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सम्मिश्र जांच दल/ Composite Trials Team
द्वारा नेवी कार्यालय/ C/o Navy Office
मुख्यालय/ Headquarter
अन्डमान एवं निकोबार कमान/
Andaman & Nicobar Command
पोर्ट ब्लेयर/ Port Blair - 744 102

CTT/300/11/02

31 Oct 22

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

POST REFIT TRIALS OF PORT DA – INS CHETLAT (SR-22)

1. **Background**. Post Refit Trials of Port DA onboard INS Chetlat including SDCs, Performance, Vibration and attenuation checks were undertaken as part of post refit trials. Detailed engineering and electrical reports of the same are placed at **Enclosures**.

2. **Performance Parameters**.

(a) DA sustained a Max load of 80 KW (100%) against a rated capacity of 80 KW for duration of two hours.

(b) High exhaust temp of 420 ^{0}C at 100 % of rated load. Remarks - **SAT**.

(c) Lub oil pressure at 100% load found to be 3.8 bar. Remarks - **SAT**.

(d) Lub oil temp at various loads found within range of 80^{0}C -116^{0}C. Remarks - **SAT**.

(e) Fresh water temperature observed in the range of 75^{0}C - 96 ^{0}C. Remarks – **SAT**.

3. **Observations**. Salient observations/ defects observed during the trials are as follows:-

(a) **Engineering**.

(i) Lub oil leakage from LO pressure sensor and cylinder head covers.

(ii) Fuel leakage from following points:-

(aa) FIP, feed pump and fuel return line hose.

(ab) Return line tank adapter.

(ac) HP line for cylinder no 1, 4 and 5.

(iii) Over flow line of coolant expansion tank not connected to bilge.

(iv) Vacuum indicator not fitted.

(v) Crankcase breather hose not connected to bilge.

(vi) Hot lagging not complete.

(vii) Ammeter of LCP non ops.

(viii) Sea water leakage from inlet connection near fresh water cooler.

(ix) Over Speed trip operated when load increased from 60 kW to 80 kW.

(b) **Electrical**.

(i) Under Voltage trip found **UNSAT**, operated at 332V against limit of 352V.

(ii) Paralleling trials not offered by SS.

(iii) kW meter of Port DA section showing erratic reading.

(iv) Power factor meter non-ops.

(v) Supply breakers not calibrated.

4. **Recommendations**. It is recommended that SS be directed to liquidate issues mentioned above.

G. Jagannath

(जगन्नाथ गूरुमूर्ति /Jagannath Gurumurthy)
लेफ़्टिनेंट कमांडर / Lieutenant Commander
उप-प्रभारी अधिकारी/ Dy. Officer-in-Charge
क्रिते प्रभारी अधिकारी/ for Officer-in-Charge

Encl: - As above

Copy to: -

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

The Commodore Superintendent
(for DSY)
Naval Ship Repair Yard
C/o Navy Office
Port Blair – 744 102

The Commanding Officer
INS Chetlat
C/o Navy Office
Port Blair - 744 102

Enclosure to CTT(Pbr) letter
CTT/300/11/02 dated 31 Oct 22

SDCs, PERFORMANCE & VIBRATION TRIALS OF DIESEL ALTERNATORS

1. Trial Inspector
   (a) Giribabu ERA 4
   (b) N N Rao LME

2. Date and Time
   (a) 29 Jul 22 (1700 - 2145Hrs)

3. Equipment used for SDCs
   (a) Nagman LP Calibrator
   (b) Nagman HP Calibrator
   (c) Nagman Temp. Calibrator
   (d) Frequency Generator

4. Equipment used for Performance trials
   (a) SPM T-30
   (b) Temperature gun

5. **Safety device checks**.

Ser	Description	Unit	Design Value	Port DA	Remarks
(a)	Low LO Pr. alarm	Kg/cm²	1.2	1.0	SAT
(b)	Low LO Pr. trip	Kg/cm²	0.7-1.0	0.8	
(c)	High F/W temp. alarm	°C	90±2	92	
(d)	High F/W temp. trip	°C	95±2°C	96	
(e)	High lub oil temp. alarm	°C	120	120	
(f)	Over speed trip	RPM	1650	1650	

6. **Performance Trials**.

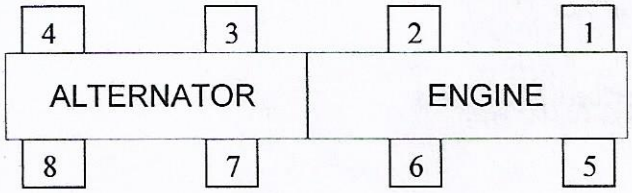
Ser.	Parameter readings	Unit	Port DA	Remarks
(a)	Max. sustained Load	kW	80	SAT
(b)	RPM	RPM	1500	
(c)	L.O. Pressure	Kg/cm²	3.8	
(d)	S.W. Pressure	Kg/cm²	0.5	

Ser.	Parameter readings	Unit	Port DA	Remarks
(e)	L.O. Temp.	°C	82	SAT
(f)	F.W. Temp	°C	76	
(g)	Exhaust Temp	°C	420	

7. **Vibration trials**.

