Rapid Decompression Testing

Decompression Tests 2015

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ForeFlight
Intelligent Apps for Pilots™

ForeFlight LLC Rapid Decompression Test Report for Apple iPad Air and Apple iPad mini 3 Retina

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CASCADE™ TEK

TEST REPORT

CTC C1504

March 19, 2015

Accredited by
American Association for
Laboratory Accreditation (A2LA)

Certified Commercial
Package Testing Laboratory
(ISTA)

MIL-STD Laboratory
Suitability Status by
Defence Logistics Agency (DLA)

LABORATORY LOCATIONS

OREGON
5245-A NE Elam Young Pkwy.
Hillsboro, OR, 97124 • Ph: 503-648-1818

COLORADO
1530 Vista View Drive
Longmont, CO, 80504 • Ph: 720-340-7810

www.cascadetek.com

Job Number: C1504

Rev.	Description of the Revision	Date
---	Initial Release of the Data Report.	March 10, 2015
A	Amended the attention to and correct sample name	March 19, 2015
B	Amended the sample name to include Serial Numbers	March 19, 2015

Test Title	Test Summary
Rapid Decompression	The test was conducted per the required standard with no deviations.

Cascade Technical Sciences
www.cascadetek.com
1-888-835-9250

TESTING CERT #2582.02

March 19, 2015

Certification No: CTC C1504

Attention:

Reference:

a. Cascade Tek Job No.:	C1504
b. Cascade Tek Quote No.:	CTQ 16075A
c. Client Purchase Order No.:	1009
d. Technical Specification:	1. RTCA DO-160G

Cascade Technical Sciences hereby certifies that Two (2) Electronic Devices, P/N the iPad Air and the iPad mini 3, were subjected to the following test:

1. Rapid Decompression Test per Reference (b) Item 1, and (d1), samples were exposed to a pressure equivalent to 8,000 feet (565 TORR) of altitude to stabilize for a customer specified time and then exposed to a pressure equivalent of 51,000 feet (83 TORR) of altitude with a transition of less than 15 seconds. Samples were left to dwell for a minimum of 10 minutes and then returned to ambient altitude conditions (630 TORR).

Testing was done in accordance with the above references as evidenced and reported in the accompanying data. The test samples were returned to the customer for evaluation.

The original of this report is on file at Cascade Technical Sciences, Inc. under the above referenced certification number for review by authorized personnel. The results of the testing reported herein relate only to the actual items tested.

Respectfully submitted,

David Bowles
Quality Administrator
Cascade Technical Sciences, Inc.

This test certification shall not be reproduced, except in full, without written authorization from Cascade Technical Sciences Inc.

Total number of pages in this document is 14.

The objective of this test program was to subject customer provided test hardware to environmental simulation in compliance with customer stated specification, including any authorized modification, deviations or concessions to the original requirements. The hardware consisted of items identified in the appropriate sections of this report. In addition to test hardware identification, each section contains information that describes the associated test setup and performance and the resulting data. Cascade TEK, Inc. measuring instruments used in testing were calibrated according to the requirements of ANSI/NCSL Z540-1-1944 and ISO/IEC 17025, 2nd Edition and are NIST traceable. Calibration records are on file and available for inspection by request. Because the test methods are well established and are qualitative or semi-quantitative in nature, Cascade TEK, Inc. does not apply measurement uncertainty unless obligated by contract. Measured value related to the corresponding tolerance requirement is used to decide whether a test meets the requirements of the specification. Any test hardware operational setups and resulting evaluations or inspections performed by the customer are not included in this report, unless they were explicitly requested. While observations and/or specification compliance statements may be reported, no interpretations or opinions regarding customer product performance are intended. Unless otherwise indicated in the appropriate report section, all contract obligations were met and the test objective achieved.

Test Data Log

Job Number: C1504
Customer: ForeFlight LLC

Date Started: 3/4/2015
Date Completed: 3/4/2015

Reviewing Engineer: Meg Talbert
Signature: Meg Talbert

Responsible Technician: Keefe Hart

Type of Test: Decompression
Test Specification: RTCA DO-160G Section 4.6.2

Specimen Description: Electronic Devices

Specimen P/N or Model No.	Specimen S/N
iPad Air Model No. MH322LL/A	
iPad mini 3 Retina Model No. MH3N2LL/A	

Laboratory Temperature: +71°F

Laboratory Humidity: 18% RH

Test Description: Samples will be stabilized at a pressure equivalent to 8000 feet of altitude. Following a customer specified stabilization time, the samples will be exposed to a pressure equivalent of 51,000 feet of altitude with the transition occurring in less than 15 seconds. Upon achievement of the 51,000 foot level, the unit will dwell at that pressure for a minimum of 10 minutes and then be returned to ambient conditions. Customer will be onsite for the testing and has requested a short video of the test being conducted. Full operation of samples will be confirmed both pre and post testing.

