is placed at **Enclosure** for reference. Similar approach of 'Lead' and Assist trial units needs to be incorporated by various trial units at every station whilst undertaking equipment and system trials onboard refit ships for different class of ships as per the charter of duties laid down in NOs/ extant directives in respective Command/ Stations. The responsibility of making the consolidated report of a particular equipment / system shall lie with the 'Lead' trial unit. Further, any discrepancies/ disagreements towards establishment of the 'Lead' and 'Assist' units may be referred to NATAA on case-to-case basis for resolution.

6. **Improvements Envisaged with Implementation of IMAT Methodology**. Following improvements are envisaged with implementation of IMAT:-

(a) Clear and unambiguous status of complete equipment and systems will be available for taking informed decisions by Ops / Admin Authority, Yard and ship's staff.

(b) Concurrent trials by multiple trial teams will lead to lesser number of trials. Further, carrying out concurrent trials will ensure ironing out of technical issues amongst trial teams.

(c) Lead trial team shall function as single point of contact for ship's staff, NATAA, Yard, Ops Authority, Admin Authority and IHQMoD(N) to comprehend the overall status of an equipment / system.

7. **Conclusion**. In light of the above, it is requested that Integrated Machinery Acceptance Trials (IMAT) procedures be implemented for conduct of trials of equipment and systems onboard naval platforms with immediate effect. Clarifications, if any, may be sought from NATAA office at Mumbai.

(Jasvir Singh)
Captain
Addl Director
for Director General

Enclosures: - As above

Internal: -

TA/COM SO/ACOM(IT&S) SO/ACOM(D&R) SO/DG NATAA

Copy to: -

The Flag Officer Commanding-in-Chief
(for CRO/CEO/CLO/CCONO)
Headquarters, Western Naval Command
Mumbai 400023

The Commander-in-Chief
(for CTO {Marine})
Headquarters, A & N Command
c/o Naval Base
Port Blair 744102

The Flag Officer Commanding-in-Chief
(for CRO/CEO/CLO/CCONO)
Headquarters, Eastern Naval Command
Visakhapatnam 530014

The Flag Officer Commanding-in-Chief
(for CRO/CEO/CLO/CCONO)
Headquarters, Southern Naval Command
Kochi 682004

The Admiral Superintendent
(for GM(R))
Naval Dockyard
Mumbai 400023

The Admiral Superintendent
(for GM(R))
Naval Dockyard
Visakhapatnam 530014

The Admiral Superintendent of Yard
(for GM)
Naval Ship Repair Yard
Naval Base
Karwar 581308

The Admiral Superintendent of Yard
(for GM)
Naval Ship Repair Yard
Naval Base, Kochi 682004

The Commodore Superintendent of Yard
Naval Ship Repair Yard
Naval Base
Port Blair 744102

Enclosure to NATAA letter
NATAA/318/IMAT dt 07 Jan 22

INTEGRATED MACHINERY ACCEPTANCE TRIALS MATRIX

TALWAR AND TEG CLASS

A. MAIN PROPULSION MACHINERY & ASSOCIATED SYSTEMS

SNO	DESCRIPTION	LEAD TRIAL UNIT	ASSISTANT TRIAL UNIT 1	ASSISTANT TRIAL UNIT 2
1.	CRUISE GTs (02)	GTTT	-	-
2.	BOOST GTs (02)		-	-
3.	02 CRGA AND 02 BRGA		-	-
4.	PROPULSION SHAFTING (BOTH)		MTU	-
5.	GT FIRE FIGHTING SYSTEM		-	-
6.	GT AIR INTAKE & EXHAUST SYSTEM		-	-
7.	GT HP/ LP AIR SYSTEM		-	-
8.	GT FUEL SYSTEM & PUMPS		MTU	ETMU
9.	GT LUB OIL SYSTEM & PUMPS		MTU	ETMU
10.	GT CASING DRAIN SYSTEM		-	-
11.	GT COOLING WATER SYSTEM & PUMPS		MTU	ETMU
12.	RG LUB OIL SYSTEM & PUMPS		MTU	ETMU
13.	COMPARTMENT VENTILATION (PART OF HVAC TRIALS - FER AND AER)		HITU	ETMU

B. POWER GENERATION AND SYSTEMS

SNO	DESCRIPTION	LEAD TRIAL UNIT	ASSISTING TRIAL UNIT 1	ASSISTING TRIAL UNIT 2
1.	DIESEL ALTERNATOR - PRIME MOVER (ENGINE)	DTTT	MTU	-
2.	ALTERNATOR		ETMU	-
3.	DA CONTROL SYSTEM		ETMU	-
4.	DA AIR INTAKE SYSTEM		-	-
5.	DA EXHAUST SYSTEM		HITU	-
6.	DA FUEL SYSTEM		-	-
7.	DA AIR SYSTEM		-	-
8.	DA LUB OIL SYSTEM		-	-

9.	DA COOLING WATER SYSTEM	DTTT	-	-
10.	DA SEA WATER SYSTEM		-	-
11.	COMPARTMENT VENTILATION (PART OF HVAC TRIALS – AMR)		HITU	ETMU
12.	EMERGENCY DA		ETMU	MTU

