

Document number RTSOFA309/15

Edition Α

Document kind Report

Classification For internal use

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Approved by

2015-07-02 Mikael Hallberg

only Order number

BB000013S01B 119970-W1

2045-07-02 Daniel Lopez

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B13, Gainesville, SST 900, Startup after warranty work, Commissioning Report, 2015

B000013 **B-number:**

Catchword: Gainesville

Turbine module: SST900

Project leader: Ibrahim Bachtay, SIT

Tommy Gardner Customer/ Contact person:

Date for the visit: 150508 - 150509

Personnel on site: Markus Sjunnesson, Commissioning

Engineer

Short summary of executed work

GREC Gainesville was visited for a start-up of B000013 after warranty inspection of the inner turbine. Some remarks were made that can be found in the findings part of the report.



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01: Findings

Speed reading

MAB10CS015 is not working properly. The correct speed is registered by the Overspeed card and can be seen in the Bently software. The Tachometer card output does not give out pulses at turning gear speed and the BASI pulse diode is not flashing but gives a fix light at turning gear speed (MAB10CS005/010 tachometer card gives out pulses and BASI pulse diode is flashing). The input in PCS7 indicates zero speed with no faults but of course alarm for signal deviation. In addition to this sometimes the speed disturbance alarm activates on MAB10CS005 The tachometer card on MAB10CS015 has been exchanged by customer. There is a firmware difference between the tachometer cards. MAB10CS005/010/015 5.35/5.39/5.41 There is a stationary computer with network connection to the rack. The Serial connection we "normally" use at Siemens is blocked for downloading software to the rack.

There has been reported that it is a hardware fault in the tachometer cards that is installed at the moment. These tachometer cards should be replaced by the new cards supplied by Siemens.

Rotor Earth Equipment

Original rotor earth equipment was replaced by a copper string by GREC. New coals should be ordered and should be mounted back in original bracket.

Turning gear

Speed at turning gear: 28 Rpm

This is lower than normal. During next visit the jacking oil pump pressure should be measured and adjust the speed up to 52 rpm.

Control Valve feedback

We spent a lot of time fault searching why the new feedback (Baluff) didn't work. It was found that the wiring was wrong on two places. This was fixed during commissioning.

Casing water injector valve

LCE10AA050 is not operating correctly. Before start up I needed to help the pneumatic actuator to open the valve by using a wrench. This valve should be overhauled at next turbine stop to prevent high temperatures in the turbine exhaust.

Wire break warning

There is a signal fault on CJJ20 U13/6CH4. This is due to a disconnected pressure transmitter used in performance tests.

SICLOCK

The setup from new installation has been modified.

Casing temperature measurement

Two casing temperature measurements were out of function. MAB10CT065 and MAB10CT070.

ESV Position Feedback

The micro switches were wrongly connected. This was fixed during commissioning.



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02: Start up

The turbine was started and synchronized on Friday with some remarks (see findings and below).

Activity	Remarks
Start of auxiliary systems	Not OK ¹
Performance of functional tests	Not OK ²
Run up, selection of run up curve	ок
CV tightness test	ок
ESV tightness test	ок
Turning gear releases and jacking oil pump stops at 30% speed.	ок
Live over speed test	ок
Field breaker automatically close at >95% speed	ок
Synchronization	ок
Loading, selection of loading curve	ок
Check of Vibrations	ок
ESV part stroke test with turbine in operation	ок
Test of trip valves with turbine in operation	Not OK ²
Note 1: The turning gear speed is too low and the water inj	

Note 2: Individual speed channels could not be tested due to one faulty speed channel

Oscillation at full power

The Power/Pressure oscillations are still there but according to the operators there is a significant improvement from before. This might be because it was an offset from the MOOG balance point and the set point in the Logic before.

During testing the turbine regulation was set in internal output regulation. Operational trends have been sent to Finspång.