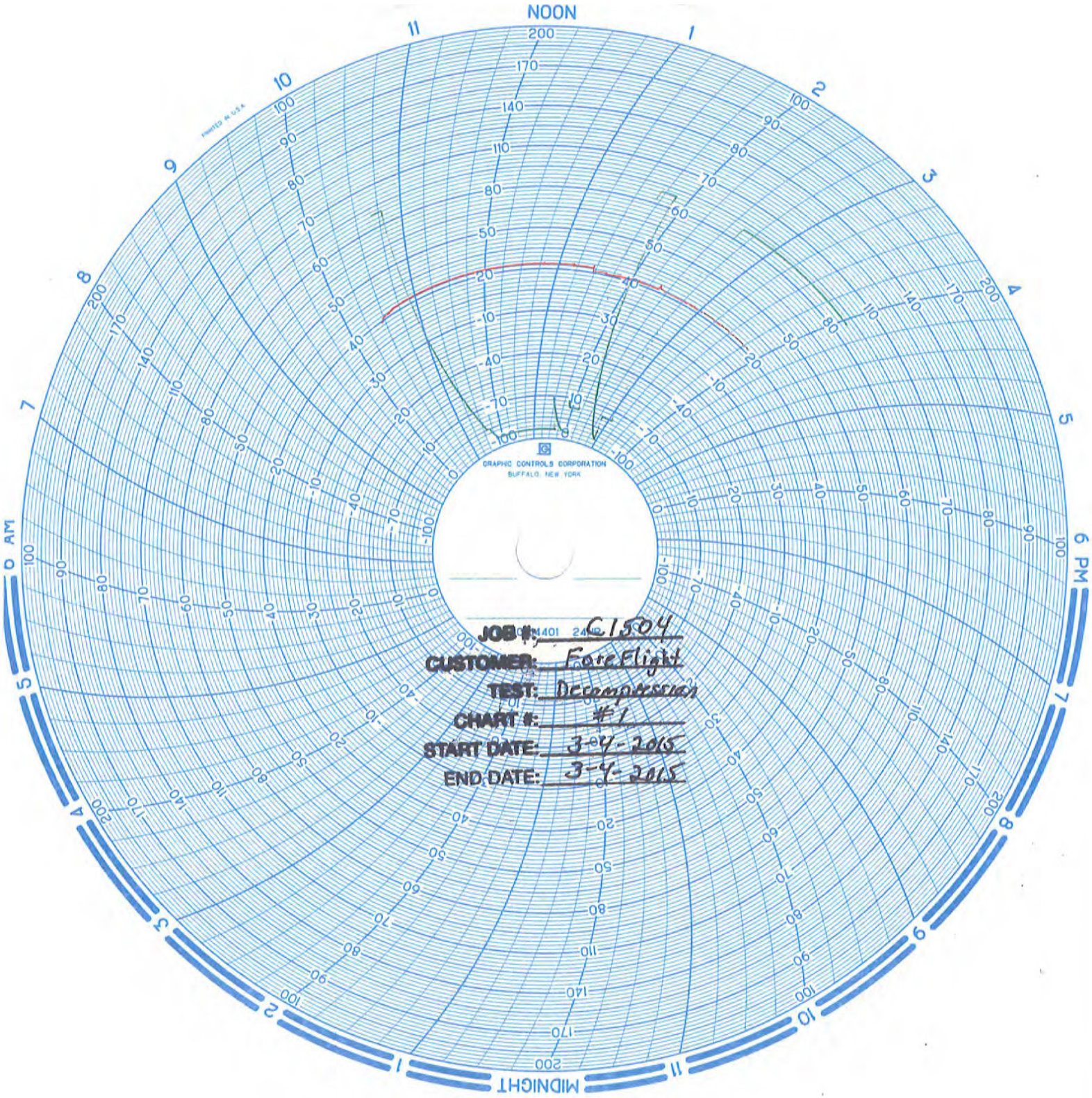
Initials	Date	Time	Notes	Photo
KH	3/4/2015	1000	All altitude readings will be registered in "TORR". Critical values are: 8000 feet of altitude = 565 TORR 51,000 feet of altitude = 83 TORR 75,000 feet of altitude = 26 TORR 78,000 feet of altitude = 22 TORR Test site ambient altitude = 630 TORR	☐
KH	3/4/2015	1030	Customer is on site and advises that they will video the testing.	☐
KH	3/4/2015	1055	Correct operation of test samples is verified and samples are placed in chamber 1208.	☒
KH	3/4/2015	1055	Chamber 1208 is sealed and set for 8,000 feet altitude (565 TORR).	☒
KH	3/4/2015	1100	Chamber 1228 is sealed and set for 75,000 feet altitude (26 TORR); this chamber is equipped with a circular chart to verify altitude.	☐
KH	3/4/2015	1100	Both chamber are started. Data collection equipment is started under data file "A".	☐
KH	3/4/2015	1240	Both chamber are at the prescribed set points.	☐
KH	3/4/2015	1245	The connecting valve between chamber 1208 and chamber 1228 is opened allowing the drawdown of pressure in chamber 1208.	☐

