

CERTIFIED TEST DATA

GAS COMPRESSOR

PERFORMANCE ACCEPTANCE CERTIFICATE

SOLAR PROJECT NO.:
3B471

SOLAR NAME:
PAN-R50

GAS COMPRESSOR SERIAL NUMBER

GAS COMPRESSOR ACCEPTANCE APPROVAL

Solar Turbines Incorporated at San Diego certifies that the equipment identified above was tested as described herein and found to meet applicable requirements of the Solar Project Definition, the engineering specifications and the contractual requirements.

COMPRESSOR TEST ENGINEER:


D. Nguyen

DATE: 6-17-08

MANAGER, PRODUCTION
TEST ENGINEERING:


J. Lee

DATE: 6-17-08

TEST CONDITIONS AND TEST DATA

The gas compressor was tested on a Solar facility test stand using a facility control system. The performance and acceptance data is contained within this report.

ITEM 1. GAS COMPRESSOR ACCEPTANCE TEST

The attached figure labeled "Gas Compressor Production Test Instruction" is the specific test agenda for this gas compressor. It was prepared to reflect contractual requirements and compliance with Solar Engineering Specification ES 1597.

ITEM 2. GAS COMPRESSOR DATA

The attached figures define the testing and data taken on the gas compressor in compliance with Solar Engineering Specification ES 1597.

The attached section labeled "Gas Compressor Aerodynamic and Mechanical Performance Variance" accepts the discrepancy as tested.

The attached section labeled "Data Point" contains mechanical data at 70%, 80%, 90% and maximum continuous speeds, followed by a speed trend plot, bode plots and vibration signatures of the four proximitors probes.

The attached section is labeled "Estimated Compressor Performance" which contains the actual air test data of CFM and head plotted on the estimated air performance curve.

The attached section labeled "Gas Compressor Performance" contains data on which the upper portion of each data point shows measured parameters followed by several computer calculations. The CFM and head calculations are the plot points on the "Estimated Compressor Performance" figure.

The attached section labeled "Static Leak" documents seal leakage on primary and secondary seals up to maximum suction pressure.

ITEM 1. GAS COMPRESSOR ACCEPTANCE TEST

Gas Compressor Production Test Instruction Stamp-Off Sheet (Cells 12A, 12B and 12C)

Customer: PAN-R50	PD#: 2-3B471	Model: C4021TAU-0130
S/N:	T.E. Dan Nguyen/J.Lee	Staging: C2-1B

Oper #	Operation	Rev Date	Operation	QTT Stamp																																																																								
2000	General Guidelines	02/06	Guidelines for all subsequent operations	803																																																																								
2005	Visual Inspection	05/06	Name Plate Data: Model No. <u>C4021TAU-0130</u> Assembly P/N _____ Serial No. _____ Purchase Item No. <u>N/A</u> <table border="1"> <tr> <td>Critical Speed rpm (calculated)</td> <td>1st</td> <td>2nd</td> <td>Critical DANGER</td> <td>3rd</td> <td>18,500</td> </tr> <tr> <td>Speeds, continuous rpm</td> <td>Min.</td> <td>Max.</td> <td>14,300</td> <td>Trip</td> <td>105% Max</td> </tr> <tr> <td>Allowable Temp. (gas)</td> <td>Min.</td> <td>Max.</td> <td>350°F</td> <td></td> <td></td> </tr> <tr> <td>Operating Pres. psia</td> <td>Suction:</td> <td>533</td> <td>Discharge:</td> <td>763</td> <td></td> </tr> <tr> <td>Case Pres. Rating, psig max.</td> <td></td> <td>1600</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Hydro Test Pres.</td> <td>1.5X CASE PRE RATING</td> <td>Leak Test Pres.</td> <td>1500 PSIG</td> <td></td> <td></td> </tr> <tr> <td>ANSI Flg. size & rating, S/D/CI</td> <td colspan="5">20 CI 900 RFF</td> </tr> <tr> <td>1st Compartment staging</td> <td colspan="5">C2-1B</td> </tr> <tr> <td>2nd Compartment staging</td> <td colspan="5"></td> </tr> <tr> <td>Normal Capacity MMSCFD</td> <td>245</td> <td>Normal Power hp</td> <td>4443</td> <td></td> <td></td> </tr> <tr> <td>Year of Mfg.:</td> <td>2008</td> <td>Cprsr Wt.: 26,900 lbs</td> <td>Module Wt: 6,600 lbs</td> <td></td> <td></td> </tr> <tr> <td>For Integration as</td> <td>Ex II</td> <td>3</td> <td>G cb Temperature Code T</td> <td>3</td> <td></td> </tr> </table>	Critical Speed rpm (calculated)	1st	2nd	Critical DANGER	3rd	18,500	Speeds, continuous rpm	Min.	Max.	14,300	Trip	105% Max	Allowable Temp. (gas)	Min.	Max.	350°F			Operating Pres. psia	Suction:	533	Discharge:	763		Case Pres. Rating, psig max.		1600				Hydro Test Pres.	1.5X CASE PRE RATING	Leak Test Pres.	1500 PSIG			ANSI Flg. size & rating, S/D/CI	20 CI 900 RFF					1st Compartment staging	C2-1B					2nd Compartment staging						Normal Capacity MMSCFD	245	Normal Power hp	4443			Year of Mfg.:	2008	Cprsr Wt.: 26,900 lbs	Module Wt: 6,600 lbs			For Integration as	Ex II	3	G cb Temperature Code T	3		803
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2010	Review Paperwork	02/06	Compare Data nameplate with rest of paperwork	803																																																																								
2015	Install Unit on Test Bed	02/06	Cell: 12B Drive End: Suction	803																																																																								
2020	Computer Pre-Set	04/03	Max. Cont. Speed (RPM) <u>14300</u> Vibration Table No. <u>1</u> Lube Oil Temp (Deg F) <u>140</u> Seal Type: <u>Dry</u>	TE 22																																																																								
2025	Coupling Installation	07/07	Electro-Magnetism Check Complete: ☒ Yes ☐ No	803																																																																								
2028	Vibration, Temperature Ground Check & Hookup	07/03	Run #97 Continuity Between Compressor Frame and Prox. Probes: ☐ Yes ☒ No Prox. Probe Gap Voltages within Limits: ☒ Yes ☐ No	803																																																																								
2029	Breakaway Torque Measurement	04/06	Pre-Run: Breakaway Torque Value _____ lbf (Operation applies to C45, C65 and C51 Compressors)	N/A TE 22																																																																								
2030	Pre-Alignment	05/00	Record Coupling P/N Used <u>233020-1200</u> Record Axial Distance Measured <u>18.000</u>	803																																																																								
2035	Inlet Venturi, Suction & Discharge Duct Installation	04/03	Speed (RPM) <u>10686</u> Venturi Diameter <u>6.5xx</u>	411																																																																								

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Stamp-Off Sheet (Cells 12A, 12B and 12C)

Oper #	Operation	Rev Date	Operation	QTT Stamp
2040	Final Alignment	10/98	<u>0.000</u> <u>0.001</u> <u>0.0005</u> <u>0.002</u> Face <u>0.000</u> <u>0.005</u> <u>0.003</u> <u>0.008</u> Bore	
2050	Shaft Installation	07/07	Install interconnect shaft	
2055	Shaft Verification	07/07	Have someone, other than the person who installed the shaft, inspect the installation.	
2060	System Plumbing Hookup (Wet Seal)	10/98	Install the correct type slave fittings and flanges with the associated flex line hookups onto the lube oil, buffer gas, and seal oil ports of the compressor.	N/A
2065	System Plumbing Hookup (Dry Seal)	10/98	Install the correct type slave fittings and flanges with the associated flex line hookups onto the lube oil, buffer gas, and seal gas ports of the compressor.	
2070	Instrumentation Hookup	04/03	Axial Probe(s): 2 Thrust Bearing: RTD Radial Bearing: RTD Keyphasor: Yes Suction Damper Brg: No Impeller Eye: Yes	
2070	Transducer Hookup	04/03	P2/1 P2/2 Low Range Transducers DPEYE: High Range Transducers	
2075	Zero Check	06/06	Run #98 and IC_Check Verify and document that all parameters are reading normal in a static, ambient condition prior to turning on facilities.	
2080	Cell Configuration (Wet Seal)	10/98	On the skid gauge panel, open the buffer air hand valve and close filtered seal gas hand valve.	N/A
D	Double Breakdown Seals	04/00	Connect flex lines to the "Inter-Seal Cavity Pressure Ports" on the compressor to their respective PSOM.S and PSOM.D connections on the pressure patch panel.	N/A
2085	Cell Configuration (Dry Seal)	10/98	On the skid gauge panel, open the buffer air and filtered seal gas hand valves.	
2090	Pre-Lube and Leak Check	11/05	Run #99 <u>0</u> % <u>0</u> (RPM) Data point with facility air and oil pumps enabled	
2095	Break in Runs	03/08	Run #100 <u>100</u> %* <u>14300</u> (RPM) *DO NOT Exceed Max. Allowable Temp (T2)	T/E
2095	Break in Runs	07/07	Run #101 Slow Roll Run-out (Mils P-P): Suct <u>0.369</u> Disch <u>0.245</u> Maximum Axial Vibration (Mils P-P) Axial 1 <u>2.17</u> Axial 2 <u>2.14</u>	

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Gas Compressor Production Test Instruction Stamp-Off Sheet (Cells 12A, 12B and 12C)

Customer: PAN-R50	PD#: 2-3B471	Model: C4021TAU-0130
S/N:	T.E. Dan Nguyen/J.Lee	Staging: C2-1B

Oper #	Operation	Rev Date	Operation	QTT Stamp
2098	Gas Compressor Trim Balance	10/98	Complete Trim Balance Worksheet: Final Trim Balance Data: Suction: _____ Hole No(s) _____ Wgt (g) _____ Discharge: _____ Hole No(s) _____ Wgt (g) _____ Comments: _____ Run #102 (Same speed as Run #101) Complete: ☐ Yes ☐ No	N/A TE 22
2100	Mechanical Performance	07/07	Acceptance Vibration Limit (MIL P-P): <u>1.0</u> Discharge Air Temperature Limit (Deg F): <u>350</u> Data required for the following speed points (RPM): Run #1001 <u>70</u> (%) <u>10010</u> (RPM) Run #1002 <u>80</u> (%) <u>11440</u> (RPM) Run #1003 <u>90</u> (%) <u>12870</u> (RPM) Run #1004 <u>100</u> (%) <u>14300</u> (RPM)* *DO NOT exceed Max. Allowable Temp (T2)	807
C	4-Hour Test	07/07	Data taken at half hour intervals with compressor at max continuous speed.	N/A TE 22
2105	Aerodynamic Performance	05/07	Air Master Control No(s): <u>SD - 33187</u> 100% Air Speed (RPM): <u>12055</u> Discharge Air Temperature Limit (Deg F): <u>350</u> Speed Line data required for the following speeds (RPM) <u>88.6</u> (%) <u>10686</u> (RPM) _____ (%) _____ (RPM) _____ (%) _____ (RPM) _____ (%) _____ (RPM) _____ (%) _____ (RPM) _____ (%) _____ (RPM) Surge Line data required for the following speeds (RPM) <u>88.6</u> (%) <u>10686</u> (RPM) <u>70</u> (%) <u>8439</u> (RPM) <u>80</u> (%) <u>9644</u> (RPM) <u>100</u> (%) <u>12055</u> (RPM) _____ (%) _____ (RPM)	817
F	Unbalance Sensitivity	01/00	Unbalance Sensitivity Test (Target Weights) Suction Wgt (g) _____ Discharge Wgt (g) _____	N/A TE 22
F	Unbalance Sensitivity	01/00	Unbalance Sensitivity Test (Actual Weights) Suction Wgt (g) _____ Discharge Wgt (g) _____	N/A TE 22
2109	Performance Test Acceptance	08/03	Verify all data is acceptable and paperwork is complete up to this point (including stamps). Have test engineer review data to insure compressor acceptability prior to removing unit from test stand.	411
2110	Disconnect and De-Prep	10/98	Disconnect all facility instrumentation and hardware from the compressor and remove unit from the test stand.	817
2029	Breakaway Torque Measurement	04/06	Post-Run: Breakaway Torque Value _____ lbf (Operation applies to C45, C65 and C51 Compressors)	N/A TE 22
2112	Test Cell Cleanup (12A or 12B)	05/99	Store all facility equipment in its proper location. Do not leave material prone to weather damage exposed to the elements, especially interconnect shafts.	817

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Gas Compressor Production Test Instruction Stamp-Off Sheet (Cells 12A, 12B and 12C)

Customer: PAN-R50	PD#: 2-3B471	Model: C4021TAU-0130
S/N:	T.E. Dan Nguyen/J.Lee	Staging: C2-1B

Oper #	Operation	Rev Date	Operation	QTT Stamp
2115	Pressure Plate & Relief Valve Installation	10/00	Install the blank-off flanges and the pressure relief valve according to the test instructions.	
2120	Static Leak Test (Wet Seal)	02/06	Wet Seal Case Pressure (PSIG): <u>0</u>	N/A 
2120	Static Leak Test (Wet Seal)	02/06	Wet Seal - Amount of Residual Oil Suction Cavity: _____ Discharge Cavity: _____	N/A 
2125	Seal Leakage Test (Dry Seal)	02/06	Maximum Leak Test Pressure (PSIG): <u>1500</u>	
G	N2 Bottles/Facility Switching	03/00	This procedure is to be followed when using bottled nitrogen to test at pressures higher than maximum available facility pressure.	N/A 
2128	Remove Static Leak Test Hardware	02/07	Remove the suction and discharge pressure plates and associated facility hardware.	
2128	Bend All Lock Tabs & Stake Coupling	02/07	(Wet seal) Bend all lock tabs. Stake the coupling sleeves on both ends of the compressor.	N/A 
2129	Test Cell Cleanup (12C)	02/00	Return, with care, all facility items to their proper storage location.	
2130	Thread Check	02/00	Thread Check: ☐ Pass ☐ Fail If FAIL, send to CAM for thread repair Post-repair Thread Check: ☐ Pass ☐ Fail	N/A 
2135	Post Test Paperwork Review & Final Acceptance	03/03	Verify all specifications are met or accepted. Verify all discrepancies have been entered into the log and have been addressed. Ensure stamp-off sheet has been completely stamped off. Turn in folder containing all data to test engineer.	
2145	Green OK Tag	08/03	Fill out the green OK tag and along with the traveler, attach it to the compressor.	

