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मुख्यालय/ Headquarter
अन्डमान एवं निकोबार कमान/
Andaman & Nicobar Command
पोर्ट ब्लेयर/ Port Blair - 744 102

CTT/300/03/13/TECH 30Jan 23

The Commander-in-Chief
{for CTO (Marine)/CTO(ML)}
Headquarters
Andaman & Nicobar Command
Port Blair - 744 102

LOAD TRIAL OF DA NO. 2 (250 KW) - *IN* LCU L 55

1. Refer to *IN* LCU L 55 fax 300/3/34 dated 26 Jan 23.

2. **Background**. Full load Trials including performance, vibration and attenuation checks of DA no 2 onboard LCU L 55 were undertaken on 27 Jan 23. DA was loaded upto 100% (250 KW) on load bank and sustained for a duration of 02 hours.

3. **Performance Parameters**. A detailed report w.r.t engineering & performance trial and report of electrical trial placed at **Enclosure I and II** respectively. The salient parameters are as follows: -

(a) **Lub Oil Pressure**. Lub oil pressure of DA at 100% of rated load was found to be 2.6 bar and is **SAT**.

(b) **Lub Oil Temperature**. Lub oil temperature of DA at various loads was found to be in the range of 86°C to 106°C and is **SAT**.

(c) **Fresh Water Temperature**. Fresh water temperature of DA was found to be in the range of 78°C to 85°C and is **SAT**.

(d) **Exhaust Temperature Exceeding**. At 100% of rated load (250 KW) exhaust temperature was observed to be 535^{0}C and is **SAT**.

4. **Vibration Analysis**. Vibration trials were undertaken at 60% and 100% of rated load. Vibration was found to be within permissible limits. NBA of vibration was found **SAT**.

5. **Observations**.

(a) **Engineering**.

(i) Lub oil leakage observed from cyclinder head cover 5 and 6.

(ii) Expansoin tank over flow line not fitted.

(iii) Mounts not preserved.

(iv) Rust marks found on various points on foundation.

(v) Attenuation of four mounts at 60% load and three mount at 100% load found UNSAT.

(b) **Electrical**. SPM reading of alternator found in **yellow zone at 0% and in red zone at 100%**.

6. **Recommendations**. DA cleared for exploitation post liquidation of following:-

(a) Observations mentioned at para 5 ibid.

(b) Replacement of alternator bearing and SPM readings in Green Zone.

G. Jagannath

(जगन्नाथ गूरुमूर्ति /Jagannath Gurumurthy)
लेफ़्टिनेंट कमांडर / Lieutenant Commander
प्रभारी अधिकारी/ Officer-in-Charge(AOL)

Encl : - As above

Copy to : -

The Naval Component Commander
{for SSO (Tech)}
c/o Navy Office
Port Blair – 744 102

The Commanding Officer
IN LCU L 55
c/o Navy Office
Port Blair – 744 102

Enclosure I to CTT (PBR) letter
CTT/300/03/13 dated 30 Jan 23

LOAD TRIAL OF DA NO. 02 (250 KW) - *IN* LCU L 55

1. Trial Inspector : (a) ANURAG, ERA-3
   (b) D. Prajapati , LME

2. Date and Time : 27 Jan 23 (1000-1430 h)

3. Equipment used for trials : (a) SPM T-30
   (b) Temperature Gun

4. Details of trials are as follows:-

(a) **Safety Device Checks**.

Ser.	Description	Unit	Design Value	DA No. 2 (250 KW)
(i)	Low LO Pr Alarm	Kg/cm^2	1.2	1.2
(ii)	Low LO Pr Trip	Kg/cm^2	0.8	0.9
(iii)	High FW temp Alarm	°C	93 to 95	90
(iv)	High FW temp Trip	°C	97 to 99	96
(v)	High LO temp Alarm	°C	119	120
(vi)	Over speed Trip	RPM	1650	1650
(vii)	Crash stop Local	--	Ops/ Non-ops	Ops
(viii)	Crash stop Remote	--	Ops/ Non-ops	Ops

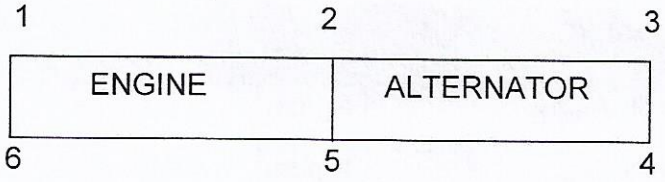
(b) **Performance Parameters at 100% Load**.