The flow in the leak-off condenser

54,5 Gallon/hour at 83 MW



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03: Operational data

Calc Operating hours	12344 h
Calc EQV Operating hours	13734 h
Cold starts	22
Warm starts	40
Hot starts	17
Note:	



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04: Additional Information

Used spare parts

- Baluff
- I/O card during fault finding of Baluff (old one OK)

Recommended spare parts for supply

- Baluff
- Rotor earth coals

Necessary adjustment by the Client

- · Change the faulty tachometer cards
- Connect/fix the missing casing temperature measurement.
- · Overhaul the casing water injector valve.
- Investigate/adjust the low turning gear speed.

Recommended future activities

- Mount back the original rotor earth brackets with new coals.
- Keep the maintenance plan with MO/LI/SI
- Keep a log book of important values according to operational manual
- Place a resistor on CJJ20 U13/06 CH 4 to remove signal fault.
- Do a new setup of the time synchronization ES/OS/AS/SICLOCK

Necessary updating of the documentation in Finspång

Backup of software

Backups of PCS7 and Bentley Nevada speed/vibration were taken

Circuit diagram

Stator temperature KKS are wrong in circuit diagram MKA10FT910, FT920, FT930.



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05: Register of appendix

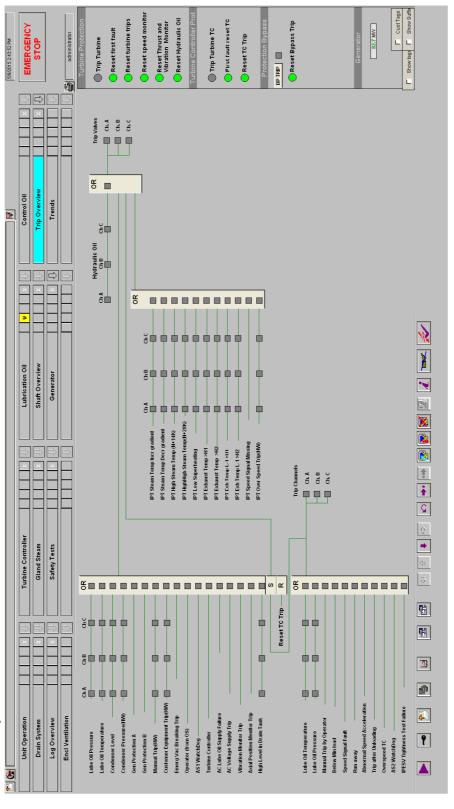
Appendix 1: Turbine tripsAppendix 2: Operational data

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Appendix 1 Turbine Trips



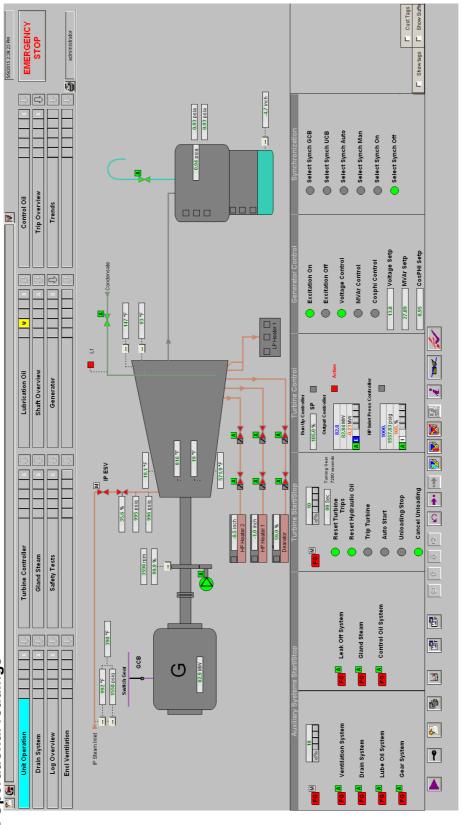
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Appendix 2 Operational readings



