Final Report

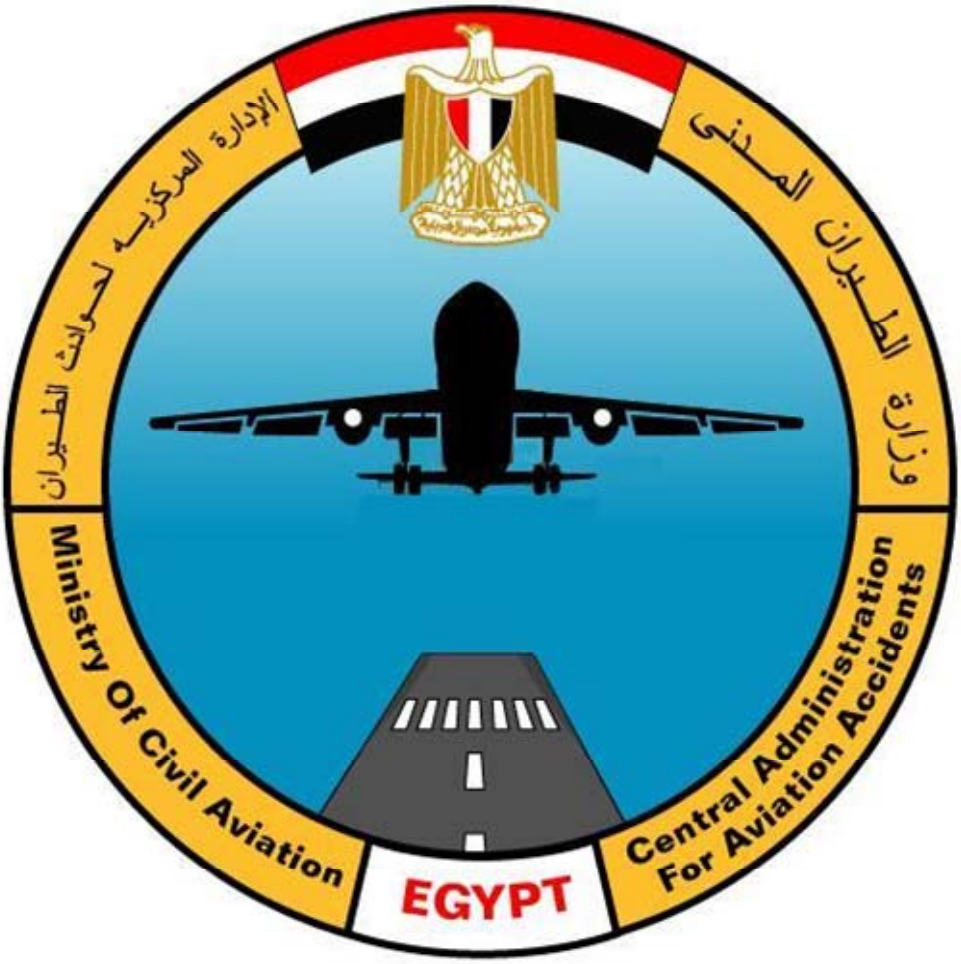
Concerning
Airbus A321 aircraft tail strike

At Hurghada Airport

On 28th February 2013

Registration VQ-BOC

Flight No SVR3027



Issued by

Aircraft Incident Investigation Central Directorate

Egyptian Ministry of Civil Aviation

Cairo

November 17, 2013

Foreword

In accordance with Annex 13 to the Convention on International Civil Aviation and with European Regulation n°996/2010, the investigation has not been not conducted so as to apportion blame, nor to assess individual or collective responsibility. The sole objective is to draw lessons from this occurrence which may help to prevent future accidents.

Consequently, the use of this report for any purpose other than for the prevention of future accidents could lead to erroneous interpretations.

Table of Content:

Glossary

A/C	Aircraft
AAI DIR	Aircraft Accident Investigation Directorate
ATC	Air Traffic Control
APU	Auxiliary Power Unit
Capt	Captain
CAVOK	Ceiling and Visibility O.K.
CSN	Cycles since New
ECAA	Egyptian Civil Aviation Authority
EgyptAir M & E	EgyptAir Maintenance and Engineering
F/O	First Officer
FAA	Federal Aviation Administration
ICAO	International Civil aviation Organization
MCA	Ministry of Civil Aviation
(MCA- AAI)	Ministry of Civil Aviation, Aircrafts Accidents Investigation
TSN	Time since New
UTC	Universal Time Coordinate

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Synopsis

***Date of incident*:** 28th February 2013.

Time of accident: almost 02:13:59 UTC.

Site of incident: Hurghada Airport-, Egypt.

Flight Number: SVR3027

Flight from to: Flight from "Bolshoye Savino" Russia (USPP), to Hurghada, Egypt (HEGN)

Aircraft type, registration: Airbus A321 registered VQ-BOC.

Operator: Ural Air.

Persons onboard:

- 3 Cockpit Crew (One Captain plus two First Officers)
- 4 Cabin crew
- 225 Passenger (201 adult, 19 child, 5 infants)

FDR information: P.N 980-4700-003, manufactured by AlliedSignal

CVR information: P.N 980-6022-001, manufactured by Honeywell

*

INFORMATION ABOUT THE INVESTIGATION PROCEDURE

• Just after the incident, the "Aircraft Accident Investigation Directorate" was informed. A delegate from the AAI DIR moved immediately to the incident site at Hurghada. Both Flight recorders (FDR and CVR) were brought to the AII. "Necessary down Loads" for both Flight recorders has been made at the AII FDR and CVR lab. Flight Recorders were sent back to the Service Provider at Hurghada.

• The status of the aircraft damage was recorded. Several photos were taken to thoroughly show the aircraft damage. In addition, several photos were taken to show the traces of the aircraft on the runway.

(Refer to exhibit #1 for incident pictures).

• Relevant information (copies) regarding the incident was received from Airports Holding Company, including:

- Captain report
- Computerized Weight and Balance sheet
- Cockpit Crew ID's
- Cockpit Crew Passports
- Conversation Transcript (Approach recording, Tower recording)
- Copy of the daily work of the National Company for Aviation Navigation Services, day of the incident (Thursday, 28 February, 2013)
- Copy of the daily work of the National Company for Aviation Navigation Services (Tower), day of the incident (Thursday, 28 February, 2013)
- Aircraft Control Occurrence Report
- General Declaration Sheet.
- Meteorology Report.

• Time correlation between the events included in the video tape and the CVR was made by (AAI DIR).

• Animation for the incident was developed by dedicated software based on the incident flight FDR information.

1 - FACTUAL INFORMATION

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1.1 History of Flight

On February 28, 2013, at almost 02:13:59 UTC, the said Airbus A321, Russian registration VQ-BOC, Flight No SVR3027, operated by Ural Airlines (Flight from to: Flight from "Bolshoye Savino" Russia (USPP), to Hurghada, Egypt (HEGN)), has suffered a tail strike during landing at Hurghada, runway 34. The flight crew performed a Go Around procedure after the tail strike and landed the A/C later on the same runway (34), same airport (Hurghada Airport).

Inspection of the A/C after landing, revealed that the lower tail section of the A/C was badly affected by the tail strike and showed some damage (as indicated in this report)

The Marshalling people examined the runway after the incidents. Marshalling people announced that the runway was serviceable, with some traces of the aircraft paint on the left side near the runway centerline.

The A/C was carrying 3 Cockpit Crew (One Captain plus two First Officers), 4 Cabin crew and 225 Passenger (201 adult, 19 children, 5 infants)

1.2 Injuries to persons:

No injury.

1.3 Damage to aircraft:

A. Examination of the aircraft

Examination of the aircraft revealed that the lower aft side of the fuselage just right side of the A/C centerline suffered a structural damage as a result of the tail strike and the impact with the ground. (Refer to photos showing A/C damage)

B. Incident aircraft photos:

Several shots were taken of the aircraft to show the damage details.
(Refer to exhibit #1).

1.4 Other Damages

No other damages

1.5 Personnel Information

1.5.1 Captain:

A. Captain information:

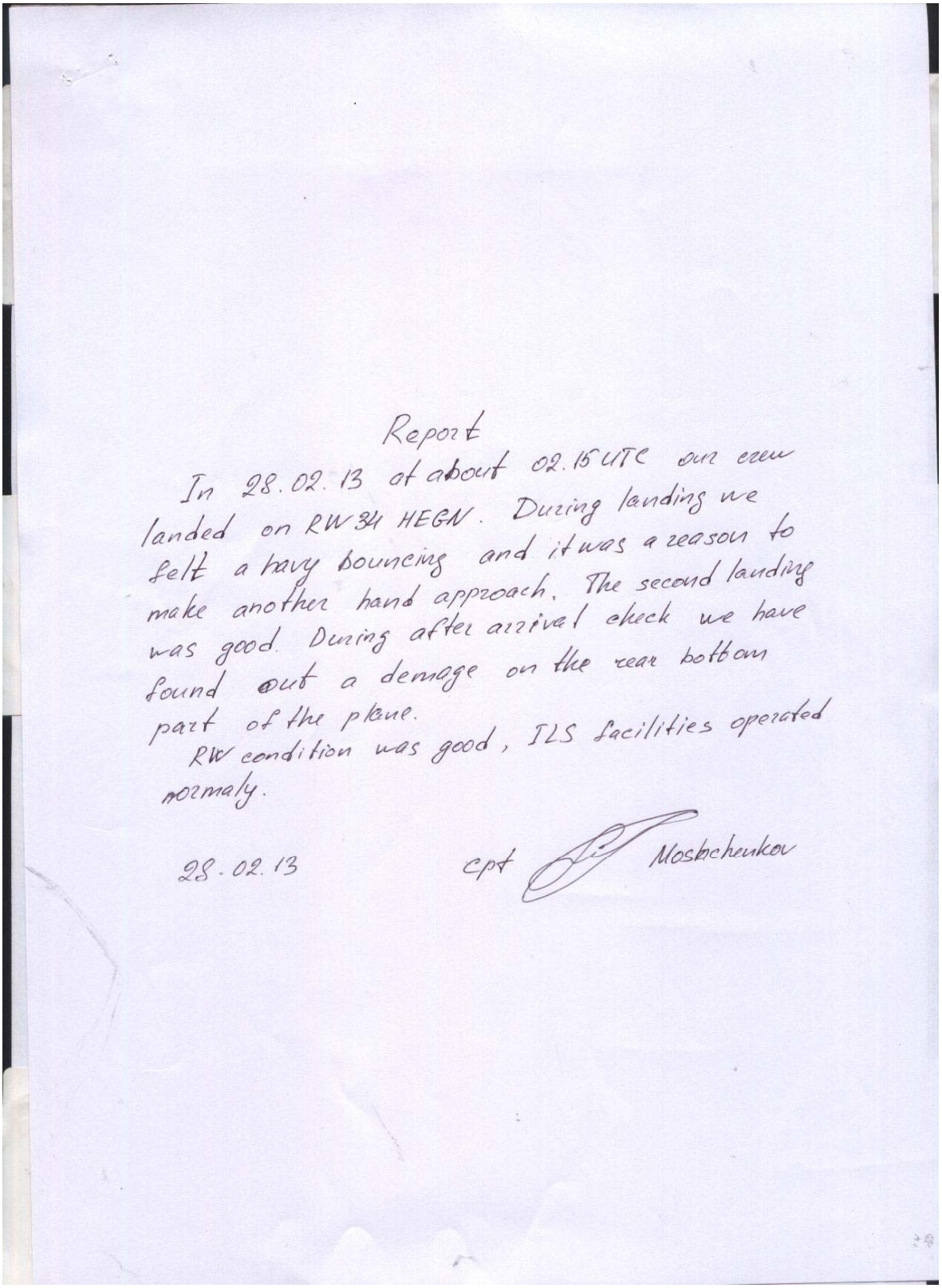
– Following table includes information concerning his past experience and number of flying hours up to 29/07/2011.

[1]

Position	Captain
Gender	Male
Licence number and validity	II-II 010056 10/05/2013
Licence category and rating	ATPL, Captain A319/320/321
Instrument rating details	CAT III-A ICAO
Class and date of last medical	Class 1, 10/05/2012
Total all types	3498
Total on type	2817
Total last month	77.29
Total last week	27.54
Total last 24 hours	11.24
Line and proficiency check	03/10/2012

[1] The table shows that the number of flying hours for the F/O is much higher than the flying hours of the captain. The F/O flew a lot on the A/C type TU-154, and that might explain this large difference in flying hours between the F/O and the captain. The feeling of the captain that the F/O is highly experienced with a large amount of flying hours might have some effect on his behavior towards his F/O. The captain might have felt high confidence in the F/O resulting in a feeling of relaxation assuming that the error probability from the F/O side is too low.

B. Captain Report:



Report

In 28.02.13 at about 02.15 UTC our crew landed on RW 34 HEGN. During landing we felt a havy bouncing and it was a reason to make another hand approach. The second landing was good. During after arrival check we have found out a demage on the rear bottom part of the plane.

RW condition was good, ILS facilities operated normaly.

28.02.13 cpt Moshchenkov

1.5.2 First Officer:

A. F/O information:

Following table includes information concerning his past experience and number of flying hours up to 29/07/2011.

Position	First Officer
Gender	Male
Licence number and validity	I-Π009896 23/04/2013
Licence category and rating	ATPL, First Officer A319/320/321
Instrument rating details	CAT III-A ICAO
Class and date of last medical	Class 1, 23/04/2012
Total all types	15102
Total on type	757
Total last month	46.10
Total last week	27.54
Total last 24 hours	11.24
Line and proficiency check	05/07/2012

B. F/O Report:

- Not Available

1.5.3 Crew member 3

- Not Available [2]

[2] Only a copy of the third crewmember Passport is available

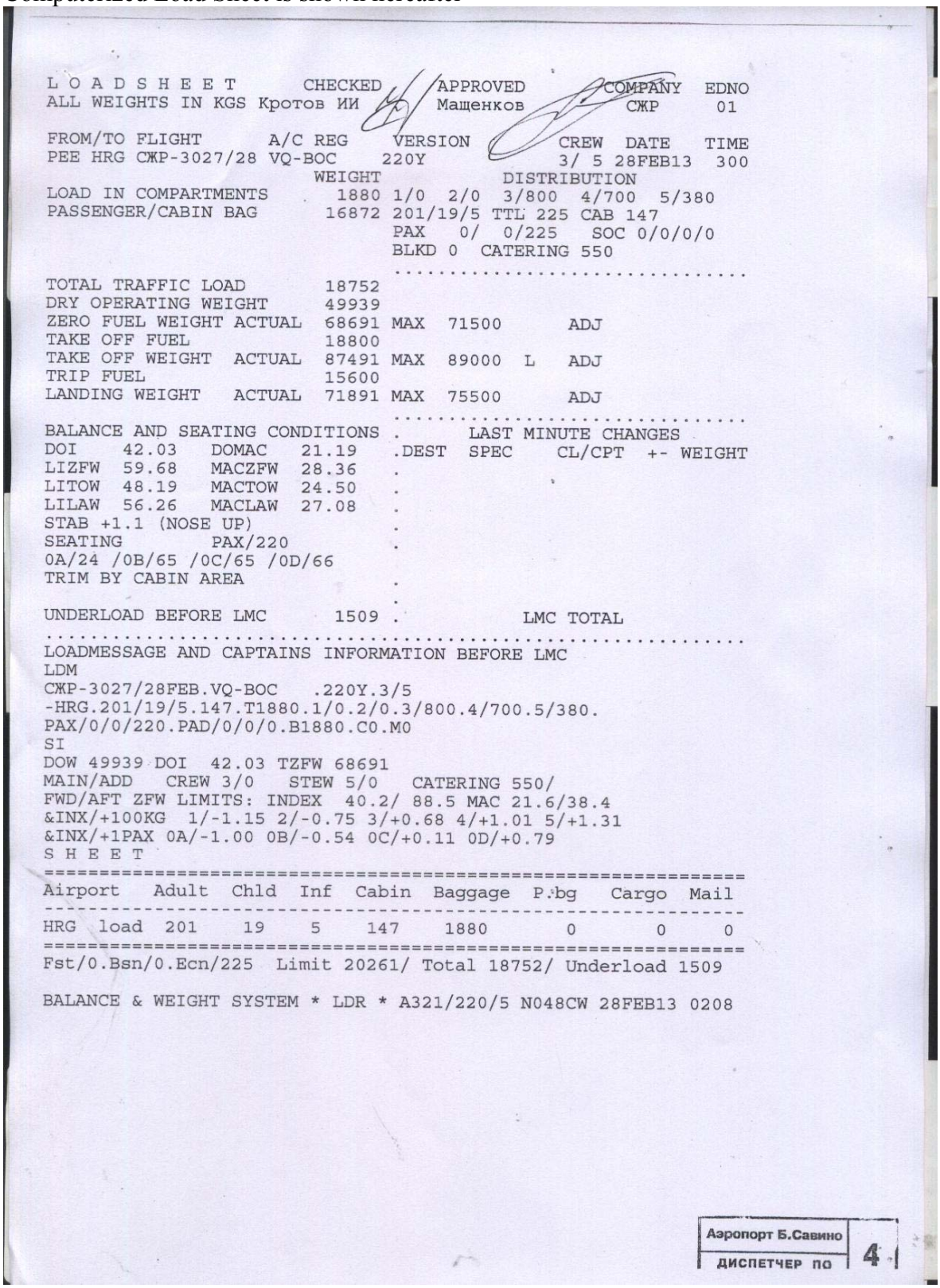
1.6 Aircraft Information

1.6.1 Aircraft General Information

- Manufacturer: Airbus industry
- Type: A321-231
- Aircraft registration: VQ-BOC
- Aircraft Serial Number: 1199
- Year of manufacturing: 2000
- Number and type of engines: 2 V2533-A5 turbofan engines
- Total airframe hours: 39597 FH; 15681 FC
- Certificate of Registration: # 1845 Issued on 21 October 2011 and valid.
- Certificate of Airworthiness: # 1646 Valid until 23 October 2013
- Owner Royal Flight Limited
- Operator: Join Stock Company Ural Airlines
- Air Operator Certificate #18 Issued on 26 May 2011 and valid

1.6.2 Aircraft Relevant Load Sheet:

Computerized Load Sheet is shown hereafter



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L O A D S H E E T      CHECKED          APPROVED          COMPANY   EDNO
ALL WEIGHTS IN KGS Кротов ИИ            Мащенков          СЖР       01

FROM/TO FLIGHT      A/C REG    VERSION          CREW  DATE    TIME
PEE HRG СЖР-3027/28 VQ-BOC     220Y             3/ 5 28FEB13  300
                    WEIGHT                DISTRIBUTION
LOAD IN COMPARTMENTS     1880 1/0  2/0  3/800  4/700  5/380
PASSENGER/CABIN BAG     16872 201/19/5 TTL 225 CAB 147
                              PAX   0/  0/225   SOC 0/0/0/0
                              BLKD 0  CATERING 550
                              ..............................
TOTAL TRAFFIC LOAD      18752
DRY OPERATING WEIGHT    49939
ZERO FUEL WEIGHT ACTUAL 68691 MAX  71500      ADJ
TAKE OFF FUEL           18800
TAKE OFF WEIGHT  ACTUAL 87491 MAX  89000  L   ADJ
TRIP FUEL               15600
LANDING WEIGHT   ACTUAL 71891 MAX  75500      ADJ
                              ..............................
BALANCE AND SEATING CONDITIONS .      LAST MINUTE CHANGES
DOI    42.03   DOMAC   21.19   .DEST  SPEC    CL/CPT  +- WEIGHT
LIZFW  59.68   MACZFW  28.36   .
LITOW  48.19   MACTOW  24.50   .
LILAW  56.26   MACLAW  27.08   .
STAB +1.1 (NOSE UP)           .
SEATING        PAX/220        .
0A/24 /0B/65 /0C/65 /0D/66
TRIM BY CABIN AREA            .
                              .
UNDERLOAD BEFORE LMC     1509 .          LMC TOTAL
..............................................................
LOADMESSAGE AND CAPTAINS INFORMATION BEFORE LMC
LDM
СЖР-3027/28FEB.VQ-BOC   .220Y.3/5
-HRG.201/19/5.147.T1880.1/0.2/0.3/800.4/700.5/380.
PAX/0/0/220.PAD/0/0/0.B1880.C0.M0
SI
DOW 49939 DOI  42.03 TZFW 68691
MAIN/ADD   CREW 3/0   STEW 5/0   CATERING 550/
FWD/AFT ZFW LIMITS: INDEX  40.2/ 88.5 MAC 21.6/38.4
&INX/+100KG  1/-1.15 2/-0.75 3/+0.68 4/+1.01 5/+1.31
&INX/+1PAX 0A/-1.00 0B/-0.54 0C/+0.11 0D/+0.79
S H E E T
==============================================================
Airport   Adult  Chld  Inf  Cabin  Baggage  P.bg   Cargo  Mail
--------------------------------------------------------------
HRG  load 201    19    5    147    1880     0      0      0
==============================================================
Fst/0.Bsn/0.Ecn/225  Limit 20261/ Total 18752/ Underload 1509

BALANCE & WEIGHT SYSTEM * LDR * A321/220/5 N048CW 28FEB13 0208
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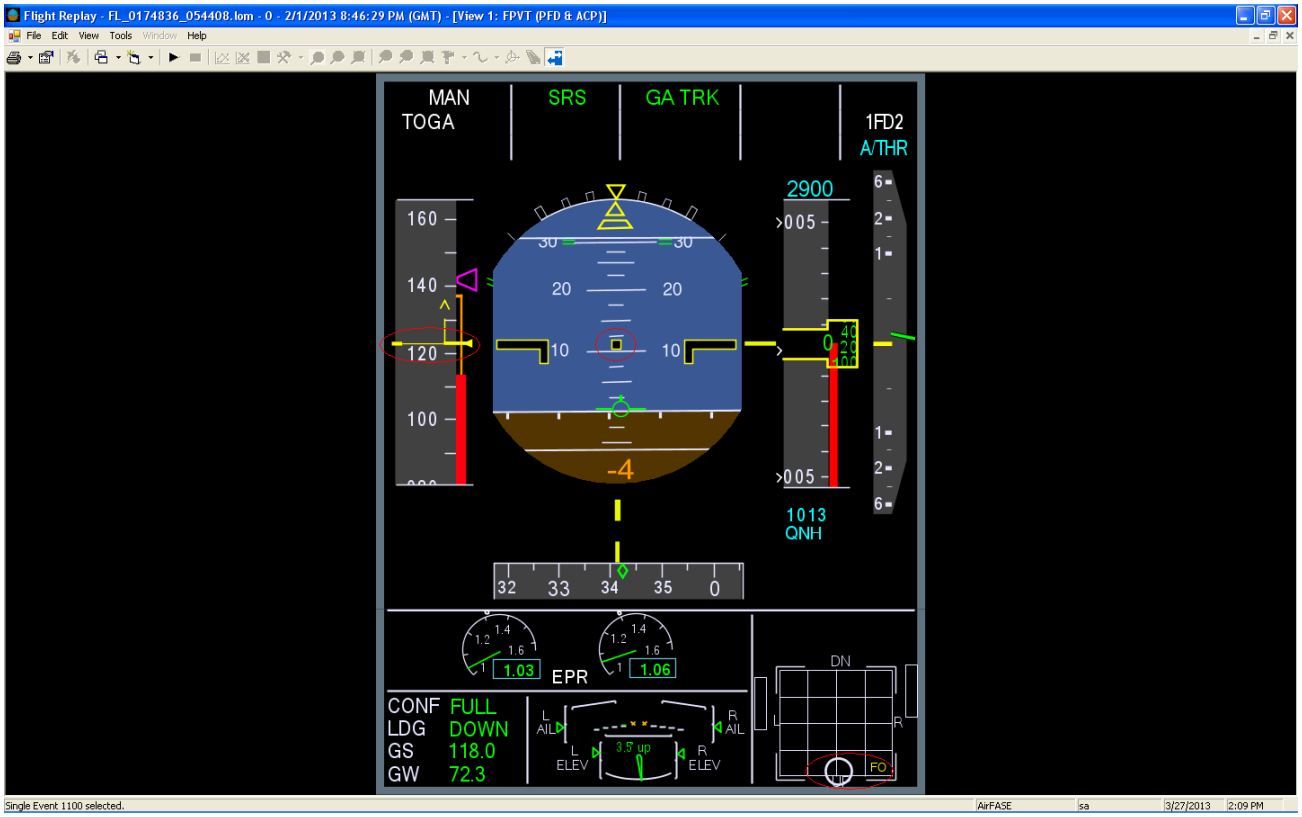
Аэропорт Б.Савино
ДИСПЕТЧЕР ПО 4

For in depth analysis for the weight and balance, refer to the analysis section 2.11

1.6.3 Primary Flight Display PFD:

The following PFD drawing is shown for better understanding of the parameters follow up



1.7 Meteorological Information

Based on the report submitted by "Holding Company for Airports and Aviation Navigation chairman" dated 11-March-2013, following indicated summary of the weather at the time of the incident:

Time: 0200

Wind direction/ wind speed: 320/ 13

Visibility: CAVOK (Ceiling and Visibility O.K.)

- Visibility >10 km
- No ceiling below 5000 ft
- No precipitation
- No CB.

Outside Air Temp (OAT) = 18 Degree Celsius

Dew point= 3 Degree Celsius

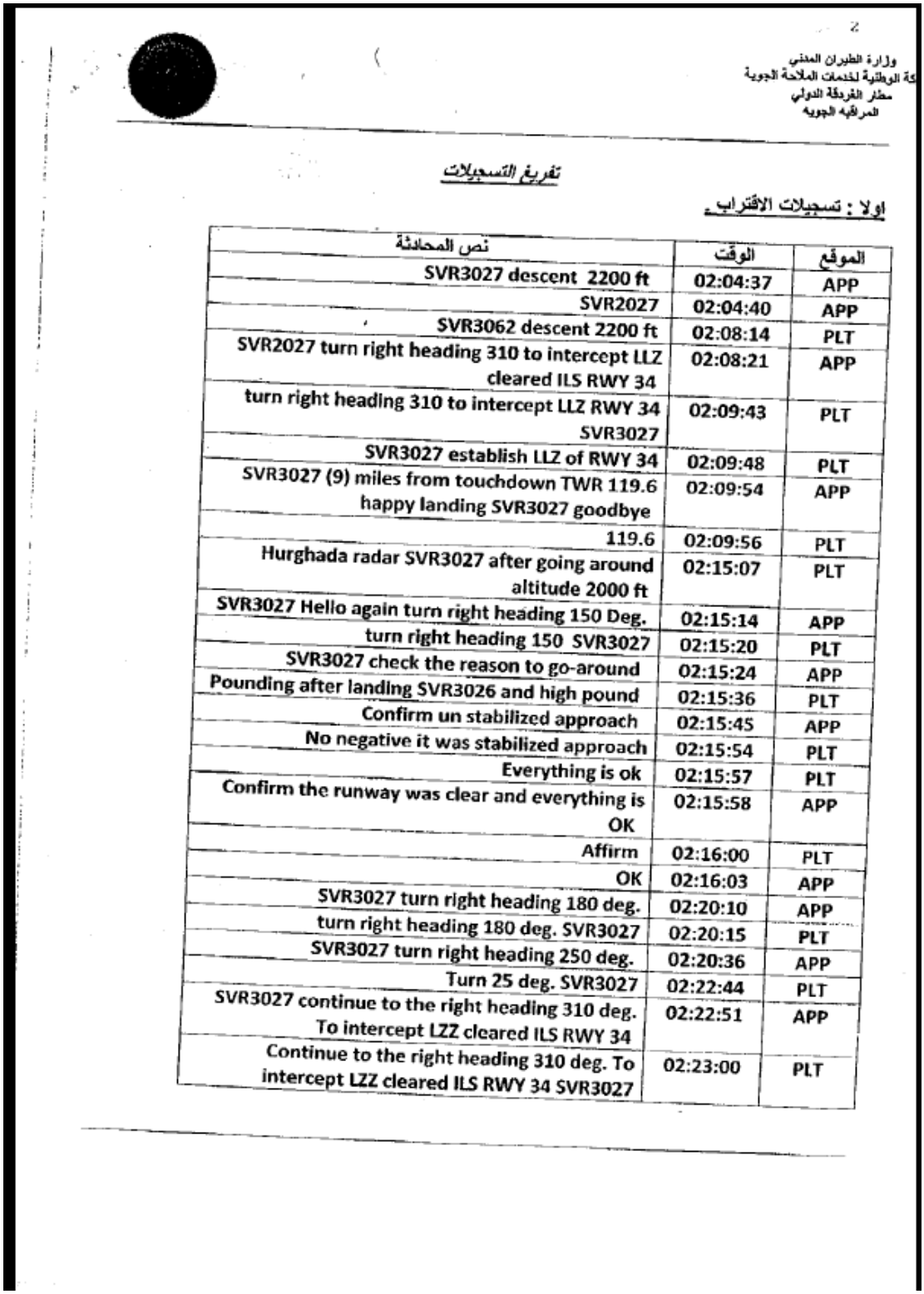
QNH= 1013 mb (hp)

1.8 Aids to Navigation

- Not relevant.