ITEM 2. GAS COMPRESSOR DATA

Gas Compressor Aerodynamic and Mechanical Performance Variance

GAS COMPRESSOR AERODYNAMIC AND MECHANICAL PERFORMANCE VARIANCE

Model No.: G4021TAU-0130		Staging: [Prefix 400] C2-1B	
Serial No.:	Customer: PAN-R50	P.D.: 3B471	
Project Mgr: J. CLARY	Guarantee: ☐ Yes ☐ No		
Test Date: 05/05/08	Reviewed By: J. DI LIBERTI	Date: 05/05/08	
Is this a Retest? ☐ Yes ☒ No	If Yes W/N#:	Date Written:	
Has Compressor been Disassembled and Inspected? ☐ Yes ☒ No		Date:	
Have Identical Units Been Tested? ☐ Yes ☐ No:		P.D.:	
Test Engineer Comments: The compressor reached peak head coefficient on the air test prior to the prediction at 100 % air speed line (12055 rpm's)			
Signed <u>[Signature]</u> Test Engineer		Date <u>05/22/08</u> Accepted ☒ Rejected ☐	
Recommended Action Accept the unit. See attached variance for explanation			
Signed <u>[Signature]</u> Gas compressor Engineer		Date <u>05/18/08</u> Accepted ☒ Rejected ☐	
Performance Analysis Concurrence with Recommended Action: Yes ☐ No ☐ Comments or Recommendation:			
Signed <u>[Signature]</u> Performance Engineer		Date <u>06/15/08</u> Accepted ☒ Rejected ☐	
Project Management Concurrence with Recommended Action: Yes ☐ No ☐ Comments or Recommendations:			
Signed <u>[Signature]</u> Project Manager		Date <u>06/13/08</u> Accepted ☒ Rejected ☐	
Signed original forwarded to Test Engineer Date Received: _____			
Copy of this form to: Project Engineer		Date _____	
Quality control		Date _____	

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COMPRESSOR VARIANCE

Date: 05/18/08
To: J. Clary
From: Jean-Luc Di Liberti, GCE Aero performance
Subject: AIR TEST RESULTS FOR PAN-R50 C40P "C2-1" (PD 3B471,

A C40P with staging "C2-1" was air tested in Cell 12 in Kearny Mesa, San Diego, on May 5th, 2008. This compressor is to be used by (project PD.3B471) as a single body driven by a Centaur 50L.

Results of the air test are shown in Figure 1. The compressor shows a good head/flow capability. Head was slightly higher than predicted throughout the entire map. Surge margin was as predicted or better for the three lower speed lines. There is a flattening of the head flow curve before reaching the predicted surge line at the 100% speed line (the 100% speed line, corresponds to a rotational speed of 14,300 rpm in the field). The peak head coefficient was reached earlier than anticipated by 6.5% at high speed

Solar uses a conservative criterion to establish the surge line during the air test. The surge flow is based on the flow corresponding to the peak head coefficient. Regarding the 100% speed line, per Solar's test procedure ES1597, we are to issue a compressor variance followed by a recommendation because the peak head coefficient is reached at more than 5% surge margin.

Table 1 shows the operating points that were used during the compressor stage selection. Table 2 shows the corresponding performance with the new database. Only the head flow curve was adjusted. It is seen that this new characteristics does not impact any of the checkpoints.

Based on these results it is recommended to accept the unit as is.

Table 1 Original checkpoints

CS 1xCen50L-C402

--- Solar Turbines Incorporated, GCASE Rev 3.5.0:DB 96.00 ---

--- Run by J. Lotton on: 02 FEB. 2007 at 11:05:01

```
Compressor No.= 1                      Housing= C402
Case(kcx) 55, Type 0 Operation          Driven End= suction
EOS used= REDLICH-KWONG(components input) Seals= Dry Gas
Reynolds Correction: 3rd Gen Mach: First Driver= Centaur 50L
```

Stages: [409] C21
Stage Diam.: 17.80

Case Line	Spring 200	Spring 200 Pwr.	Winter 200	Winter 200 Pwr.	
KCX	2	55	2	55	
POSITION					
P1	533.55	533.55	583.55	583.55	psia
P2	763.55	763.55	808.55	808.55	psia
HEAD, ISEN	15946.5	15946.5	13979.9	13979.9	ft-lbf/lbm
HEAD, POLY	16058.0	16064.7	14069.4	14083.3	ft-lbf/lbm
INLET FLOW	4319.85	5187.45	4207.21	5314.61	acfm
STANDARD FLOW	245.00	294.21	270.00	341.07	mmscfd
POWER	4488.	5436.	4327.	5587.	hp
SPEED	12668.	13163.	11968.	12655.	rpm
PRESS. RATIO	1.431	1.431	1.386	1.386	
T1	60.0	60.0	50.0	50.0	Deg F
T2	113.9	114.2	98.4	99.2	Deg F
EFF, ISEN	85.7	85.0	85.9	84.0	percent
EFF, POLY	86.3	85.6	86.4	84.6	percent
SURGE MARGIN	27.2	36.1	30.5	40.6	percent
TURNDOWN	31.3	42.8	35.2	48.7	percent
SPEC. GRAVITY	0.6005	0.6005	0.6005	0.6005	
K1	1.307	1.307	1.311	1.311	
K2	1.289	1.289	1.294	1.294	
PCP	672.2	672.2	672.2	672.2	psia
PCT	351.1	351.1	351.1	351.1	Deg R
Z1	0.9216	0.9216	0.9082	0.9082	
Z2	0.9252	0.9253	0.9123	0.9128	
K - 50 DEG F	1.311	1.311	1.311	1.311	
K - 300 DEG F	1.240	1.240	1.240	1.240	
OPTIMUM POWER	0.	5437.	0.	5600.	hp
OPTIMUM SPEED	0.	13256.	0.	13295.	rpm

Table 2 Original checkpoints rerun with revised database

--- Solar Turbines Incorporated, GCASE Rev 3.5.6:DB125.00

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--- Run by J-L DiLiberti on: 20 MAY 2008 at 09:42:29 ---