Ser.	Measuring Points	At 60% (48KW) load			At 100% (80 KW) load			Remarks (Limit 16 mm/sec)
		H	V	A	H	V	A	
(a)	Engine free end	6.3	8.2	8.4	5.5	7.8	6.2	SAT
(b)	Engine drive end	5.3	7.6	8.3	8.5	7.9	5.1	
(c)	Alternator drive end	6.8	4.6	8.8	8.6	3.9	4.3	
(d)	Alternator free end	2.4	5.1	7.1	2.5	3.0	6.0	

8. **Attenuation Checks**. DA attenuation checks were carried out at 100 % of rated load and maximum load sustained by the DA.



Position	Vibration readings of SV mounts at 100 % Load							
	1	2	3	4	5	6	7	8
Top	13.8	10.1	9.0	10.6	11.9	9.6	7.1	8.6
Bottom	2.5	1.5	1.0	1.5	2.2	1.5	1.0	2.2
Attenuation % age (Above 70%)	81	85	88	85	81	84	85	74
Remarks	SAT							

9. **SPM Reading**.

Ser.	Description	0 % Load dbm/dbc	60 % Load dbm/dbc	29 Jul 22 100% Load dbm/dbc	12 Aug 22 100% Load dbm/dbc
(i)	Alternator driven end	7/-9	12/-8	**29/-6**	13/-9
(ii)	Alternator free end	2/-4	18-6	**26/-6**	18/-3

Enclosure II to CTT (PBR) letter CTT/300/11/02 dated 31 Oct 22

ELECTRICAL TRIALS OF PORT DA – INS CHETLAT

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

(a)	Trial Inspector	:	Nishant Yadav, LEM(P) Rakesh, EM(R) I
(b)	Presented by	:	SS / NSRY(PBR)
(c)	Trials date	:	12 Aug 22
(d)	Reference	:	ANCO (Tech) Art 0810 (f)
(e)	File Reference	:	CTT/300/11/02

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	:	Calibrated
(c)	Under Voltage Relay	:	**Unsat**

4. **Paralleling Trials**.

(a)	Unattended Paralleling	:	NA
(b)	Attended Paralleling	:	Not offered by SS

5. **Observations**.

(a)	Governor droop	:	Sat (0.93%)
(b)	Governor checks	:	Sat
(c)	AVR Checks	:	Sat (P.F = 1)
(d)	M load trials	:	Sat (P.F = 1)

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

(a) **Engine**.

(i)	Engine	:	Cummins
(ii)	Type	:	6 BT 5.9 DM.
(iii)	Maker's Name/Serial No	:	Not provided by SS.
(iv)	Speed (R.P.M)	:	1500

(b) **Alternator**.

(i)	Maker's Name	:	Kirloskar
(ii)	Maker's Type /Serial No	:	Not provided by SS.
(iii)	Full Load Output	:	80 KW
(iv)	Volts	:	415 V
(v)	Amps	:	140 Amps (At Unity PF)
(vi)	Speed (RPM)	:	1500

(c) **Governor**.

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

(d) **Automatic Voltage Regulator**.

(i)	Maker's Name	:	Not provided by SS.
(ii)	Type /Serial No	:	Not provided by SS.

(e) **Generator Supply Breaker**.

(i)	Maker's Name	:	Not provided by SS.
(ii)	Capacity	:	Not provided by SS.
(iii)	Maker's Type / Serial No	:	Not provided by SS.

7. **Parameters Recorded**.

(a) **Insulation Resistance**.

(i)	Cold	-	04 MΩ
(ii)	Hot	-	09 MΩ

(b) **Temperature Rise**.

(i) Ambient temperature at Start - 39^{0}C

(ii) Temperature rise after two hours of running at Full load – 50^{0}C

(iii) Cooler (water cooled) – effective

(c) **SPM Readings**.

Load	DE	Colour	NDE	Colour	Remarks
0 %	dbm/dbc = 3/-9	Green	dbm/dbc = 9/-2	Green	-
100 %	dbm/dbc = 13/-9	Green	dbm/dbc = 18/-3	Green	-

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	50.26	50.19	NA	
25-50	50.19	50.00		
50-75	50.00	49.92		
75-100	49.92	49.79		
100-0	**49.79**	**50.26**	**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	50.26	50.11	50.14	0.30	3.0 (L)	2	2
25	50	50.14	49.63	50.00	1.02		2	
50	75	50.00	49.27	49.91	1.46		2	
75	100	49.91	48.43	49.79	2.96		2	
100	75	49.79	50.12	49.91	0.60		2	
75	50	49.91	50.14	50.00	0.46		2	
50	25	50.00	50.32	50.19	0.64		2	
25	0	50.19	50.85	50.26	1.32		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	50.25	47.9	49.93	4.70	5 %	Sat
100	0	49.79	51.5	50.80	3.42	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	50.26	49.50 – 50.50	Sat
100	49.79		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	0.06	0.05		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	415.70	± 4.15	0	-
25	20	416.23		30	1.0
50	40	415.00		61	1.0
75	60	416.06		90	1.0
100	80	416.52		112	1.0