Ser.	Description	Unit	Design values	Parameters recorded at 250 KW (100% rated load)
				250 KW DA
(i)	Max sustained Load	KW	250	250
(ii)	RPM	RPM	1500	1490
(iii)	Lub oil Pressure	Kg/cm^2	03 to 05	2.6
(iv)	Sea water Pressure	Kg/cm^2	0.5 to 1.5	0.8
(v)	Lub oil Temperature	°C	84 to 116	106
(vi)	Fresh water Temperature	°C	75 to 96	85
(vii)	Exhaust Temperature	°C	570	535

(c) **Vibration Trials**. Vibration trials of DA was undertaken at load 180 KW (60% of rated load) and 250 KW (100% of rated load). Overall vibration readings of DA at monitoring points found within permissible limit and is Sat. The details of trials are as follows:-

Ser	Description	250 KW DA						Remarks (Limit 16 mm/sec)
		At 60 % load (250 KW)			At 100% load (250KW)			
		H	V	A	H	V	A	
(i)	Engine FE	5.9	5.6	5.6	9.4	5.6	6.7	SAT
(ii)	Engine DE	6.3	5.8	5.5	9.6	9.2	8.4	
(iii)	Alternator DE	4.9	6.2	5.9	6.7	8.4	11.3	
(iv)	Alternator FE	5.9	4.4	3.4	6.9	5.6	5.3	

(d) **Attenuation checks**.



Position	250 KW (60 % load)					
	1	2	3	4	5	6
Top	8.1	4.9	5.8	7.8	5.3	9.1
Bottom	2.9	1.5	0.4	1.3	1.8	3.0
Atten.	**64**	**69**	93	83	**68**	**67**
Remarks	**UNSAT**		SAT		**UNSAT**	

Position	250KW (100 % load)					
	1	2	3	4	5	6
Top	14.3	7.0	9.8	9.7	8.5	15.8
Bottom	5.4	2.2	0.6	1.8	2.8	4.5
Atten.	**62**	**68**	93	81	**67**	71
Remarks	**UNSAT**		SAT		**UNSAT**	SAT

Note: Attenuation lesser than 70% indicates overloaded/over tightened mounts. All SV mounts to be loosened and torque tightened as per OEM specified value.

(e) **SPM Readings**.

Ser	Description	0% Load dbm/ dbc	60 % Load dbm/ dbc	100 % Load dbm/ dbc	Remarks
(a)	Alternator Driven End	**27/14**	**26/11**	**40/9**	**UNSAT**
(b)	Alternator Free End	**24/9**	**23/-3**	**23/3**	

Enclosure II to CTT (PBR) letter
CTT/300/03/13 dated 30 Jan 23

ELECTRICAL TRIALS OF DA NO. 2 – *IN* LCU L-55

1. **Trials Presented by / Authority**.

(a)	Trial Inspector	:	V B Naidu, LEM(P) Rakesh, EM(R)-I
(b)	Presented by	:	SS / NSRY(PBR)
(c)	Trials date	:	27 Jan 23
(d)	Reference	:	ANCO (Tech) Art 0810 (f)
(e)	File Reference	:	CTT/300/03/13

2. **Test Equipment Used**.

(a) Power Quality Analyzer Fluke 435
(b) 500 V Megger
(c) Tong Tester
(d) Switchboard Panel Mounted meters
(e) SPM T-30

3. **Protective Devices**.

(a)	Over Voltage Trip	:	Sat
(b)	Reverse Power Relay	:	Sat
(c)	Under Voltage Relay	:	Sat

4. **Paralleling Trials**.

(a)	Unattended Paralleling	:	Not offered
(b)	Attended Paralleling	:	Not offered

5. **Observations**.