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High vibration
Low Lube Oil Temp
Low Initial Steam Temp
Overspeed Test CustTags C Show Suffix CV's Forced Closed EMERGENCY STOP Cancel Live Test
Freq./Outp. Contr administrator 5/8/2015 2:41:04 PM Decrease Runup Cancel Unloading Run UP Con Increase Runup Manual Runup Auto Start Ulive Test Trip Overview Control Oil 146.8°F 92.6 °F Load Curve 01 Run-Up Curve 01 19.1 °F 19 °F 816 °F × 35.6 % pisd same Shaft Overview Lubrication Oil M IP ESV 261.1psig | 109.3psig | 21.8 151.9 psia -6.4 psiq GCB 3599 rpm 996 psig -100.0% 82.8 M/V U Bleed Steam System 65.3 % Gland Steam Safety Tests 2 - z **Σ** ∢ × Ü ħ 12 105.0 40 itroke Detting Initial Pressure Controller ondenser Pressure Limiter IPT Step-Gradient Limiter IPT Max Stroke Limiter <u>"</u> SP 43.5 MAX FORCE LIMITER SP 0.0 SP 1158.6 MAX DP LIMITER 2 Max Output Limiter SP 100.0 Min Output Limiter SP 12.6 MW Log Overview 0.46 MW MAX DP LIMITER 1 SP 156.6 MAX DP LIMITER 4 105.% Unit Operation Encl Ventilation Drain System MAX DP LIMITER 3 ٢ <u>.</u> ₽

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☐ Show tags ☐ Show Suffe AC Pump 1 Test
AC Pump 2 Test DC Pump Test Bypass Test Test OK
Test Failed administrator 5/9/2015 2:41:54 PM Active Test OK Trip Overview Control Oil -0.38 psiq 134 °F 100.0 % × Shaft Overview 3600 rpm 100.0 % Lube oil purification Speed <4rpm Speed <300rpm Turbine Controller Safety Tests Gland Steam G **T** 曹 ZI. **M** Log Overview Encl Ventilation Unit Operation Drain System 9

CustTags C Show Suffix EMERGENCY STOP administrator 5/9/2015 2:43:37 PM **P P P** Trip Overview Page 12 (20) 116.7 °F ____ Lubrication Oil Shaft Overview Generator Date Classification For internal use 2106 psiq --82.6 MW 35.4 % Turbine Controller Gland Steam Safety Tests 髄 Document kind Report I Log Overview Unit Operation Encl Ventilation Drain System 7 <u>.</u> ₽

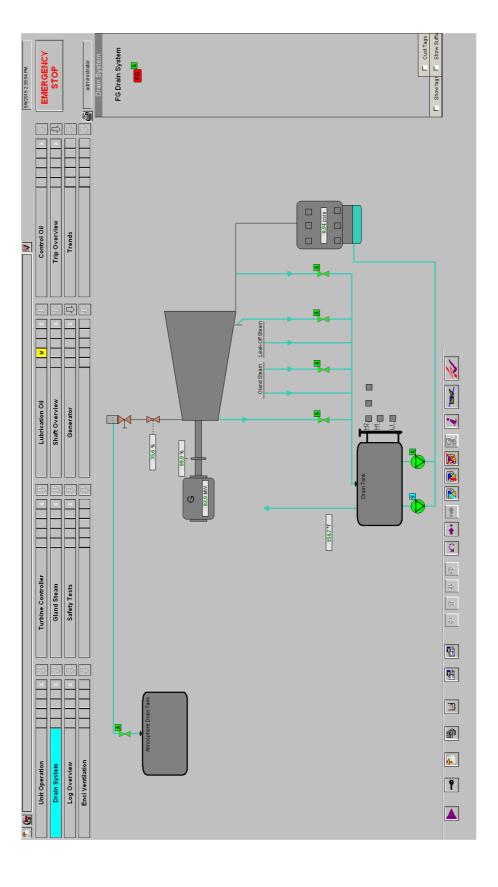
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CustTags C ShowSuffi EMERGENCY STOP administrator 5/9/2015 2:41:22 PM Ī 4.35 4.34 psig 29.63 % Trip Overview Control Oil Drain System 302. 305.6 °F 26.38 % --- LCE10AA105 Drain Syst Shaft Overview Lubrication Oil Gland Steam **Turbine Controller** Safety Tests 2.9 2.94 psig 46.9 % **P** Drain System 1559 psig ---- 105 °F **Ģ** 7° 707 **M** Motor Temp>H1 Gland Steam <u>"</u> Encl Ventilation Unit Operation Log Overview Drain System 7