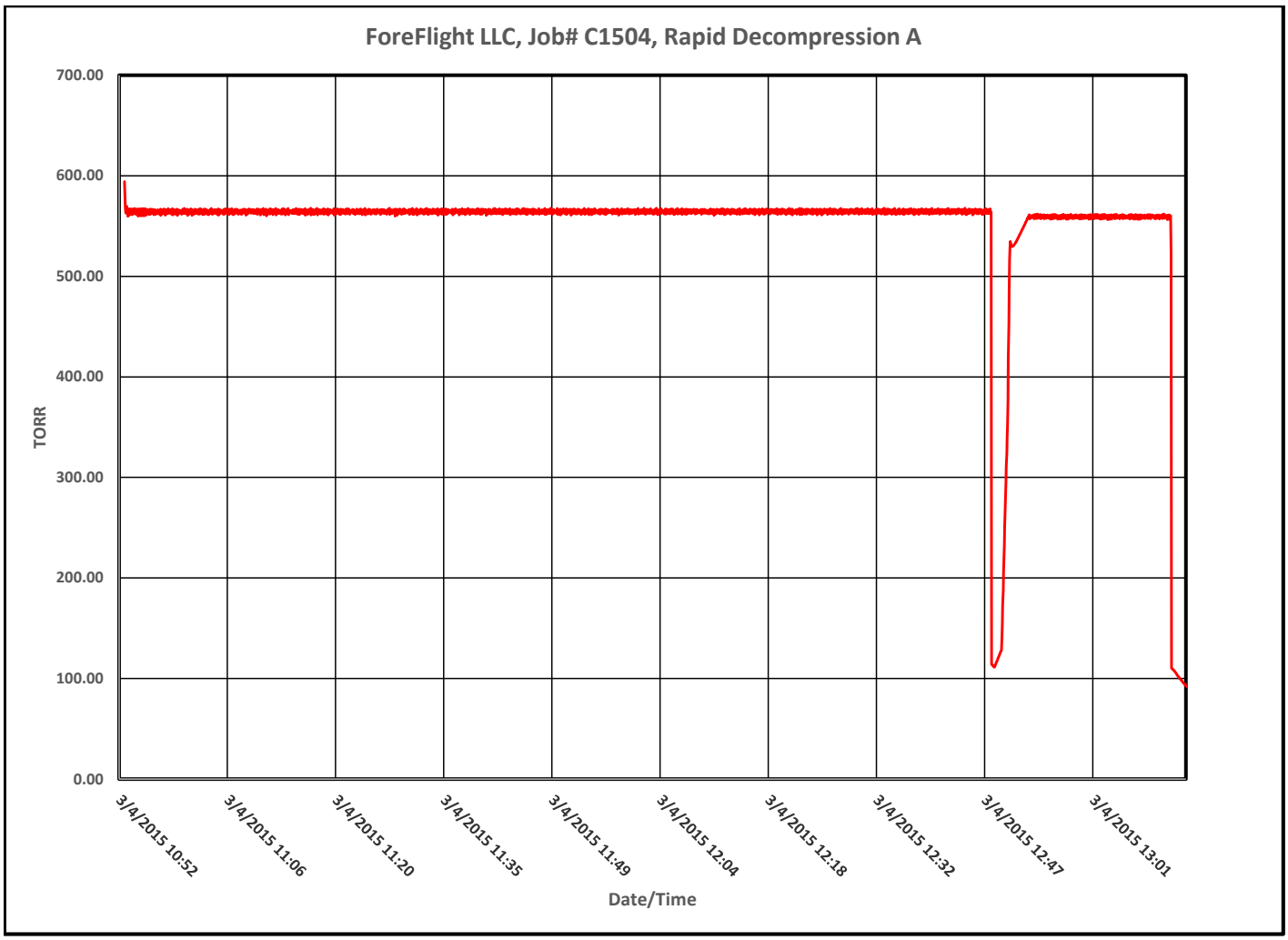
Initials	Date	Time	Notes	Photo
KH	3/4/2015	1245	Upon conclusion of a 15 second period, chamber 1208 has not achieved the required pressure equivalent to 51,000 feet of altitude (83 TORR).	☐
KH	3/4/2015	1247	Chamber 1208 is returned to 8,000 feet of altitude pressure equivalent and held. Chamber 1228 is set for 78,000 feet altitude (22 TORR).	☐
KH	3/4/2015	1308	Chamber 1228 has reached 78,000 feet altitude (22 TORR).	☐
KH	3/4/2015	1310	The connecting valve between chamber 1208 and chamber 1228 is opened allowing the drawdown of pressure in chamber 1208.	☐
KH	3/4/2015	1312	Upon conclusion of a 15 second period, chamber 1208 has again not achieved the required pressure equivalent to 51,000 feet of altitude (83 TORR).	☐
KH	3/4/2015	1313	Customer is advised that test can be better achieved if samples are placed in test vessel 1151 due the smaller internal volume. Customer agrees to allow samples to be moved to 1151.	☐
KH	3/4/2015	1320	Samples have been relocated and are in vessel 1151. Full operation of samples is confirmed.	☒
KH	3/4/2015	1321	Chamber 1208 is connected to vessel to supply the 8,000 feet altitude (565 TORR) and vessel 1151 is drawn down to proper level.	☐
KH	3/4/2015	1321	Chamber 1228 is set for 75,000 feet (26 TORR) and allowed to achieve set point. Data collection equipment has been connected to CTEK vessel 1151 and disconnected from chamber 1208. Data collection is re-started under data file “B”.	☐
KH	3/4/2015	1355	Chamber 1228 is at prescribed set point.	☐
KH	3/4/2015	1405	Valve connecting 1228 and 1151 is opened allowing 1151 pressure to be drawn down below the 51,000 foot altitude equivalent pressure (83 TORR).	☐
KH	3/4/2015	1405	Decompression occurs in less than the prescribed 15 second period and vessel 1151 is held below the prescribed level for a period in excess of 10 minutes.	☐
KH	3/4/2015	1418	Chambers 1208 and 1228 are shut down and vessel 1151 is returned to ambient altitude conditions of 630 TORR.	☐
KH	3/4/2015	1430	Vessel is opened and full operation of both samples is verified by customer.	☒
KH	3/4/2015	1500	Testing is complete.	☐