(a)	Governor droop	:	Sat **(0.93%)**
(b)	Governor checks	:	Sat
(c)	AVR Checks	:	Sat
(d)	M load trials	:	Sat

6. **Parameters of the Generating Set.**

(a) **Engine.**

(i)	Engine	:	Cummins
(ii)	Type	:	N (BIG CAM)
(iii)	Maker's Name/Serial No	:	NT855DM1
(iv)	Speed (R.P.M)	:	1500

(b) **Alternator.**

(i)	Maker's Name	:	ELMOT
(ii)	Maker's Type /Serial No	:	14060024
(iii)	Full Load Output	:	250 KW
(iv)	Volts	:	415 V
(v)	Amps	:	600 Amps (At Unity PF)
(vi)	Speed (RPM)	:	1500

(c) **Governor.**

(i)	Maker's Name	:	Woodward
(ii)	Maker's Type/Serial No	:	Not provided.
(iii)	Type	:	Electronic

(d) **Automatic Voltage Regulator.**

(i)	Maker's Name	:	STAMFORD
(ii)	Type /Serial No	:	MX321

(e) **Generator Supply Breaker.**

(i)	Maker's Name	:	MASTERPACT
(ii)	Capacity	:	800A
(iii)	Maker's Type / Serial No	:	NT08H1

7. **Parameters Recorded.**

(a) **Insulation Resistance.**

(i)	Cold	-	08 MΩ
(ii)	Hot	-	06 MΩ

(b) **Temperature Rise**.

(i) Ambient temperature at Start - 38^0C

(ii) Temperature rise after two hours of running at Full load – 47^0C

(iii) Cooler (water cooled) – effective

(c) **SPM Readings**.

Load	DE	Colour	NDE	Colour	Remarks
0 %	dbm/dbc = **27/16**	**Yellow**	dbm/dbc = **24/8**	**Yellow**	**Unsat**
100 %	dbm/dbc = **44/14**	**Red**	dbm/dbc = **23/7**	**Yellow**	**Unsat**

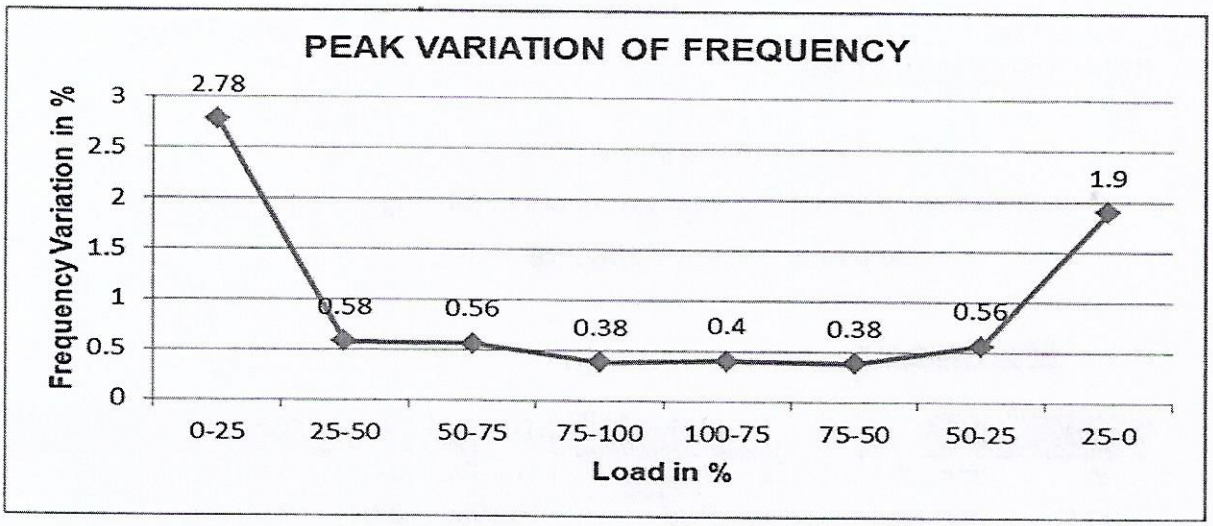
8. **Speed Control Tests**.