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	Control Oil	Trip Overview	Trends		<u>0.06 (retris</u>	X Position 1.05 mils g		
Page 15 (20)	Lubrication Oil		Generator X			X Position 1.13 mis g	1. 91. 91. 91. 91. 91. 91. 91. 91. 91. 9	
Classification Date For internal use	×	×	1 x	Generator			3900 pm (100.05%)	
Document kind Report	Turbine Controller	Gland Steam	Safety Tests			X Postiton 1.16 mils 3	D WWW	
۵ ـد	Unit Operation	Drain System	Log Overview	Encl Ventilation		X Position 1.48 mils <u>B</u>		?

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Cust Tags Reset Bypass Trip EMERGENCY STOP administrator 5/9/2015 2:44:13 PM Control Oil Lubrication Oil Shaft Overview Generator 8 ... Condenser HH Level
Turbine Exhaust Temperature Spray Water Pressure Ok — Trip Bypass to Condenser Condenser HH Pressure Gland Steam Pressure -FG Turning Gear On — FG Gland Steam On — Shaft Speed >4rpm -Reset Bypass Trip **Turbine Controller** Gland Steam Safety Tests 髄 - Trip Overview BP Trip Overview <u>į</u> Log Overview Unit Operation Encl Ventilation Drain System 9

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☐ Show tags ☐ Show Suff EMERGENCY STOP administrator 5/8/2015 2:40:16 PM ā 82 °F 85 °F Temp in CJJ20 Temp in CJJ30 Temp in CJJ40 Trip Overview Control Oil Trends 1559 psig 994 "F 391 "F 173.7 °F 173.2 °F 173.2 °F 92.6 °F 93.0 °F 0.94 psia 0.94 psia 12344h 13734h Page 17 (20) Calc Number Of Cold Starts
Calc Number Of Warm Starts
Calc Number Of Hot Starts Calc Operating Hours Calc Eqv Operating Hours Condensor Pressure AS1
Condensor Pressure AS2 IP Inlet Pressure
IP Inlet Temperature
IP Inlet Superheat temp. Temp Phase 1
Temp Phase 2
Temp Phase 3
Temp Aff. Cooler NE Temp Aft. Cooler EE Temp Before Cooler 18 × Shaft Overview Lubrication Oil Generator •₩ 91 99.9 % 35.6 % 99.7 psig 99.7 psig 99.3 psig 147.0 ° 26.6 psig 100.4 psig 21.8 c.4 psig 3.6 kA 3.6 kA 3.6 kA 3.6 kA 13.8 kV 14.8 kV 14 Classification For internal use Turbine Speed
Pos P hiel Control Valve
IP Turbine Casing Temp.
Pressure Turbine hielt
Pressure Turbine hielt
Pressure Turbine hielt
Pressure Turbine hielt
pressure Pressure
IP T Exhaust Temp before
hiel stage
hiel stage ÷ Gen Voltage L1-L2 Gen Voltage L2-L3 Gen Voltage L3-L1 Gen Reactive Power Current phase L2 Current phase L3 Gen Aktive Power Frequence Ç 312.9 °F 305.4 °F 4.34 psiq 1557 psiq 709 °F 106.3 °F Turbine Controller 1 Gland Steam Safety Tests x y 1.1 mils g 0.6 mils g 1.0 mils p 1.5 mils g 0.8 mils g 1.7 mils p Gland Steam Pressure 1
Gland Steam Pressure 2
Gland Steam Supply Pressure
Gland Steam Supply Temp.
Gland Steam Supply Superh Temp. **E** Gland Steam Temp 1 Gland Steam Temp 2 曹 168.0 °F 0.05 inch/s Metal Temp Seismic Vibr 145.2 °F 0.06 inch/s 166.1 °F 0.05 inch/s Document kind Report XI. 29.8 psiq 113.0 °F 134.6 °F 0.4 psiq 126.1 °F 147.3 °F 125.9 °F -18.61mils 150.8 °F m <u>"</u> Log Overview
Encl Ventilation Unit Operation Drain System IPT Thrust Brg Upper/Oute IPT Thrust Brg Lower/Oute IPT Thrust Brg Upper/Inner IPT Thrust Brg LowerAnne ٢ IP-turbine Inlet/Thrust Brg Gen Non Exciter End Brg P-turbine Exhaust Brg Oil Pressure
Oil Temp Bef Bearings
Oil Tank Temp
Oil Tank Pressure Gen Exciter End Brg IPT Thrust Position <u>.</u> ₽