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Compressor No.= 1                      Housing= C402
Case(kcx) 2, Type 0 Operation          Driven End= suction
EOS used= REDLICH-KWONG(properties input)  Seals= Dry Gas
Reynolds Correction: 3rd_Gen Mach: First  Driver= Centaur 50L
```

Stages: [409] C21
Stage Diam.: 17.80

KCX	2	55	2	55	
POSITION					
P1	533.55	533.55	583.55	583.55	psia
P2	763.55	763.55	808.55	808.55	psia
HEAD, ISEN	15963.9	15963.9	13988.8	13988.8	ft-lbf/lbm
HEAD, POLY	16078.6	16087.2	14080.3	14096.5	ft-lbf/lbm
INLET FLOW	4319.97	5176.33	4207.34	5296.50	acfm
STANDARD FLOW	245.00	293.57	270.00	339.90	mmscfd
POWER	4487.	5435.	4326.	5583.	hp
SPEED	12595.	13069.	11897.	12566.	rpm
PRESS. RATIO	1.431	1.431	1.386	1.386	
T1	60.0	60.0	50.0	50.0	Deg F
T2	115.1	115.6	99.2	100.1	Deg F
EFF, ISEN	85.8	84.9	85.9	83.8	percent
EFF, POLY	86.4	85.6	86.5	84.5	percent
SURGE MARGIN	26.4	35.2	29.8	39.7	percent
TURNDOWN	30.0	41.6	34.2	47.8	percent
SPEC. GRAVITY	0.6005	0.6005	0.6005	0.6005	
K1	1.310	1.310	1.311	1.311	
K2	1.307	1.307	1.308	1.308	
PCP	672.2	672.2	672.2	672.2	psia
PCT	351.1	351.1	351.1	351.1	Deg R
Z1	0.9216	0.9216	0.9083	0.9083	
Z2	0.9258	0.9261	0.9128	0.9134	
K - 50 DEG F	1.311	1.311	1.311	1.311	
K - 300 DEG F	1.294	1.294	1.294	1.294	
OPTIMUM POWER	0.	5436.	0.	5600.	hp
OPTIMUM SPEED	0.	13256.	0.	13295.	rpm

Estimated Compressor Performance Based On:
 Air at P1 = 14.7 PSIA T1 = 70. F
 [400] C21

Centrifugal Sta.
 HP/HR = 0.508

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Control No.
5D-33167
Issue Date
24-APR-08
Engineer
J. DILBERT

Equivalent Speeds		
%	Gas Speed	Test Speed
100.0	14360	12055
88.6	12675	10686 Design
80.0	11440	9644
70.0	10010	8429
60.0	8583	7233

$Q_{max} = 3211$
 $Q_{avg} = 3060$
 6.5 X
 $3000 \frac{3500}{1}$

PAN-R50
 P.I. 2-38471 P-38511
 S/N:
 P/N: C38471-61
 TEST DATE: 5/5/2008
 VENTURE: 6.526
 SEQUENCE: 81461
 MODEL: C4821AU-0130

1794 - A-1123
 New unit

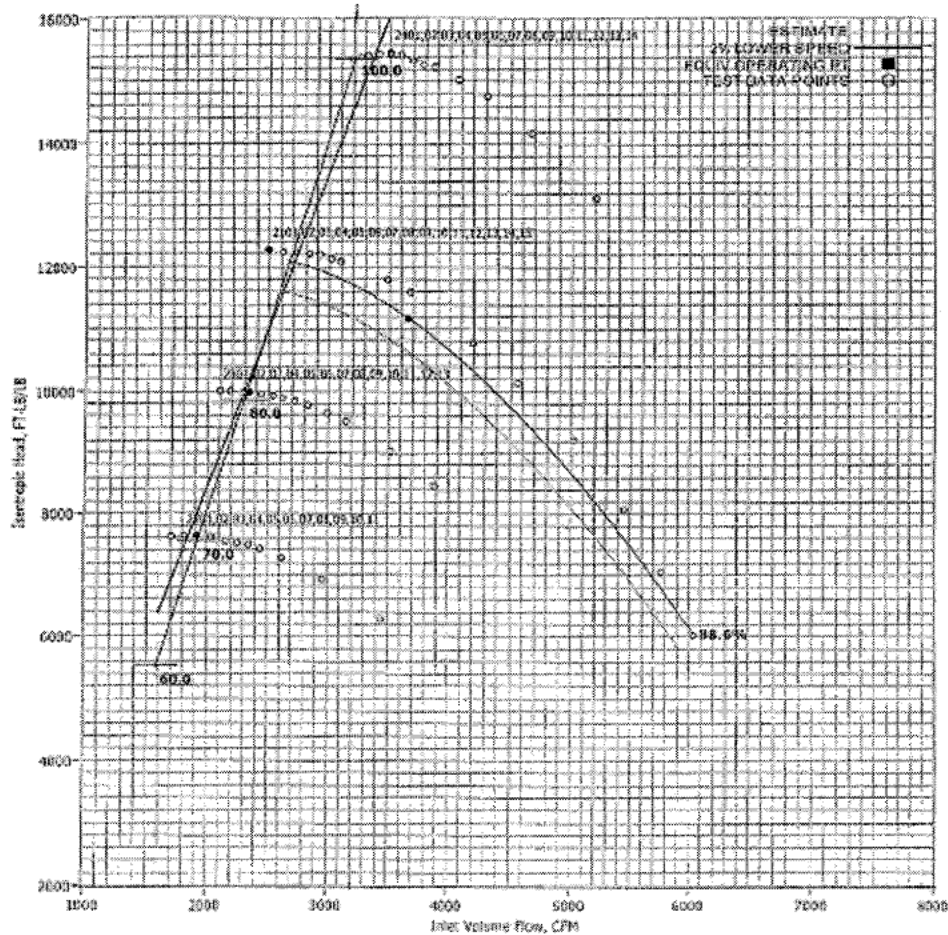


Figure 1 Air test results

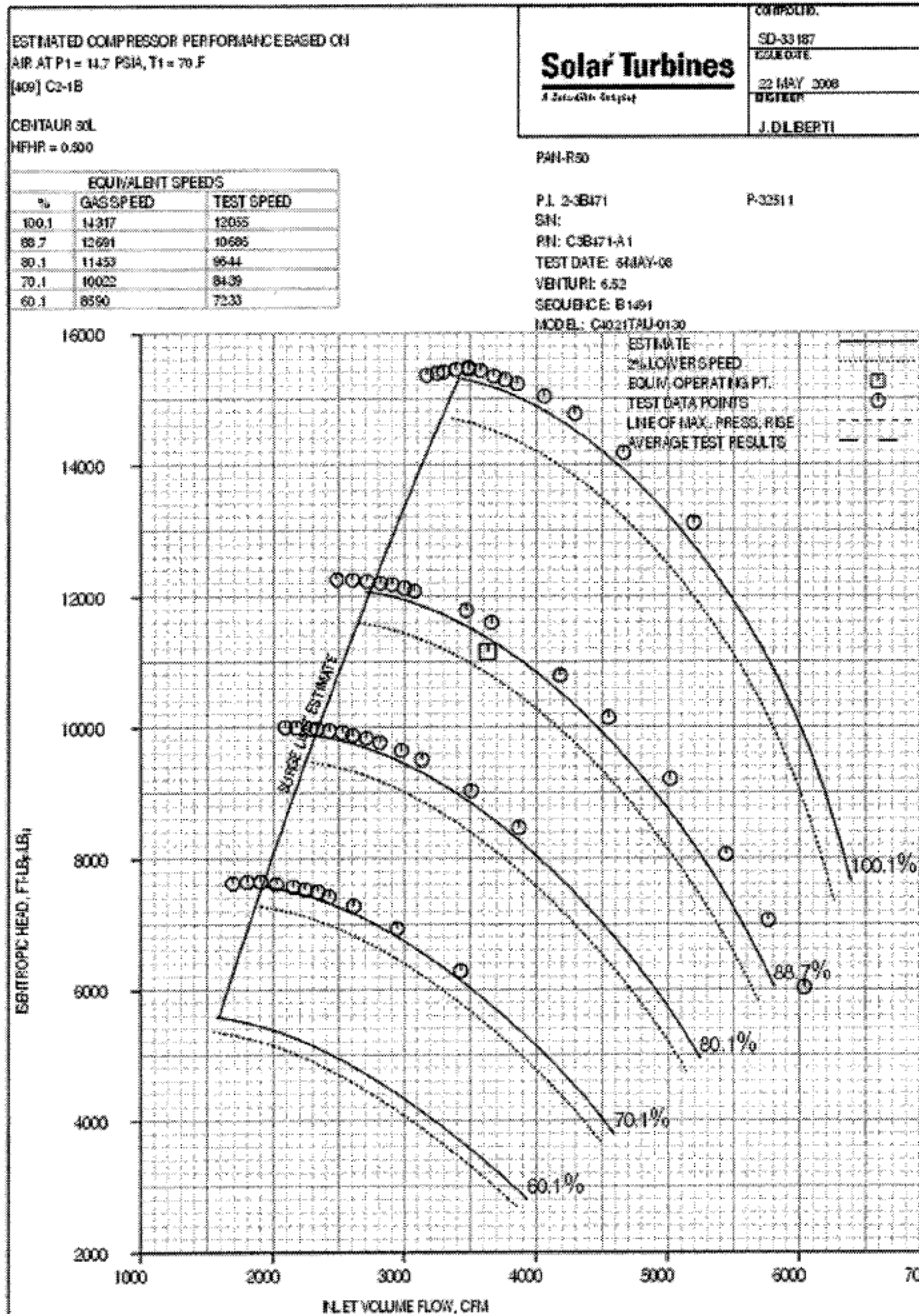


Figure 2 Revised map (in air)

Data Point

Project.....:2-3B471
Compressor S/N.....:
Test Engineer.....:D. Nguyen
Cell.....:12B

Customer.....:PAN-R50
Compressor Model.....:C4021TAU-0130
Operator.....:DANIEL LEONARD
Test Description.....:Production Air Performance Test

Parameter Name	Eng. Units	Current Value	Low Limit	High Limit
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***RUN NUMBER & GAS COMPRESSOR SPEED ***

RUN.#		1001	--	--	RUN NUMBER
NGC	RPM	10009	0	14350	GAS COMPRESSOR SPEED
%NGC	%	70.0	--	--	PERCENT SPEED, GAS COMPRESSOR ROTOR
NGC.100%	RPM	14300	--	--	100% GAS SPEED

***LUBRICATION: PRESS, TEMP & FLOWS ***

PLO.S	PSIG	35	30	40	PRESS., LUBE OIL, SUCTION BRG.	
PLO.D	PSIG	35	30	40	PRESS., LUBE OIL, DISCHARGE BRG.	
FLO.S	GPM	45.1	32.0	47.0	FLOW, LUBE OIL, SUCTION BRG.	
FLO.D	GPM	4.3	2.5	5.0	FLOW, LUBE OIL, DISCHARGE BRG.	
PBSG.S	PSIG	21.7	20.0	25.0	PRESS., BARRIER SEAL GAS, SUCTION (DRY)	
PBSG.D	PSIG	21.7	20.0	25.0	PRESS., BARRIER SEAL GAS, DISCHARGE (DRY)	
FBSG.S	SCFM	-0.04	--	0.30	FLOW, BARRIER SEAL GAS, SUCTION	
FBSG.D	SCFM	-0.04	--	0.30	FLOW, BARRIER SEAL GAS, DISCHARGE	
PDGSG.S	PSIG	21.1	18.0	22.0	PRESS., DRY GAS SEAL GAS, SUCTION	
PDGSG.D	PSIG	21.0	18.0	22.0	PRESS., DRY GAS SEAL GAS, DISCHARGE	
TLO.IN.S	DEG.F	142	135	145	TEMP., LUBE OIL IN, SUCTION BRG.	
TLO.IN.D	DEG.F	136	135	145	TEMP., LUBE OIL IN, DISCHARGE BRG.	
TL.OUT.S	DEG.F	150	50	250	TEMP., LUBE OIL OUT, SUCTION BRG.	
TL.OUT.D	DEG.F	145	50	250	TEMP., LUBE OIL OUT, DISCHARGE BRG.	
DT.LO.S	DEG.F	8	2	50	DELTA TEMP., LUBE OIL, SUCTION BRG.	-(OUT-IN)
DT.LO.D	DEG.F	9	2	50	DELTA TEMP., LUBE OIL, DISCHARGE BRG.	-(OUT-IN)
T.BRG.S1	DEG.F	159	0	210	TEMP., RADIAL BRG., SUCT., #1	
T.BRG.S2	DEG.F	160	0	210	TEMP., RADIAL BRG., SUCT., #2	
T.BRG.S3	DEG.F	148	0	210	TEMP., RADIAL BRG., SUCT., #3	
T.BRG.S4	DEG.F	154	0	210	TEMP., RADIAL BRG., SUCT., #4	
T.BRG.D1	DEG.F	160	0	210	TEMP., RADIAL BRG., DISCH., #1	
T.BRG.D2	DEG.F	163	0	210	TEMP., RADIAL BRG., DISCH., #2	
T.BRG.D3	DEG.F	152	0	210	TEMP., RADIAL BRG., DISCH., #3	
T.BRG.D4	DEG.F	151	0	210	TEMP., RADIAL BRG., DISCH., #4	
TTBRG.I1	DEG.F	157	0	190	TEMP., THRUST BRG, INBOARD, #1	
TTBRG.I2	DEG.F	156	0	190	TEMP., THRUST BRG, INBOARD, #2	
TTBRG.O1	DEG.F	161	0	190	TEMP., THRUST BRG, OUTBOARD, #1	
TTBRG.O2	DEG.F	157	0	190	TEMP., THRUST BRG, OUTBOARD, #2	