(a) **Steady State Tests**. (Set frequency at 50 Hz at 50 % Load)

Load%	Initial Speed (Hz)	Final Speed (Hz)	Governor droop(at 100 % load)	Permitted limits
50	--	Set frequency at 50 Hz	$\frac{(NI-N2)x100}{N}$	Between 0.875% to 1% (for electronic governor)
0-25	50.40	50.11	NA	
25-50	50.11	50.01		
50-75	50.01	49.99		
75-100	49.99	49.93		
100-0	**49.93**	**50.40**	**0.93%**	

(b) **Transient Tests**.

Load %		Initial Speed (Hz)	Momentary speed (Hz)	Final Speed (Hz)	% Peak = Initial-momentary / Nominal		Time of recovery (in sec)	
Initial	To				Observed	Permitted	Observed	Permitted
0	25	50.42	49.03	50.12	2.78	3.5	2	2
25	50	50.12	49.83	50.01	0.58		2	
50	75	50.01	49.73	49.99	0.56		2	
75	100	49.99	49.80	49.93	0.38		2	
100	75	49.93	50.13	49.99	0.40		2	
75	50	49.99	50.18	50.04	0.38		2	
50	25	50.04	50.32	50.16	0.56		2	
25	0	50.16	51.11	50.43	1.90		2	



For Machine Charged With Turbo Charged Engine.

Load %		Initial Speed (Hz)	Momentary speed (Hz)	Final Speed (Hz)	% Peak = Initial - Final / Nominal		Remarks
Initial	To				Observed	Permitted	
0	70	50.43	48.25	49.99	4.36	5 %	Sat
100	0	49.93	51.76	50.42	3.66	5 %	Sat

(c) **Governor Range**. (This is undertaken by varying the frequency using the frequency control knob / lever provided for the alternator on switchboards).

Load %	Achieved frequency	Permitted	Remarks
0	50.42	49.50 – 50.50	Sat
100	49.93		Sat

(d) **Rate affected by Governor Motor**.

Load %	Rate Hz/s		Permitted	Remarks
	Up	Down		
0	0.06	0.05	Between 0.05 to 0.07 Hz per sec for Electronic Governors	Sat
100	0.07	0.06		Sat

9. **Voltage Control Tests**.

(a) **Steady State Tests**. (Set Voltage to Nominal value at 50 % load 415 V)

Load%	KW	Voltage(V)		Amps	PF
		Observed	Permitted		
0	0	414.9	(415V) (± 4.15V)	0	-
25	62.5	414.8		110	0.8
50	125	415.0		218	0.8

Load%	KW	Voltage(V)		Amps	PF
		Observed	Permitted		
75	187.5	416.2		328	0.8
100	250	416.7		436	0.8

(b) **Transient Tests**.

Load %		Initial Voltage	Momentary Voltage	Final Voltage	% Peak Initial-momentary Nominal		Time of recovery (in sec)	
Initial	To				Observed	Permitted	Observed	Permitted
100	75	413.3	437.7	414.9	5.86	7.5	1	1
75	50	414.9	430.3	414.7	3.71		1	
50	25	414.7	433.4	416.2	4.52		1	
25	0	416.2	439.1	416.7	5.51		1	
0+M		416.4	384.1	416.3	7.77	15	1	
25+M		416.0	394.3	416.9	5.23		1	
50+M		414.6	388.3	415.8	6.32		1	
75+M		414.8	373.7	415.0	9.90		1	
85+M		413.6	363.3	413.7	12.1		1	

(c) **Voltage balance**.

Load %	Line Voltage			Difference (Between Max and Min of three values)	Permitted limits (1% of Avg of three line voltage)
	R-Y	Y-B	B-R		
0	416.2	416.3	416.4	0.2 V	4.15 V
100	413.1	413.3	411.0	2.3 V	

(d) **Voltage Range**. (This test is undertaken by varying the voltage trimmer (Hand / Auto as applicable) from lowest limit to highest limit.)

	Load %	At lowest limit of trimmer	At highest limit of trimmer	Remarks
AVR trimmer	0	395	435	Sat
	100	395	435	
Hand regulator	0	-		
	100			

Note. Permissible Limit ± 5% of rated voltage (Volts)