C. **ENGINEERING AUXILIARY EQUIPMENT**

SNO	DESCRIPTION	LEAD TRIAL UNIT	ASSISTING TRIAL UNIT 1	ASSISTING TRIAL UNIT 2
1.	FUEL STRIPPING PUMPS (02)	MTU	ETMU	-
2.	FUEL & LUB OIL CENTRIFUGES (02)			-
3.	FUEL TRANSFER PUMPS (02)			
4.	A/C PLANTS (05)			-
5.	A/C CW PUMPS (05)			-
6.	A/C SW PUMPS (05)			-
7.	REF PLANTS (03)			-
8.	REF PLANT SW PUMPS (03)			-
9.	HPAC (03)			-
10.	DD AIR COMPRESSOR			-
11.	SW COOLING PUMPS (07)			-
12.	FIRE MAIN PUMPS (05)			-
13.	FRESH WATER PUMPS (04)			-
14.	SALVAGE PUMPS (06)			-
15.	BILGE PUMPS (02)			-
16.	OILY WATER SEPERATORS (02)			-
17.	AVCAT TRANSFER PUMPS (02)			-
18.	STEERING GEAR SYSTEM			-
19.	STEERING PUMPS (03)			-
20.	STABILISER SYSTEM			-
21.	STABILIZER PUMPS (02)			-
22.	RO PLANTS 30 TPD (02)			-

D. SHIP'S ENGINEERING SYSTEMS

SNO	DESCRIPTION	LEAD TRIAL UNIT	ASSISTING TRIAL UNIT
1.	CHILLED WATER SYSTEM	MTU	-
2.	AVCAT SYSTEM		-
3.	HP AIR SYSTEM		-
4.	HELO HYDRAULIC SYSTEM		-
5.	BALLAST SYSTEM		-
6.	BILGE PUMPING OUT SYSTEM		-
7.	FIRE MAIN SYSTEM		-
8.	SHIPS FUEL SYSTEM		-
9.	LUB OIL SYSTEM		-
10.	FRESH WATER SYSTEM		-
11.	CATHELCO SYSTEM		-

E. CONTROL SYSTEMS

SNO	DESCRIPTION	LEAD TRIAL UNIT	ASSISTING TRIAL UNIT
1.	BURYA (GT CONTROLS)	GTTT	-
2.	ONEGA (AUXILIARY CONTROLS)	MTU	-
3.	DOLOMITE (STABILISER CONTROLS)	MTU	-
4.	CORRACKS (STEERING GEAR CONTROLS)	MTU	-
5.	ANGARA (APMS)	ETMU	-

F. ELECTRICAL EQUIPMENT AND SYSTEMS

SNO	DESCRIPTION	LEAD TRIAL UNIT	ASSISTING TRIAL UNIT
1.	ELECTRICAL POWER GENERATION MACHINERY EQUIPMENT DAS (PARALLELING, INSULATION)	ETMU	-
2.	STATIC/ ROTARY CONVERTERS		-
3.	BATTERY BANKS		-
4.	MAIN/AUXILIARY SWITCHBOARDS AND ASSOCIATED SWITCHGEAR		-

5.	LIGHTING SYSTEM ILLUMINATION/ LUMINOSITY CHECKS	ETMU	-
6.	GENERAL LIGHTING		-
7.	ALL DOMESTIC MACHINERY/ EQUIPMENT E.G. LAUNDRY, GALLEY, COMMERCIAL EQUIPMENT		HITU
8.	RECTIFIERS (HELO STARTING RECTIFIER, OTHER SHIPS RECTIFIER, BATTERY CHARGING RECTIFIER) & DEGAUSSING		-
9.	DBS, FUSE PANELS, SOCKETS AND PLUGS		-
10.	AUTO CHANGEOVER SWITCHES/ HAND CHANGEOVER SWITCHES		-
11.	MAIN BROADCAST/ SRE		-
12.	INTERCOM SYSTEM		-
13.	SOUND POWER TELEPHONE		-
14.	SHIPS INSTALLED RADIAC SYSTEM (SIRS)		-
15.	SHIPS INSTALLED CHEMICAL AGENT DETECTION SYSTEM (SICADS)		-
16.	INTERPHONE		-
17.	AUTO TELEPHONE EXCHANGE		-
18.	FIELD TELEPHONE		-
19.	FIRE ALARM SYSTEM		-
20.	FLOOD ALARM SYSTEM		-
21.	PORTABLE MONITORING SYSTEM		-
22.	RECREATIONAL TV		-
23.	CCTV		-
24.	LOUD HAULER		-
25.	EMERGENCY POWER SUPPLY ARRANGEMENT		-
26.	ELECTRICAL HYGIENE CHECKS		-

G. **HULL MACHINERY**

SNO	DESCRIPTION	LEAD TRIAL UNIT	ASSISTING TRIAL UNIT 1	ASSISTING TRIAL UNIT 2
1.	BOAT DAVITS	HITU	ETMU	-
2.	ACCOMMODATION LADDER		ETMU	-
3.	ANCHOR CAPSTAN		ETMU	-
4.	MOORING CAPSTAN		ETMU	-
5.	HANGER SHUTTER		ETMU	-
6.	ICCP SYSTEM		ETMU	-
7.	SEWAGE TREATMENT PLANT		ETMU	-
8.	HULL STRUCTURE		-	-
9.	APT		-	-
10.	HVAC SYSTEM (INCLUDES MACHINERY COMPARTMENTS, NON - AC COMPARTMENTS, BATHROOMS, STORES, ETC.)		MTU	ETMU
11.	ICCP		ETMU	-
12.	6.5M RHIB		DTTT/MTU	ETMU
13.	4.7M RHIB		DTTT/MTU	ETMU

H. **MAJOR FIRE FIGHTING SYSTEMS**

SNO	DESCRIPTION	LEAD TRIAL UNIT	REMARKS
1.	CHEMICAL SMOTHERING SYSTEM (OKT)	MTU	MEMBERS TO BE CO-OPTED FROM OTHER TRIAL TEAMS/ SS/ IAW EXTANT ORDERS
2.	FOAM EXTINGUISHING SYSTEM		
3.	BILGES & BULKHEAD LADDER SPRINKLING SYSTEM		