***VIB: DISPL(PROX) AND GAP VOLTS ***

VIB.S.X	MILS.P-P	0.40	0.00	1.00	VIB., SUCTION BRG., X
VIB.S.Y	MILS.P-P	0.45	0.00	1.00	VIB., SUCTION BRG., Y
VIB.D.X	MILS.P-P	0.50	0.00	1.00	VIB., DISCHARGE BRG., X
VIB.D.Y	MILS.P-P	0.45	0.00	1.00	VIB., DISCHARGE BRG., Y
GAP.S.X	VDC	-9.1	-10.2	-6.8	GAP VOLTAGE, PROX. PROBE, SUCTION BRG., X
GAP.S.Y	VDC	-9.2	-10.2	-6.8	GAP VOLTAGE, PROX. PROBE, SUCTION BRG., Y
GAP.D.X	VDC	-8.4	-10.2	-6.8	GAP VOLTAGE, PROX. PROBE, DISCHARGE BRG., X
GAP.D.Y	VDC	-8.8	-10.2	-6.8	GAP VOLTAGE, PROX. PROBE, DISCHARGE BRG., Y
AX.POS1	VDC	-9.5	-11.0	-6.8	AXIAL POSITION #1 (GAS COMPRESSOR)
AX.POS2	VDC	-9.7	-11.0	-6.8	AXIAL POSITION #2 (GAS COMPRESSOR)

***AIR TEMP ***

T1.AVG	DEG.F	60	--	--	TEMP., COMPRESSOR SUCTION AIR, AVERAGE
T2.AVG	DEG.F	92	--	--	TEMP., COMPRESSOR DISCHARGE AIR, AVERAGE

***AMBIENT CONDITIONS ***

P.BARO	IN.HG	29.45	25.00	35.00	PRESS., BAROMETRIC (IN.HG)
PBARO	PSIA	14.462	--	--	PRESS., BAROMETRIC (PSIA)
T.AMB	DEG.F	61.3	10.0	110.0	TEMP., AMBIENT
%R.H.	%	50	0	100	PERCENT RELATIVE HUMIDITY

***FACILITY: CALIB & VERIFICATION ***

PBARO.SL	IN.HG	29.90	--	--	PRESS., BAROMETRIC @ SEA LEVEL (IN.HG)
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Project.....:2-3B471
Compressor S/N.....:
Test Engineer.....:D. Nguyen
Cell.....:12B

Customer.....:PAN-R50
Compressor Model.....:C4021TAU-0130
Operator.....:DANIEL LEONARD
Test Description.....:Production Air Performance Test

Parameter Name	Eng. Units	Current Value	Low Limit	High Limit
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***RUN NUMBER & GAS COMPRESSOR SPEED ***

RUN.#		1002	--	--	RUN NUMBER
NGC	RPM	11438	0	14350	GAS COMPRESSOR SPEED
%NGC	%	80.0	--	--	PERCENT SPEED, GAS COMPRESSOR ROTOR
NGC.100%	RPM	14300	--	--	100% GAS SPEED

***LUBRICATION: PRESS, TEMP & FLOWS ***

PLO.S	PSIG	35	30	40	PRESS., LUBE OIL, SUCTION BRG.
PLO.D	PSIG	35	30	40	PRESS., LUBE OIL, DISCHARGE BRG.
FLO.S	GPM	45.1	32.0	47.0	FLOW, LUBE OIL, SUCTION BRG.
FLO.D	GPM	4.3	2.5	5.0	FLOW, LUBE OIL, DISCHARGE BRG.
PBSG.S	PSIG	21.7	20.0	25.0	PRESS., BARRIER SEAL GAS, SUCTION (DRY)
PBSG.D	PSIG	21.7	20.0	25.0	PRESS., BARRIER SEAL GAS, DISCHARGE (DRY)
FBSG.S	SCFM	-0.04	--	0.30	FLOW, BARRIER SEAL GAS, SUCTION
FBSG.D	SCFM	-0.04	--	0.30	FLOW, BARRIER SEAL GAS, DISCHARGE
PDGSG.S	PSIG	21.1	18.0	22.0	PRESS., DRY GAS SEAL GAS, SUCTION
PDGSG.D	PSIG	21.0	18.0	22.0	PRESS., DRY GAS SEAL GAS, DISCHARGE
TLO.IN.S	DEG.F	142	135	145	TEMP., LUBE OIL IN, SUCTION BRG.
TLO.IN.D	DEG.F	137	135	145	TEMP., LUBE OIL IN, DISCHARGE BRG.
TL.OUT.S	DEG.F	152	50	250	TEMP., LUBE OIL OUT, SUCTION BRG.
TL.OUT.D	DEG.F	147	50	250	TEMP., LUBE OIL OUT, DISCHARGE BRG.
DT.LO.S	DEG.F	10	2	50	DELTA TEMP., LUBE OIL, SUCTION BRG.
DT.LO.D	DEG.F	10	2	50	DELTA TEMP., LUBE OIL, DISCHARGE BRG.
T.BRG.S1	DEG.F	161	0	210	TEMP., RADIAL BRG., SUCT., #1
T.BRG.S2	DEG.F	162	0	210	TEMP., RADIAL BRG., SUCT., #2
T.BRG.S3	DEG.F	151	0	210	TEMP., RADIAL BRG., SUCT., #3
T.BRG.S4	DEG.F	157	0	210	TEMP., RADIAL BRG., SUCT., #4
T.BRG.D1	DEG.F	163	0	210	TEMP., RADIAL BRG., DISCH., #1
T.BRG.D2	DEG.F	166	0	210	TEMP., RADIAL BRG., DISCH., #2
T.BRG.D3	DEG.F	154	0	210	TEMP., RADIAL BRG., DISCH., #3
T.BRG.D4	DEG.F	154	0	210	TEMP., RADIAL BRG., DISCH., #4
TTBRG.I1	DEG.F	158	0	190	TEMP., THRUST BRG, INBOARD, #1
TTBRG.I2	DEG.F	158	0	190	TEMP., THRUST BRG, INBOARD, #2
TTBRG.O1	DEG.F	163	0	190	TEMP., THRUST BRG, OUTBOARD, #1
TTBRG.O2	DEG.F	158	0	190	TEMP., THRUST BRG, OUTBOARD, #2

-(OUT-IN)
-(OUT-IN)

***VIB: DISPL(PROX) AND GAP VOLTS ***

VIB.S.X	MILS.P-P	0.40	0.00	1.00	VIB., SUCTION BRG., X
VIB.S.Y	MILS.P-P	0.40	0.00	1.00	VIB., SUCTION BRG., Y
VIB.D.X	MILS.P-P	0.45	0.00	1.00	VIB., DISCHARGE BRG., X
VIB.D.Y	MILS.P-P	0.42	0.00	1.00	VIB., DISCHARGE BRG., Y
GAP.S.X	VDC	-9.1	-10.2	-6.8	GAP VOLTAGE, PROX. PROBE, SUCTION BRG., X
GAP.S.Y	VDC	-9.2	-10.2	-6.8	GAP VOLTAGE, PROX. PROBE, SUCTION BRG., Y
GAP.D.X	VDC	-8.4	-10.2	-6.8	GAP VOLTAGE, PROX. PROBE, DISCHARGE BRG., X
GAP.D.Y	VDC	-8.8	-10.2	-6.8	GAP VOLTAGE, PROX. PROBE, DISCHARGE BRG., Y
AX.POS1	VDC	-9.3	-11.0	-6.8	AXIAL POSITION #1 (GAS COMPRESSOR)
AX.POS2	VDC	-9.5	-11.0	-6.8	AXIAL POSITION #2 (GAS COMPRESSOR)

***AIR TEMP ***

T1.AVG	DEG.F	61	--	--	TEMP., COMPRESSOR SUCTION AIR, AVERAGE
T2.AVG	DEG.F	103	--	--	TEMP., COMPRESSOR DISCHARGE AIR, AVERAGE

***AMBIENT CONDITIONS ***

P.BARO	IN.HG	29.45	25.00	35.00	PRESS., BAROMETRIC (IN.HG)
PBARO	PSIA	14.463	--	--	PRESS., BAROMETRIC (PSIA)