1.9 Communication:

Communication and Conversation among the Approach Controller (APP) , tower controller (TWR) and cockpit crew (Pilot) are shown in the following pages:



وزارة الطيران المدني
ة الوطنية لخدمات الملاحة الجوية
مطار الغردقة الدولي
المراقبه الجويه

تفريغ التسجيلات

اولا : تسجيلات الاقتراب .

نص المحادثة	الوقت	الموقع
SVR3027 descent 2200 ft	02:04:37	APP
SVR2027	02:04:40	APP
SVR3062 descent 2200 ft	02:08:14	PLT
SVR2027 turn right heading 310 to intercept LLZ cleared ILS RWY 34	02:08:21	APP
turn right heading 310 to intercept LLZ RWY 34 SVR3027	02:09:43	PLT
SVR3027 establish LLZ of RWY 34	02:09:48	PLT
SVR3027 (9) miles from touchdown TWR 119.6 happy landing SVR3027 goodbye	02:09:54	APP
119.6	02:09:56	PLT
Hurghada radar SVR3027 after going around altitude 2000 ft	02:15:07	PLT
SVR3027 Hello again turn right heading 150 Deg.	02:15:14	APP
turn right heading 150 SVR3027	02:15:20	PLT
SVR3027 check the reason to go-around	02:15:24	APP
Pounding after landing SVR3026 and high pound	02:15:36	PLT
Confirm un stabilized approach	02:15:45	APP
No negative it was stabilized approach	02:15:54	PLT
Everything is ok	02:15:57	PLT
Confirm the runway was clear and everything is OK	02:15:58	APP
Affirm	02:16:00	PLT
OK	02:16:03	APP
SVR3027 turn right heading 180 deg.	02:20:10	APP
turn right heading 180 deg. SVR3027	02:20:15	PLT
SVR3027 turn right heading 250 deg.	02:20:36	APP
Turn 25 deg. SVR3027	02:22:44	PLT
SVR3027 continue to the right heading 310 deg. To intercept LZZ cleared ILS RWY 34	02:22:51	APP
Continue to the right heading 310 deg. To intercept LZZ cleared ILS RWY 34 SVR3027	02:23:00	PLT

وزارة الطيران المدني
كة الوطنية لخدمات الملاحة الجوية
مطار الغردقة الدولي
المراقبه الجويه

SVR3027 (6) miles from touchdown TWR 119.6	02:23:03	APP
SVR3027 full establish RWY 34	02:23:08	PLT
SVR3027 TWR 119.6	02:23:10	APP
119.6 goodbye SVR3027	02:23:13	PLT
BYE	02:23:15	APP

ثانيا : تسجيلات البرج .

نص المحادثة	الوقت	الموقع
hurghada TWR SVR3027 السلام عليكم to land	02:10:06	PLT
3027 عليكم السلام insight wind 300/15 gusting 20 KNT 34 cleared to land	02:10:11	TWR
RWY 34 clear to land SVR3027	02:10:19	PLT
SVR3027 go around	02:13:59	PLT
ok sir you are insight . insight	02:14:02	TWR
SVR3027 continue runway heading climb 2000 FT	02:14:16	TWR
climb 2000 FT on runway heading SVR3027	02:14:22	PLT
SVR3027 switch radar 123.4	02:14:32	TWR
123.4 SVR3027	02:14:36	PLT
hurghada tower SVR3027 full establish of runway 34	02:23:17	PLT
SVR3027 insight wind 300/12knt. Clear to land runway 34	02:23:21	TWR
clear to land runway 34 SVR3027	02:23:30	PLT
SVR3027on land	02:26:14	PLT
ya insight SVR3027 welcome on ground time 25 continue to vacate via F,A,N stand 23 to report marshaler insight and when vacate just inform me when you are free	02:26:18	TWR
roger SVR3027 vacate via F,A,N runway to 23 and call you when vacate SVR3027	02:26:36	PLT
SVR3027 runway is vacated	02:27:31	PLT
thank you sir can you give me your registration mark and aerodrome and entry point from Cairo FIR	02:27:35	TWR
departure aerodrome was USPP entry point METSA registration VQBOC	02:27:41	PLT
VQBOC and A321	02:27:52	TWR

affirm SVR3027	02:27:56	PLT
and what is the reason of the missed approach	02:27:58	TWR
it was pounding and high jump after pounding and we have to !!aa!! and we have to go	02:28:02	PLT
sorry sir you lost what ?	02:28:12	TWR
YES	02:28:16	PLT
say again sir I didn't copy your message . what pleas	02:28:20	TWR
it was high pounding and touch ground .SVR3027 and we must to !!aa!! we have to go	02:28:26	PLT
ok you missed out the touchdown zone	02:28:37	TWR
YES	02:28:39	PLT
OK sir and welcome	02:28:40	TWR
thank you	02:28:43	PLT
SVR3027 marshaler insight thank you	02:30:35	PLT
follow marshaler signal and welcome and confirm your next flight plan is SVR3010 or change crow	02:30:39	TWR
confirm SVR3027	02:30:46	PLT
change crew	02:30:48	TWR
affirm	02:30:49	PLT
have a good day in hurghada sir	02:30:50	TWR
thanks	02:30:51	PLT

APP : approach controller
TWR: tower controller
PLT : pilot

(متولى)

1.10 Aerodrome Information:

Flight has originated from “Bolshoye Savino” Russia (USPP), and ended at Hurghada, Egypt (HEGN)

A. Incident (Landing) Airport:

- Flight from “Bolshoye Savino” Russia (USPP), to Hurghada, Egypt (HEGN)), has suffered a tail strike during landing at Hurghada, runway 34. The flight crew performed a Go Around procedure after the tail strike and landed the A/C later on the same runway (34), same airport (Hurghada Airport).

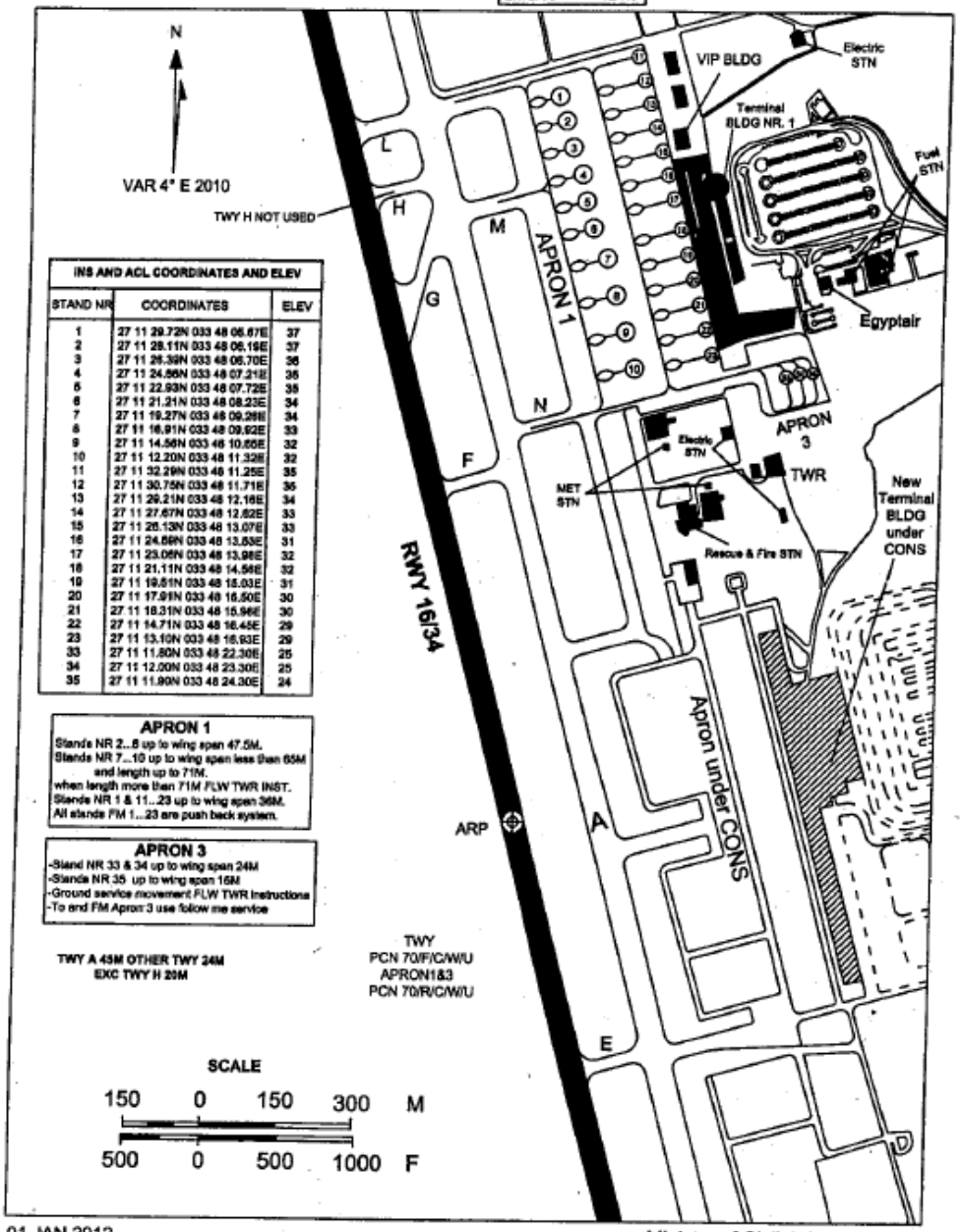
- Details of the Air port are shown hereafter (Ref. AIP A.R.E)

AIRCRAFT PARKING / DOCKING CHART - ICAO

APRON ELEV 37FT

TWR & APP	119.6
GND	121.9
RADAR APP	123.4
EMERG	121.5

HURGHADA/HURGHADA



INS AND ACL COORDINATES AND ELEV

STAND NR	COORDINATES	ELEV
1	27 11 29.72N 033 48 06.67E	37
2	27 11 28.11N 033 48 06.19E	37
3	27 11 26.39N 033 48 06.70E	36
4	27 11 24.86N 033 48 07.21E	36
5	27 11 22.93N 033 48 07.72E	35
6	27 11 21.21N 033 48 08.23E	34
7	27 11 19.27N 033 48 09.26E	34
8	27 11 16.91N 033 48 09.92E	33
9	27 11 14.56N 033 48 10.65E	32
10	27 11 12.20N 033 48 11.32E	32
11	27 11 32.29N 033 48 11.25E	35
12	27 11 30.75N 033 48 11.71E	35
13	27 11 29.21N 033 48 12.16E	34
14	27 11 27.67N 033 48 12.62E	33
15	27 11 26.13N 033 48 13.07E	33
16	27 11 24.58N 033 48 13.53E	31
17	27 11 23.05N 033 48 13.98E	32
18	27 11 21.11N 033 48 14.56E	32
19	27 11 19.51N 033 48 15.03E	31
20	27 11 17.91N 033 48 15.50E	30
21	27 11 16.31N 033 48 15.96E	30
22	27 11 14.71N 033 48 16.45E	29
23	27 11 13.10N 033 48 16.93E	29
33	27 11 11.80N 033 48 22.30E	25
34	27 11 12.00N 033 48 23.30E	25
35	27 11 11.90N 033 48 24.30E	24

APRON 1
Stand's NR 2...8 up to wing span 47.5M.
Stands NR 7...10 up to wing span less than 65M and length up to 71M.
when length more than 71M FLW TWR INST.
Stands NR 1 & 11...23 up to wing span 36M.
All stands FM 1...23 are push back system.

APRON 3
-Stand NR 33 & 34 up to wing span 24M
-Stands NR 35 up to wing span 16M
-Ground service movement FLW TWR instructions
-To and FM Apron 3 use follow me service

B. Originating Airport:

- The aircraft took off from “Bolshoye Savino” Russia (USPP)
- Bolshoye Savino Airport (Russian: Аэропорт Большое Савино) (IATA: PEE, ICAO: USPP) is an international airport located in Perm Krai, Russia located 16 km southwest of Perm, in the village of Bolshoye Savino. It is the only airport in Perm Krai with regular scheduled passenger flights.

1.11 Flight Recorders [3]

1.11.1 Cockpit Voice Recorder CVR

– CVR information: P.N 980-6022-001, manufactured by Honeywell

– CVR read out has been made at the Flight Recorders Lab, Accidents and Incidents Directorate.

– CVR Transcript:

- The following CVR translation has been made to the best available accuracy, considering the language problem, close similarity in the voices between the PIC (referred as Captain) and SIC (referred as F/O).
- "Captain" and "F/O" expressions are included in the speaker column in the cases where the voices of the Captain and F/O were identified and differentiated .The "Pilot" expression is used elsewhere.
- Conversations using Russian languages are shown in Italic Font
- Events marked in yellow background are the events that were used for time correlation with FDR data.
- The time duration for the CVR transcript is about 8 minutes. This time was selected to cover the incident event. .
- A time reference for CVR was used as follows:

  0 time reference refers to 00:00:00 hh:mm:ss, with increments of 1 second on both scales

3 Information has been made available by the FDR, CVR center, Central Accident Investigation Department

CVR Transcript: [4]

CVR Ref time new HH:MM:SS	CVR time sec	Speaker	Event
0:00:01	1	CAPT	Glide Slope
0:00:02	2	CAPT	Check flaps
0:00:05	5	CAPT	Flaps
0:00:06	6	F/O	3
0:00:07	7	CAPT	Speed checked
0:00:12	12	F/O	flaps 3
0:00:14	14		Flaps *And* Flaps full
0:00:16	16	CAPT	Speed checked
0:00:19	19	F/O	Flaps full
0:00:20	20	F/O	Landing check list
0:00:23	23	CAPT	Landing check list Cabin crew
0:00:24	24	F/O	advised
0:00:24	24.5	CAPT	I can't ……Everyone…….. Everyone ……
0:00:25	25		Auto thrust……..
0:00:26	26	F/O	Speed
0:00:27	27	CAPT	Auto Brake
0:00:30	30	F/O	eh manual
0:00:31	31	CAPT	ECAM memo
0:00:33	33	F/O	landing no blue
0:00:35	35		Landing check list completed
0:00:37	37		Yes, 37 Yes
0:01:09	69	PILOT	Autopilot off
0:01:12	72		Sound of three successive tones
0:01:13	73		Check them go
0:01:14	74		Checked
0:01:16	76		Let's check
0:01:17	77		Clear to land
0:01:18	78		Checked
0:01:19	79	System	One thousand Auto Call)
0:02:06	126		Four hundred (Auto Call)
0:02:10	130	CAPT	Land green
0:02:11	131	F/O	Checked
0:02:13	133		Words in Russian Slang (un-understood)
0:02:15	135	CAPT	Checked
0:02:17	137	F/O	*Continue*
0:02:22	142	CAPT	Minimum

[4] The word Pilot is used whenever it is not possible to identity whether the relevant spoken phrase was made by the captain or the F/O

0:02:24	144	F/O	Continue
0:02:26	146	Auto Call out	2 hundred Auto Call out
0:02:35	155		1 hundred
0:02:39	159		50,40,30,20,……Retard, Retard, Retard…
0:02:45	165		…(Wow)….
0:02:46	166	CAPT	.Retard C
0:02:50	170		*That, What we have to do?*
0:02:51	171		Go
0:02:52	172		Unidentified sound
0:02:53	173	F/O	Sound of unidentified knock
0:02:54	174	F/O	5 Chimes sound
02:56	176	CAPT	*I didn't see anything*
03:0	180	CAPT	*This is the flaps*
03:2	182		I put it ……I put it
03:3	183		Gear up
03:4	184	F/O	Checked
		CAPT	(Sound of warning) (A/P warning)
03:7	187	CAPT	*Switch on*
03:9	189	Tower	*Understand Tower*
		CAPT	*Go around*
03:13	193	F/O	Ok, sir you are insight insight
03:15	195	CAPT	*(Slaw(at least you have to say anything when you saw something C*
03:19	199		*That, what happened….I didn't see anything*
03:22	202	Tower	*Ok Tower*
03:27	207		Flaps
03:28	208		SVR 027 continue Ramio heading climb 2 thousand feet
03:36	216		Climbing 2 thousand feet on runway heading SVR 027
03:37	217		What happened? /What is this?
03:38	218		Speed over star
03:39	219	Tower	Normal Tower
03:41	221	PILOT	Why he gave to us these changes?
03:43	223		SVR 3027 switch radar 1 2 3 4
03:47	227		1 2 3 4 SVR 3027
			This is flaps 1
03:49	229		flaps 1
03:56	236		Nothing bad happened
03:59	239		1 2 3 4, how I couldn't see the ground, when I landed!
04:1	241	PILOT	Everything was very lighting
04:2	242		Let's make like this

04:18	258	Tower	Hurghada Radar SVR 3027 AAA……. After going around altitude 2 thousand feet Tower
04:25	265	PILOT	SVR 3027, Hello again
04:29	269	Tower	Turn right heading 150 degrees
04:31	271		Turn right heading 150 degrees SVR 3027
04:36	276	PILOT	3027 check the reason for the go around
04:41	281	Tower	It's not suppose to go ahead after 6
04:47	287	PILOT	Bbouncing after landing SVR 3027 and AAA……. High bounce
04:54	294		Confirm unstabilized approach
04:56	296		No, negative It was stabilized approach
		Tower	Tower
05:3	303	PILOT	Everything is ok
05:5	305		…..And confirm the runway was clear and Everything is ok
05:9	309		affirm
05:10	310		Ok
05:15	315		Like this
05:16	316		At landing check list, Did you do everything?
05:20	320		After takeoff check list
05:22	322		After takeoff check list
05:24	324		Landing gear
05:26	326		Up
05:27	327		Flaps
05:28	328		Retracted
			One position
05:31	331		Packs
05:32	332		AAA…… On
05:33	333		On
05:35	335		After check list completed
05:41	341		The impact was strong
05:43	343		We little bit jump and as usually I thought ,that we'll continue/complete , but we hold
05:55	355		It was right that we decided to go
			I didn't see how long distance we left, but I thought, that we aren't landing , we are going
06:3	363		I thought the same
06:32	392		Ladies and gentlemen don't be worry there is something on runway ,so that we'll make another trail
			I pulled not a little
07:0	420		No, no normal it was a good opportunity, but in the impact we didn't pull as usually

07:41	461		I put small power as he told me then I felt touch and I felt that we leave not like as usually. After we went out we touched again like what happened in “TU”
07:50	470	Pilot	Even it was less than 5 thousand we thought it …… Anyway It’s better than crashing and It was 10 degrees
08:11	491	Pilot	You should ask me, what we have to do I’m looking to the ground if we land or no and I didn’t see any instruments

For FDR, CVR correlation, refer to Analysis sub section 2.11.1.

1.11.2 Flight Data Recorder FDR [5]

- FDR information: P.N 980-4700-003, manufactured by AlliedSignal.
- The FDR recording included two types of parameters as follows:
  - Analog parameters
  - Discrete values
- Discrete parameters are the parameters that can have only two distinct values, Analog value can have different values, varying between a min value and a max value with certain resolution value.
- All the recorded FDR parameters were listed and sorted among the analog and discrete parameters.
- Most of the parameters have been plotted against reference time. A zero reference time was selected to be equivalent to frame number 83500 with the same time interval of one seconds,
- Analog parameters were sorted according to different areas as follows:
  1. A/C Performance
  2. Systems Parameters (including analog and discrete parameters):
     - Landing Gears
     - Flight Controls
     - Power Plant
  3. Miscellaneous

- Plots are included in Exhibit # 2, Flight Data Recorder FDR Read out
- A list of the recorded plotted parameters is shown hereafter.
- The complete FDR Downloaded parameters tables are saved on CD as Spread sheets tables (Excel file, ext .xls) The CD is available with the report

[5] Information has been made available by the FDR, CVR center, Central Accident Investigation Department

List of the recorded plotted parameters

1- Aircraft Performance/ Control

- 106 AOA L
- 107 AOA R
- 122 Baro Setting Capt
- 123 Baro Setting F/O
- 161 Drift Angle
- 192 Flaps position
- 211 Gross Weight lbs
- 212 Ground Speed kts
- 215 Heading (Degrees)
- 227 IAS knots
- 230- 233 Lateral Acceleration
- 247- 250 Longitudinal Acceleration
- 272- 279 Normal Acceleration
- 291 294 Pitch Attitude degrees
- 305 Press Altitude ft
- 310 Radio Altitude 1 ft
- 310 Radio Altitude 2 ft
- 319- 320 Roll Attitude angle degrees
- 321- 324 Roll Command Capt degrees
- 325- 328 Roll Command F/O degrees
- 329- 330 Roll Command Capt degrees
- 334 Selected Altitude feet
- 334 Selected Altitude feet
- 334 Selected Decision Height feet
- 337 Selected FPA
- 339 Selected Mach
- 340 Selected speed kts
- 341 Selected Tracks
- 342 Selected Vertical Speed
- 345 Side Stick Pos Pitch Capt
- 346 Side Stick Pos Pitch Capt

- 347 Side Stick Pos Pitch Capt
- 348 Side Stick Pos Pitch Capt
- 349 Side Stick Pos Pitch F/O
- 350 Side Stick Pos Pitch F/O
- 351 Side Stick Pos Pitch F/O
- 352 Side Stick Pos Pitch F/O
- 353 Side Stick Pos Roll Capt
- 353 Side Stick Pos Roll Capt
- 356 Side Stick Pos Roll Capt
- 363 Side Stick Pos Roll F/O
- 358 Side Stick Pos Roll F/O
- 359 Side Stick Pos Roll F/O
- 360 Side Stick Pos Roll F/O
- 382 TCAS RA
- 387 TAT degree
- 393 Wind Direction degrees
- 393 Wind speed kts

2- Systems Parameters:

2.1 Landing Gears

- 124 Brake Pedal Angle degrees

- 125 Brake Pedal Angle R degrees

2.2 Flight Controls

- 178 Elevator Pos –L degrees
- 179 Elevator Pos –L degrees
- 239 Left Aileron Pos Degrees Elevator Pos –L degrees
- 316 Right Spoiler 2 Position degrees
- 317 Right Spoiler 3 Position degrees
- 318 Right Spoiler 5 Position degrees
- 329 Rudder Position Degrees
- 330 Rudder Position Degrees

- 361 Slat Position degrees

2.3 Power Plant

- 184 EPR Actual Eng 1
- 185 EPR Actual Eng 2
- 203 Furl Flow L pph
- 204 Fuel Flow R pph
- 257 N1 Actual Eng 1 %
- 257 N1 Actual Eng 2 %
- 259 N1 Command Actual Eng 1 %
- 260 N1 Command Eng 2 %
- 261 N1 Vibration Eng 1 %
- 262 N1 Vibration Eng 2 %
- 264 N2 Vibration Eng 1 %
- 265 N2 Vibration Eng 2 %
- 385 TLA Eng 1
- 386 TLA Eng 2
- 385-386 TLA Eng 1

3- Miscellaneous:

- 138 Constraints Altitude ft
- 208 Glide Slope 1 dots
- 208 Glide Slope 2 dots
- 200 Frame Counter (counts)
- 157 DME 1 Distance nm
- 158 DME 1 Frequency MHz
- 159 DME 2 Distance nm
- 225 ILS 1 Frequency MHz
- 226 ILS 2 Frequency MHz
- 240 Localizer 1 dots
- 241 Localizer 2 dots
- 381 Sync World counts
- 383 TCAS Sensitivity
- 384 TCAS TA

- 391 VOR 1 Frequency MHz
- 392 VOR 2 Frequency MHz

List of the recorded plotted parameters (Discrete)

201-Fuel Fire Valve –L (Fully Closed=1)

202-Fuel Fire Valve –R (Fully Closed=1)

205-Gear Not Locked Down

206-Gear Selection Down (Down =1)

207-Gear Selection Up (Up=1)

210-GPWS Warning (Warning=1)

213-Ground Spoiler Armed (Not Armed=1)

214-(Not Armed=1)

216-Heading Selection (Magnetic=1)

217-HF Keying (Keyed=1)

218-HP Fuel Valve-L (Open=1)

219-HP Fuel Valve-R (Open=1)

220-HPV Not Full Closed –L (Closed=1)

221-HPV Not Full Closed –R (Closed=1)

223-Hyd Low Press-Green

224-Hyd Low Press-Yellow

228-Lat Accel Check Fail (Okay=1)

229-Lat Accel Check Not Run (Not Checked=1)

242-Long Accel Check Fail (Okay=1)

243-Long Accel Check Not Run (Not Checked=1)

251-Mach Selection (speed=1)

252-Marker Beacon Passage

253-Master Warning (Not on=1)

254-MLS Selection (ILs=1)

255-Month (Mar=1)

256-Month – Test (Mar=1)

263-N1/EPR Mode Selection (EPR=1)

266-ND Capt Anomaly (Normal Config =1)

267-ND F/O Anomaly (Normal Config =1)

268-No Data from EEC1 (Data=1)

269-No Data from EEC2 (Data=1)

270-Norm Accel Check Fail (Okay=1)

271-Norm Accel Check Not Run (Not Checked=1)

280-Normal Flight Law (Normal Law=1)

281-Oil Low Press-Eng 1 (Warning=1)
282-Oil Low Press-Eng 2 (Warning=1)
283-OPV Not Full Open-L (Fully Open=1)
284-OPV Not Full Open-R (Fully Open=1)
285-Pack 1 Flow Not Fully Closed=1)
286-Pack 2 Flow (Not Fully Closed=1)
287-PFD Capt Anomaly (Normal Config=1)
288-PFD F/O Anomaly (Normal Config=1)
289-PFD/ND XFR Capt (Normal Config=1)
290-PFD/ND XFR F/O (Normal Config=1)
303-Playback Fail (Okay=1)
304-Playback Inactive (Active=1)
306-PRV Not Fully Closed-L (Closed=1)
307-PRV Not Fully Closed-R (Closed=1)
308-QAR Fail (Okay=1)
309-QAR Tape Low (Okay=1)
312-Reverser Deployed-L (Stowed=1)
313-Reverser Deployed-R (Stowed=1)
314-Reverser Unlock-L (Lock=1)
315-Reverser Unlock-R (Lock=1)
331-SEC 1 Fault (Not Fault=1)
332-SEC 2 Fault (Not Fault=1)
333-SEC 3 Fault (Not Fault=1)
335-Selected Data base Cycle (Cycle 2=1)
343-Severity Ice Detected-Eng1 (Ice Detected=1)
344-Severity Ice Detected-Eng2 (Ice Detected=1)
362-Slats Fault (Not Fault=1)
363-Speed Brake Command (Not Commanded=1)
364-Spoiler 1 Out-L (In=1)
66-Spoiler 1 Out-R (In=1)
367-(In=1) 365-(In=1)

368-Spoiler 1 Validity (Valid=1)
369-Spoiler 2 Validity (Valid=1)
370-Spoiler 3 Validity (Valid=1)

371-Spoiler 4 Validity (Valid=1)

372-Spoiler 5 Validity (Valid=1)

373-Squat Switch-L (Not Compressed=1)

374-Squat Switch-Nose (Not Compressed=1)

375-Squat Switch-R (Not Compressed=1)

377-Stall

378-Starter Valve-Eng1 (Closed=1)

379-Starter Valve-Eng2 (Closed=1)

380-Surfaces Not in T.O. Config

389-VHF Keying (keyed=1)

390-VMO/MMO Overspeed

395-Windshear Warning (No winds hear=1)

396-Wing Anti Ice (Off=1)

397-Wing Anti-Ice-L (Closed=1)

398-Wing Anti-Ice-R (Closed=1)

399-Yaw Damper 1 Fault (Fault=1)

400-(Fault=1)

401-Yaw Damper 2 Fault (Fault=1)

402-(Fault=1)

1.12 Wreckage and impact information

- For aircraft damage details, refer to section 1.3

1.13 Medical Pathological Information

- Not relevant.

1.14 Fire

- Not relevant.

1.15 Survival Aspects

- Not relevant.

1.16 Tests and Researches

- FDR data was entered and used by a dedicated software program. This software is capable of creating a replica of the event based on the entered input data (FDR data) showing also some relevant parameters within the animation (e.g. ADI parameters, including speed, attitude, heading, press altitude, rate of descent.
- This program was used to cover the time span including approach and touch down, focusing on the tail strike action.

1.17 Organizational and Management

- None.