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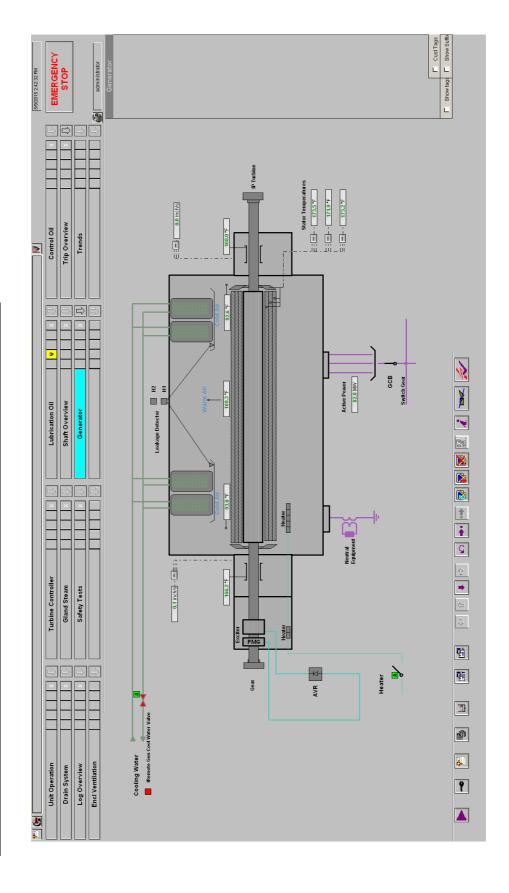
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	Control Oil	Trip Overview	Trends																	ı		
	× N	X				Reset Speed Monitor		essure L1												ı		N. T.
	Lubrication Oil	Shaft Overview	Generator Generator		d Monitor Tests	Channel Speed 100.0 % Reset	100.0%	Trip Block Pressure L1	ESV Tightness Tests	P		Stroke Tests								DC Lube Oil Pump Test		
	ıtroller	aam ×	sts		Speed	Trip Valve A	Trip Valve B	MAB10CS010/XH31 Trp Speed ChB Trip Valve C	ESVT	Cancel Turbir	100.0%	Cancel	•		,		• (•	DCLus	■> H1 ■ AS1 ■ AS2	
	Turbine Controller	Gland Steam	Safety Tests			Failed Trip Contacts				Failed Valve Position	35.5 %	Failed	N						N N		Failed	
	Unit Operation	Drain System	Log Overview	Encl Ventilation		Selection Active Blocked Ok				Selection Active Blocked Ok		Selection Active Blocked Ok									Selection Active Ok	
	Ď	۵	Ļ	Ē		S IPT Ch. A	IPT Ch. B	IPT Ch. C		S	IP ESV		IP ESV	NRV 1	NRV 2	č Z <u>QN</u>	NRV 4	NRV 5	NRV 6		S DC Lube Oil	

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5/9/2015 2:40:39 PM	EMERGENCY			administrator	Ventilation System					Reactive Pow, C. 25.8 MVAV Frequency, f. 60.0 Hz Power Factor, Pf. 0.95 Current, I. 3.6 kA	Show tags Show Suffi
	Control Oil	Trip Overview	Trends								
	Lubrication Oil N X	Shaft Overview x	Generator X			Vorifiation Fan	Generator	[₂ .		10.00 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
	Turbine Controller	Gland Steam	Safety Tests			Sound Enclosure	Exc.	0.0 DBIO 0.0	Vertilation Fan	104.17	
<u>.</u>	Unit Operation	Drain System	Log Overview	Encl Ventilation							