T.AMB	DEG.F	61.9	10.0	110.0	TEMP., AMBIENT
%R.H.	%	50	0	100	PERCENT RELATIVE HUMIDITY

***FACILITY: CALIB & VERIFICATION ***

PBARO.SL	IN.HG	29.90	--	--	PRESS., BAROMETRIC @ SEA LEVEL (IN.HG)
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Project.....:2-3B471
Compressor S/N.....:
Test Engineer.....:D. Nguyen
Cell.....:12B

Customer.....:PAN-R50
Compressor Model.....:C4021TAU-0130
Operator.....:DANIEL LEONARD
Test Description.....:Production Air Performance Test

Parameter Name	Eng. Units	Current Value	Low Limit	High Limit
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***RUN NUMBER & GAS COMPRESSOR SPEED ***

RUN.#		1003	--	--	RUN NUMBER
NGC	RPM	12869	0	14350	GAS COMPRESSOR SPEED
%NGC	%	90.0	--	--	PERCENT SPEED, GAS COMPRESSOR ROTOR
NGC.100%	RPM	14300	--	--	100% GAS SPEED

***LUBRICATION: PRESS, TEMP & FLOWS ***

PLO.S	PSIG	35	30	40	PRESS., LUBE OIL, SUCTION BRG.	
PLO.D	PSIG	35	30	40	PRESS., LUBE OIL, DISCHARGE BRG.	
FLO.S	GPM	45.5	32.0	47.0	FLOW, LUBE OIL, SUCTION BRG.	
FLO.D	GPM	4.3	2.5	5.0	FLOW, LUBE OIL, DISCHARGE BRG.	
PBSG.S	PSIG	21.7	20.0	25.0	PRESS., BARRIER SEAL GAS, SUCTION (DRY)	
PBSG.D	PSIG	21.7	20.0	25.0	PRESS., BARRIER SEAL GAS, DISCHARGE (DRY)	
FBSG.S	SCFM	-0.04	--	0.30	FLOW, BARRIER SEAL GAS, SUCTION	
FBSG.D	SCFM	-0.04	--	0.30	FLOW, BARRIER SEAL GAS, DISCHARGE	
PDGSG.S	PSIG	21.1	18.0	22.0	PRESS., DRY GAS SEAL GAS, SUCTION	
PDGSG.D	PSIG	21.1	18.0	22.0	PRESS., DRY GAS SEAL GAS, DISCHARGE	
TLO.IN.S	DEG.F	142	135	145	TEMP., LUBE OIL IN, SUCTION BRG.	
TLO.IN.D	DEG.F	137	135	145	TEMP., LUBE OIL IN, DISCHARGE BRG.	
TL.OUT.S	DEG.F	156	50	250	TEMP., LUBE OIL OUT, SUCTION BRG.	
TL.OUT.D	DEG.F	149	50	250	TEMP., LUBE OIL OUT, DISCHARGE BRG.	
DT.LO.S	DEG.F	14	2	50	DELTA TEMP., LUBE OIL, SUCTION BRG.	-(OUT-IN)
DT.LO.D	DEG.F	12	2	50	DELTA TEMP., LUBE OIL, DISCHARGE BRG.	-(OUT-IN)
T.BRG.S1	DEG.F	164	0	210	TEMP., RADIAL BRG., SUCT., #1	
T.BRG.S2	DEG.F	165	0	210	TEMP., RADIAL BRG., SUCT., #2	
T.BRG.S3	DEG.F	153	0	210	TEMP., RADIAL BRG., SUCT., #3	
T.BRG.S4	DEG.F	159	0	210	TEMP., RADIAL BRG., SUCT., #4	
T.BRG.D1	DEG.F	166	0	210	TEMP., RADIAL BRG., DISCH., #1	
T.BRG.D2	DEG.F	168	0	210	TEMP., RADIAL BRG., DISCH., #2	
T.BRG.D3	DEG.F	157	0	210	TEMP., RADIAL BRG., DISCH., #3	
T.BRG.D4	DEG.F	156	0	210	TEMP., RADIAL BRG., DISCH., #4	
TTBRG.I1	DEG.F	166	0	190	TEMP., THRUST BRG, INBOARD, #1	
TTBRG.I2	DEG.F	167	0	190	TEMP., THRUST BRG, INBOARD, #2	
TTBRG.O1	DEG.F	166	0	190	TEMP., THRUST BRG, OUTBOARD, #1	
TTBRG.O2	DEG.F	161	0	190	TEMP., THRUST BRG, OUTBOARD, #2	

***VIB: DISPL(PROX) AND GAP VOLTS ***

VIB.S.X	MILS.P-P	0.35	0.00	1.00	VIB., SUCTION BRG., X
VIB.S.Y	MILS.P-P	0.38	0.00	1.00	VIB., SUCTION BRG., Y
VIB.D.X	MILS.P-P	0.35	0.00	1.00	VIB., DISCHARGE BRG., X
VIB.D.Y	MILS.P-P	0.35	0.00	1.00	VIB., DISCHARGE BRG., Y
GAP.S.X	VDC	-9.1	-10.2	-6.8	GAP VOLTAGE, PROX. PROBE, SUCTION BRG., X
GAP.S.Y	VDC	-9.2	-10.2	-6.8	GAP VOLTAGE, PROX. PROBE, SUCTION BRG., Y
GAP.D.X	VDC	-8.3	-10.2	-6.8	GAP VOLTAGE, PROX. PROBE, DISCHARGE BRG., X
GAP.D.Y	VDC	-8.8	-10.2	-6.8	GAP VOLTAGE, PROX. PROBE, DISCHARGE BRG., Y
AX.POS1	VDC	-9.2	-11.0	-6.8	AXIAL POSITION #1 (GAS COMPRESSOR)
AX.POS2	VDC	-9.4	-11.0	-6.8	AXIAL POSITION #2 (GAS COMPRESSOR)

***AIR TEMP ***

T1.AVG	DEG.F	60	--	--	TEMP., COMPRESSOR SUCTION AIR, AVERAGE
T2.AVG	DEG.F	114	--	--	TEMP., COMPRESSOR DISCHARGE AIR, AVERAGE

***AMBIENT CONDITIONS ***

P.BARO	IN.HG	29.45	25.00	35.00	PRESS., BAROMETRIC (IN.HG)
PBARO	PSIA	14.462	--	--	PRESS., BAROMETRIC (PSIA)
T.AMB	DEG.F	62.7	10.0	110.0	TEMP., AMBIENT
%R.H.	%	49	0	100	PERCENT RELATIVE HUMIDITY

***FACILITY: CALIB & VERIFICATION ***

PBARO.SL	IN.HG	29.90	--	--	PRESS., BAROMETRIC @ SEA LEVEL (IN.HG)
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Project.....:2-3B471
Compressor S/N.....:
Test Engineer.....:D. Nguyen
Cell.....:12B

Customer.....:PAN-R50
Compressor Model.....:C4021TAU-0130
Operator.....:DANIEL LEONARD
Test Description.....:Production Air Performance Test

Parameter Name	Eng. Units	Current Value	Low Limit	High Limit
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***RUN NUMBER & GAS COMPRESSOR SPEED ***

RUN.#		1004	--	--	RUN NUMBER
NGC	RPM	14302	0	14350	GAS COMPRESSOR SPEED
%NGC	%	100.0	--	--	PERCENT SPEED, GAS COMPRESSOR ROTOR
NGC.100%	RPM	14300	--	--	100% GAS SPEED

***LUBRICATION: PRESS, TEMP & FLOWS ***

PLO.S	PSIG	35	30	40	PRESS., LUBE OIL, SUCTION BRG.	