1.18 Additional Information

1.18.1 Response from FATA regarding the Draft Final Report issued by Egyptian AAI:

- On October 30, 2013, Egyptian AAI received an email from the Accredited Representative, State Inspector of the FATA Ural Regional Office, The Federal Air Transport Agency (FATA), Russian Federation, including their response regarding the Draft Final Report issued by the Egyptian AAI and sent to FATA on 28 August 2013.
- The received response assured that FATA has no significant comments on the content of the final draft report issued bt the Egyptian AAI.
- However the received response included some remarks as follows:

    1- As a result of internal investigation conducted by the Ural Airlines Flight Safety Department we got a report. The conclusions on the cause of the event were close to the ones published in your draft final report. In addition:

        a. From pilots interrogation it was concluded - after touching down the RWY both pilots become sure that the aircraft bounced of RWY and was floating close to the ground. The same time DFDR data showed both landing gears compressed. It was found that probable cause of the illusion might be combination of very little bounce followed by soft touch down and abnormal pitch attitude at the time of the landing. FO was holding the aircraft nose high to prevent hard landing. This

pilot technique was against the Airbus recommendation (FCTM) and the Company SOP for the case of bouncing at landing. The Captain failed to properly conduct his duties as a Pilot Non Flying for aircraft pitch monitoring at landing and timely announcing exceeding of this parameter.

b. It was found that pilots were possibly affected by the fatigue influence of the long duty period and early time of the day but it was checked that the duty period of this flight was in strict compliance with Ural Airlines duty time regulations.

2- In few places in the draft final report Hurghada was spelled as Herghada and we are not sure if it is correct.

2. ANALYSIS

Analysis:

Note:

All the analysis in this chapter is based on information included in the Factual Information Chapter (Chapter 1)

2.5 Personnel Information

- The cockpit crew was eligible for the flight. All documents and certifications were conforming with the relevant rules and standards

- The flying hrs for the captain is

Total last month	77.29
Total last week	27.54
Total last 24 hours	11.24
Line and proficiency check	03/10/2012

- The flying hrs for the F/O is

Total last month	46.10
Total last week	27.54
Total last 24 hours	11.24
Line and proficiency check	05/07/2012

- It is evident that both the Captain and F/O flew for 11.24 last 24 hrs before the event; suggesting that they were under fatigue condition.

Intentionally blank

2.6 Aircraft Information:

2.6.1 Airplane status

- The airplane was airworthy; there was no evidence of mechanical failure throughout the whole event flight.

2.6.2 Weight and balance:

Weight and Balance Analysis: [6]

- Flight:
  From PEE airport Russia to HRG airport Egypt
- A/C Registration: VQ-BOC
- Version: 220 Y
- Crew: 3/5
- Date: 28-02-2013
- Time: 300
- Cargo loading:
  - Hold # 1 0 kg
  - Hold # 2 0 kg
  - Hold # 3 800 kg
  - Hold # 4 700 kg
  - Hold # 5 380 kg

  Total 1880 kg

- Passenger/ Cabin Baggage
  - 0A Section 24 pax
  - 0B Section 65 pax
  - 0CSection 65 pax
  - 0D Section 66 pax

  Total 220 Pax (201 Adult, 19 Children, 5 infants)

  Cabin Baggage 147 kg
- Total weight of Pax and Cabin Baggage = 16872 kg

  201 adult* 80 kg
  + 19 Children* 30
  + 5 Infants* 15
  + 147 kg Cabin Baggage

  = 16872 kg

[6] References: presented AHM 560 document and the event flight computerized load sheet

(* AHM 560 Page 4)

Catering = 550 kg

- Total Traffic load 18752 kg (1880 kg+ 16872 kg)
- Dry Operating Weight= 49939 kg
- Zero Fuel Weight= 68691 kg (49939 kg +18752 kg)

  (Max Z.F.W. =71500 kg, Underweight= 71500 kg – 68691 kg = 10809 kg) (AHM 560 Page 10)
- T.O. Fuel = 18800 kg
- T.O Weight = 87491 kg (= 68691 kg + 18800 kg)

  (Max T.O Weight = 89000 kg, Underweight = 89000- 87491 kg =1509 kg limiting) (AHM 560 Page 10)

- Trip Fuel= 15600 kg
- Landing Fuel = 18800-15600= 3300 kg
- Landing Weight = 71891 kg (68691+3300= 87491 kg – 15600 kg)

  (Max Landing Weight = 75500 kg, Underweight = 75500 kg-71891 kg= 3609 kg) (AHM 560 Page 10)

Under Weight value = 1509 kg (limited by Max T.O. Weight)

Index Calculations:

- Dry operating index calculation

	Weight kg	MAC	Arm	Index
Basic Weight	48526	19.54	22.89	38.984598
crew 3/5	240			
Cabin crew	375			
crew baggage				
Documentation	30			-0.52
Pantry	550			4.32
Potable W*ater	200			3.12
Toilet Fluids	10			0.16
Weapon Box	8			0.11
Total				

DOI= 42.03

(Refer to relevant AHM-560 document……)

- Cargo index calculation:

Index

- Hold # 1 0 kg 0
- Hold # 2 0 kg 0
- Hold # 3 800 kg 5.44 (one unit represents 500 kg = 3.4 on the index scale)
- Hold # 4 700 kg 7.56 (one unit represents 500 kg = 5.1 on the index scale)
- Hold # 5 380 kg 4.98 (one unit represents 250 kg = 3.28 on the index scale)

---------- --------

Total 1880 kg 17.98

(Refer to relevant AHM-560 document……)

- Passengers index calculations:

Zone	Max No of Pax	Index	
▪ 0A	24	-26.4	(one unit represents 5 pax = - 5.5 on the index scale)
▪ 0B	65	-39.65	(one unit represents 5 pax = -3.05 on the index scale)
▪ 0C	65	8.45	(one unit represents 20 pax = 2.6 on the index scale)
▪ 0D	66	58.08	(one unit represents 5 pax = 4.4 on the index scale)
	---	---	
Total	220	0.48	

(Refer to relevant AHM-560 document……)

- Zero Fuel Weight index
  - Dry operating index DOI = 42.03
  - Cargo index = 17.98
  - Pax Index = 0.48

  ZFW index 60.49

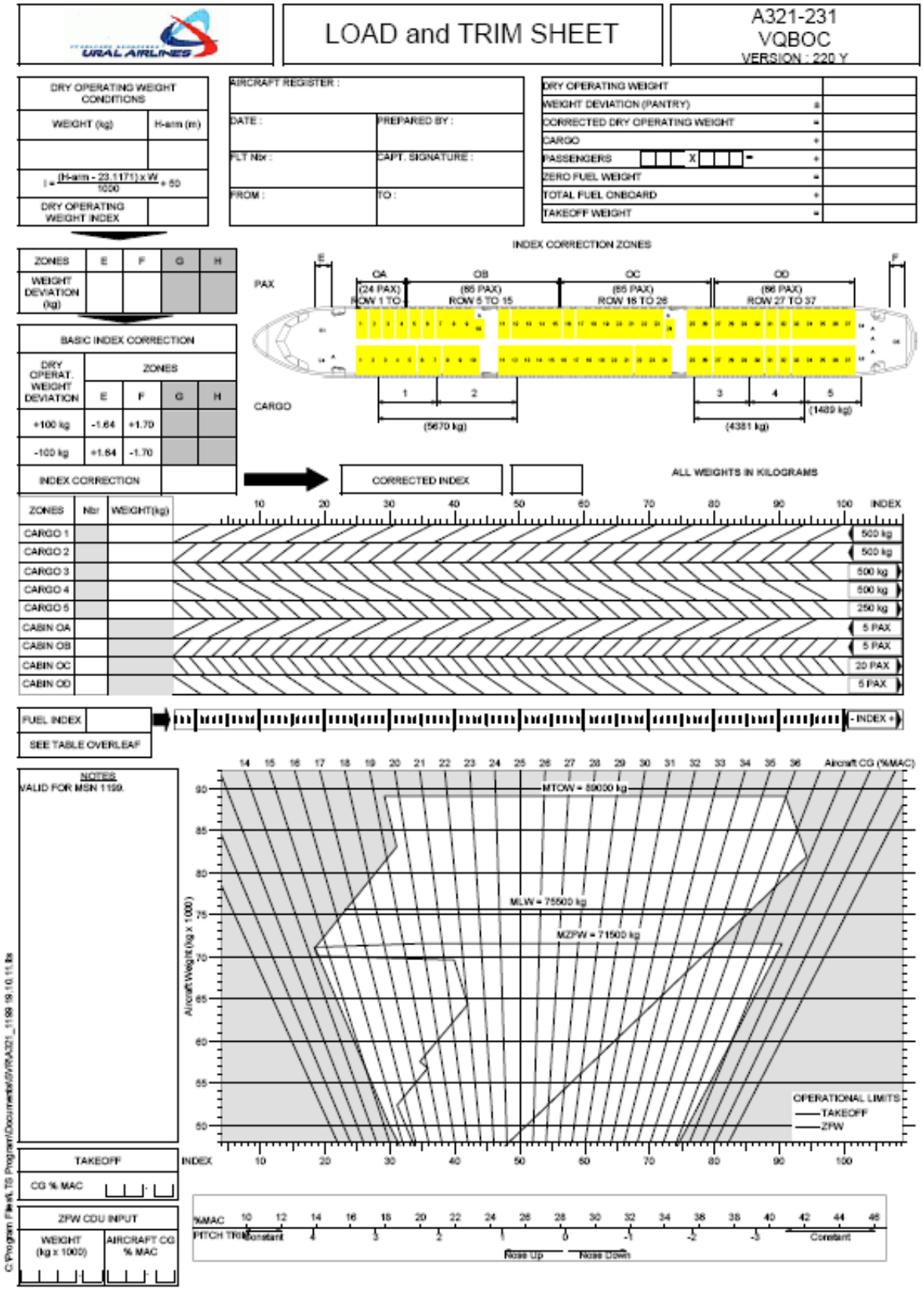
(Reference to computerized form ZFW index is 59.68)

- Referring to Load and Trim Sheet Ural Airlines A321-231 VQBOC Version 220
  ZFW MAC = 28.3 %
- Fuel Index calculation:
  T.O Fuel = 18500 kg
  T.O. Fuel Index= -12 (Relevant AHM 560 document)
  Trip Fuel= 15600 kg
  Remaining fuel at Landing= 3300 kg
  Landing Fuel Index= -3.6
- T.O weight index = 48.69 (ZFW index+ T.O. Fuel index = 60.49 -12)
- Landing weight index = 56.9 (ZFW index+ Landing Fuel index = 60.49 -3.6)
- Referring to Load and Trim Sheet Ural Airlines A321-231 VQBOC Version 220
  T.O MAC = 24.5 %
  Landing MAC = 27.0 %
- C.G limits:
  - ZFW limits:
    Fwd MAC = 21.6 %, Fwd index = 40.2
    Aft MAC = 38.3 %, AFT index = 88.5
  - T.O limits:
    Fwd MAC = 19.4%, Fwd index = 29.5
    AFT MAC =36.3%, AFT index = 91.5
  - Landing limits:
    Fwd MAC % 15 %, Fwd index = 19.8
    Aft MAC = 35.3 % , Aft index = 82

Weights, Indices, MAC Summary:

	Weight	Index	MAC %	Fwd MAC limit %	Fwd Index Limit	Aft MAC Limit %	Aft Index Limit
OEW	49939	42.03					
ZFW	68691	60.49	28.3	21.6	40.2	38.3	88.5
T.O Wt.	87491	48.69	24.5	19.4	29.5	36.6	91.5
Ldg Wt.	71891	56.9	27	15	19.8	35.3	82

- Based on the results shown above obtained from the weight and balance analysis, it can be concluded that airplane was loaded properly and all relevant parameters were in the appropriate limits (weights, indices, cg MAC %). No exceedances or violations were observed for all phases of flight (T.O, Landing, Zero fuel weight)



A321 Load and Trim sheet (Ref: AHM-560)

2.6.3 A/C performance analysis, landing speed:

- The airplane landing weight at the event was about 71891 kg
- With reference to A321 QRH, the VREF speed for this weight is almost 137 kts
- Airplane heading at the event landing was ranging from 336 to 340 degrees
- Wind direction at the event landing was almost ranging between 282, 304 degrees
- Wind speed at the event landing was about 12 knots.
- Relative wind direction about 30 degrees
- Head wind component = 10.4 kts
- Referring to A321 QRH VAPP based on FMGS Computations (In Flight Performance VAPP determination) (FPE-IFL 1 / 4)

  The VLS is the higher value of:

  1. VLS= VREF+5

     (The 5 knots increment is required when the Auto throttle is used or when an auto landing is performed)

     (Auto throttle was engaged up till touch down, then it was disengaged for 6 seconds)

     VLS = 137 + 5 = 142 kts

  2. VLS corrected to wind

     VLS= VREF+ wind correction = VREF + 1/3 Headwind excluding gust (max correction= 15 knot)

     VLS= 137 + 10.4 /3 = 140.5 kts

- V APP = max (condition 1, condition 2) = 142 kts
- Actual landing speed is almost 137.5 kts (lower than the computed speed by about 4.5 kts)

SPEEDS

OPERATING SPEEDS (KT)					
W (1000 KG)	F	S	Green dot FL < 200(1)	VLS CONF 3	VREF
52	130	168	188	121	116
56	135	174	194	125	121
60	140	180	200	130	125
64	144	186	206	134	129
68	149	192	212	138	133
72	153	197	218	142	137
76	157	203	224	146	141
80	161	208	230	150	144
84	165	213	236	154	148
88	169	218	242	157	151
92	173	223	248	161	155
94	175	226	251	163	157

(1) *Above FL 200 add 1 kt per additional 1 000 ft.*

VAPP DETERMINATION

The FMGS performs the following VAPP computation for landing in normal configuration (CONF 3 or CONF FULL).

W (1000Kg)	52	56	60	64	68	72	76	80	84	88	92	94
VLS CONF FULL (KT)	116	121	125	129	133	137	141	144	148	151	155	157
VLS CONF 3 (KT)	121	125	130	134	138	142	146	150	154	157	161	163

\+

CORRECTION

5KT(1) | 1/3 HEADWIND (EXCLUDING GUST) MAX=15KT

WHICHEVER IS HIGHER

=

VAPP

V_{APP}(2) = MAX(VLS + 5KT(1), VLS + W_{IND} CORR)

1. The 5 kt increment is required when the ATHR is used, or when an autoland is performed.
2. In case of loc acceleration, Vapp must not be lower than:
   - VLS + 5 kt in CONF FULL
   - VLS + 10 kt in CONF 3

   In case of strong or gusty crosswind greater than 20 kt, Vapp should be at least VLS + 5 kt. The 5 kt increment above VLS may be increased up to 15 kt at the flight crew's discretion.

2.6.4 A/C performance analysis, Tail Strike limitations:

Clearance information at Touch Down (Landing) is shown hereafter (Reference: A318/A319/A320/A321 Flight Crew Training Manual, Normal Procedure, Landing section)
It is shown that the geometric limit at touch down is 10.8 degree.
The airplane reached a maximum pitch angle of 10.8 degrees (average of the 4 pitch angle readings), and 11.2 degrees (pitch angle reading number 4) at time 265 seconds (last second of compressed squat switches).
Consequently, it can be concluded that the actual pitch exceeded the airplane geometric limit during touch down.

CLEARANCE AT TOUCH DOWN

Criteria: 321-200
Applicable to: MSN 0680-0725

Geometry limit at touch down	Pitch attitude at VAPP(Vref +5 kt) (1)	Pitch attitude at touch down	Clearance (2)
10.8 °	2.4 °	6.6 °	4.2 °

(1) *Flight path in approach:-3 °*
(2) *Clearance = geometry limit - pitch attitude at touch down*

TAIL STRIKE AVOIDANCE

Applicable to: ALL

Although most of tail strikes are due to deviations from normal landing techniques, some are associated with external conditions such as turbulence and wind gradient.

DEVIATION FROM NORMAL TECHNIQUES

Deviations from normal landing techniques are the most common causes of tail strikes. The main reasons for this are due to:

- Allowing the speed to decrease well below VAPP before flare
  Flying at too low speed means high angle of attack and high pitch attitude, thus reducing ground clearance. When reaching the flare height, the pilot will have to significantly increase the pitch attitude to reduce the sink rate. This may cause the pitch to go beyond the critical angle.
- Prolonged hold off for a smooth touch down
  As the pitch increases, the pilot needs to focus further ahead to assess the aircraft's position in relation to the ground. The attitude and distance relationship can lead to a pitch attitude increase beyond the critical angle.
- Too high flare
  A high flare can result in a combined decrease in airspeed and a long float. Since both lead to an increase in pitch attitude, the result is reduced tail clearance.
- Too high sink rate, just prior reaching the flare height
  In case of too high sink rate close to the ground, the pilot may attempt to avoid a firm touch down by commanding a high pitch rate. This action will significantly increase the pitch attitude and, as the resulting lift increase may be insufficient to significantly reduce the sink rate, the high pitch rate may be difficult to control after touch down, particularly in case of bounce.
- Bouncing at touch down
  In case of bouncing at touch down, the pilot may be tempted to increase the pitch attitude to ensure a smooth second touch down. If the bounce results from a firm touch down, associated with high pitch rate, it is important to control the pitch so that it does not further increase beyond the critical angle.

2.7 Meteorological Information

- No evidences of any weather problem that might be contributing to the event

2.8 Aids to Navigation

- Not relevant

2.9 Communication

- The whole communication transcript between the cockpit crew and the tower as mentioned in section 1.9 showed normal communication flow, without any evidence of anomalies or abnormalities.

2.10 Aerodrome Information

- No evidences of any anomalies or problems that might be contributing to the event

2.11 Flight Recorders:

2.11.1. CVR Analysis [7]

CVR-FDR Time Correlation:

- Some parameters that could be identified in both CVR and FDR were used for time correlation. Parameters that were used for time correlation are shown in the following table.
- Δ Time between the events in the FDR and the same event in the CVR were derived (shown in the last column).
- An average Δ Time value was developed (98 seconds) to relate the times in CVR and in FDR as follows:

FDR reference time = CVR reference time+ 98 seconds

- Another column was developed in the CVR transcript to show the CVR events using FDR correlated time (3rd column). This reference time was used to present both CVR and FDR events

1 CVR/ FDR events used for time correlation

	CVR time new sec	FDR Correlated time	Speaker	Event	FDR time sec	FDR frame no	Difference between FDR time, CVR time
0:01:19	79	177	System	One thousand System	173	83673	94
0:02:06	126	224		Four hundred	226.5	83726.5	101
0:02:26	146	244	Auto CAPT call out	2 hundred Auto Call out	244.5	8744.5	99
0:02:35	155	253		1 hundred	252	83752	97
0:02:39	159	257		50,40,30,20,……Retard, Retard, Retard…	255	83755	96
0:02:45	165	263		…(Wow)….			

[7] The actual CVR transcript is included in the Factual information chapter, 1.11.1

2. CVR Transcript including correlation time:

CVR Ref time new HH:MM:SS	CVR time new sec	FDR Approximate time	Speaker	Event	FDR time sec	FDR frame no	Difference between FDR time, CVR time
0:00:01	1	99	CAPT	Glide Slope			
0:00:02	2	100	CAPT	Check flaps E27			
0:00:05	5	103	CAPT	Flaps			
0:00:06	6	104	F/O	3			
0:00:07	7	105	CAPT	Speed checked			
0:00:12	12	110	F/O	flaps 3			
0:00:14	14	112		Flaps *And* Flaps full			
0:00:16	16	114	CAPT	Speed checked			
0:00:19	19	117	F/O	Flaps full			
0:00:20	20	118	F/O	Landing check list			
0:00:23	23	121	CAPT	Landing check list			
0:00:24	24	122	F/O	Cabin crew advised			
0:00:24	24.5	123	CAPT	I can't ……Everyone…….. Everyone …… This C			
0:00:25	25	123		Auto thrust……..			
0:00:26	26	124	F/O	Speed			
0:00:27	27	125	CAPT	Auto Brake			
0:00:30	30	128	F/O	eh manual			
0:00:31	31	129	CAPT	ECAM memo			
0:00:33	33	131	F/O	landing no blue			
0:00:35	35	133		Landing check list completed			
0:00:37	37	135		Yes, 37 Yes			
0:01:09	69	167	PLT	Autopilot off			
0:01:12	72	170		((صوت ثلاث رنات متتابعة			
0:01:13	73	171		Check them go			
0:01:14	74	172		Checked			
0:01:16	76	174		Let's check			
0:01:17	77	175		Clear to land			
0:01:18	78	176		Checked			
0:01:19	79	177	System	One thousand System	173	83673	94
0:02:06	126	224		Four hundred	226.5	83727	101
0:02:10	130	228	CAPT	Land green			
0:02:11	131	229	F/O	Checked			

0:02:13	133	231		((كلام غير مفهوم			
0:02:15	135	233	CAPT	Checked			
0:02:17	137	235	F/O	*Continue*			
0:02:22	142	240	CAPT	Minimum			
0:02:24	144	242	F/O	Continue			
0:02:26	146	244	Auto call out	2 hundred Auto	244.5	8744.5	99
0:02:35	155	253		1 hundred	252	83752	97
0:02:39	159	257		50,40,30,20,……Retard, Retard, Retard…	255	83755	96
0:02:45	165	263		…(Wow)….			486
0:02:46	166	264	CAPT	.Retard C			
0:02:50	170	268		*That, What we have to do?*			
0:02:51	171	269		Go			
0:02:52	172	270		(تكة مجهولة صوت)			
0:02:53	173	271	F/O	(خبطة صغيرة صوت)			
0:02:54	174	272	F/O	(5 رنات صوت)			
02:56	176	274	CAPT	*I didn't see anything*			
03:0	180	278	CAPT	*This is the flaps*			
03:2	182	280		I put it ……I put it			
03:3	183	281		Gear up			
03:4	184	282	F/O	Checked			
			CAPT	(Sound of warning) (A/P warning)			
03:7	187	285	CAPT	*Switch on*			
03:9	189	287	Tower	*Understand Tower*			
			CAPT	*Go around*			
03:13	193	291	F/O	Ok, sir you are insight insight			
03:15	195	293	CAPT	*(Slaw(at least you have to say anything when you saw something*			
03:19	199	297		*That, what happened….I didn't see anything*			
03:22	202	300	Tower	*Ok Tower*			
03:27	207	305		Flaps			
03:28	208	306		SVR 027 continue Ramio heading claim 2 thousand feet			
03:36	216	314		Climbing 2 thousand feet on runway heading SVR 027			
03:37	217	315		What happened? /What			

				is this?
03:38	218	316		Speed over star
03:39	219	317	Tower	Normal Tower
03:41	221	319	PLT	Why he gave to us these changes?
03:43	223	321		SVR 3027 switch radar 1 2 3 4
03:47	227	325		1 2 3 4 SVR 3027 This is flaps 1
03:49	229	327		flaps 1
03:56	236	334		Nothing bad happened
03:59	239	337		1 2 3 4, how I couldn't see the ground, when I landed!
04:1	241	339	PLT	Everything was very lighting
04:2	242	340		Let's make like this
04:18	258	356	Tower	Hurghada Radar SVR 3027 AAA……. After going around altitude 2 thousand feet Tower
04:25	265	363	PLT	SVR 3027, Hello again
04:29	269	367	Tower	Turn right heading 150 degrees Tower
04:31	271	369		Turn right heading 150 degrees SVR 3027
04:36	276	374	PLT	3027 check the reason for the go around
04:41	281	379	Tower	It's not suppose to go ahead after 6 Tower
04:47	287	385	PLT	Bouncing after landing SVR 3026 and AAA……. high bounce
04:54	294	392		Confirm unstabilized approach
04:56	296	394		No, negative It was stabilized approach
			Tower	Tower
05:3	303	401	PLT	Everything is ok
05:5	305	403		…..And confirm the runway was clear and Everything is ok
05:9	309	407		affirm
05:10	310	408		Ok
05:15	315	413		Like this
05:16	316	414		At landing check list, Did you do

			everything?
05:20	320	418	After takeoff check list
05:22	322	420	After takeoff check list
05:24	324	422	Landing gear
05:26	326	424	Up
05:27	327	425	Flaps
05:28	328	426	Retracted
			One position
05:31	331	429	Packs
05:32	332	430	AAA…… On
05:33	333	431	On
05:35	335	433	After check list completed
05:41	341	439	The impact was strong
05:43	343	441	We little bit jump and as usually I thought ,that we'll continue/complete , but we hold
05:55	355	453	It was right that we decided to go I didn't see how long distance we left, but I thought, that we aren't landing , we are going
06:3	363	461	I thought the same
06:32	392	490	Ladies and gentlemen don't be worry there is something on runway ,so that we'll make another trail
		98	I pulled not a little
07:0	420	518	No, no normal it was a good opportunity, but in the impact we didn't pull as usually
07:41	461	559	I put small power as he told me then I felt touch and I felt that we leave not like as usually. After we went out we touched again like what happened in "TU"
07:50	470	568	Even it was less than 5 thousand we thought it ……

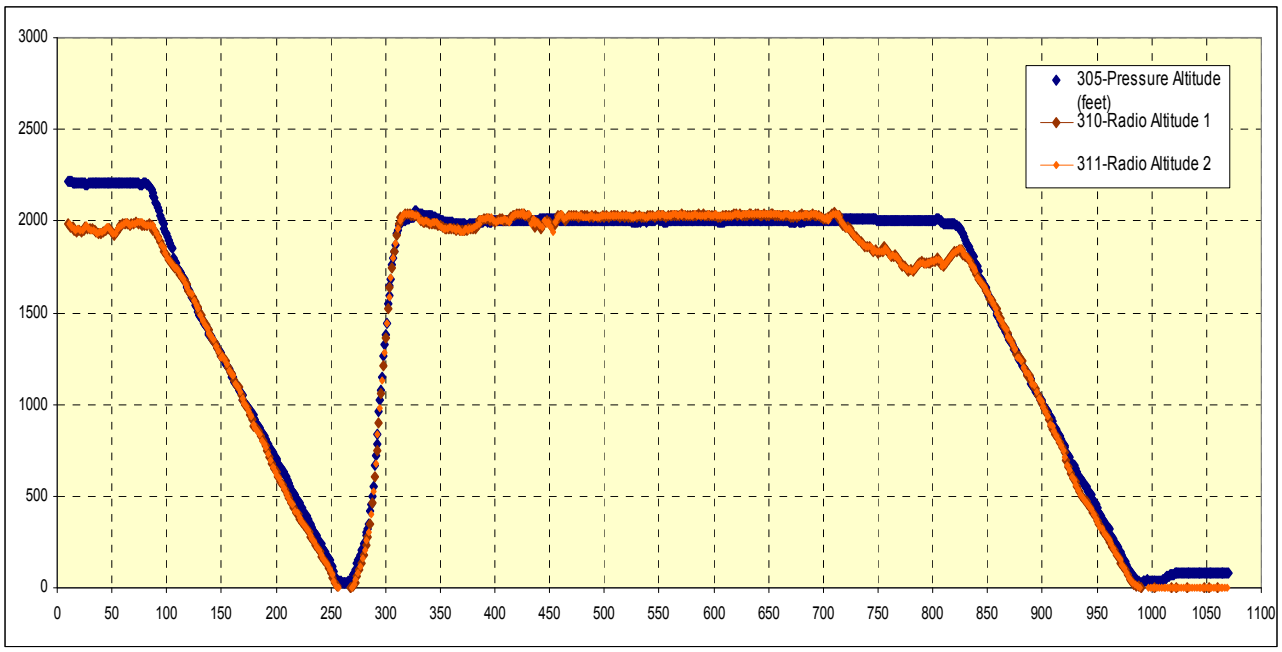
08:11	491	589	Anyway It's better than crashing and It was 10 degrees You should ask me, what we have to do I'm looking to the ground if we land or no and I didn't see any instruments

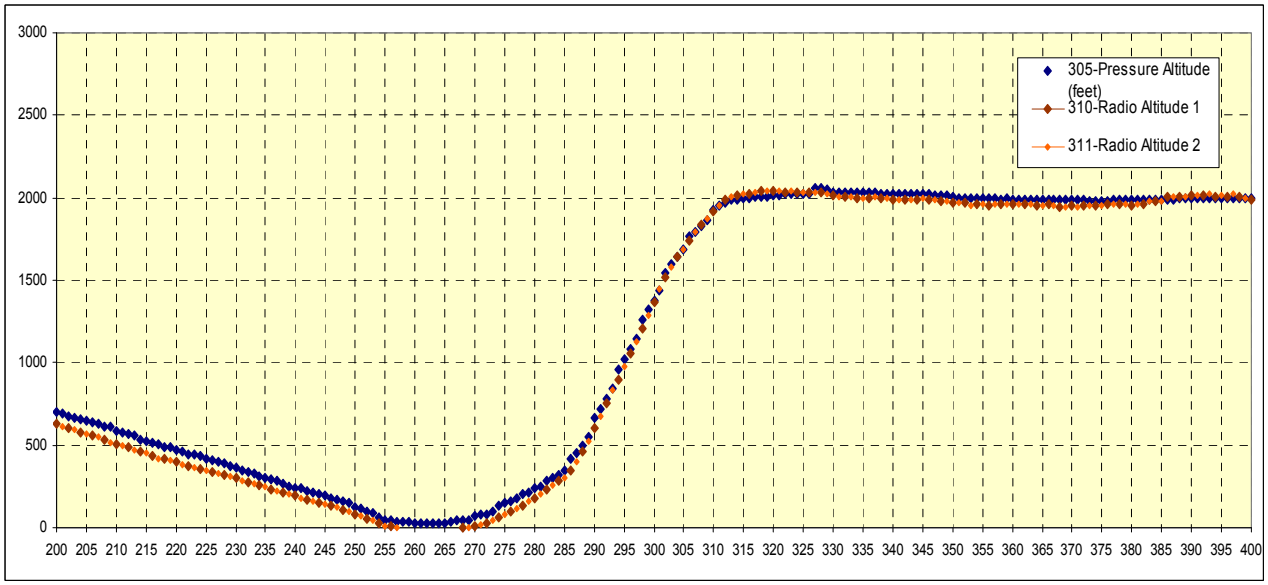
1.11.2 FDR Analysis:

1. Plots for selected most relevant parameters:

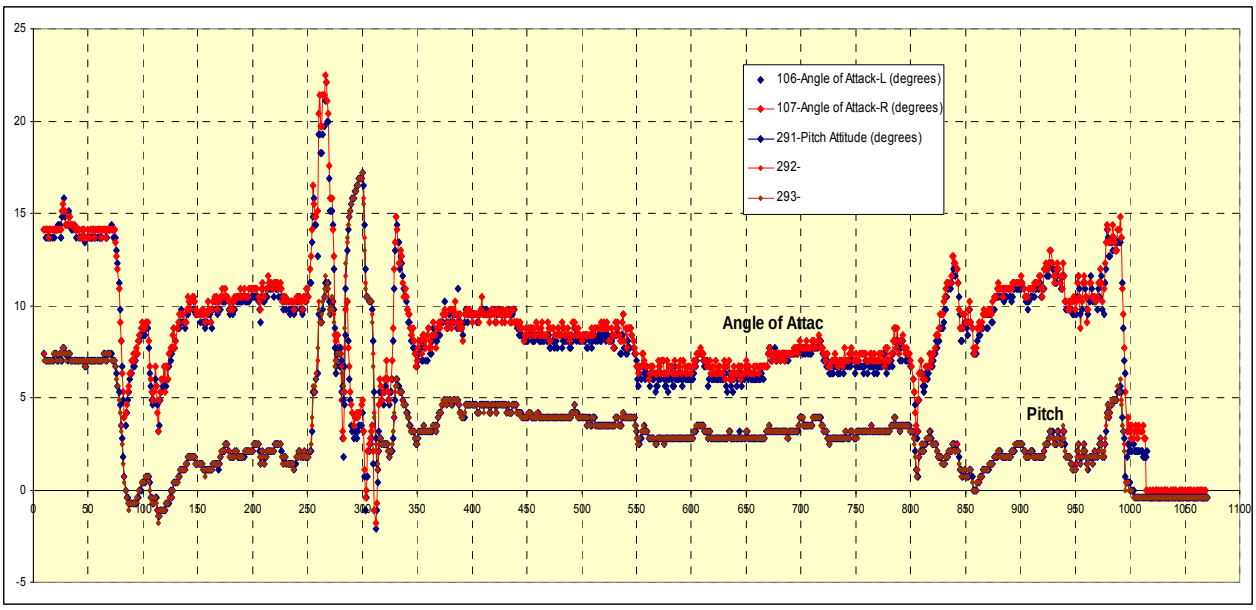
(Most of the plots are made twice. The first set of plots addresses the whole event time, the second set addresses and focus on the incident time)

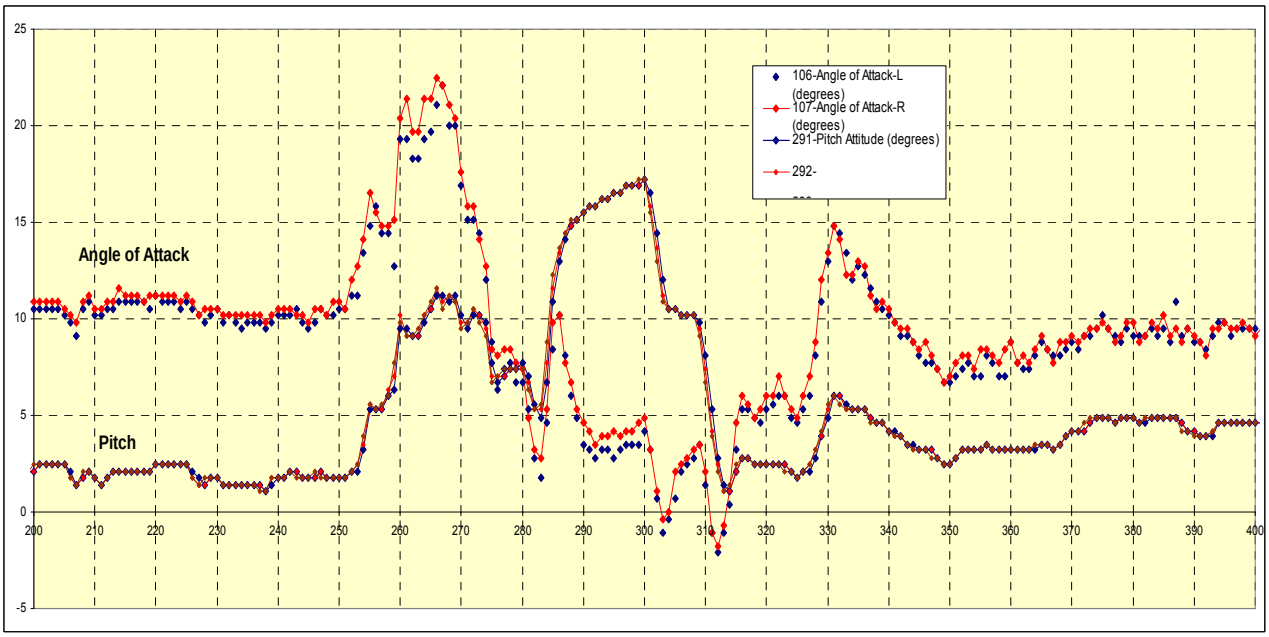
1. Press Altitude, Radio Altitudes



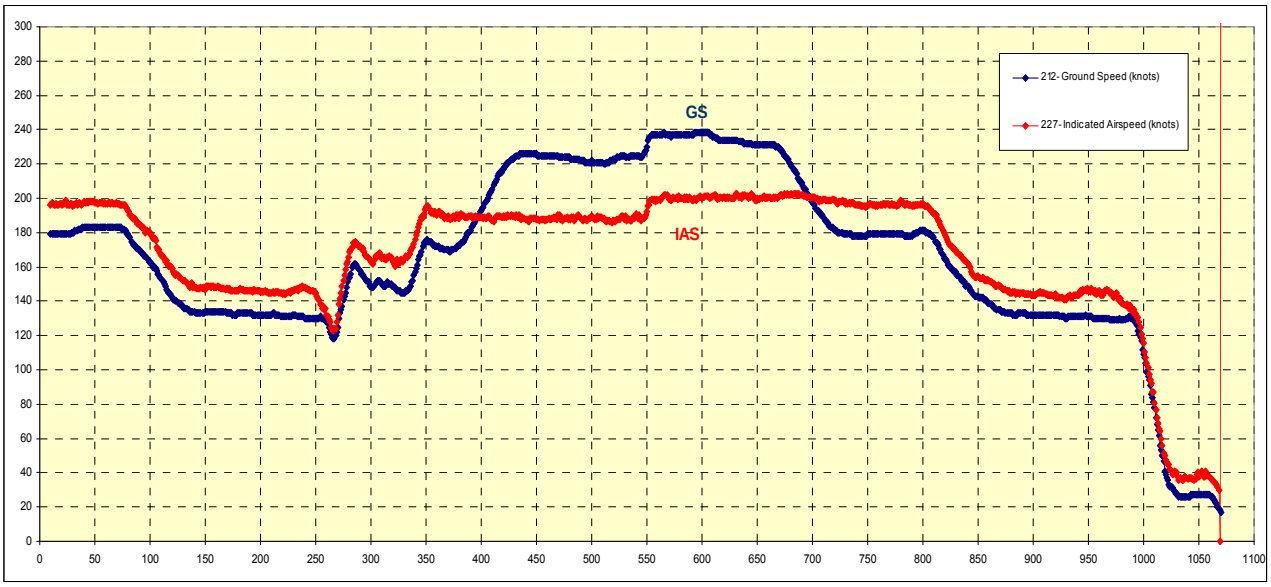


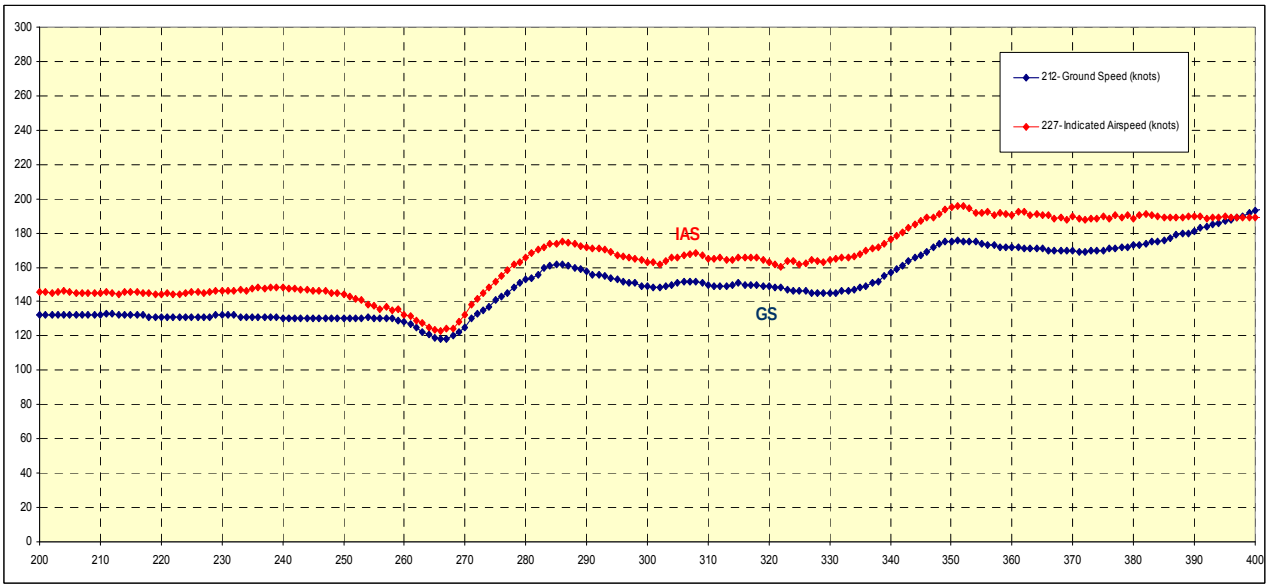
2. AOA, Pitch angles



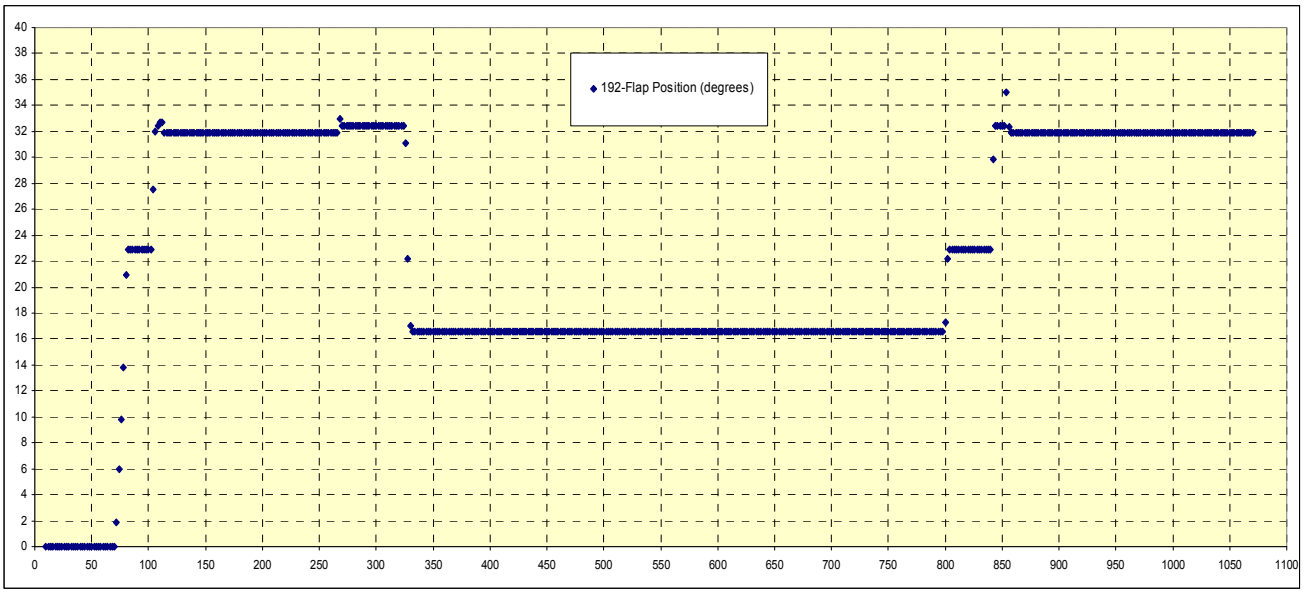


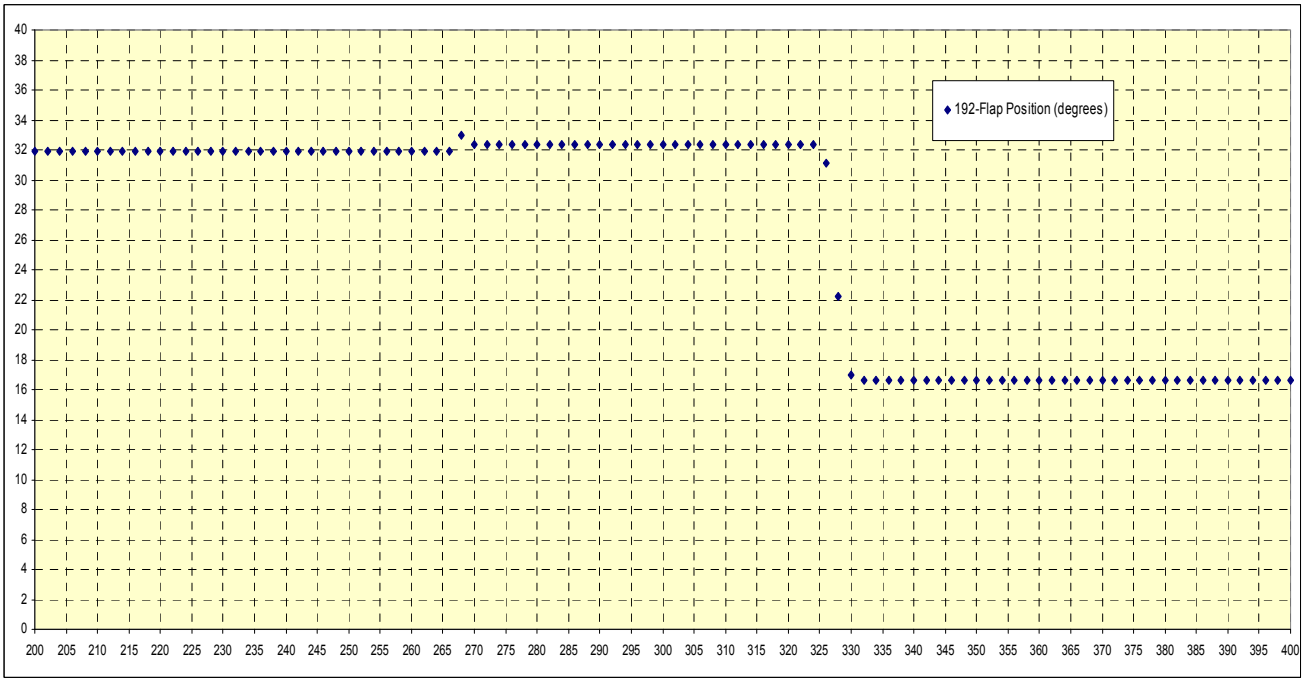
3. IAS, GS


212- Ground Speed (knots)
227- Indicated Airspeed (knots)
GS
IAS

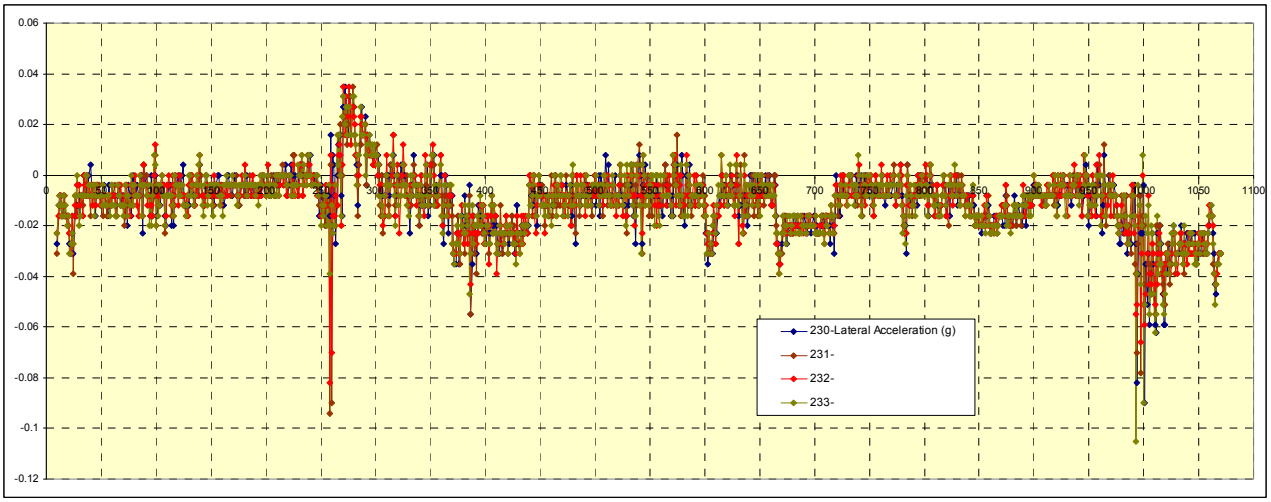

212- Ground Speed (knots)
227- Indicated Airspeed (knots)
IAS
GS

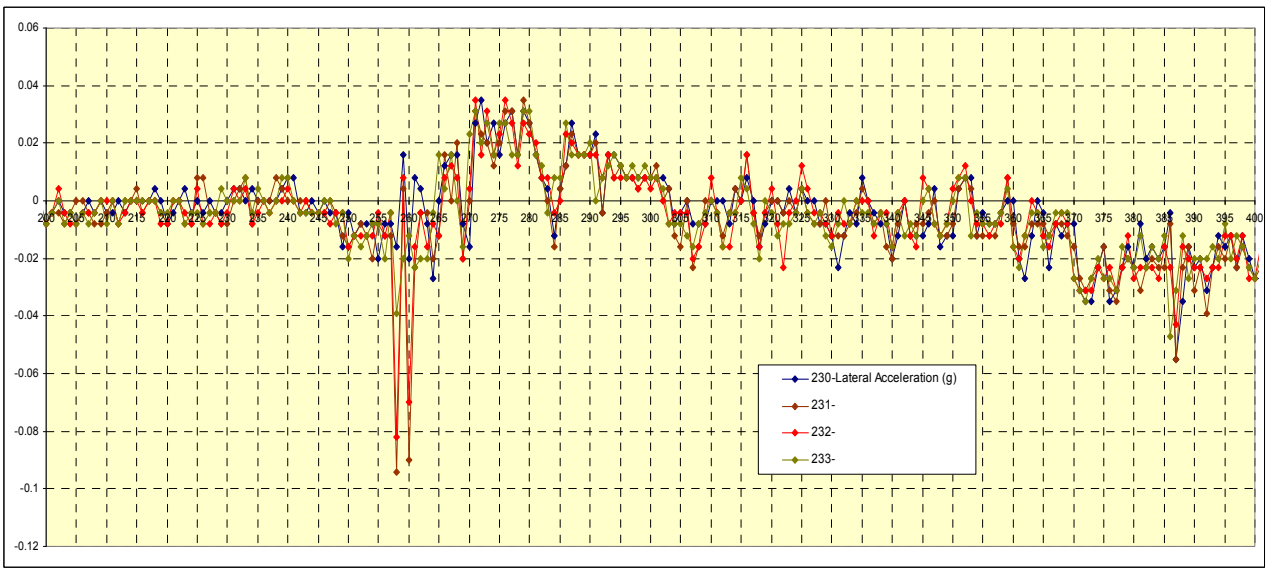
4. Flaps:


192-Flap Position (degrees)
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40
0 50 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800 850 900 950 1000 1050 1100

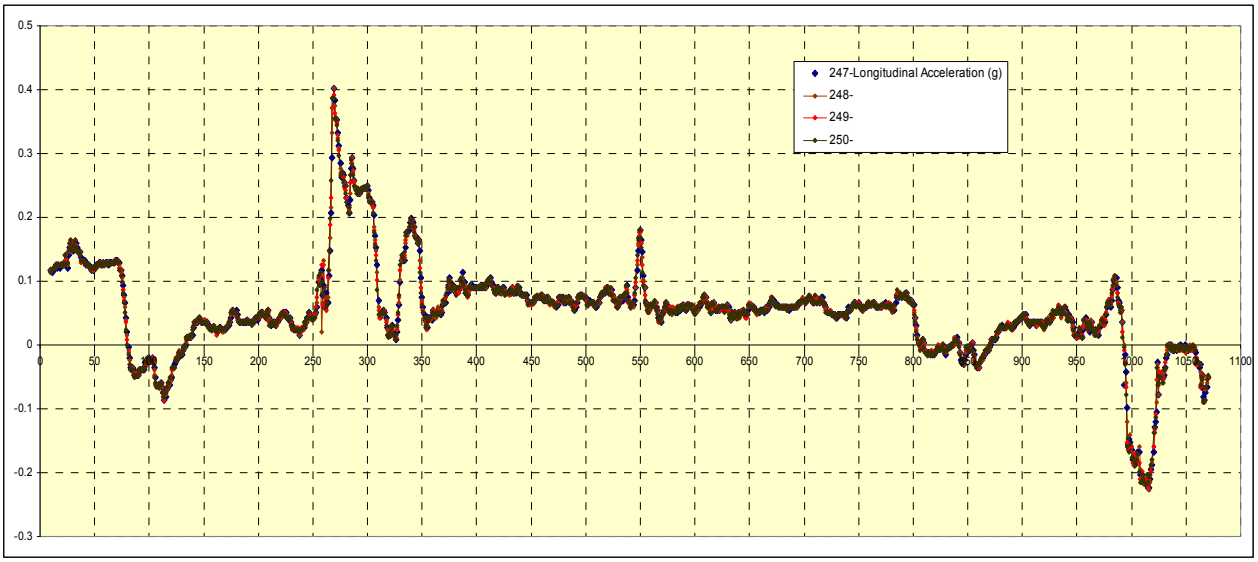

192-Flap Position (degrees)
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40
200 205 210 215 220 225 230 235 240 245 250 255 260 265 270 275 280 285 290 295 300 305 310 315 320 325 330 335 340 345 350 355 360 365 370 375 380 385 390 395 400

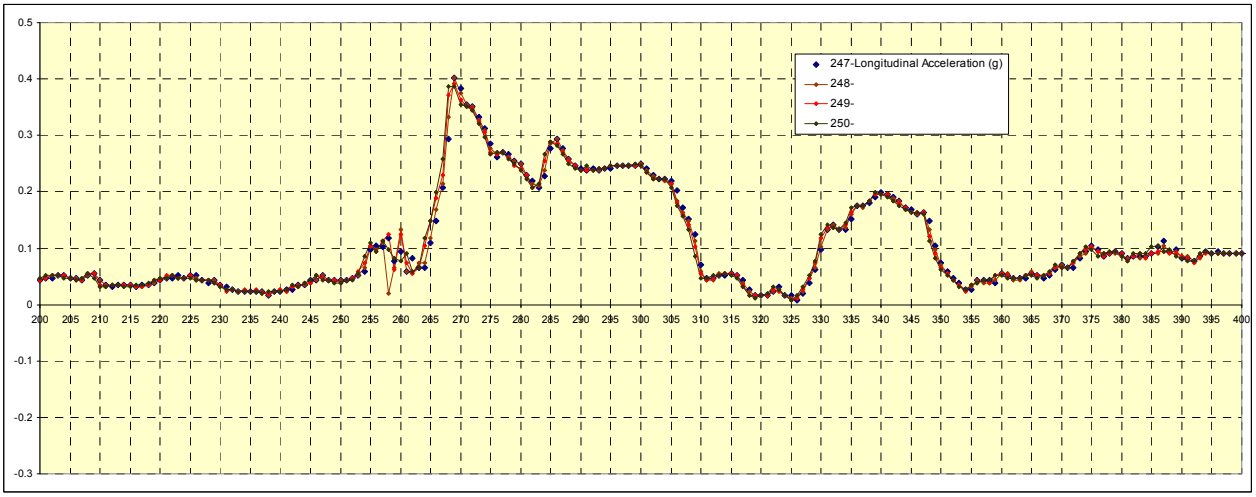
5. Lateral acceleration:



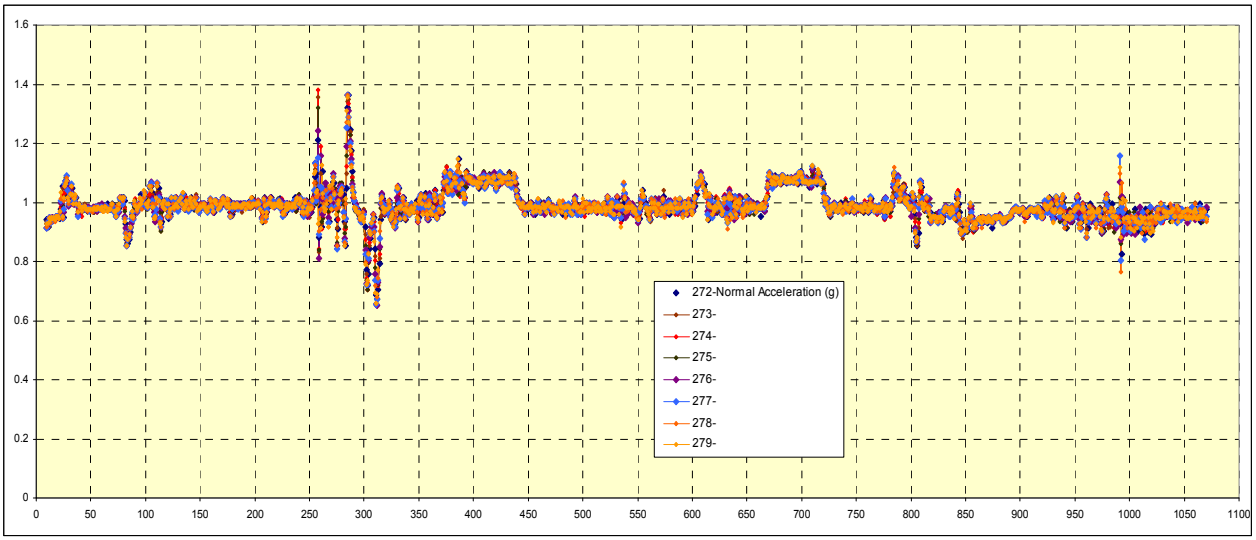


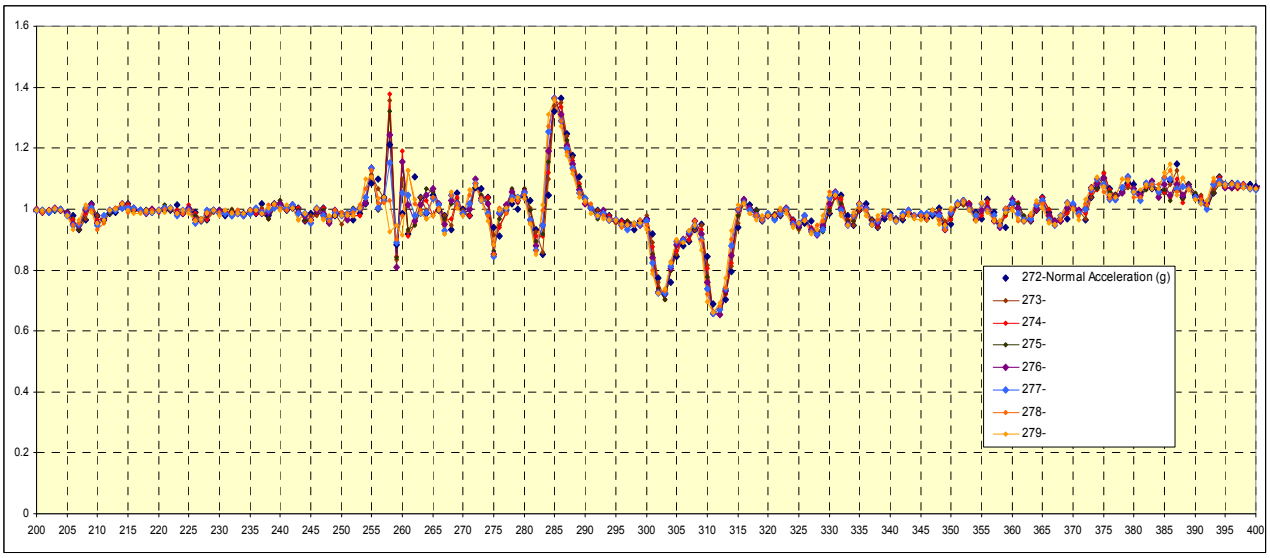
6. Longitudinal acceleration:



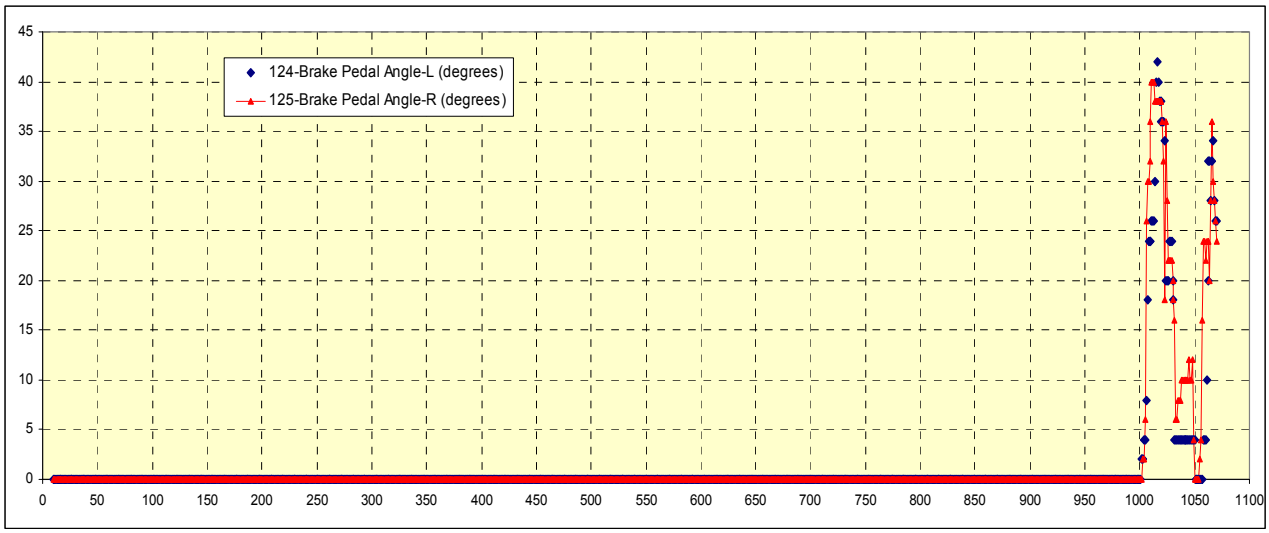


7. Vertical acceleration:

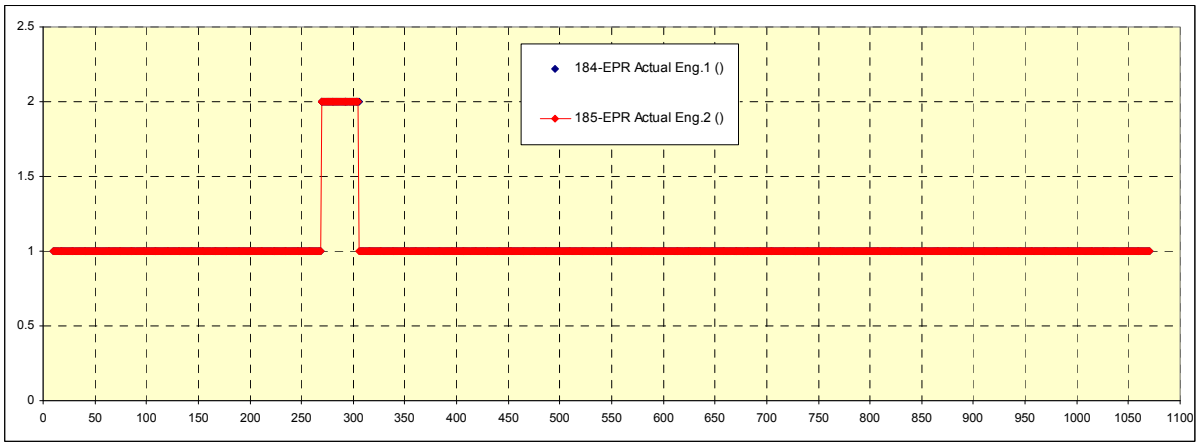




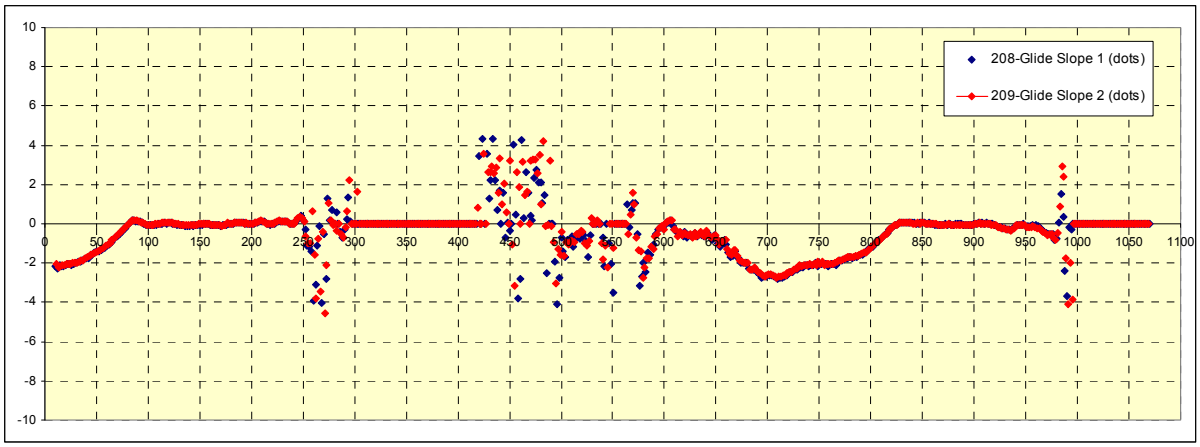
8. Brake Pedals:



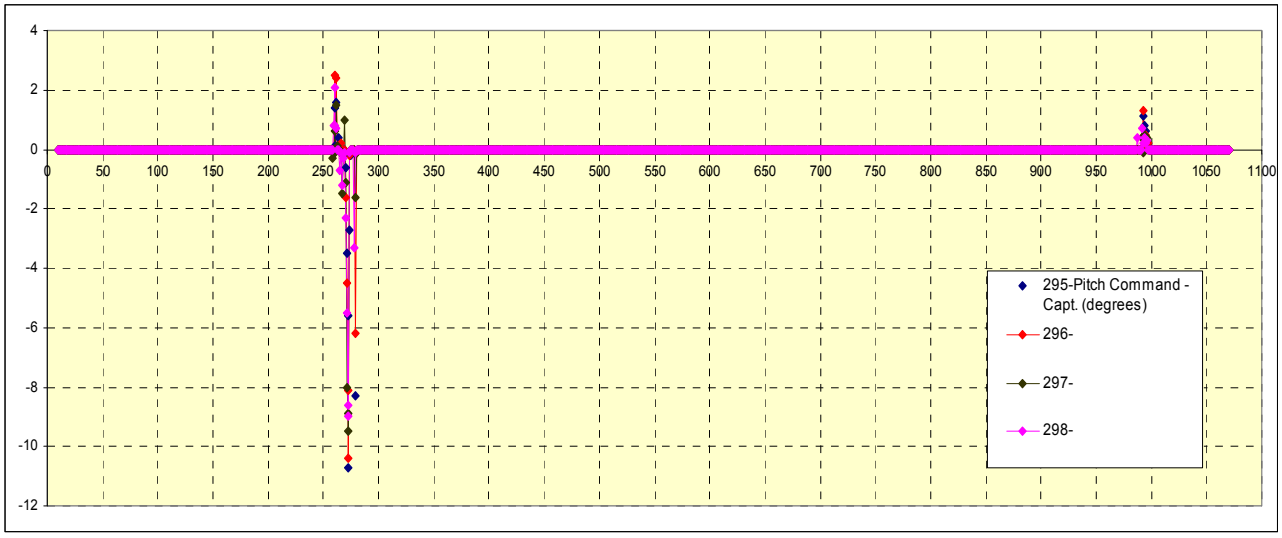
9. Engines EPR:

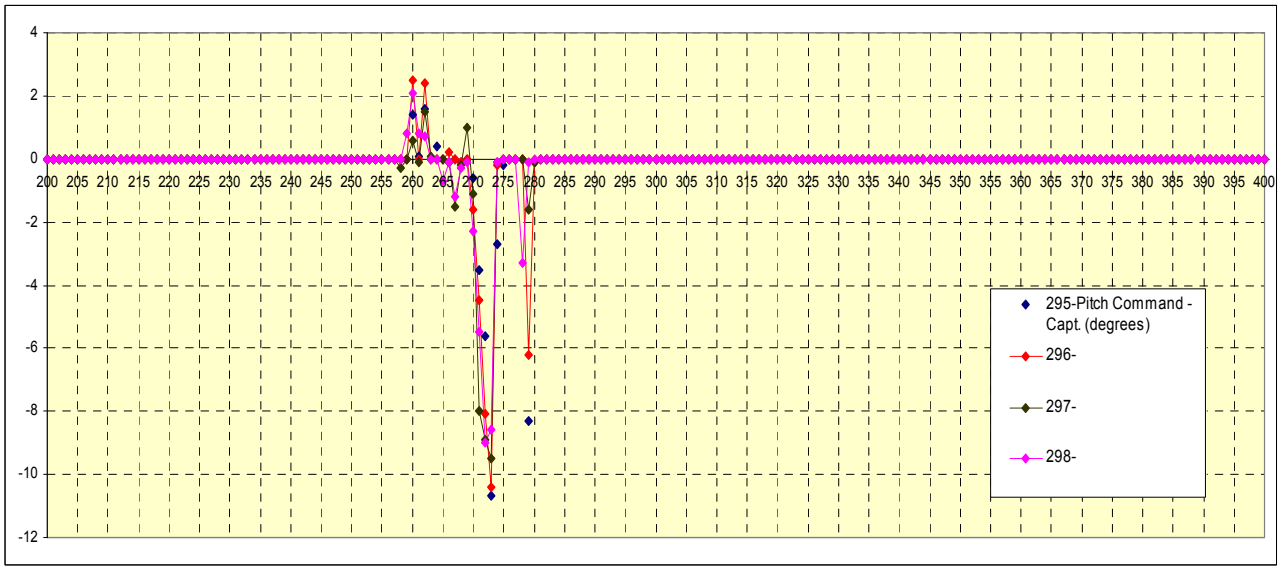


10. Glide Slope:

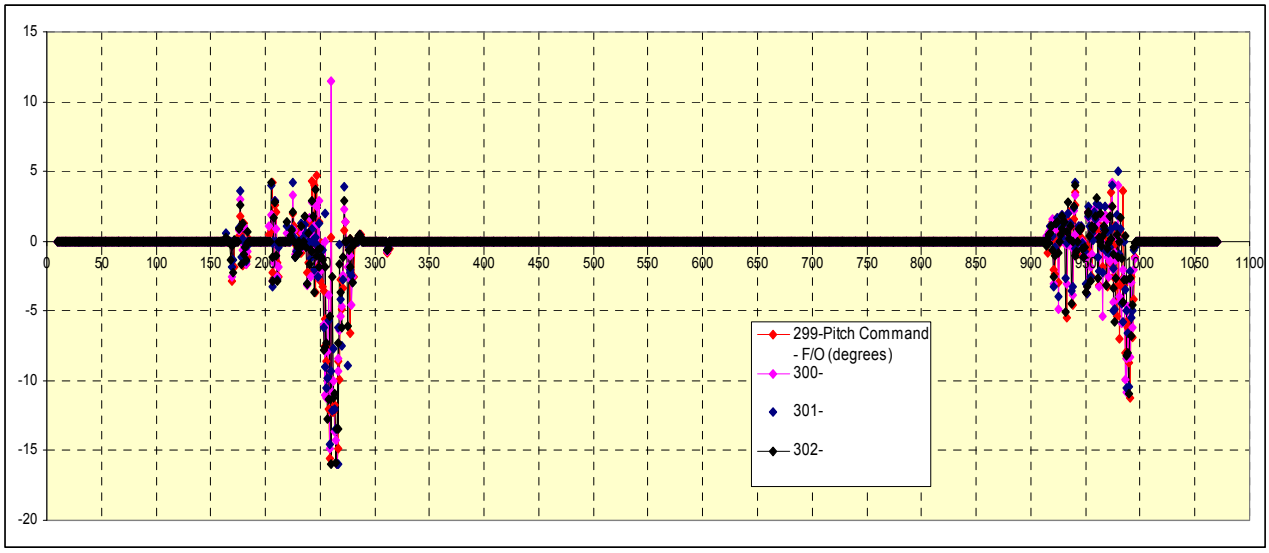


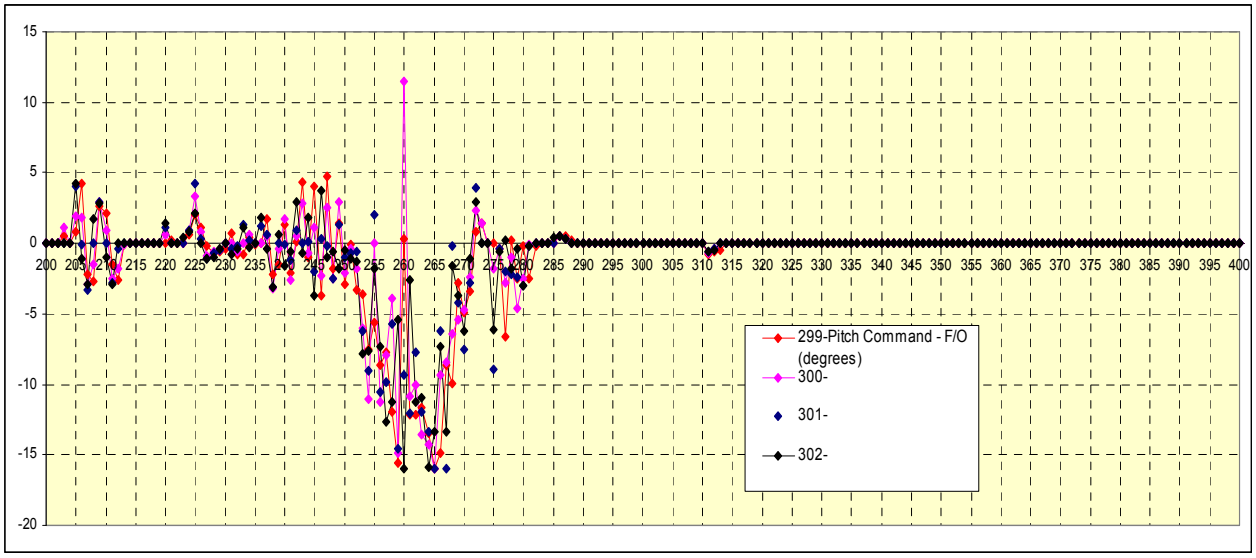
11. Pitch Command Capt:



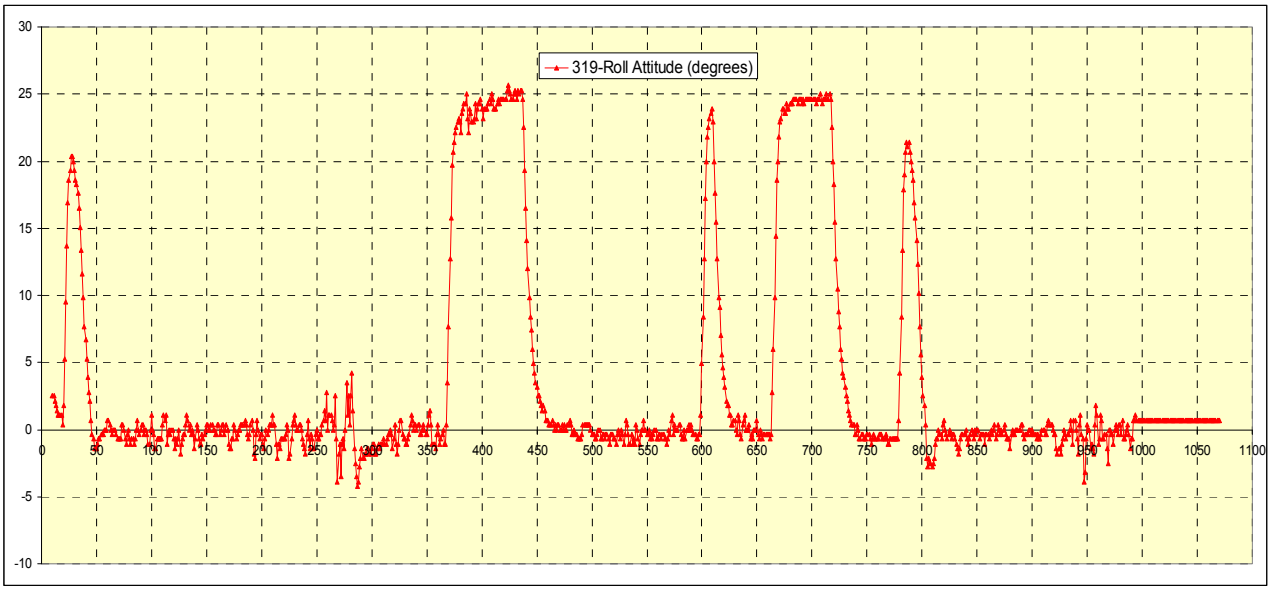


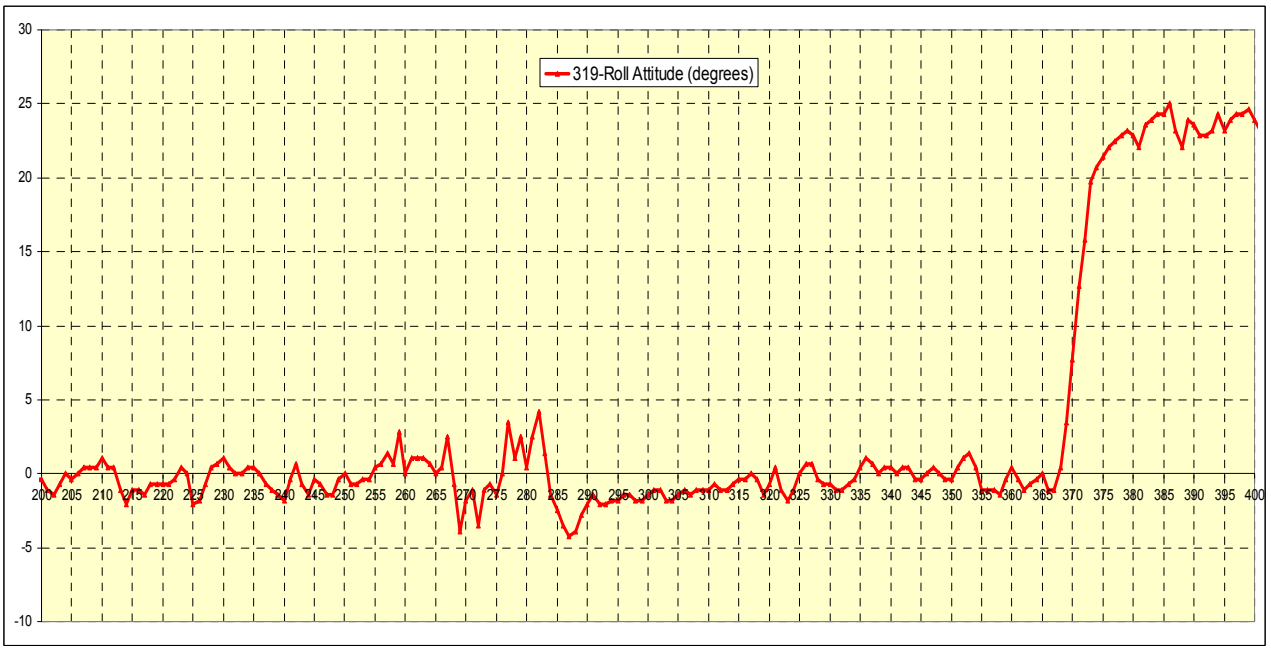
12. Pitch Command F/O:



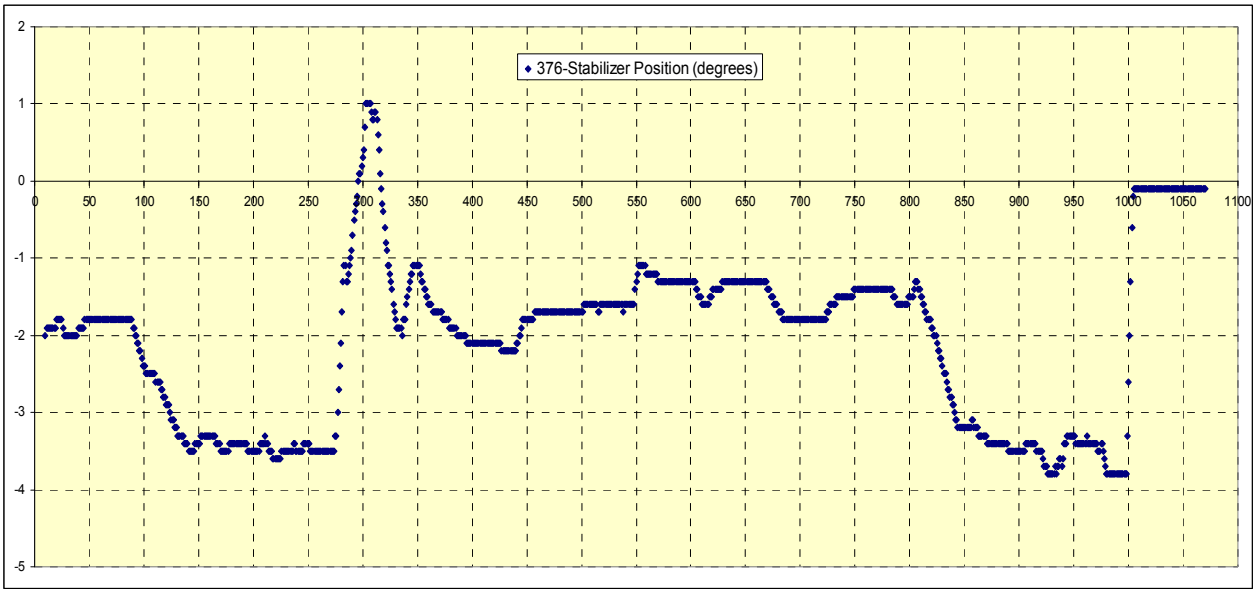


13. Roll

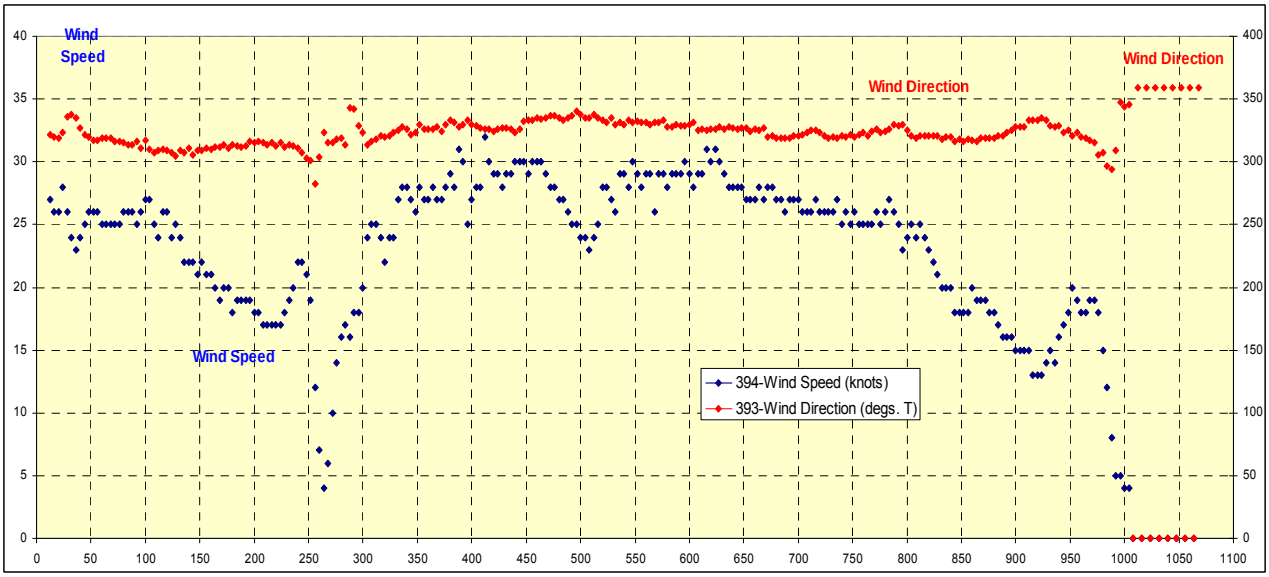

319-Roll Attitude (degrees)
30
25
20
15
10
5
0
-5
-10
0
50
100
150
200
250
300
350
400
450
500
550
600
650
700
750
800
850
900
950
1000
1050
1100


319-Roll Attitude (degrees)
30
25
20
15
10
5
0
-5
-10
200
205
210
215
220
225
230
235
240
245
250
255
260
265
270
275
280
285
290
295
300
305
310
315
320
325
330
335
340
345
350
355
360
365
370
375
380
385
390
395
400