DS2 - Test Equipment List

Test: Decompression **Job Number:** C1504 **Date:** 03/04/2015

Test Equipment List						
Equipment Description	**Manufacturer**	**Model**	**S/N**	**Cal No.**	**Calibrated Date (mm/dd/yy)**	**Calibration Due Date (mm/dd/yy)**
Altitude Chamber	Tenney	27ST-100400	8190	1208	04/29/14	04/30/15
Small Altitude Chamber	Tenney	8S	25720-02	1228	08/14/14	08/31/15
Digital Temp / RH Meter	Cole-Parmer	90080-03	130033077	FR417	03/27/13	03/31/15
Pressure Vessel	CTEK	NA	1	1151	Reference Only	
Pressure Transducer	Omega	PX303-100A5V	NA	FR332	12/17/14	12/31/15
Data Logger	Agilent	34970A	US37010202	FR411	03/20/14	03/31/15
Data Logger Input Module	Agilent	34901A	US37000277	FR412	03/20/14	03/31/15


NOON
MIDNIGHT
6 PM
0 AM
GRAPHIC CONTROLS CORPORATION
BUFFALO, NEW YORK
JOB #: C1504
CUSTOMER: ForceFlight
TEST: Decompression
CHART #: #1
START DATE: 3-4-2015
END DATE: 3-4-2015