PLO.D	PSIG	35	30	40	PRESS., LUBE OIL, DISCHARGE BRG.	
FLO.S	GPM	45.9	32.0	47.0	FLOW, LUBE OIL, SUCTION BRG.	
FLO.D	GPM	4.3	2.5	5.0	FLOW, LUBE OIL, DISCHARGE BRG.	
PBSG.S	PSIG	21.7	20.0	25.0	PRESS., BARRIER SEAL GAS, SUCTION (DRY)	
PBSG.D	PSIG	21.7	20.0	25.0	PRESS., BARRIER SEAL GAS, DISCHARGE (DRY)	
FBSG.S	SCFM	-0.04	--	0.30	FLOW, BARRIER SEAL GAS, SUCTION	
FBSG.D	SCFM	-0.04	--	0.30	FLOW, BARRIER SEAL GAS, DISCHARGE	
PDGSG.S	PSIG	21.1	18.0	22.0	PRESS., DRY GAS SEAL GAS, SUCTION	
PDGSG.D	PSIG	21.1	18.0	22.0	PRESS., DRY GAS SEAL GAS, DISCHARGE	
TLO.IN.S	DEG.F	142	135	145	TEMP., LUBE OIL IN, SUCTION BRG.	
TLO.IN.D	DEG.F	137	135	145	TEMP., LUBE OIL IN, DISCHARGE BRG.	
TL.OUT.S	DEG.F	162	50	250	TEMP., LUBE OIL OUT, SUCTION BRG.	
TL.OUT.D	DEG.F	152	50	250	TEMP., LUBE OIL OUT, DISCHARGE BRG.	
DT.LO.S	DEG.F	20	2	50	DELTA TEMP., LUBE OIL, SUCTION BRG.	-(OUT-IN)
DT.LO.D	DEG.F	15	2	50	DELTA TEMP., LUBE OIL, DISCHARGE BRG.	-(OUT-IN)
T.BRG.S1	DEG.F	166	0	210	TEMP., RADIAL BRG., SUCT., #1	
T.BRG.S2	DEG.F	167	0	210	TEMP., RADIAL BRG., SUCT., #2	
T.BRG.S3	DEG.F	155	0	210	TEMP., RADIAL BRG., SUCT., #3	
T.BRG.S4	DEG.F	162	0	210	TEMP., RADIAL BRG., SUCT., #4	
T.BRG.D1	DEG.F	168	0	210	TEMP., RADIAL BRG., DISCH., #1	
T.BRG.D2	DEG.F	171	0	210	TEMP., RADIAL BRG., DISCH., #2	
T.BRG.D3	DEG.F	160	0	210	TEMP., RADIAL BRG., DISCH., #3	
T.BRG.D4	DEG.F	158	0	210	TEMP., RADIAL BRG., DISCH., #4	
TTBRG.I1	DEG.F	170	0	190	TEMP., THRUST BRG, INBOARD, #1	
TTBRG.I2	DEG.F	170	0	190	TEMP., THRUST BRG, INBOARD, #2	
TTBRG.O1	DEG.F	176	0	190	TEMP., THRUST BRG, OUTBOARD, #1	
TTBRG.O2	DEG.F	174	0	190	TEMP., THRUST BRG, OUTBOARD, #2	

***VIB: DISPL(PROX) AND GAP VOLTS ***

VIB.S.X	MILS.P-P	0.35	0.00	1.00	VIB., SUCTION BRG., X
VIB.S.Y	MILS.P-P	0.35	0.00	1.00	VIB., SUCTION BRG., Y
VIB.D.X	MILS.P-P	0.40	0.00	1.00	VIB., DISCHARGE BRG., X
VIB.D.Y	MILS.P-P	0.40	0.00	1.00	VIB., DISCHARGE BRG., Y
GAP.S.X	VDC	-9.1	-10.2	-6.8	GAP VOLTAGE, PROX. PROBE, SUCTION BRG., X
GAP.S.Y	VDC	-9.1	-10.2	-6.8	GAP VOLTAGE, PROX. PROBE, SUCTION BRG., Y
GAP.D.X	VDC	-8.3	-10.2	-6.8	GAP VOLTAGE, PROX. PROBE, DISCHARGE BRG., X
GAP.D.Y	VDC	-8.7	-10.2	-6.8	GAP VOLTAGE, PROX. PROBE, DISCHARGE BRG., Y
AX.POS1	VDC	-8.9	-11.0	-6.8	AXIAL POSITION #1 (GAS COMPRESSOR)
AX.POS2	VDC	-9.1	-11.0	-6.8	AXIAL POSITION #2 (GAS COMPRESSOR)

***AIR TEMP ***

T1.AVG	DEG.F	61	--	--	TEMP., COMPRESSOR SUCTION AIR, AVERAGE
T2.AVG	DEG.F	128	--	--	TEMP., COMPRESSOR DISCHARGE AIR, AVERAGE

***AMBIENT CONDITIONS ***

P.BARO	IN.HG	29.44	25.00	35.00	PRESS., BAROMETRIC (IN.HG)
PBARO	PSIA	14.462	--	--	PRESS., BAROMETRIC (PSIA)
T.AMB	DEG.F	63.8	10.0	110.0	TEMP., AMBIENT
%R.H.	%	47	0	100	PERCENT RELATIVE HUMIDITY

***FACILITY: CALIB & VERIFICATION ***

PBARO.SL	IN.HG	29.90	--	--	PRESS., BAROMETRIC @ SEA LEVEL (IN.HG)
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TREND PLOT
COMPANY: Solar Turbines
MACHINE TRAIN: Gas Compressor

PLOT NO.
PLANT: KM Cell 12A
JOB REFERENCE:

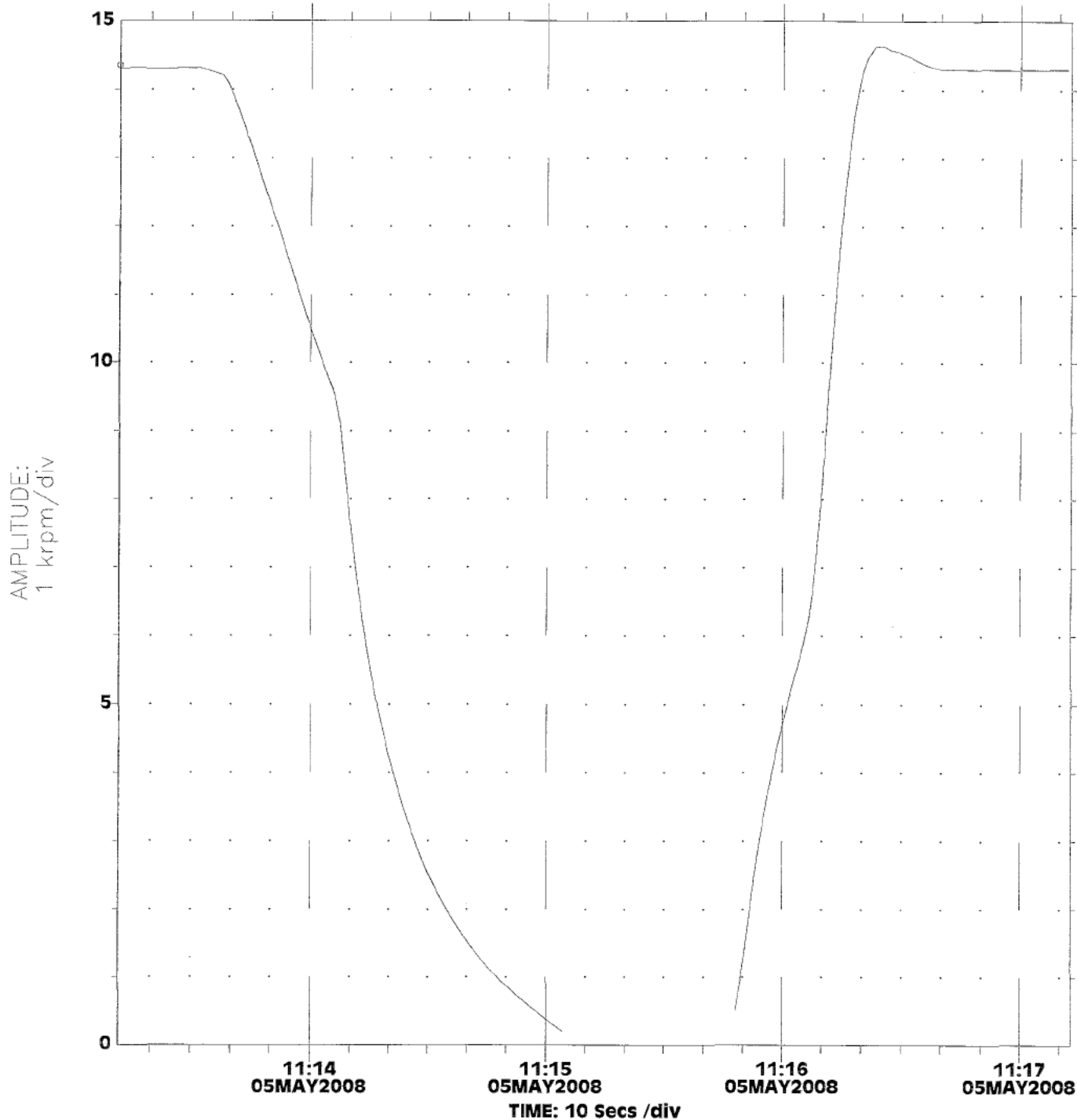
POINT: Suction X /45° Right **RPM**

14307 rpm

MACHINE: Compressor

05MAY2008

From 05MAY2008 11:13:12 To 05MAY2008 11:17:12 Startup 11:13:12



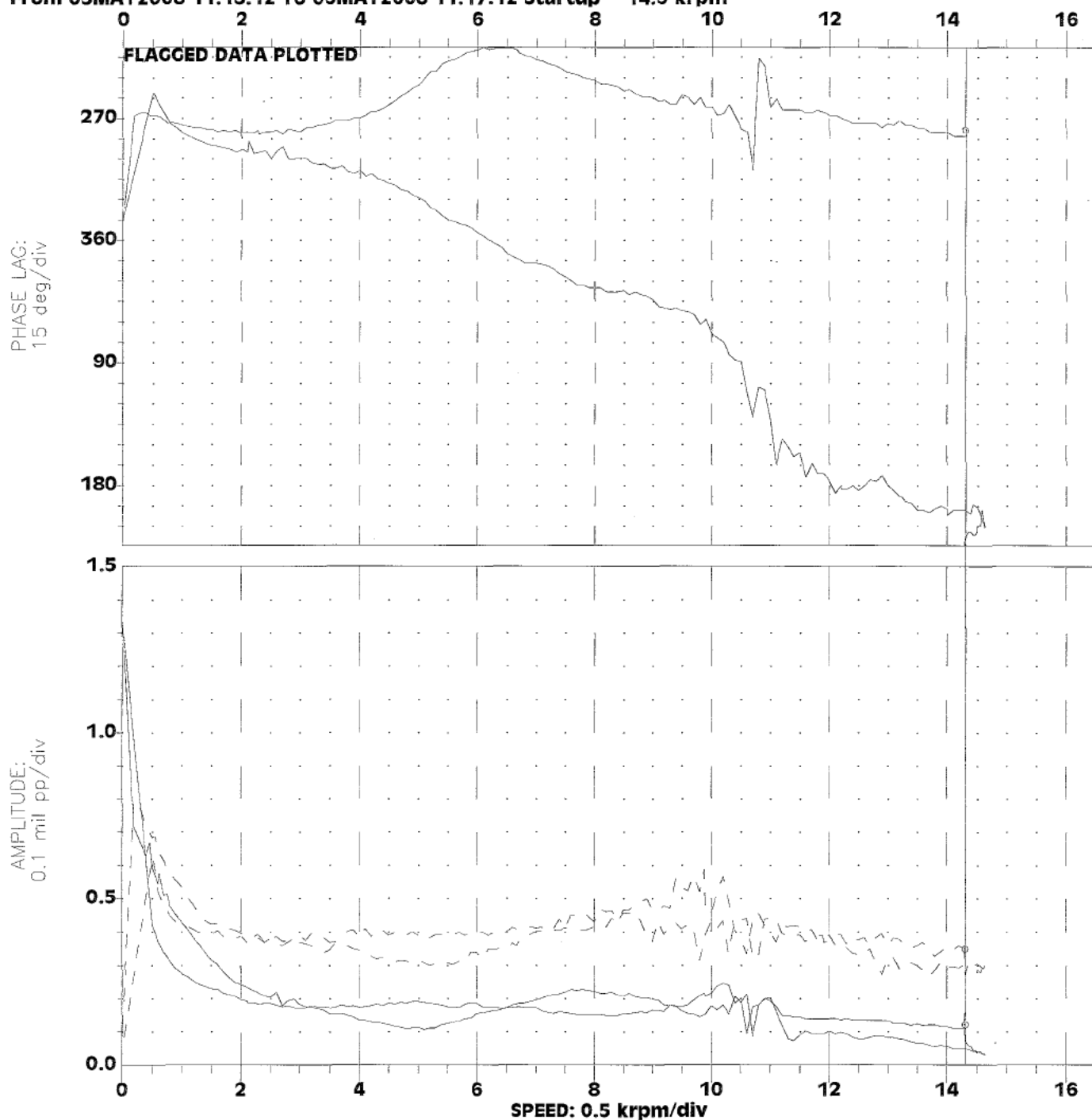
COMMENTS

S/N: , Project No.: 2-3B471, Customer: PAN-R50, Test Site: 12B
BODE PLOTS AT 14300 RPM
Batch Program Start: 5-05-2008 11:12:58 End: 5-05-2008 11:17:22
Setup Database: C:\ADREWIN\SETUPS\LIVE\C401_2
Database: C:\ADREWIN\DATABASE\ \20080505\11_12_57

BODE PLOT
COMPANY: Solar Turbines
MACHINE TRAIN: Gas Compressor

PLOT NO.
PLANT: KM Cell 12A
JOB REFERENCE:

POINT: Suction X $\angle 45^\circ$ Right — 1X UNCOMP 0.111/281°
POINT: Suction X $\angle 45^\circ$ Right - - DIRECT 0.339
MACHINE: Compressor
From 05MAY2008 11:13:12 To 05MAY2008 11:17:12 Startup 14.3 krpm



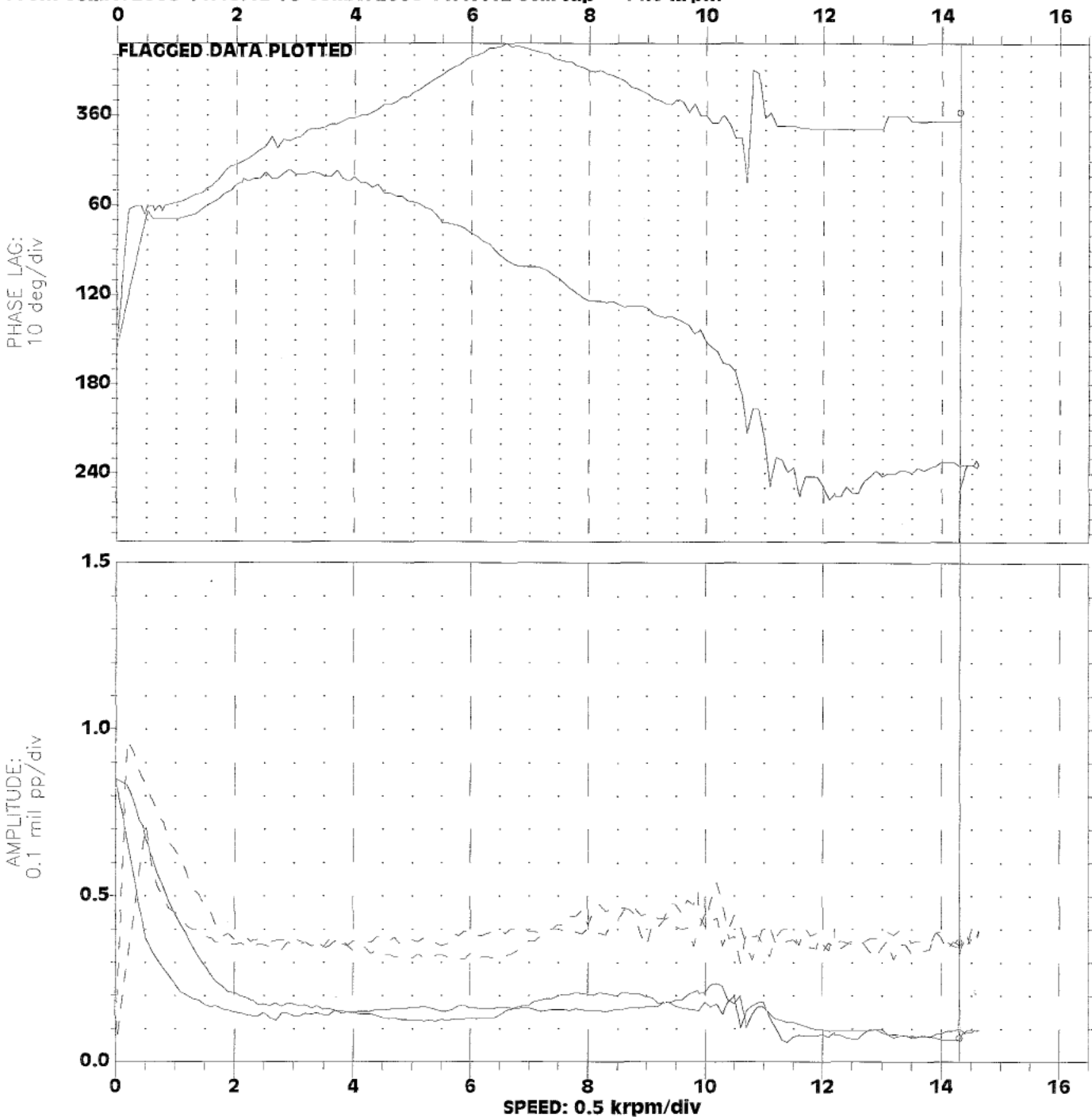
COMMENTS

S/N: , Project No.: 2-3B471, Customer: PAN-R50, Test Site: 12B
BODE PLOTS AT 14300 RPM
Batch Program Start: 5-05-2008 11:12:58 End: 5-05-2008 11:17:22
Setup Database: C:\ADREWIN\SETUPS\LIVE\C401_2
Database: C:\ADREWIN\DATABASE\ 20080505\11_12_57

BODE PLOT
COMPANY: Solar Turbines
MACHINE TRAIN: Gas Compressor

PLOT NO. _____
PLANT: KM Cell 12A
JOB REFERENCE:

POINT: Suction Y $\angle 45^\circ$ Left — 1X UNCOMP 0.062 $\angle 0^\circ$
POINT: Suction Y $\angle 45^\circ$ Left - - DIRECT 0.352
MACHINE: Compressor
From 05MAY2008 11:13:12 To 05MAY2008 11:17:12 Startup 14.3 krpm