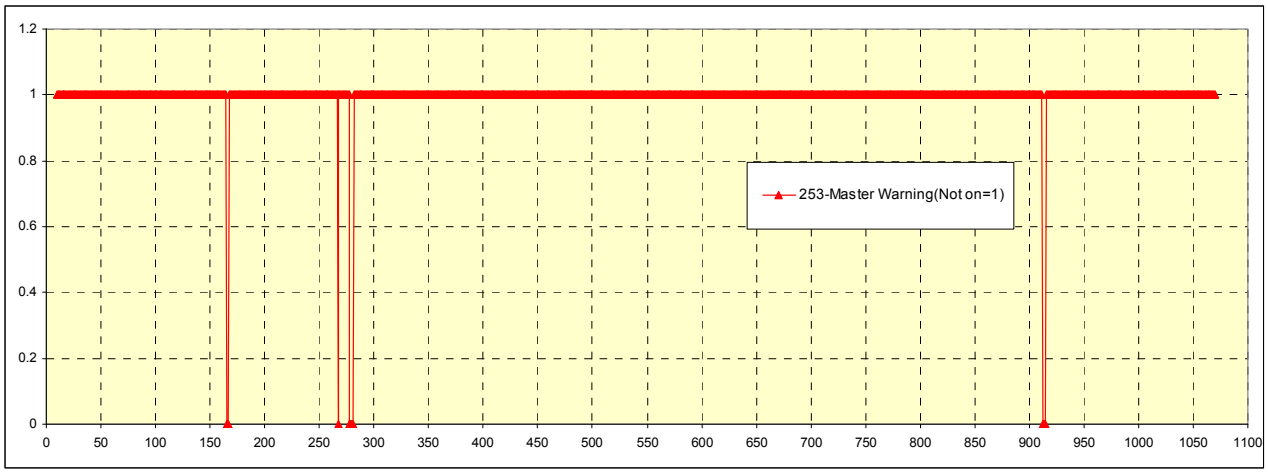
14.Stabilizer Position

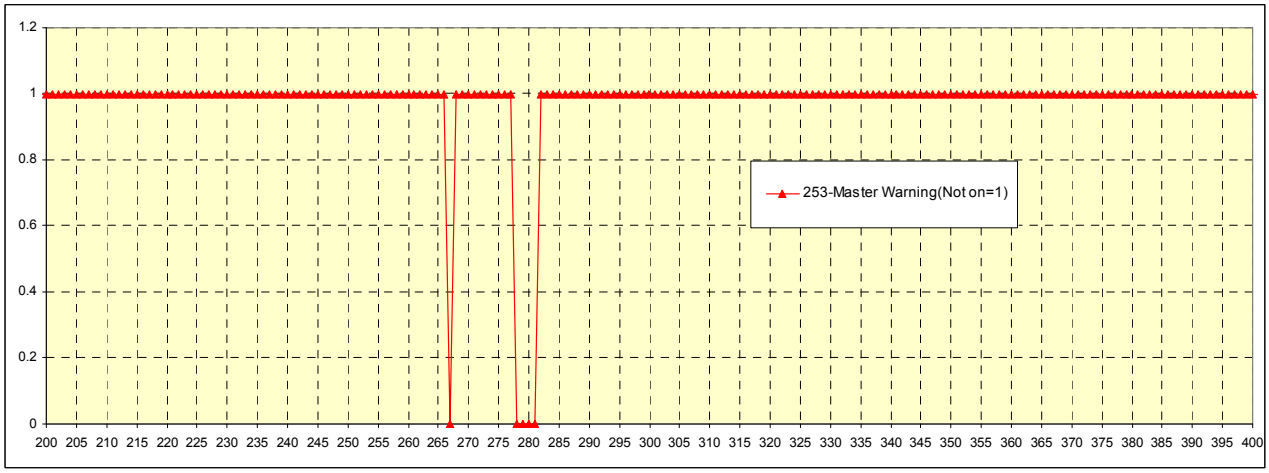


15. Wind Direct/ Speed



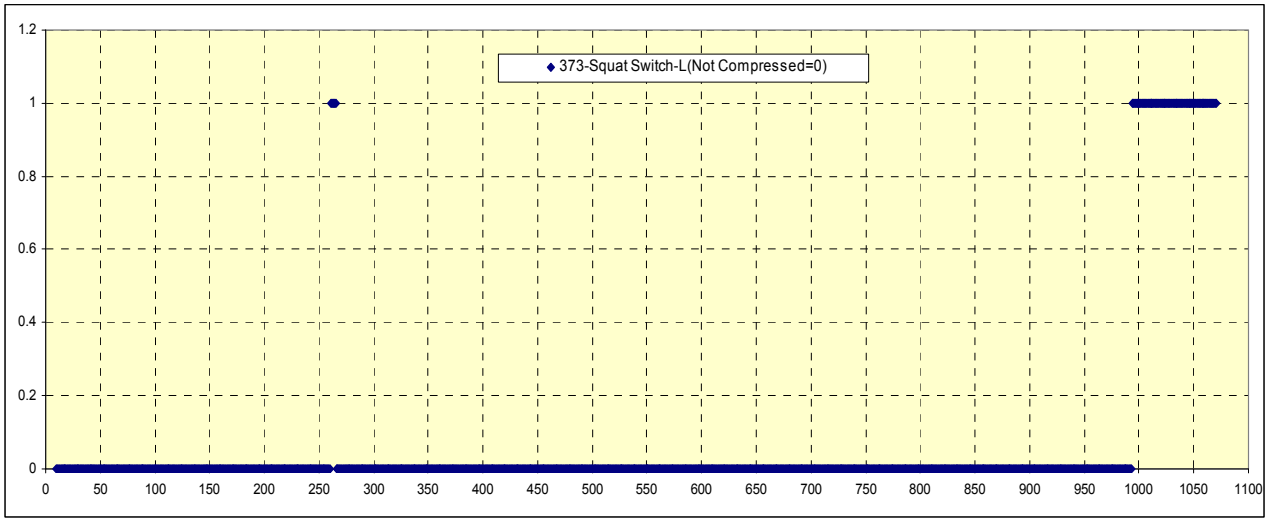
16. Master Warning

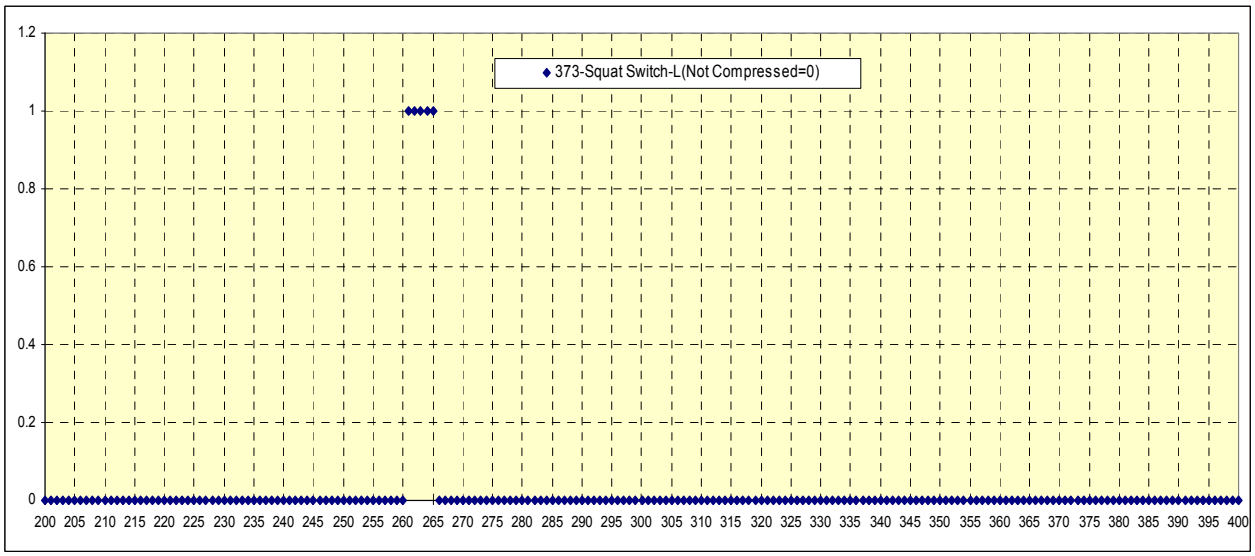




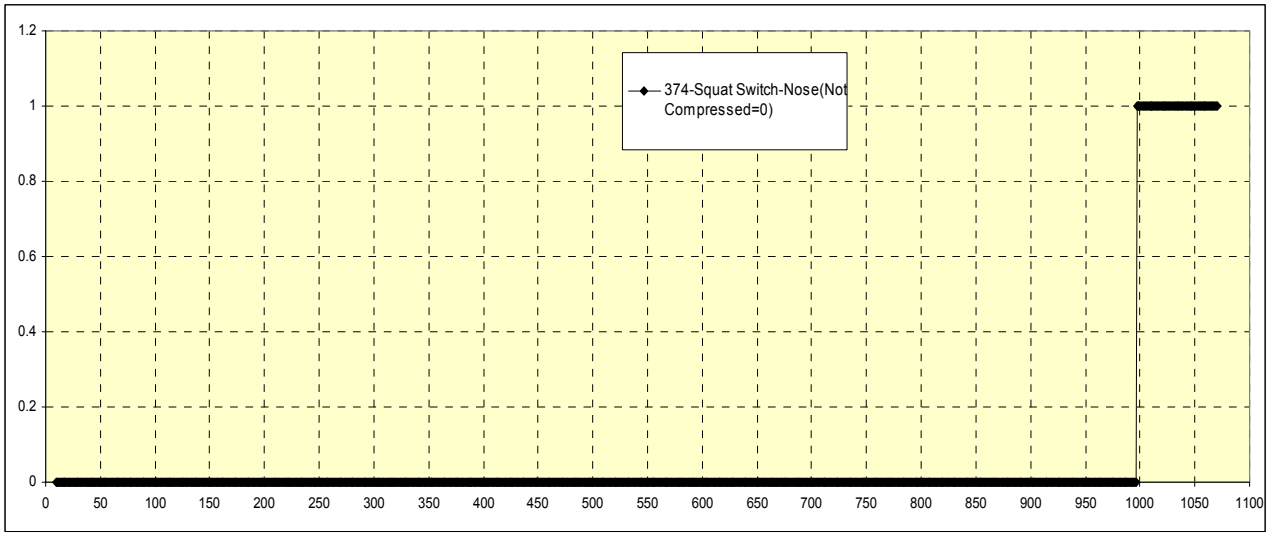
17. Squat Switches (Left, Nose, Right)

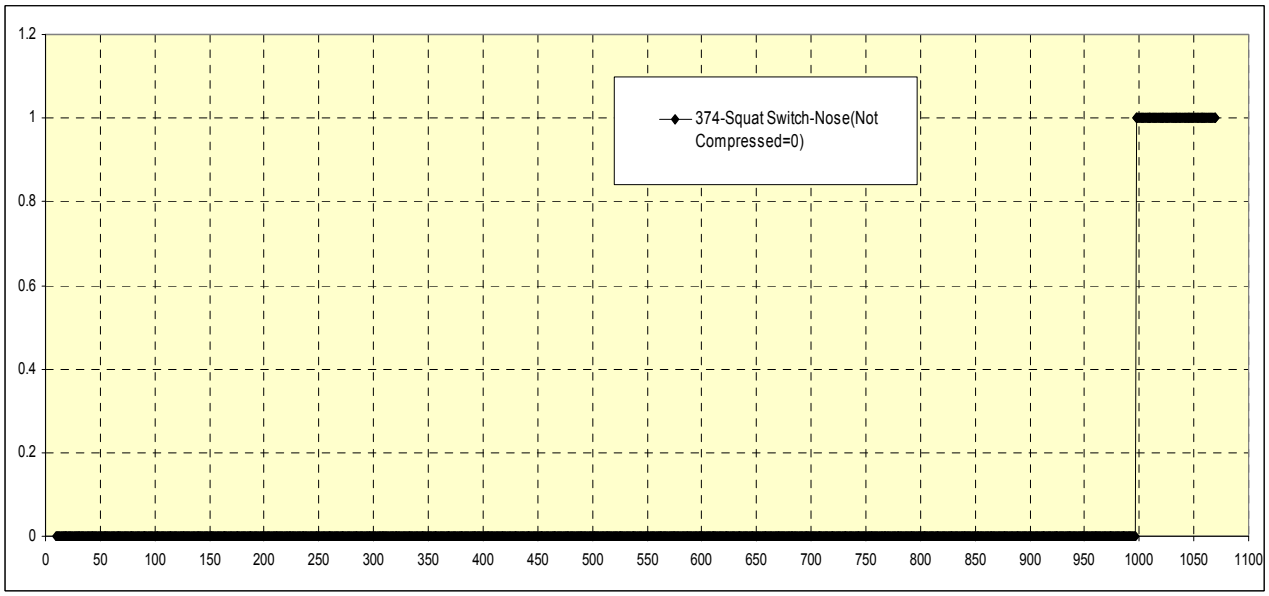
Left



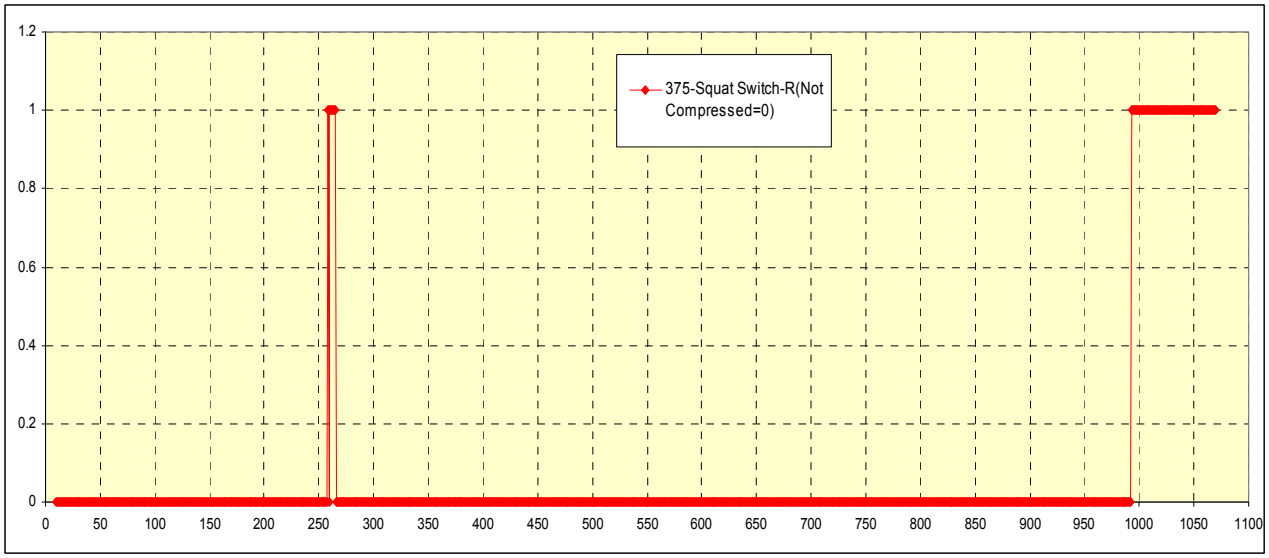


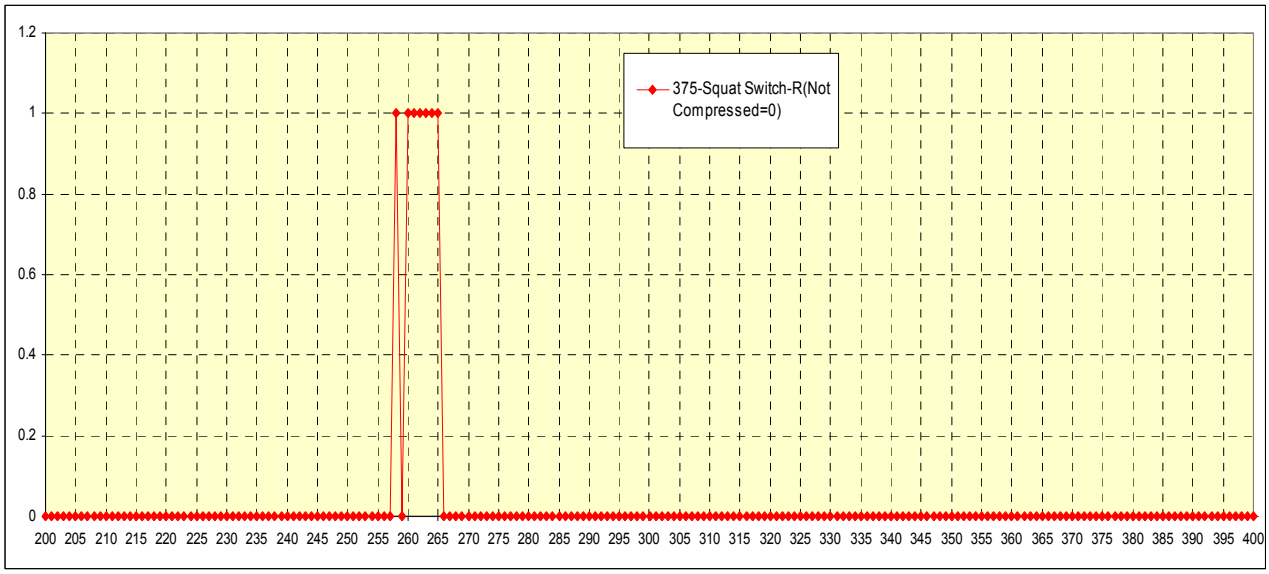
Nose


374-Squat Switch-Nose(Not Compressed=0)
1.2
1
0.8
0.6
0.4
0.2
0
0 50 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800 850 900 950 1000 1050 1100

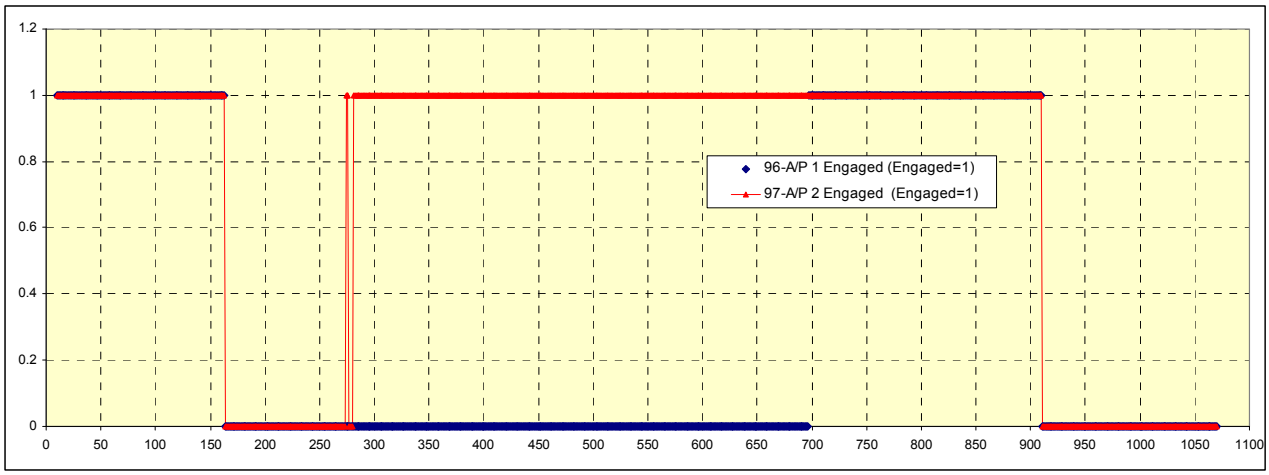

374-Squat Switch-Nose(Not Compressed=0)
1.2
1
0.8
0.6
0.4
0.2
0
0 50 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800 850 900 950 1000 1050 1100

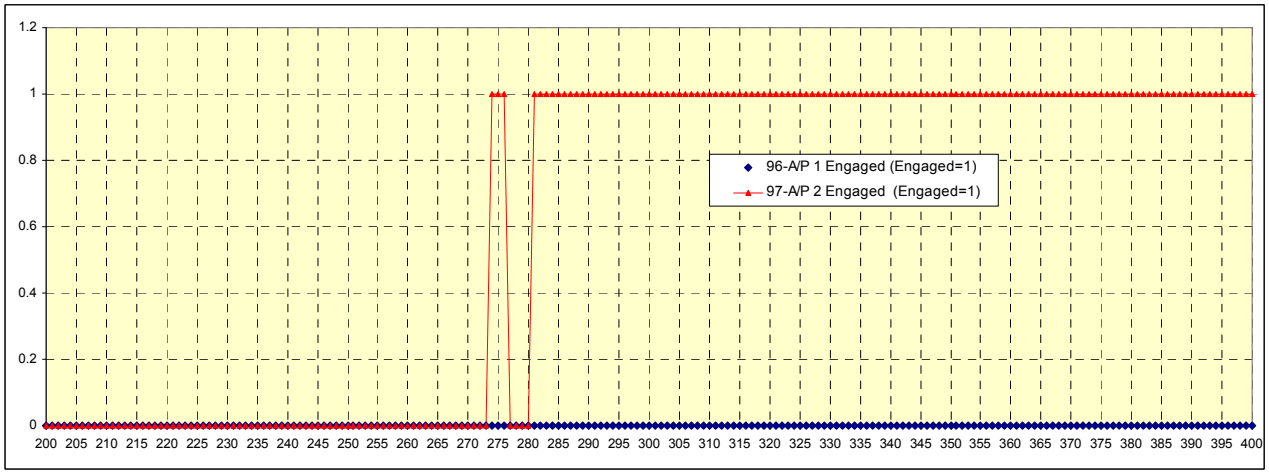
Right


375-Squat Switch-R(Not Compressed=0)
1.2
1
0.8
0.6
0.4
0.2
0
0 50 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800 850 900 950 1000 1050 1100

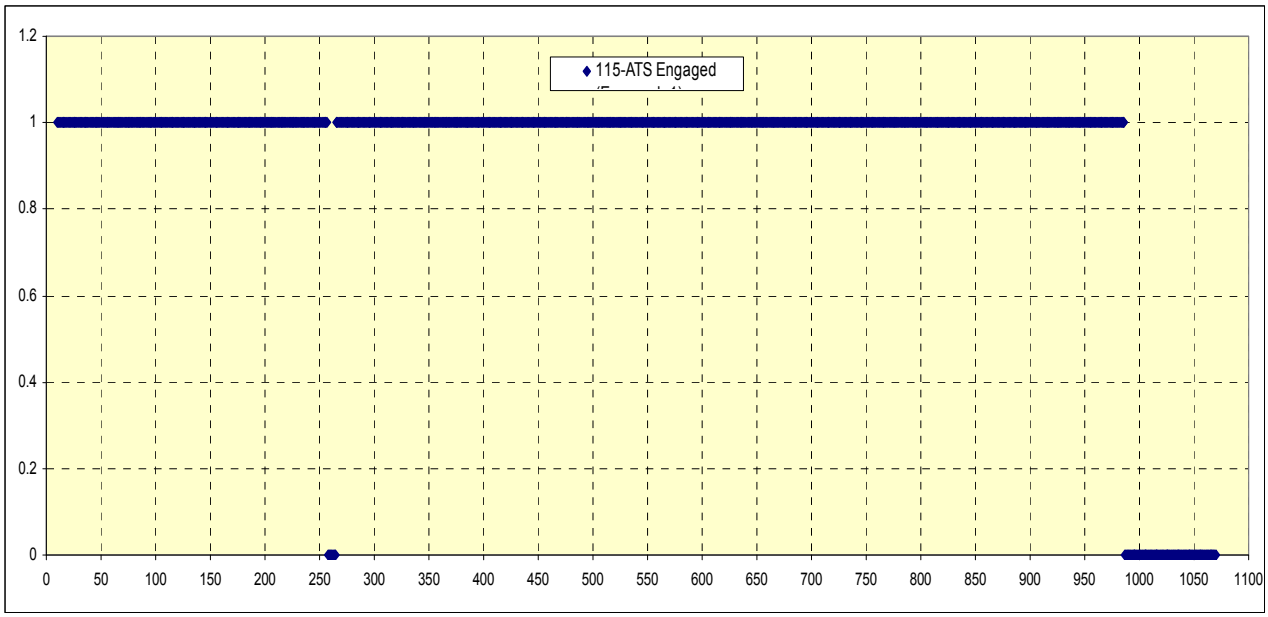

375-Squat Switch-R(Not Compressed=0)
1.2
1
0.8
0.6
0.4
0.2
0
200 205 210 215 220 225 230 235 240 245 250 255 260 265 270 275 280 285 290 295 300 305 310 315 320 325 330 335 340 345 350 355 360 365 370 375 380 385 390 395 400

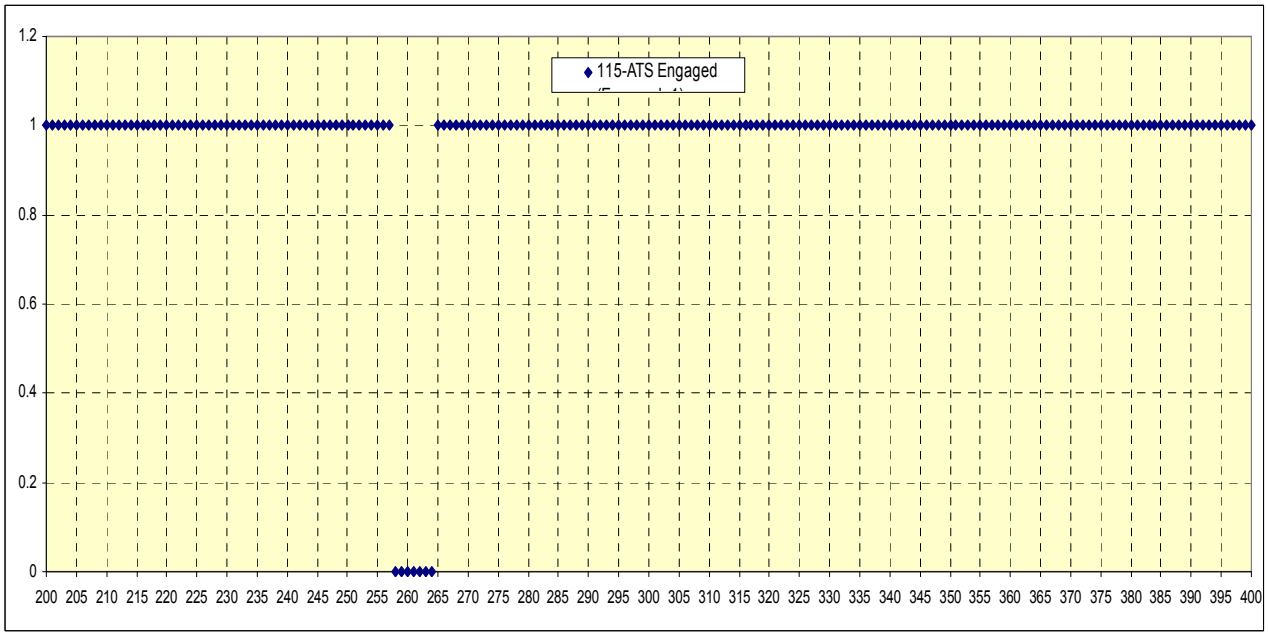
18. Auto Pilot





19. Auto Throttle System ATS





2. Interpretation of the most relevant FDR information (event scenario):

Close observation to the FDR parameters, parameters plot near the time of the event would lead to the following:[8]

- Squat switches:

  - Left L/G leg squat switch showed compressed condition (Ground) at 261 seconds ((83771 FDR frame number) and stayed on the ground for 5 seconds (from time 261 to time265)
  - Nose L/G leg squat switch did not showed any compressed condition during the event, meaning that the nose L/G almost did not touch the ground.
  - Right L/G leg squat switch showed compressed condition (Ground) at 258 seconds ((83768 FDR frame number), the L/G showed air again at 259 for one second, then showed ground again at 260 seconds and stayed on the ground for 6 seconds (from time 260 to time265)

- Pressure altitude

  The airplane showed minimum pressure altitude of 24 ft for 2 seconds (time from 260 to 261 seconds) and then showed 28 ft for 4 seconds (time 262 to time 265)

- Radio Altitude 1:

  The airplane showed minimum radio altitudes of 7 ft at 256 seconds, 0 ft at 268 second. Radio Altitude readings between time 258 seconds and 266 seconds are not reliable (readings are higher than 4000 ft)

- Radio Altitude 2:

  The airplane showed minimum radio altitudes of 1 ft at 257 seconds, 3 ft at 269 second. Radio Altitude readings between time 259 seconds and 267 seconds are not reliable (readings are higher than 4000 ft)

- Angle of Attack:

  Angle of attack was recorded in 2 columns. Using the average angle of attack values, the following can be concluded:

  During the time interval where the airplane was on ground (squat switches compressed, time between 258 seconds to 265 seconds), the pitch angle varied between 14.6 degree to 2.55 degrees, with a max value of 20.55 degrees at the time 265 second.

- Pitch angle:

  Pitch angle was recorded in 4 columns. Using the average pitch values, the following can be concluded:

[8] 0 reference used is equivalent to 83500 FDR frame number. Increments of 1 seconds are used for both scales

During the time interval where the airplane was on ground (squat switches compressed, time between 258 seconds to 265 seconds), the pitch angle varied between 6.1 degree to 10.8 degrees, with a max value of 10.8 degrees at the time 265 second.

- IAS knots:

  During the time interval where the airplane was on ground (squat switches compressed, time between 258 seconds to 265 seconds), the IAS varied between 135 knots to 124 knots.

- Ground Speed knots:

  During the time interval where the airplane was on ground (squat switches compressed, time between 258 seconds to 265 seconds), the Ground Speed varied between 130 knots to 119 knots.

- Flaps

  Flaps were set to 32 degree (Full flap)

- Lateral acceleration:

  Lateral Acceleration was recorded in 4 columns. Using the average Lateral Acceleration values, the following can be concluded:

  During the time interval where the airplane was on ground (squat switches compressed, time between 258 seconds to 265 seconds), the lateral acceleration varied between -0.058 as minimum to 0.002 as maximum.

- Longitudinal acceleration:

  Longitudinal Acceleration was recorded in 4 columns. Using the average Lateral Acceleration values, the following can be concluded:

  During the time interval where the airplane was on ground (squat switches compressed, time between 258 seconds to 265 seconds), the Longitudinal acceleration varied between 0.063 as minimum to 0.131 as maximum.

- Vertical acceleration:

  Vertical Acceleration was recorded in 8 columns. Using the average Vertical Acceleration values, the following can be concluded:

  During the time interval where the airplane was on ground (squat switches compressed, time between 258 seconds to 265 seconds), the Vertical acceleration varied between 1.20 as maximum (at time 258 seconds) and 0.868 as minimum (time 259 seconds). (indicating slight bouncing immediately after touch down)

– Brake Pedals:

  Data showed that both brake pedals angles were zero, i.e. the brake pedals were not depressed during the event.

– Engines EPR:

  Data showed that both engines EPR were increased at 269 seconds.

– Engines Levers angles:

  Data showed that Left Engines Lever Angle was moved to TOGA power at 265 seconds, EPR were increased at 269 seconds, Right Engines Lever Angle was moved to TOGA power at 264 seconds.

– Glide Slope:

  Glide slope showed almost one dot below glide slope before touch down

– Pitch Command Capt:

  Pitch Command Captain side was recorded in 4 columns. Using the average Pitch Command Captain side values, the following can be concluded:

  Before touch down the input was zero. During the time interval where the airplane was on ground (squat switches compressed, time between 258 seconds to 265 seconds), the Pitch Command Captain side was too small with a max value of 1.65 degree at time 260 seconds.

– Pitch Command F/O:

  Pitch Command F/O side was recorded in 4 columns. Using the average Pitch Command F/O side values, the following can be concluded:

  Immediately before touch down the input was -9.53 degree (time 257 second). During the time interval where the airplane was on ground (squat switches compressed, time between 258 seconds to 265 seconds), the Pitch Command F/O side varied between -8.23 degree (time 258 second) to -15.4 degree (time 265 second), with a value of -3.38 degree at 260 second.

– Roll

  Roll was recorded in 2 columns. Using the average Roll values, the following can be concluded:

  During the time interval where the airplane was on ground (squat switches compressed, time between 258 seconds to 265 seconds), the Roll angle varied in a

range between 2.8 degree as maximum (time 259 second one second after touch down) to -0.35 degrees as minimum (time 265 second.