ForeFlight LLC, Job# C1504, Rapid Decompression A
700.00
600.00
500.00
400.00
300.00
200.00
100.00
0.00
TORR
3/4/2015 10:52
3/4/2015 11:06
3/4/2015 11:20
3/4/2015 11:35
3/4/2015 11:49
3/4/2015 12:04
3/4/2015 12:18
3/4/2015 12:32
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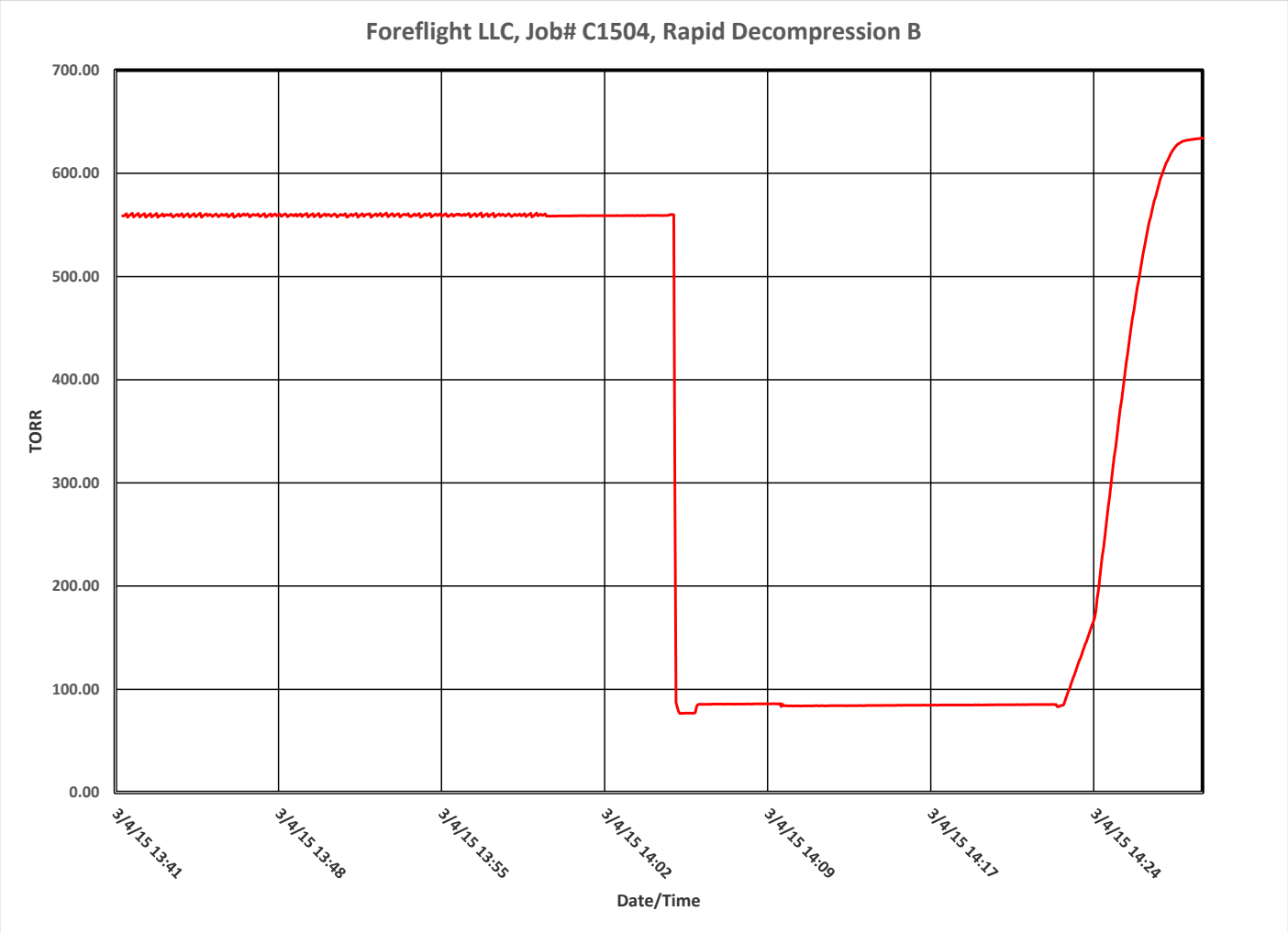
3/4/2015 13:01
Date/Time


Foreflight LLC, Job# C1504, Rapid Decompression B
700.00
600.00
500.00
400.00
300.00
200.00
100.00
0.00
TORR
3/4/15 13:41
3/4/15 13:48
3/4/15 13:55
3/4/15 14:02
3/4/15 14:09
3/4/15 14:17
3/4/15 14:24
Date/Time