(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	416.58	418.34	415.99	0.42	7.5	1	1
75	50	415.99	423.80	415.01	1.88		1	
50	25	415.01	419.74	414.40	1.13		1	
25	0	414.40	417.26	413.83	0.68		1	

Load %		Initial Voltage	Momentary Voltage	Final Voltage	% Peak Initial-momentary Nominal		Time of recovery (in sec)	
Initial	To				Observed	Permitted	Observed	Permitted
0+M		413.22	399.82	413.80	3.22	15	1	
25+M		413.75	397.02	414.75	4.03		1	
50+M		415.23	394.70	415.22	4.94		1	
75+M		415.94	395.52	415.90	4.92		1	
85+M		415.35	393.58	414.30	5.24		1	

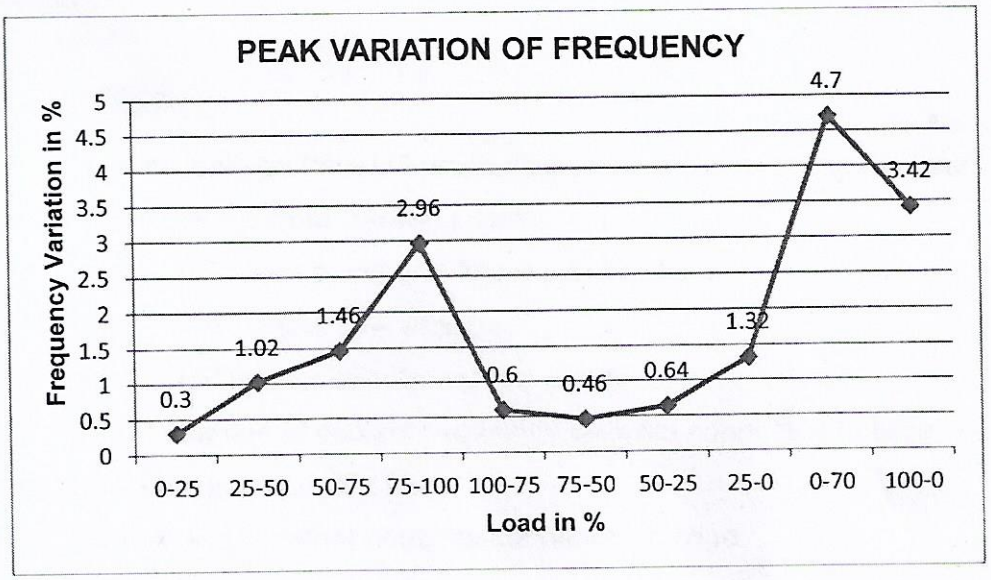
(c) **Voltage balance**.

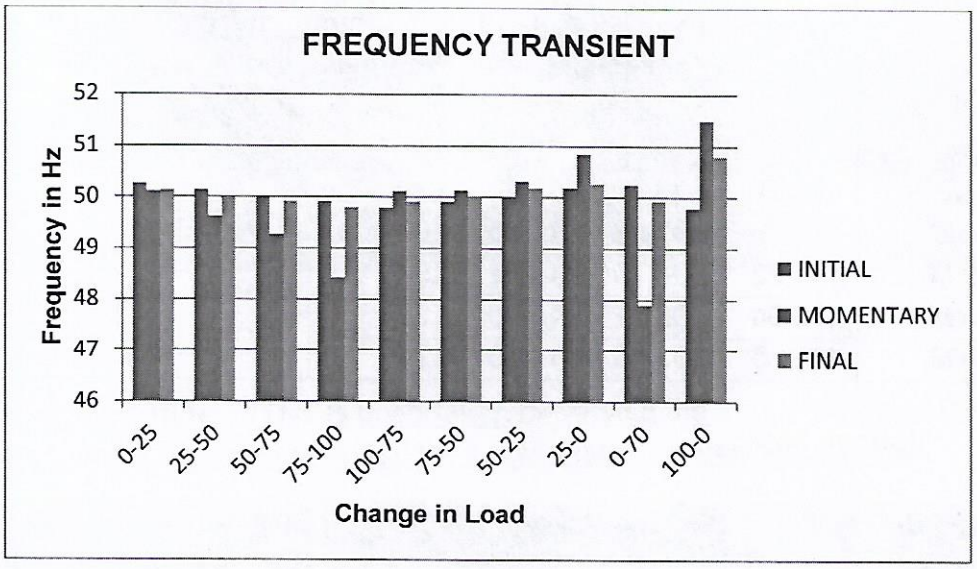
Load %	Line Voltage			Difference (Between Max and Min of three values)	Permitted limits (1% of Avg of three line voltage)
	R-Y	Y-B	B-R		
0	416.4	417.7	417.2	1.3 V	4.17 V
100	413.8	413.7	413.6	0.2 V	

(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)




FREQUENCY TRANSIENT
Frequency in Hz
52
51
50
49
48
47
46
0-25
25-50
50-75
75-100
100-75
75-50
50-25
25-0
0-70
100-0
Change in Load
INITIAL
MOMENTARY
FINAL