- Stabilizer Position

  The Stabilizer was set to -3.5 throughout the time of the event

- Wind Direct/ Speed

  The wind direction and value were sampled every 2 seconds

  The wind direction varied from 282 degree to 323 degree during the event

  The wind value varied from 12 knots degree to 4 knots during the event

- Master Warning

  The master warning came on for one second just after the event (immediately after airborn) at time 267 seconds

- Auto Pilot:

  Autopilot 1 and 2 were disconnected at 164 seconds (press altitude was about 1100 ft), Autopilot 2 was re-engaged at 274 seconds.

- Auto Throttle System ATS

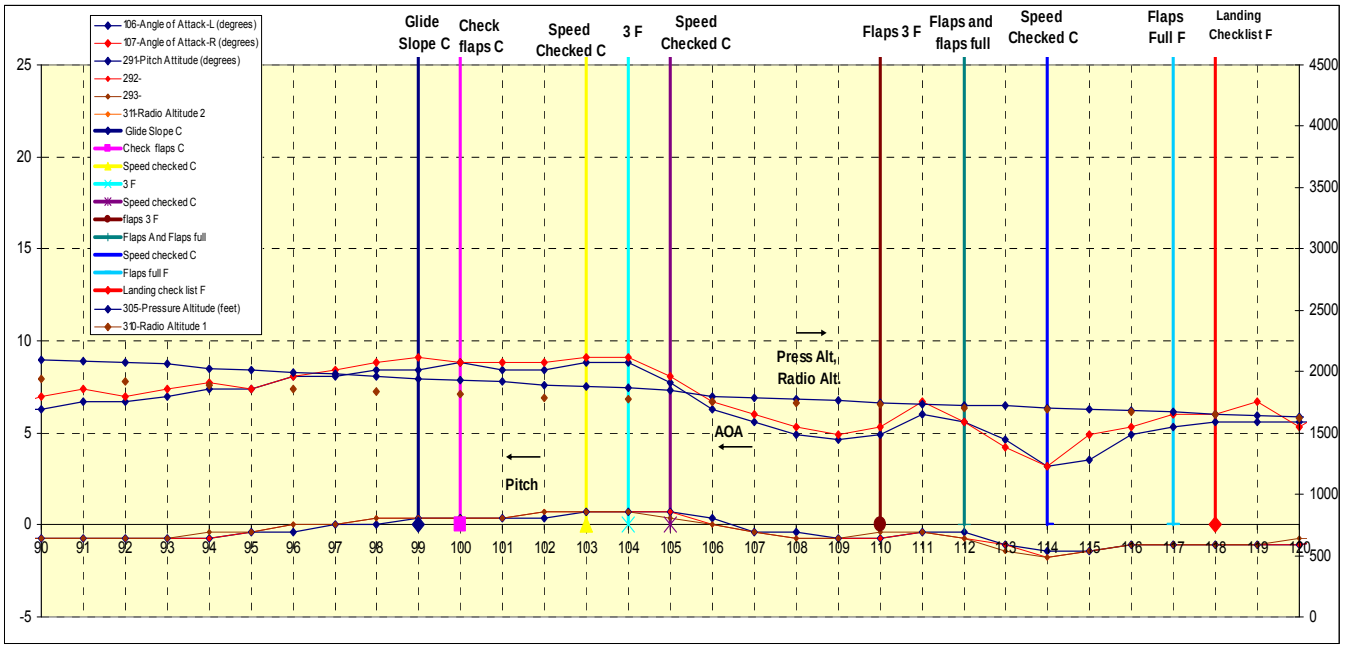
  The Auto throttle was disengaged almost the time the airplane was on ground throughout the evening (time 258 seconds to 264 seconds) and was re-engaged at 265 seconds (last minute before airborn

FDR ref time seconds	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270
FDR Frame number	83755	83756	83757	83758	83759	83760	83761	83762	83763	83764	83765	83766	83767	83768	83769	83770
CVR Ref time seconds	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172
CVR Ref time mm:ss	02:37	02:38	02:39	02:40	02:41	02:42	02:43	02:44	02:45	02:46	02:47	02:48	02:49	02:50	02:51	02:52
MLG Left							compressed	compressed	compressed	compressed	compressed					
NLG																
MLG Right				compressed		compressed	compressed	compressed	compressed	compressed	compressed					
Pressure Altitude ft	48	40	36	36	32	24	24	28	28	28	28	32	40	40	44	68
Radio Altimeter 1 ft		7		4093		4091		4092		4091		4092		0		11
Radio Altimeter 2 ft	13		1		4094		4092		4091		4092		4094		3	
Angle of Attack-L (degrees)	14.8	15.8	14.4	14.4	12.7	19.3	19.3	18.3	18.3	19.3	19.7	21.1	22.1	20.0	20.0	16.9
Angle of Attack-R (degrees)	16.5	15.5	14.8	14.8	15.1	20.4	21.4	19.7	19.7	21.4	21.4	22.5	22.1	21.1	20.4	17.6
Angle of Attack- Average (degrees)	15.65	15.65	14.6	14.6	13.9	19.85	20.35	19	19	20.35	20.55	21.8	22.1	20.55	20.2	17.25
Pitch Attitude (degrees) 1	5.3	5.3	5.3	6	6.3	9.5	9.5	9.1	9.1	9.8	10.5	11.2	11.2	10.9	11.2	10.2
Pitch Attitude (degrees) 2	5.6	5.3	5.3	6.3	7	10.2	9.1	9.1	9.1	10.2	10.5	11.6	10.9	11.2	10.9	9.8
Pitch Attitude (degrees) 3	5.6	5.3	5.6	6	7.7	9.8	9.1	9.1	9.5	10.2	10.9	11.6	10.5	11.2	10.9	9.5
Pitch Attitude (degrees) 4	5.6	5.3	6	6	8.8	9.5	9.1	9.1	9.8	10.5	11.2	11.6	10.5	11.6	10.5	9.5
Pitch Attitude Average (degrees)	5.5	5.3	5.6	6.1	7.5	9.8	9.2	9.1	9.4	10.2	10.8	11.5	10.8	11.2	10.9	9.8
IAS knots	137.5	135.5	137.2	134.9	135.4	132	131.4	129.1	127.6	125	123.9	123	124.1	124	128	132
Ground speed	130	130	130	130	129	128	127	125	122	121	119	118	118	120	122	125
Lateral Acceleration 1	-0.02	-0.01	-0.01	-0.02	0.016	-0.02	0.008	0.004	-0.01	-0.03	0	0.012	0.016	0.016	-0.01	-0.02
Lateral Acceleration 2	-0.01	-0.01	-0.01	-0.09	0.004	-0.09	-0.02	-0	-0	-0.02	-0.01	0.016	0	0.02	-0.02	0
Lateral Acceleration 3	-0	-0.01	-0	-0.08	0.008	-0.07	-0.02	-0	-0.02	-0.01	-0.01	0.008	0.012	0.008	-0.02	0.004
Lateral Acceleration 4	-0.01	-0.02	-0	-0.04	-0.02	-0.01	-0.02	-0.02	-0.02	-0	0.016	0.004	0.016	0	-0.02	0.023
Lateral Acceleration Average	-0.01	-0.01	-0.01	-0.06	0.002	-0.05	-0.01	-0.01	-0.01	-0.01	-0	0.01	0.011	0.011	-0.02	0.003
Longitudinal Acceleration 1	0.098	0.105	0.102	0.117	0.078	0.094	0.059	0.082	0.066	0.066	0.109	0.148	0.207	0.293	0.402	0.383
Longitudinal Acceleration 2	0.102	0.098	0.109	0.02	0.066	0.133	0.059	0.055	0.074	0.074	0.117	0.168	0.215	0.332	0.402	0.375
Longitudinal Acceleration 3	0.105	0.094	0.113	0.125	0.062	0.125	0.074	0.055	0.066	0.105	0.148	0.188	0.23	0.371	0.391	0.363
Longitudinal Acceleration 4	0.109	0.094	0.113	0.098	0.082	0.078	0.09	0.059	0.066	0.117	0.148	0.199	0.258	0.387	0.387	0.355
Longitudinal Acceleration Average	0.104	0.098	0.109	0.09	0.072	0.108	0.071	0.063	0.068	0.091	0.131	0.176	0.228	0.346	0.396	0.369
Normal Acceleration 1	1.086	1.098	1.039	1.211	0.883	0.984	0.918	1.105	1.039	0.984	1.047	0.996	0.977	0.934	1.051	1
Normal Acceleration 2	1.113	1.066	1.035	1.355	0.832	1.098	0.926	0.977	1.039	0.996	0.977	1.012	0.98	0.945	1.035	0.996
Normal Acceleration 3	1.125	1.035	1.039	1.379	0.844	1.191	0.91	0.949	1.016	1.027	0.977	1.016	0.965	0.969	1.039	0.984
Normal Acceleration 4	1.137	0.996	1.039	1.32	0.84	1.156	0.934	0.945	0.996	1.066	1.055	1.004	0.969	1.016	1.016	0.984
Normal Acceleration 5	1.133	1.004	1.035	1.242	0.809	1.156	1.012	0.961	1.012	1.047	1.066	1.016	0.949	1.027	1.02	0.984
Normal Acceleration 6	1.133	1.004	1.027	1.152	0.891	1.051	1.047	0.977	0.984	0.988	1.035	1.012	0.93	1.047	1.016	0.984
Normal Acceleration 7	1.125	1.02	1.02	1.027	0.902	0.977	1.125	1.016	0.996	0.969	1.039	1.004	0.918	1.047	1.016	0.977
Normal Acceleration 8	1.105	1.035	1.039	0.926	0.945	0.914	1.125	1.031	0.984	0.969	0.977	0.996	0.918	1.055	1.004	0.977
Normal Acceleration Average	1.12	1.032	1.034	1.202	0.868	1.066	1	0.995	1.008	1.006	1.022	1.007	0.951	1.005	1.025	0.986
Brake Pedal Angle-L (degrees)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brake Pedal Angle-R (degrees)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EPR Actual Eng.1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00
EPR Actual Eng.2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00
Throttle Lever Angle L	22	22	22	-3	-3	-3	-3	-3	-3	-3	45	45	45	45	45	45
Throttle Lever Angle R	22	22	17	-3	-3	-3	-3	-3	0	42	42	42	42	42	42	42
Glide Slope 1 (dots)		-1.17		-1.38		-3.92		-3.09		-1.11		-0.12		-4.01		-0.51
Glide Slope 1 (dots)	-1		-1.01		0.64		-1.56		-3.83		-0.76		-3.45		-0.42	
Pitch Comm - Capt (deg) 1	0	0	0	0	0	1.4	0.1	1.6	0	0.4	0	-0.1	0	-0.1	0	-0.6
Pitch Comm - Capt (deg) 2	0	0	0	0	0	2.5	0	2.4	0	0	0	0.2	0	-0.1	0	-1.6
Pitch Comm - Capt (deg) 3	0	0	0	-0.3	0	0.6	-0.1	1.5	0.1	0	0	-0.1	-1.5	-0.2	1	-1.1
Pitch Comm - Capt (deg) 4	0	0	0	0	0.8	2.1	0.8	0.7	0	0	-0.7	-0.1	-1.2	-0.3	-0.1	-2.3
Pitch Comm - Capt (deg) Average	0	0	0	-0.08	0.2	1.65	0.2	1.55	0.025	0.1	-0.18	-0.03	-0.68	-0.18	0.225	-1.4
Pitch Comm - F/O (deg) 1	-5.6	-8.6	-7.7	-12	-15.6	0.3	-12.2	-12.2	-11.7	-13.5	-16	-14.9	-8.6	-9.9	-2.8	-4.9
Pitch Comm - F/O (deg) 2	0	-11.2	-7.9	-3.9	-14.9	11.5	-10.8	-10	-13.6	-14.3	-16	-9.3	-8.4	-6.4	-5.4	-4.7
Pitch Comm - F/O (deg) 3	2	-10.5	-9.8	-5.7	-14.6	-9.3	-12.1	-7.7	-12	-13.4	-16	-6.2	-16	-0.2	-4.2	-7.5
Pitch Comm - F/O (deg) 4	-1.8	-7.3	-12.7	-11.3	-5.4	-16	-2.6	-11.2	-10.9	-15.9	-13.4	-7.3	-13.4	-1.6	-3.7	-6.2
Pitch Comm - Capt (deg) Average	-1.35	-9.4	-9.53	-8.23	-12.6	-3.38	-9.43	-10.3	-12.1	-14.3	-15.4	-9.43	-11.6	-4.53	-4.03	-5.83
Roll (Deg) 1	0.4	0.7	1.4	0.7	2.8	0	1.1	1.1	1.1	0.7	0	0.4	2.5	-0.7	-3.9	-1.8
Roll (Deg) 2	0.4	1.1	1.4	1.4	2.8	0.7	0.4	0.4	0.7	1.1	-0.7	2.1	1.4	-2.8	-3.2	-0.4
Roll (Deg) degree	0.4	0.9	1.4	1.05	2.8	0.35	0.75	0.75	0.9	0.9	-0.35	1.25	1.95	-1.75	-3.55	-1.1
Stabilzer	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5
Wind direction degree		282				304				323				315		
Wind value kts		12				7				4				6		
Master warning	Not On	Not On	Not On	Not On	Not On	Not On	Not On	Not On	Not On	Not On	Not On	Not On	On	Not On	Not On	Not On
Auto Pilot	Disengaged	Disengaged	Disengaged	Disengaged	Disengaged	Disengaged	Disengaged	Disengaged	Disengaged	Disengaged	Disengaged	Disengaged	Disengaged	Disengaged	Disengaged	Disengaged
Auto Throttle	Engaged	Engaged	Engaged								Engaged	Engaged	Engaged	Engaged	Engaged	Engaged

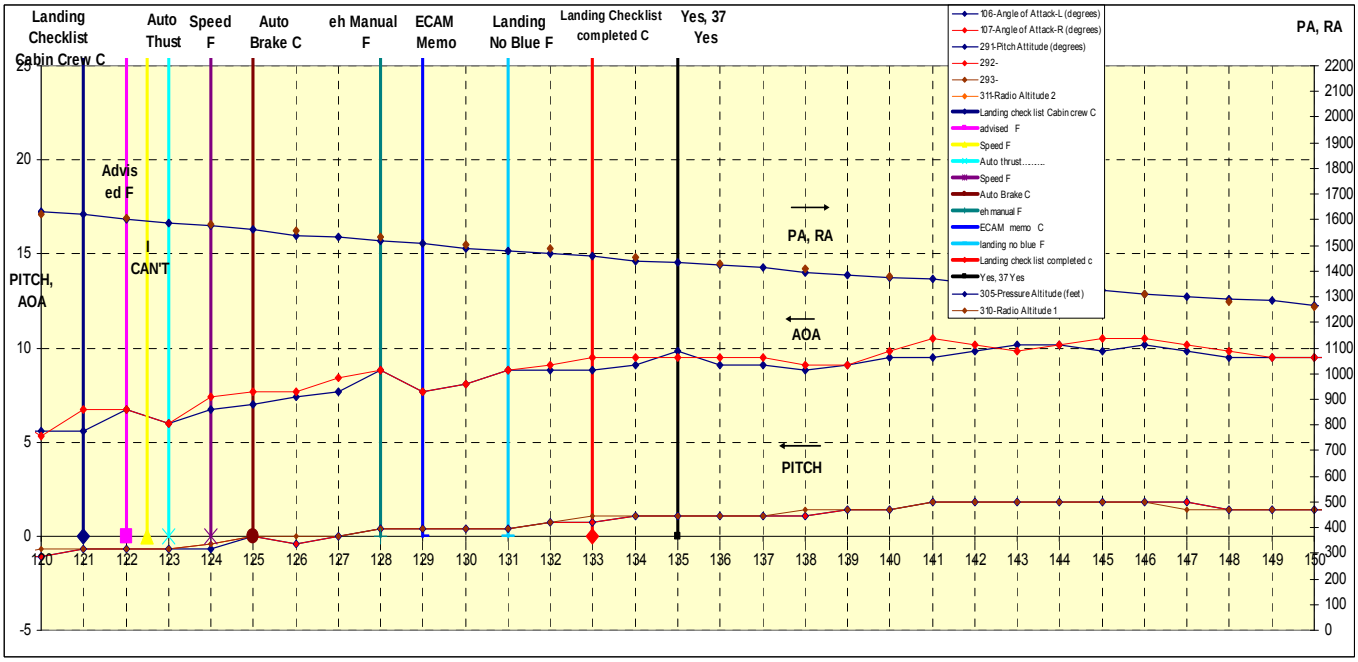
3. CVR/ FDR Correlation Plots:

- The procedure for CVR/ FDR Correlation is shown in section 2.11.1 (CVR Analysis) item A (CVR/ FDR Time Correlation)
- After making the time correlation, the conversation downloaded from the CVR was superimposed on the most selected relevant parameters (Squat switches.
- The plots were made at the time of the event (from 90 FDR reference time seconds to FDR reference time 300 seconds).
- To get better understanding about the events plots were made for every 30 seconds time span.

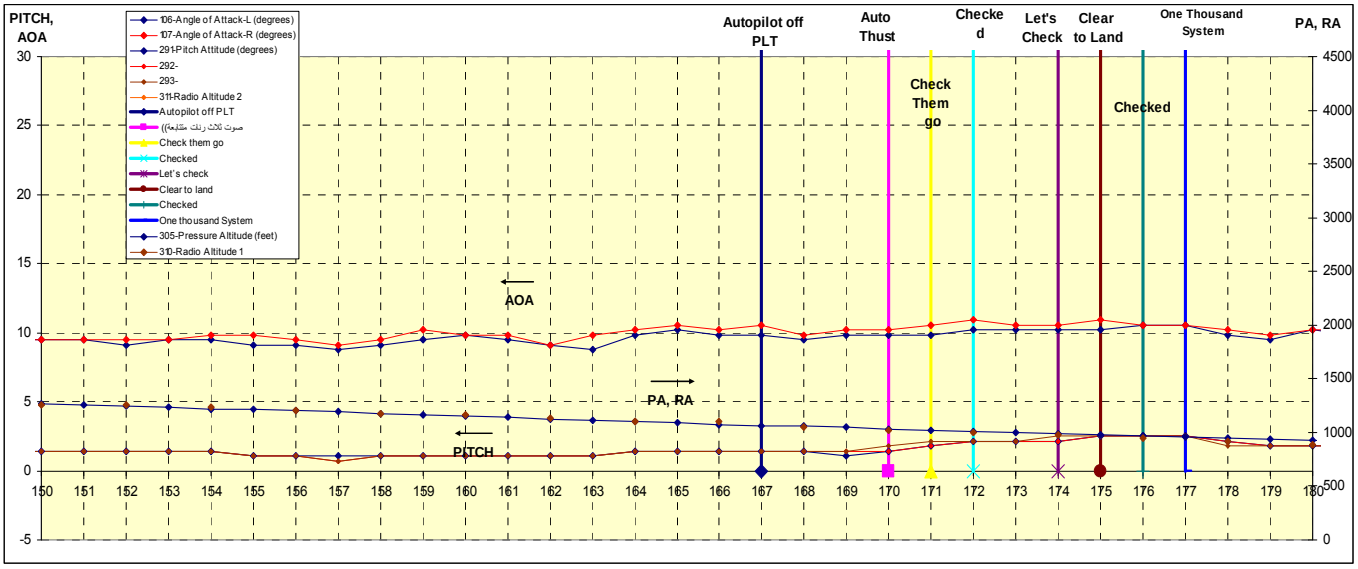
1. Time from to 90-120 FDR Ref time (seconds)



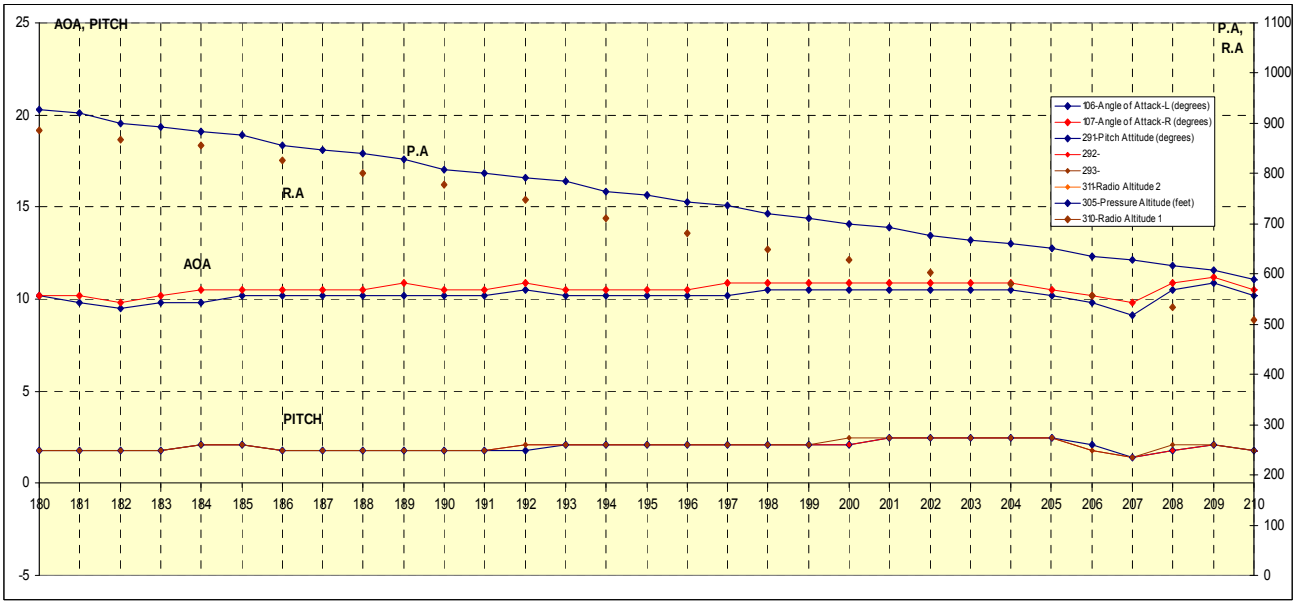
2. Time from to 120-150 FDR Ref time (seconds)



3. Time from to 150-180 FDR Ref time (seconds)

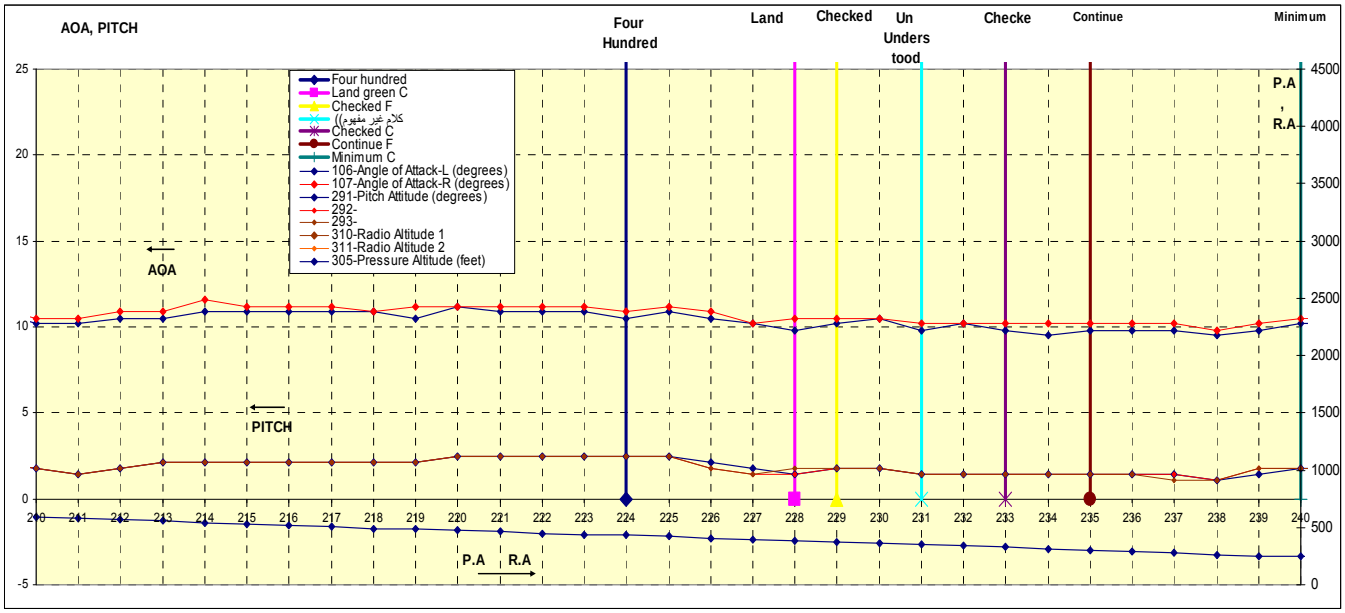


4. Time from to 180-210 FDR Ref time (seconds)

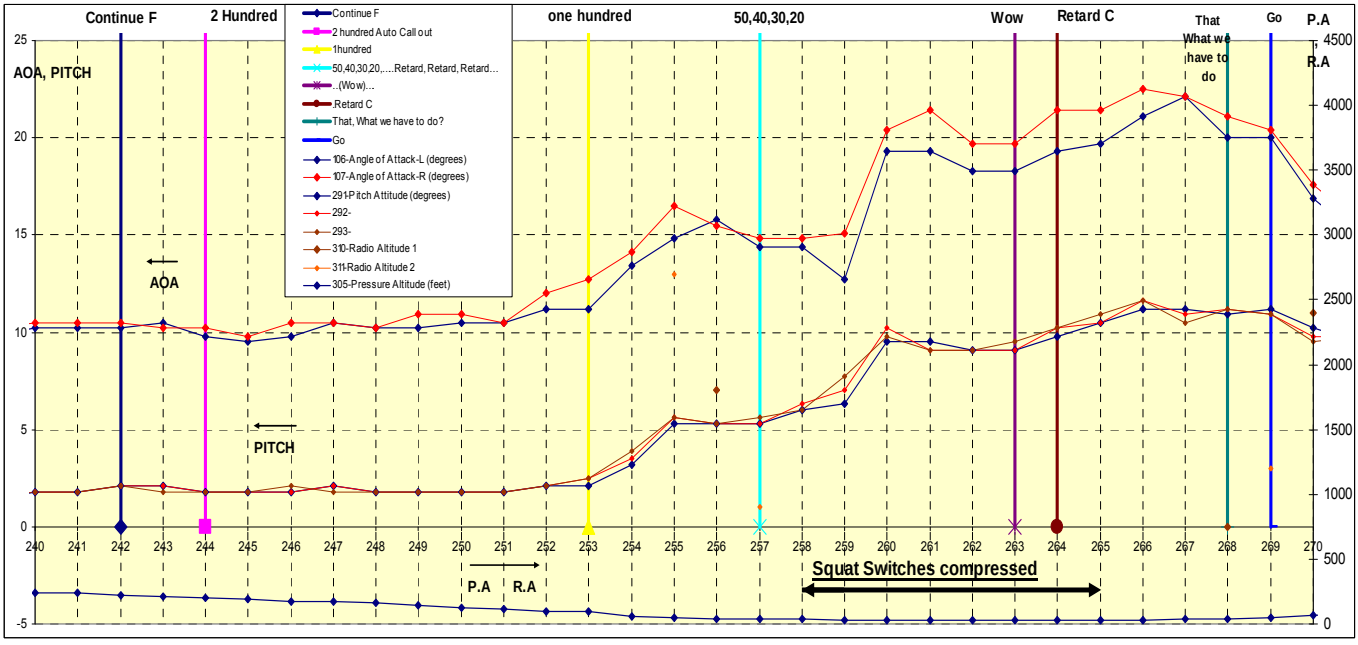


(no audio)