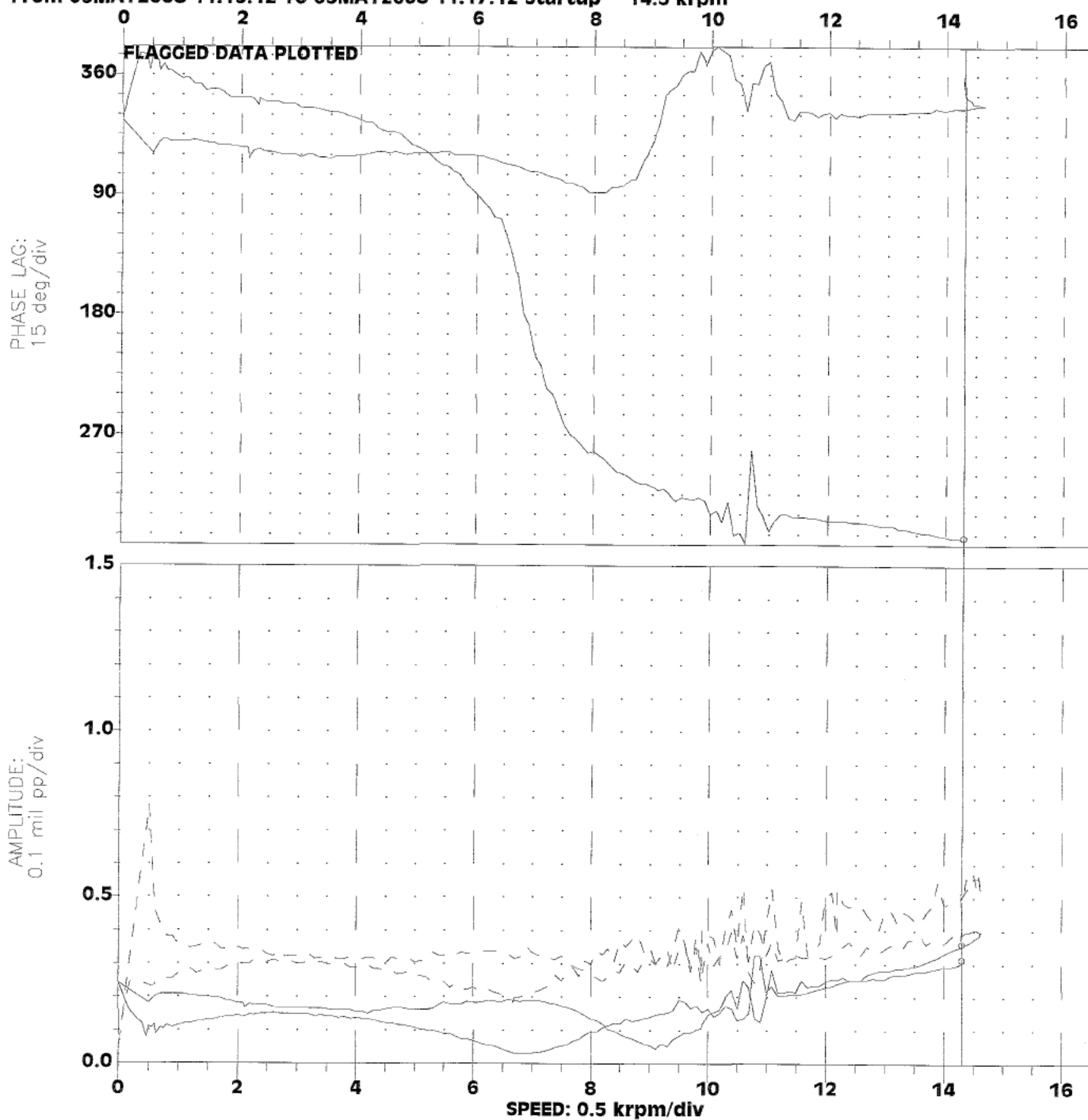
COMMENTS

S/N: _____, Project No.: 2-3B471, Customer: PAN-R50, Test Site: 12B
BODE PLOTS AT 14300 RPM
Batch Program Start: 5-05-2008 11:12:58 End: 5-05-2008 11:17:22
Setup Database: C:\ADREW\SETUPS\LIVE\C401_2
Database: C:\ADREW\DATABASE\20080505\11_12_57

BODE PLOT
COMPANY: Solar Turbines
MACHINE TRAIN: Gas Compressor

PLOT NO. _____
PLANT: KM Cell 12A
JOB REFERENCE:

POINT: Discharge X /45° Right — 1X UNCOMP 0.303/350°
POINT: Discharge X /45° Right - - DIRECT 0.351
MACHINE: Compressor
From 05MAY2008 11:13:12 To 05MAY2008 11:17:12 Startup 14.3 krpm



COMMENTS

S/N: _____, Project No.: 2-3B471, Customer: PAN-R50, Test Site: 12B
BODE PLOTS AT 14300 RPM
Batch Program Start: 5-05-2008 11:12:58 End: 5-05-2008 11:17:22
Setup Database: C:\ADREWIN\SETUPS\LIVE\C401_2
Database: C:\ADREWIN\DATABASE\20080505\11_12_57

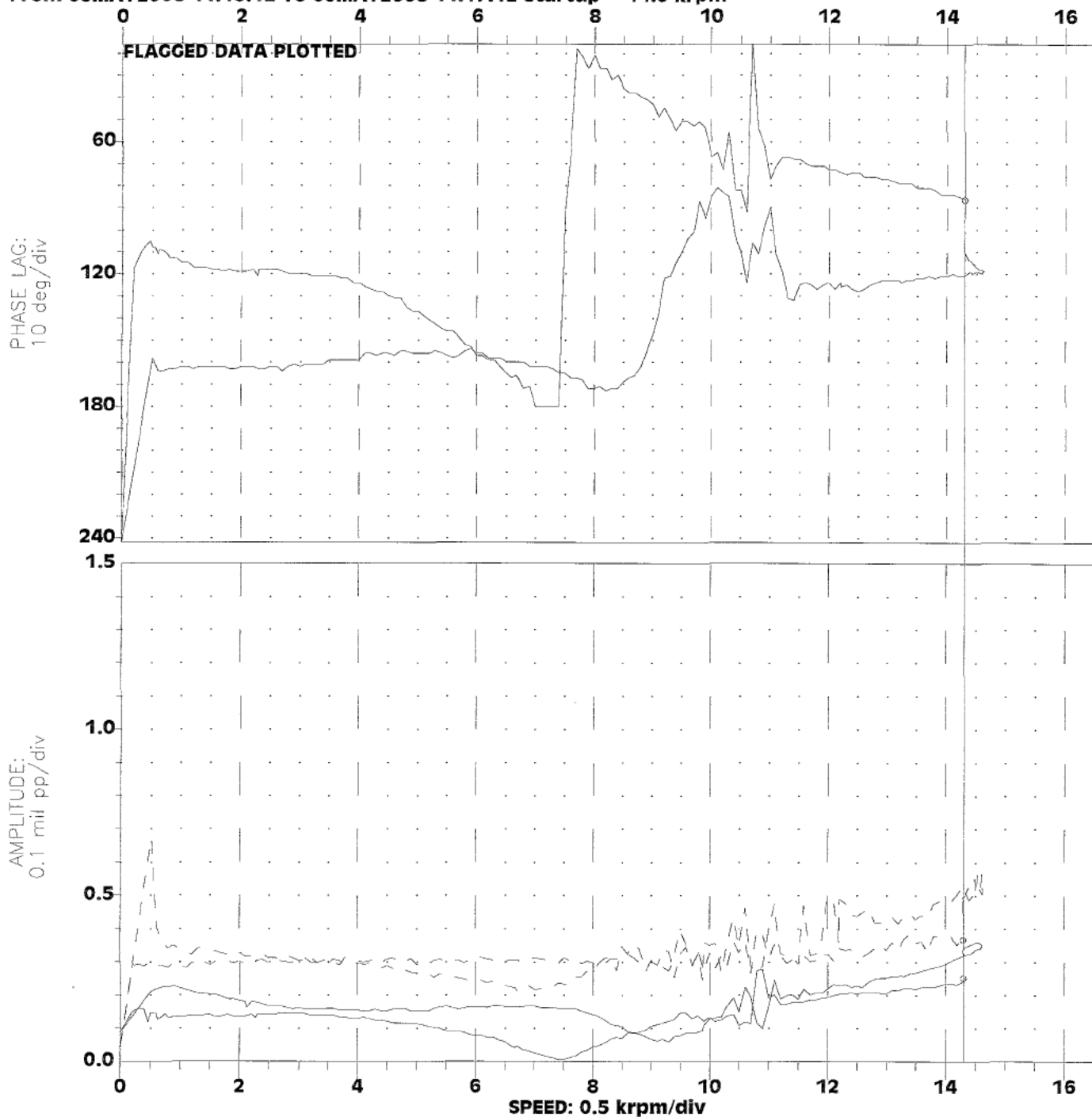
BODE PLOT
COMPANY: Solar Turbines
MACHINE TRAIN: Gas Compressor

PLOT NO.
PLANT: KM Cell 12A
JOB REFERENCE:

POINT: Discharge Y /45° Left — 1X UNCOMP
POINT: Discharge Y /45° Left - - DIRECT
MACHINE: Compressor

0.242/88°
0.357

From 05MAY2008 11:13:12 To 05MAY2008 11:17:12 Startup 14.3 krpm



COMMENTS

S/N: Project No.: 2-3B471, Customer: PAN-R50, Test Site: 12B
BODE PLOTS AT 14300 RPM
Batch Program Start: 5-05-2008 11:12:58 End: 5-05-2008 11:17:22
Setup Database: C:\ADREW\SETUPS\LIVE\C401_2
Database: C:\ADREW\DATABASE\20080505\11_12_57

VIB.S.X

Location:

Suction-X

Proximito Spectrum

Cell

12B

5/5/2008 11:08

Project

2-3B471

Ser. No.

Customer

PAN-R50

NGC

14305.8

RPM

TLO.IN.S

142.5

DEG.F

TLO.IN.D

137.8

DEG.F

PEAKS: Freq. Amplitude

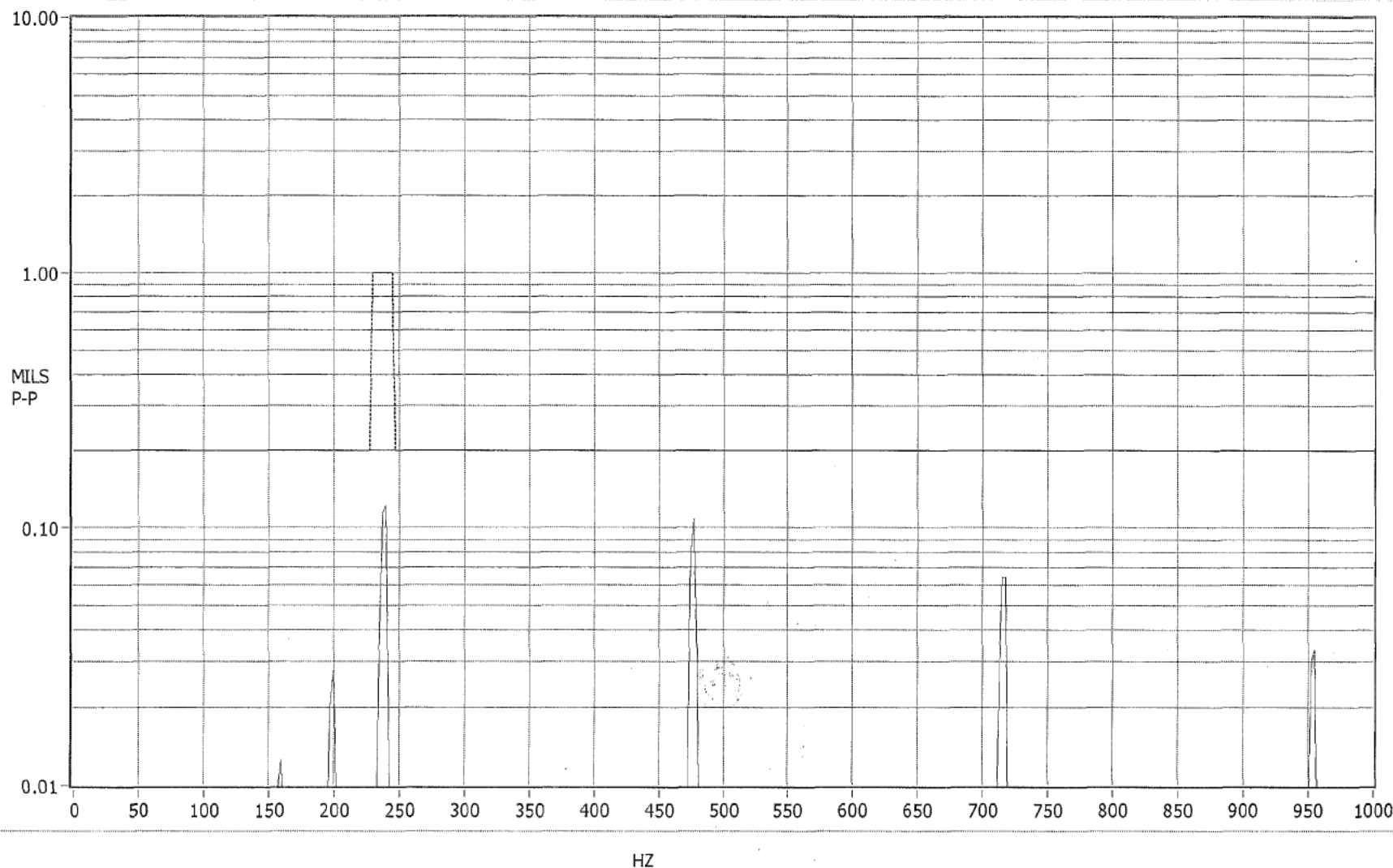
238.4 0.123

476.8 0.108

715.2 0.064

953.6 0.033

199.2 0.028



VIB.S.Y

Location:

Suction-Y

Proximito Spectrum

Cell

12B

5/5/2008 11:08

Project

2-3B471

Ser. No.

Customer

PAN-R50

NGC

14297.5

RPM

TLO.IN.S

141.5

DEG.F

TLO.IN.D

137.0

DEG.F

PEAKS: Freq. Amplitude

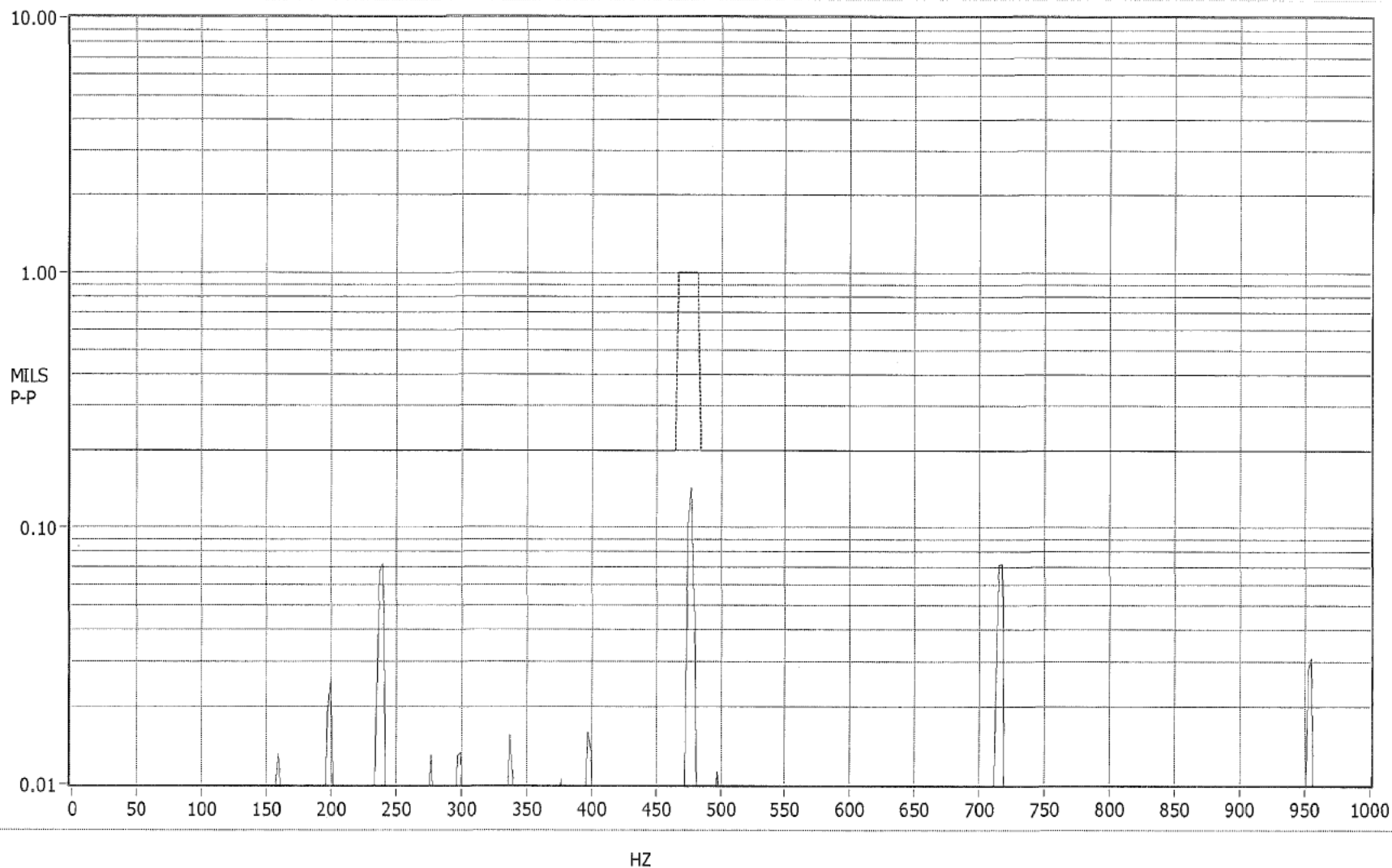
476.8 0.143

238.4 0.072

715.2 0.071

953.5 0.031

199.2 0.025



VIB.D.X

Location:

Discharge-X

Proximito Spectrum

Cell

12B

5/5/2008 11:08

Project

2-3B471

Ser. No.

Customer

PAN-R50

NGC

14303.5

RPM

TLO.IN.S

141.7

DEG.F

TLO.IN.D

137.6

DEG.F

PEAKS:

Freq.

Amplitude

238.4

0.292

476.7

0.122

158.0

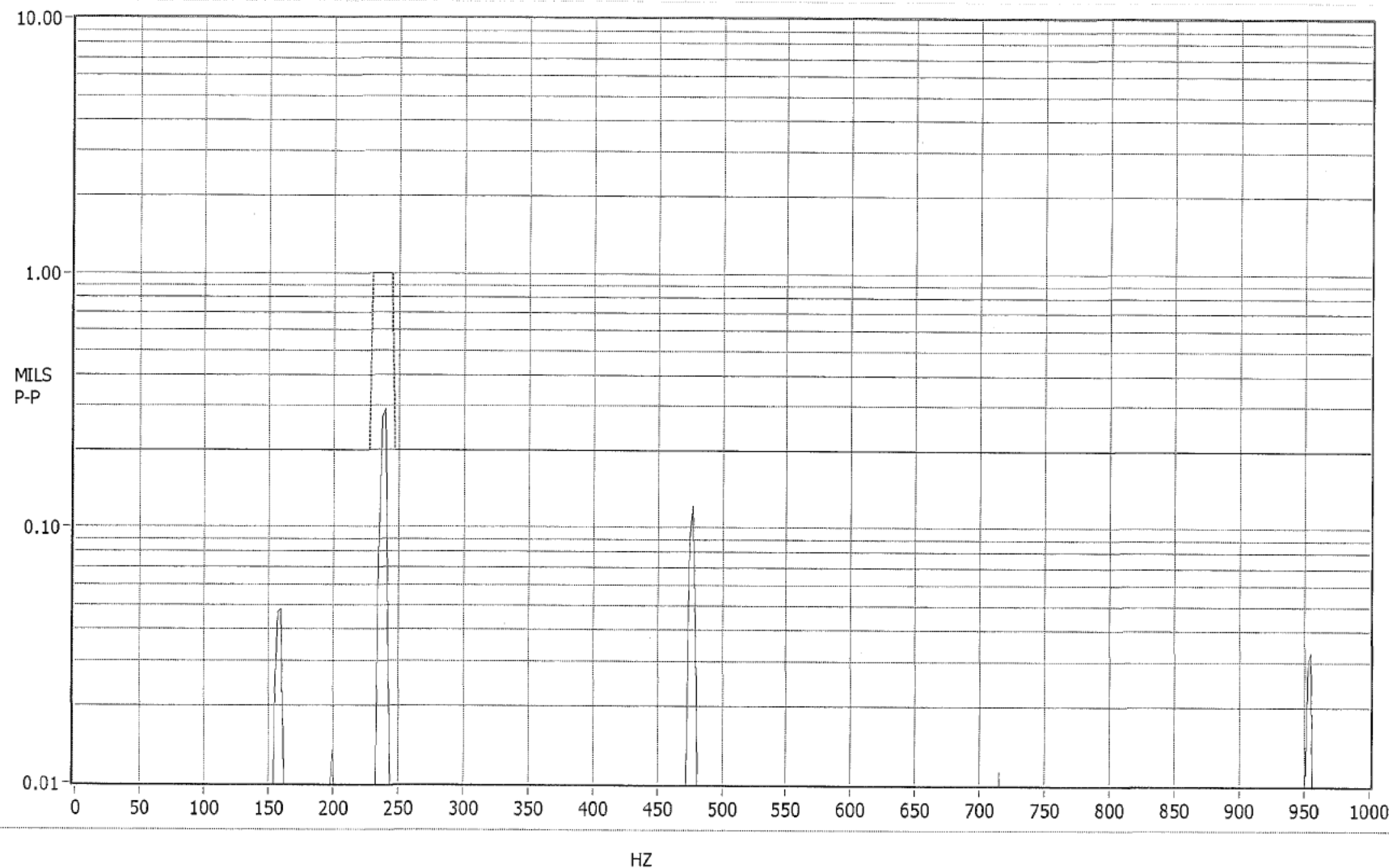
0.048

953.5

0.033

199.5

0.013



VIB.D.Y

Location:

Discharge-Y

Proximitior Spectrum

Cell

12B

5/5/2008 11:08

Project

2-3B471

Ser. No.

Customer

PAN-R50

NGC

14303.5

RPM

TLO.IN.S

142.7

DEG.F

TLO.IN.D

138.8

DEG.F

PEAKS: Freq. Amplitude

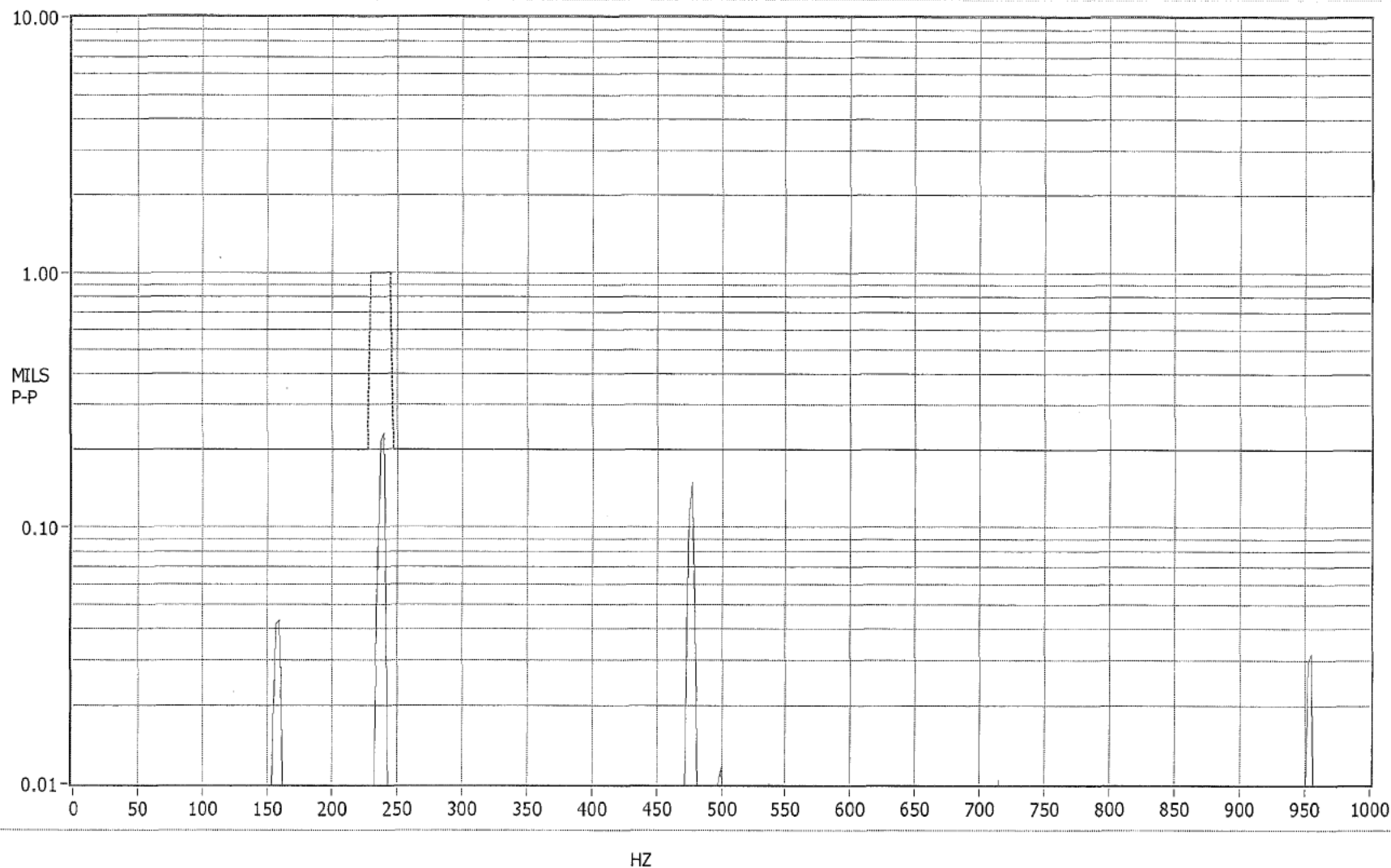
238.4 0.234

476.7 0.150

158.0 0.043

953.5 0.032

498.7 0.012



Estimated Compressor Performance

ESTIMATED COMPRESSOR PERFORMANCE BASED ON
 AIR AT P1 = 14.7 PSIA, T1 = 70.F
 [409] C2-1B
 B-FACTOR = 0.57E-06
 CENTAUR 50L
 HFHR = 0.500

Solar Turbines
 A Caterpillar Company

CONTROL NO.
 SD-33187
 ISSUE DATE
 28 MAY 2008
 ENGINEER
 J. DILIBERTI/DN

PAN-R50

P.I. 2-3B471

P-32511

S/N:

P/N: C3B471-A1

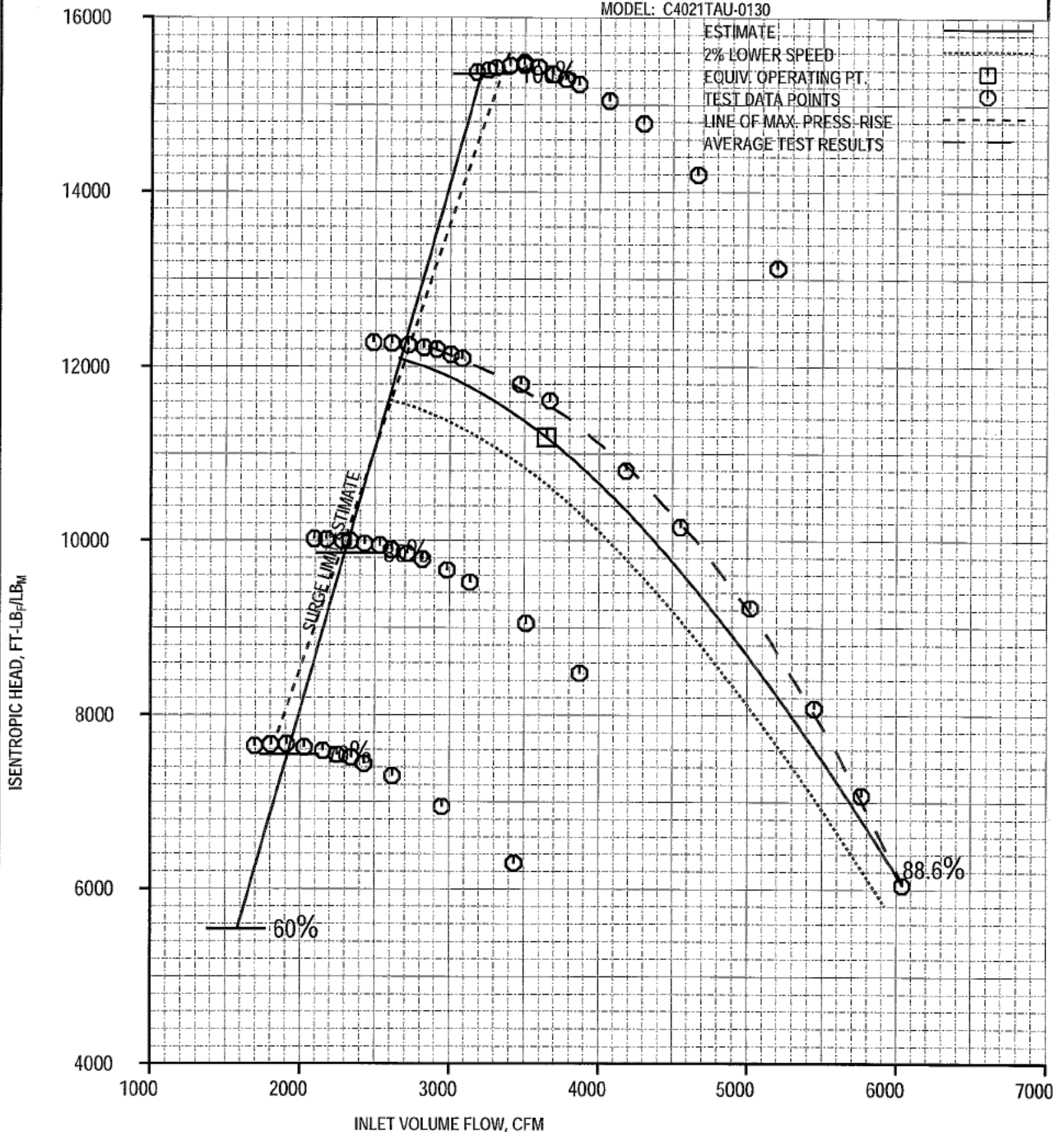
TEST DATE: 5-MAY-08

VENTURI: 6.52

SEQUENCE: B1491

MODEL: C4021TAU-0130

EQUIVALENT SPEEDS		
%	GAS SPEED	TEST SPEED
100	14300	12055
88.6	12675	10686 DESIGN
80	11440	9644
70	10010	8439
60	8580	7233



Gas Compressor Performance

GAS COMPRESSOR PERFORMANCE

Project	Customer	Ser. No.	Model	Test Engr.	Operator	Cell
2-3B471	PAN-R50		C4021TAU-0130	D. Nguyen	DANIEL LEONARD	12B

RUN_NO	TIME	VENTURI	IMPELLER	SAMPLES
2101.0	5/5/2008 12:05:55 PM	6.520	17.80	30

Measurements:

	TV	T1	T2	DPV	P1	P2	DPEYE.FL	P.BARO
	Deg_F	Deg_F	Deg_F	In_H2O	In_H2O	In_Hg	In_H2O	In_Hg
1	62.6	61.8	112.5	-46.9	-7.48	6.2	-15.75	29.44
2	62.8	62.2	112.7	-47.0	-7.50	6.3		
3		62.2	110.9					
4		62.1	111.9					
Spread	0.2	0.4	1.8	0.1	0.03	0.1		
Average	62.7	62.1	112.0	-47.0	-7.49	6.2		

Performance Summary:

HEAD	CFM	RPM	P2/P1	PHI	PSI	T2-T1/T1
6042.88	6038.83	10686.0	1.23	0.0702	0.5644	0.10

RUN_NO	TIME	VENTURI	IMPELLER	SAMPLES
2102.0	5/5/2008 12:19:10 PM	6.520	17.80	30

Measurements:

	TV	T1	T2	DPV	P1	P2	DPEYE.FL	P.BARO
	Deg_F	Deg_F	Deg_F	In_H2O	In_H2O	In_Hg	In_H2O	In_Hg
1	61.3	60.7	114.6	-42.5	-6.30	7.6	-14.40	29.44
2	61.5	61.1	114.8	-42.7	-6.52	7.6		
3		61.1	113.0					
4		61.0	114.0					
Spread	0.3	0.4	1.8	0.2	0.22	0.1		
Average	61.4	61.0	114.1	-42.6	-6.41	7.6		

Performance Summary:

HEAD	CFM	RPM	P2/P1	PHI	PSI	T2-T1/T1
7066.68	5763.91	10681.8	1.28	0.0670	0.6606	0.10

Project	Customer	Ser. No.	Model	Test Engr.	Operator	Cell
2-3B471	PAN-R50		C4021TAU-0130	D. Nguyen	DANIEL LEONARD	12B

RUN_NO	TIME	VENTURI	IMPELLER	SAMPLES
2103.0	5/5/2008 12:31:49 PM	6.520	17.80	30

Measurements:

	TV	T1	T2	DPV	P1	P2	DPEYE.FL	P.BARO
	Deg_F	Deg_F	Deg_F	In_H2O	In_H2O	In_Hg	In_H2O	In_Hg
1	61.8	62.2	119.6	-37.4	-5.41	8.9	-12.83	29.44
2	62.2	62.7	119.8	-37.7	-5.42	9.0		
3		62.6	117.6					
4		62.5	118.4					
Spread	0.4	0.4	2.2	0.2	0.01	0.1		
Average	62.0	62.5	118.8	-37.6	-5.41	8.9		

Performance Summary:

HEAD	CFM	RPM	P2/P1	PHI	PSI	T2-T1/T1
8077.90	5449.12	10687.1	1.32	0.0633	0.7543	0.11

RUN_NO	TIME	VENTURI	IMPELLER	SAMPLES
2104.0	5/5/2008 12:44:25 PM	6.520	17.80	30

Measurements:

	TV	T1	T2	DPV	P1	P2	DPEYE.FL	P.BARO
	Deg_F	Deg_F	Deg_F	In_H2O	In_H2O	In_Hg	In_H2O	In_Hg
1	62.4	62.1	123.5	-31.4	-4.41	10.5	-10.90	29.44
2	62.5	62.5	123.9	-31.6	-4.55	10.6		
3		62.4	121.9					
4		62.3	122.3					
Spread	0.1	0.4	2.0	0.2	0.14	0.1		
Average	62.4	62.3	122.9	-31.5	-4.48	10.5		

Performance Summary:

HEAD	CFM	RPM	P2/P1	PHI	PSI	T2-T1/T1
9218.57	5021.01	10684.6	1.37	0.0584	0.8613	0.12

Project	Customer	Ser. No.	Model	Test Engr.	Operator	Cell
2-3B471	PAN-R50		C4021TAU-0130	D. Nguyen	DANIEL LEONARD	12B

RUN_NO	TIME	VENTURI	IMPELLER	SAMPLES
2105.0	5/5/2008 1:03:54 PM	6.520	17.80	30

Measurements:

	TV	T1	T2	DPV	P1	P2	DPEYE.FL	P.BARO
	Deg_F	Deg_F	Deg_F	In_H2O	In_H2O	In_Hg	In_H2O	In_Hg
1	61.6	61.1	127.3	-25.5	-3.49	11.8	-8.92	29.44
2	62.0	61.5	127.5	-25.7	-3.70	11.9		
3		61.5	125.0					
4		61.4	126.1					
Spread	0.5	0.4	2.5	0.2	0.21	0.1		
Average	61.8	61.3	126.5	-25.6	-3.60	11.9		

Performance Summary:

HEAD	CFM	RPM	P2/P1	PHI	PSI	T2-T1/T1
10149.87	4552.85	10684.9	1.42	0.0529	0.9482	0.12

RUN_NO	TIME	VENTURI	IMPELLER	SAMPLES
2106.0	5/5/2008 1:20:07 PM	6.520	17.80	30

Measurements:

	TV	T1	T2	DPV	P1	P2	DPEYE.FL	P.BARO
	Deg_F	Deg_F	Deg_F	In_H2O	In_H2O	In_Hg	In_H2O	In_Hg
1	61.1	61.1	130.6	-21.3	-3.03	12.7	-7.48	29.45
2	61.6	61.4	131.0	-21.5	-3.33	12.8		
3		61.4	128.6					
4		61.3	127.9					
Spread	0.5	0.4	3.1	0.1	0.29	0.1		
Average	61.4	61.3	129.5	-21.4	-3.18	12.8		

Performance Summary:

HEAD	CFM	RPM	P2/P1	PHI	PSI	T2-T1/T1
10797.63	4183.77	10684.2	1.45	0.0486	1.0089	0.13

Project	Customer	Ser. No.	Model	Test Engnr.	Operator	Cell
2-3B471	PAN-R50		C4021TAU-0130	D. Nguyen	DANIEL LEONARD	12B

RUN_NO	TIME	VENTURI	IMPELLER	SAMPLES
2107.0	5/5/2008 1:36:35 PM	6.520	17.80	30

Measurements:

	TV	T1	T2	DPV	P1	P2	DPEYE.FL	P.BARO
	Deg_F	Deg_F	Deg_F	In_H2O	In_H2O	In_Hg	In_H2O	In_Hg
1	62.2	61.7	135.5	-16.2	-2.29	13.9	-5.71	29.45
2	62.5	62.1	135.9	-16.3	-2.53	14.0		
3		62.1	132.3					
4		62.0	133.8					
Spread	0.4	0.4	3.6	0.1	0.24	0.1		
Average	62.4	62.0	134.4	-16.3	-2.41	14.0		

Performance Summary:

HEAD	CFM	RPM	P2/P1	PHI	PSI	T2-T1/T1
11605.48	3667.45	10684.7	1.48	0.0426	1.0843	0.14

RUN_NO	TIME	VENTURI	IMPELLER	SAMPLES
2108.0	5/5/2008 1:48:26 PM	6.520	17.80	30

Measurements:

	TV	T1	T2	DPV	P1	P2	DPEYE.FL	P.BARO
	Deg_F	Deg_F	Deg_F	In_H2O	In_H2O	In_Hg	In_H2O	In_Hg
1	61.8	61.4	137.0	-14.5	-2.02	14.2	-5.12	29.44
2	62.2	61.8	137.6	-14.7	-2.25	14.4		
3		61.8	134.0					
4		61.7	135.3					
Spread	0.4	0.4	3.6	0.1	0.23	0.1		
Average	62.0	61.7	136.0	-14.6	-2.13	14.3		

Performance Summary:

HEAD	CFM	RPM	P2/P1	PHI	PSI	T2-T1/T1
11802.47	3476.41	10688.2	1.49	0.0404	1.1019	0.14

Project	Customer	Ser. No.	Model	Test Engnr.	Operator	Cell
2-3B471	PAN-R50		C4021TAU-0130	D. Nguyen	DANIEL LEONARD	12B

RUN_NO	TIME	VENTURI	IMPELLER	SAMPLES
2109.0	5/5/2008 2:01:04 PM	6.520	17.80	30

Measurements:

	TV	T1	T2	DPV	P1	P2	DPEYE.FL	P.BARO
	Deg_F	Deg_F	Deg_F	In_H2O	In_H2O	In_Hg	In_H2O	In_Hg
1	61.7	61.0	139.1	-11.4	-1.52	14.7	-4.03	29.44
2	62.0	61.4	141.4	-11.5	-1.75	14.8		
3		61.3	138.1					
4		61.3	136.3					
Spread	0.3	0.4	5.1	0.1	0.23	0.1		
Average	61.8	61.3	138.7	-11.4	-1.64	14.8		

Performance Summary:

HEAD	CFM	RPM	P2/P1	PHI	PSI	T2-T1/T1
12088.61	3080.60	10684.6	1.51	0.0358	1.1294	0.15

Static Leak

Gas Compressor Production Static Leak Test Results - Cell 12C

Compressor S/N:	
Project:	2-3B471
Customer:	PAN-R50
Compressor Model:	C4021TAU-0130
Test Engineer:	D. Nguyen/J.Lee

Test Date/Time

Max. Suction
Pressure

05/06/08 09:40:41

1500 PSIG

DRY SEAL LEAKAGE TABLE

[illegible]