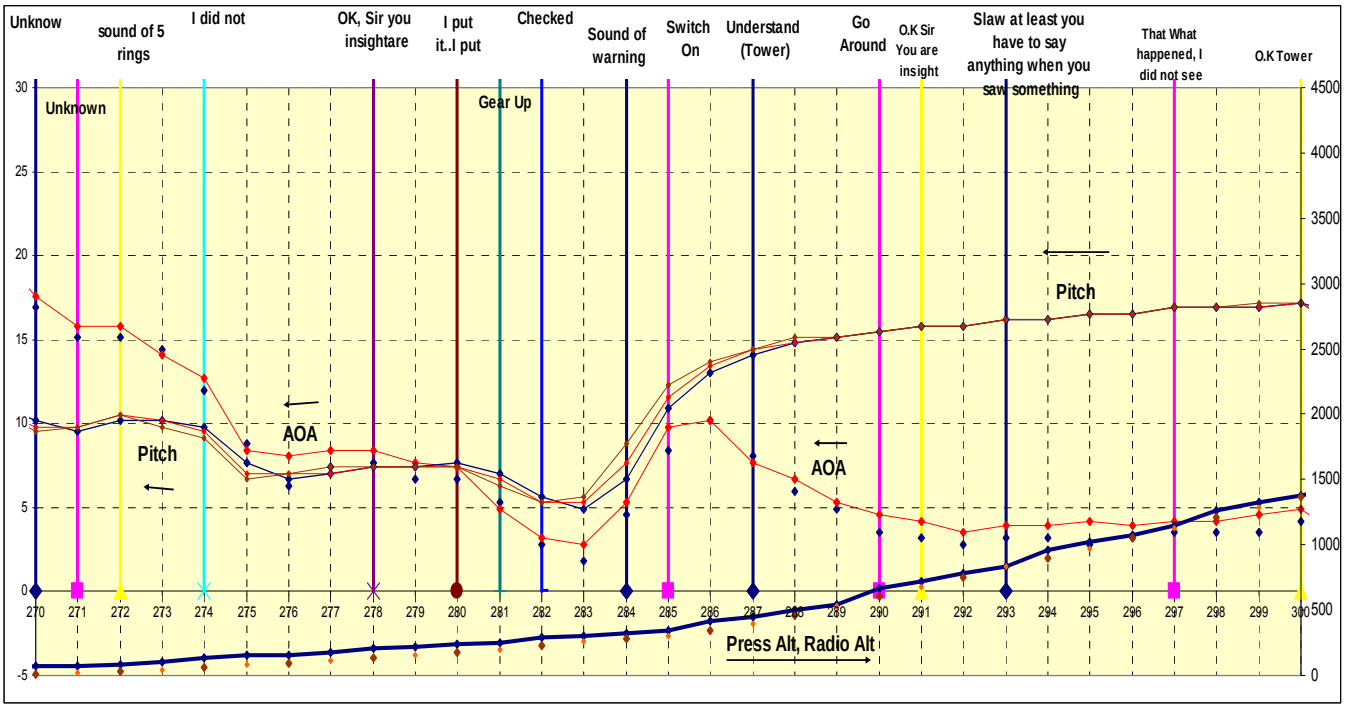
5. Time from to 210-240 FDR Ref time (seconds)



6. Time from to 240-270 FDR Ref time (seconds)



7. Time from to 270-300 FDR Ref time (seconds)



By thorough examination of the CVR-FDR correlation plots and CVR conversation, in addition to the communication made with the tower shown in section 1.9, following cab be concluded:

- The flight seemed to be normal, with no anomalies noticed up to the moment of the touch down
- During the time interval where the airplane was on ground (squat switches compressed, time between 258 seconds to 265 seconds), the pitch angle varied between 6.1 degree to 10.8 degrees, with a max value of 10.8 degrees at the time 265 second. (refer to section 2.6.4 for pitch limits for tail strike)
- The following conservations were selected as most relevant to the event and would explain what happened:

CVR Ref time new HH:MM:SS	CVR time new sec	FDR Approximate time	Speaker	Event
0:02:45	165	263		(Wow)….
0:02:46	166	264	CAPT	.Retard
0:02:50	170	268		*That, What we have to do?*
0:02:51	171	269		Go
02:56	176	274	CAPT	*I didn't see anything*
			CAPT	*Go around*
03:13	193	291	F/O	Ok, sir you are insight insight
03:15	195	293	CAPT	*(Slaw(at least you have to say anything when you saw something*
03:19	199	297		*That, what happened….I didn't see anything*
03:37	217	315		What happened? /What is this?
03:56	236	334		Nothing bad happened
03:59	239	337		1 2 3 4, how I couldn't see the ground, when I landed!
04:1	241	339	PILOT	Everything was very lighting
04:2	242	340		Let's make like this
04:36	276	374	PILOT	3027 check the reason for the go around
04:47	287	385	PILOT	Pounding after landing SVR 3026 an AAA……. Strike a pound
04:54	294	392		Confirm unstabilized approach
04:56	296	394		No, negative It was stabilized approach
			Tower	Tower
05:3	303	401	PILOT	Everything is ok
05:5	305	403		…..And confirm the runway was clear and Everything is ok
05:9	309	407		affirm
05:41	341	439		The impact was strong
05:43	343	441		We little bit jump and as usually I thought ,that we'll continue/complete , but we hold

05:55	355	453	It was right that we decided to go I didn't see how long distance we left, but I thought, that we aren't landing , we are going
06:3	363	461	I thought the same
06:32	392	490	Ladies and gentlemen don't be worry there is something on runway ,so that we'll make another trial
		98	I pulled not a little
07:0	420	518	No, no normal it was a good opportunity, but in the impact we didn't pull as usually
07:41	461	559	I put small power as he told me then I felt touch and I felt that we leave not like as usually. After we went out we touched again like what happened in "TU"
07:50	470	568	Even it was less than 5 thousand we thought it …… Anyway It's better than crashing and It was 10 degrees
08:11	491	589	You should ask me, what we have to do I'm looking to the ground if we land or no and I didn't see any instruments

- These conservation can clearly show that:

  - The F/O was performing the landing.
  - Just after touch down the captain asked ".Retard, t*hat, what we have to do?,* Go"
  - The captain mentioned that "he *didn't see anything, Go around"*
  - The F/O responded "Ok, sir you are insight insight"
  - The captain addressed the F/O saying "*(Slaw(at least you have to say anything when you saw something"*
  - The F/O responded by saying "*That, what happened….I didn't see anything" and then added "*What happened? What is this? Nothing bad happened"
  - The F/O announced "1 2 3 4, how I couldn't see the ground, when I landed! "
  - The F/O added that "Everything was very lighting". (Suggesting that he was suffering from the runway light intensity), however he did not announce or inform the captain to ask ATC for adjusting light to his convenience.
  - When the tower asked about the reason for the Go Around, the cockpit crew announced "Bouncing after landing, SVR 3026 an AAA……. high bounce"
  - The F/O announced that everything was ok , and confirmed the runway was clear and everything is ok
  - The F/O announced that the impact was strong, with a little jump.
  - The F/O mentioned that it was right that they decided to go
  - The F/O mentioned that he didn't see how long distance they left, but he thought that they aren't landing, they are going.
  - The F/O mentioned that he pulled not a little

- The Captain commented "No, no normal it was a good opportunity, but in the impact we didn't pull as usually"
- The F/O announced "I put small power as he told me then I felt touch and I felt that we leave not like as usually".
- The F/O started telling a story of almost similar event saying that "After we went out we touched again like what happened in "TU" , even it was less than 5 thousand we thought it ……, anyway It's better than crashing and It was 10 degrees"
- The Captain addressed the F/O saying that he should ask him, what they have to do
- The captain added "I'm looking to the ground if we land or no and I didn't see any instruments"

3. Conclusion

3. Conclusion

Findings:

- Regarding the cockpit crew, the cockpit crew was eligible for the flight. All documents and certifications were conforming with the relevant rules and standards

- Regarding airplane status, the airplane was airworthy; there was no evidence of mechanical failure throughout the whole event flight.

- Regarding weight and balance for the event flight, airplane was loaded properly and all relevant parameters were in the appropriate limits (weights, indices, cg MAC %). No exceedances or violations were observed for all phases of flight (T.O, Landing, Zero fuel weight)

- Regarding Meteorological Information, there is no evidences of any weather problem that might be contributing to the event

- Regarding Communication, the whole communication transcript between the cockpit crew and the tower showed normal communication flow, without any evidence of anomalies or abnormalities.

- Regarding Aerodrome Information, there is no evidences of any anomalies or problems that might be contributing to the event

Probable causes':

- Deviation from normal technique. The F/O who was making the landing did not handle the airplane properly, while the PIC did not intervene at the proper time in an attempt to prevent exceeding pitch limit.

    - The actual pitch while the airplane was on the ground was too high exceeding the geometric limit for the airplane on ground.

Contribution Factors:

The following factors might have contributed to the event:

- The captain did not intervene at the proper time in order to prevent pitch from exceeding its limits (taking into consideration that the tail strike took place in few seconds, requiring captain direct interference with the flight control).
- The behavior of the F/O during landing might be affected by several contributing factors including the following:
    - The actual total flying hours during the past 24 hours for both captain and F/O, besides the late landing time suggests fatigue condition.
    - It was found that pilots were possibly affected by the fatigue influence of the long duty period and early time of the day but it was checked that the duty period of this flight was in strict compliance with Ural Airlines duty time regulations.
    - The F/O was suffering from light intensity, though he did not announce or inform the captain.
- The factual information shows that the number of flying hours for the F/O is much higher than the flying hours of the captain. The feeling of the captain that the F/O is highly experienced with a large amount of flying hours might have some effect on his behavior towards his F/O. The captain might have felt high confidence in the F/O resulting in a feeling of relaxation assuming that the error probability from the F/O side is low.
- From pilot's statements, it was concluded - after touching down the RWY both pilots become sure that the aircraft bounced of RWY and was floating close to the ground. The same time DFDR data showed both landing gears compressed. It was found that probable cause of the illusion might be combination of very little bounce followed by soft touch down and abnormal pitch attitude at the time of the landing. FO was holding the aircraft nose high to prevent hard landing. This pilot technique was against the Airbus recommendation (FCTM) and the operator SOP [9] for the case of bouncing at landing. The Captain failed to properly conduct his duties as a Pilot Non Flying for aircraft pitch monitoring at landing and timely announcing exceeding of this parameter.

  Communication between the captain and the F/O throughout the event was not sufficiently efficient.

[9] Reference: information received from operator on November 2013

4. Safety Recommendations

4. Safety Recommendations

- Relevant Organization to review training concerning landing technique.
- Relevant Organization to issue instructions to the cockpit crew to strictly adhere to the SOP (Standard Operation Procedure) and the normal techniques.
- Relevant Organization to ensure adherence to Flight duty periods limits
- Relevant Organization to assure implementing Human Factors and CRM techniques especially in the area of maintaining “Situational Awareness” and Communicating and sharing any inconvenience with other crew members.

EXHIBITS

Exhibit #1 photos

Photo #1

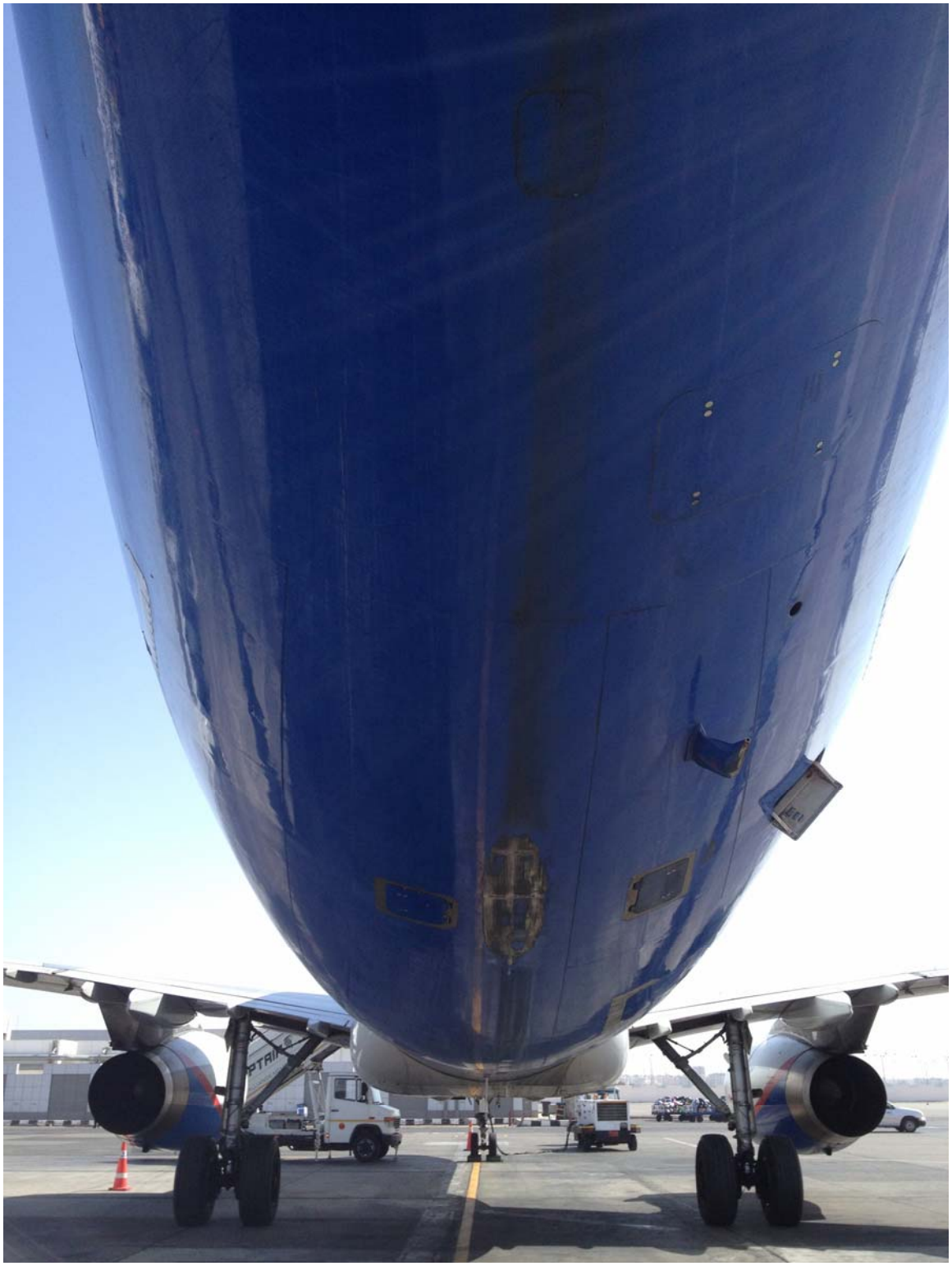


Photo #2

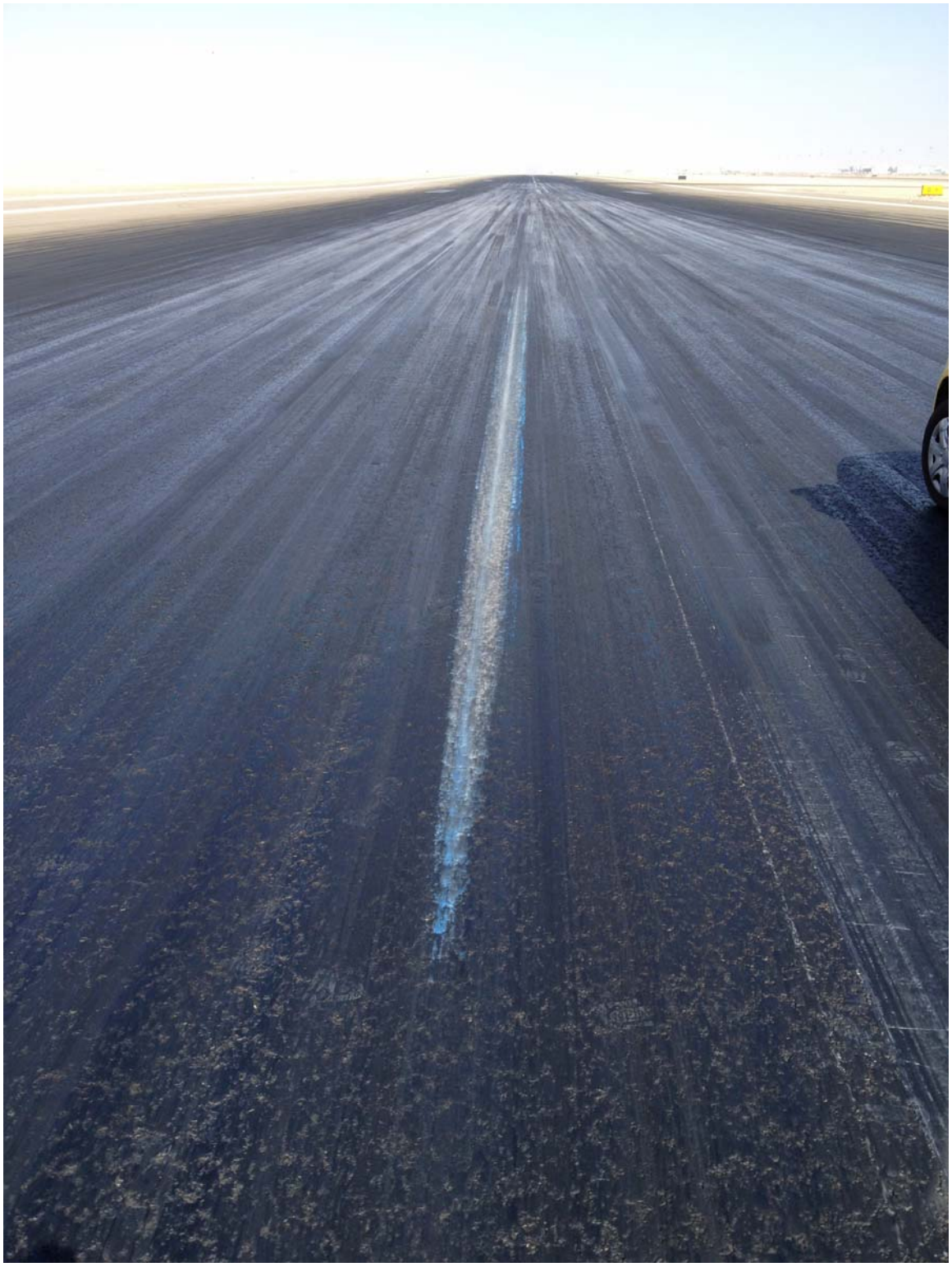


Photo #3

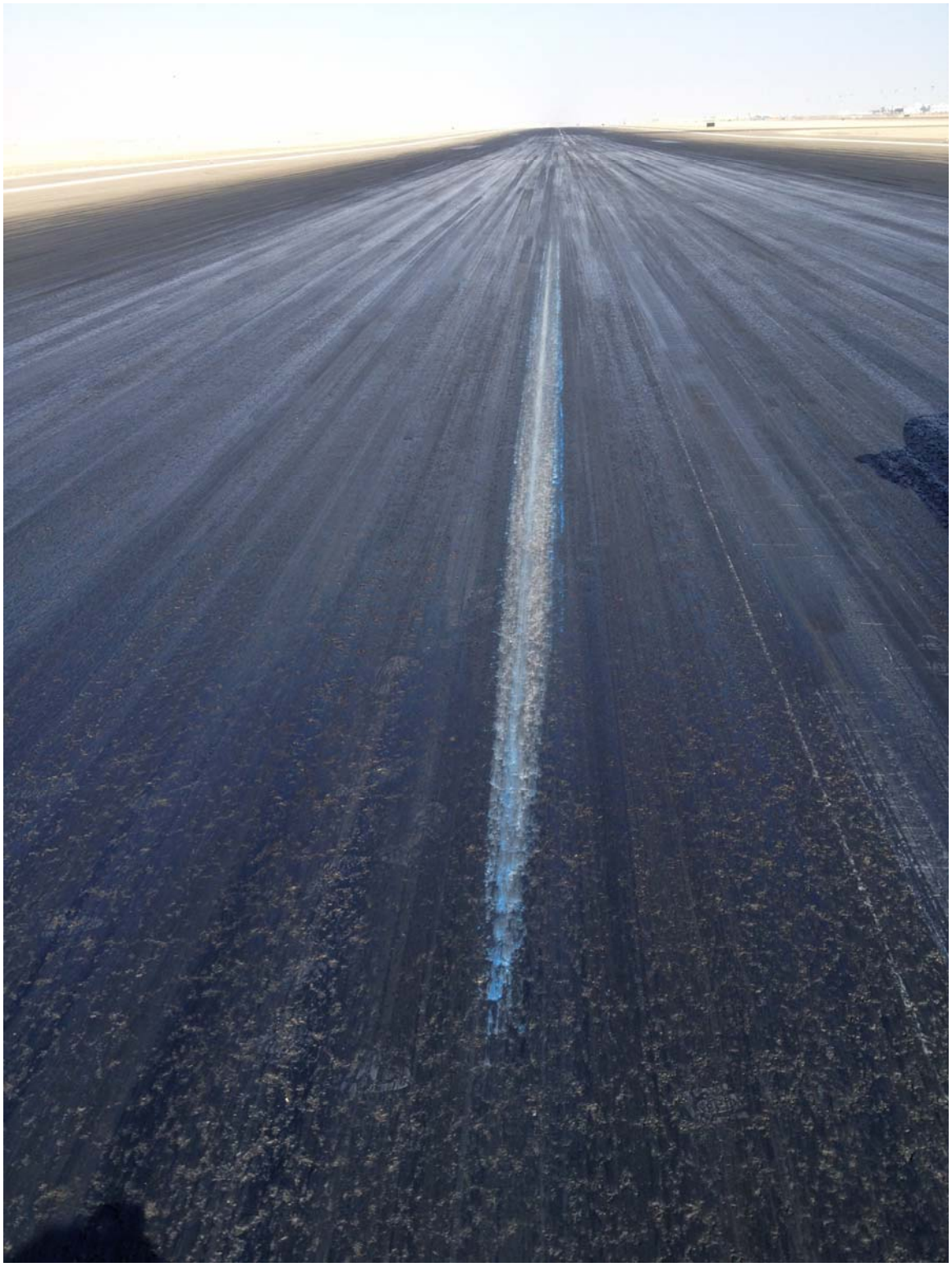
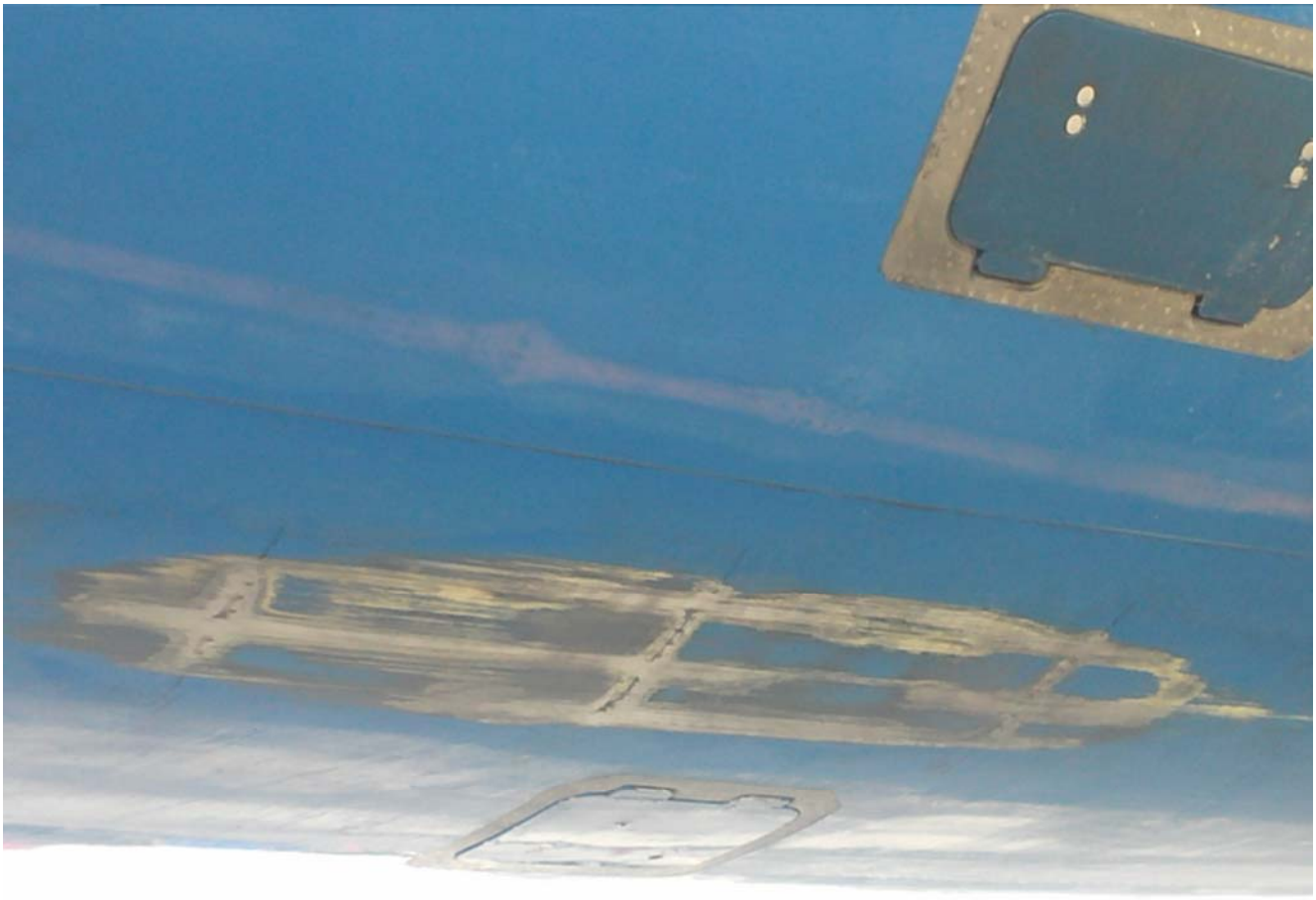


Photo #4

Image

IMG010

IMG011



IMG012

IMG013

IMG015

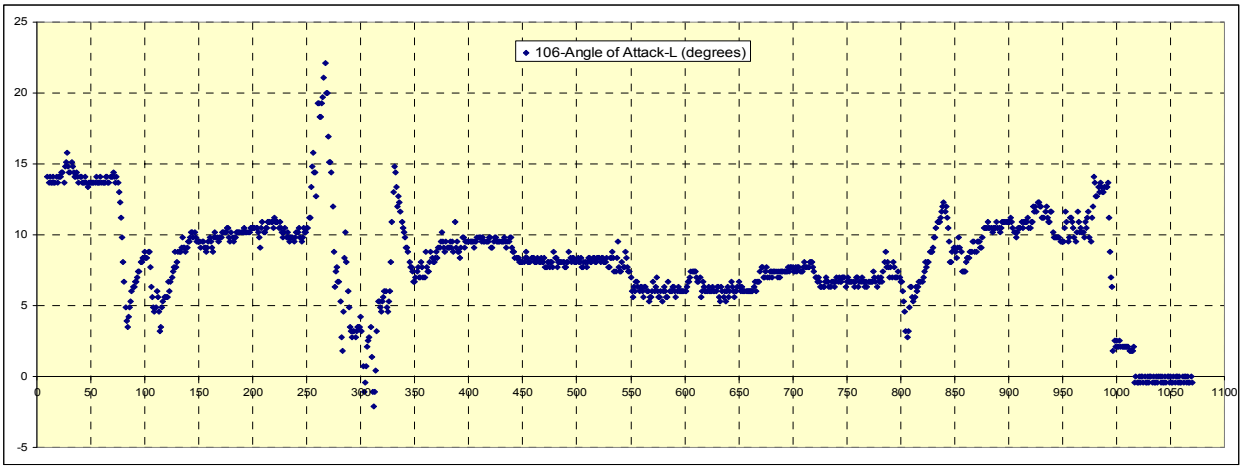
IMG016

IMG017

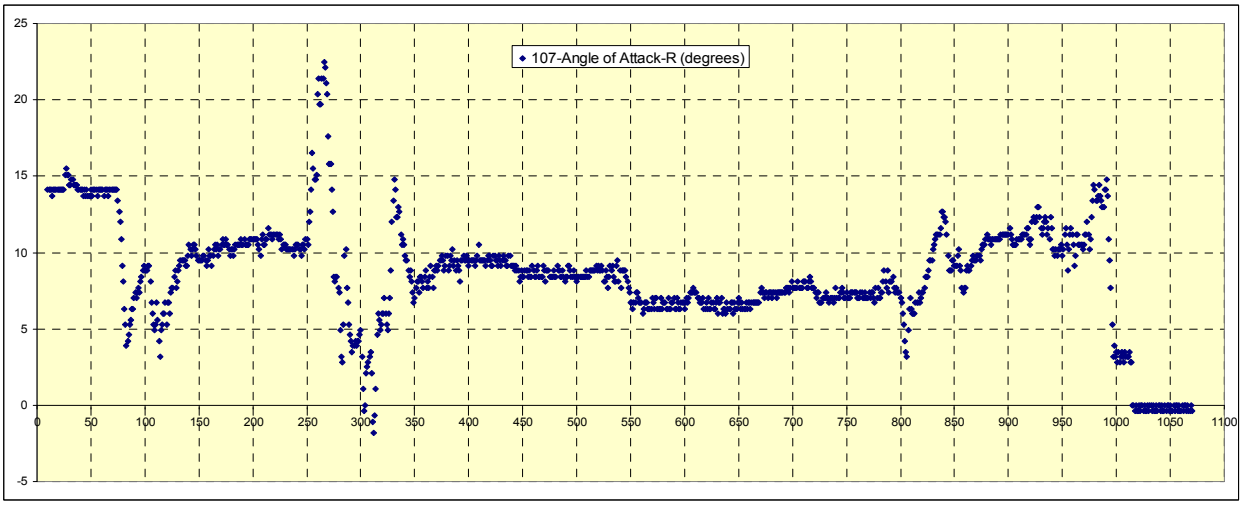
IMG018

Exhibit # 2
Flight Data Recorder FDR Read out

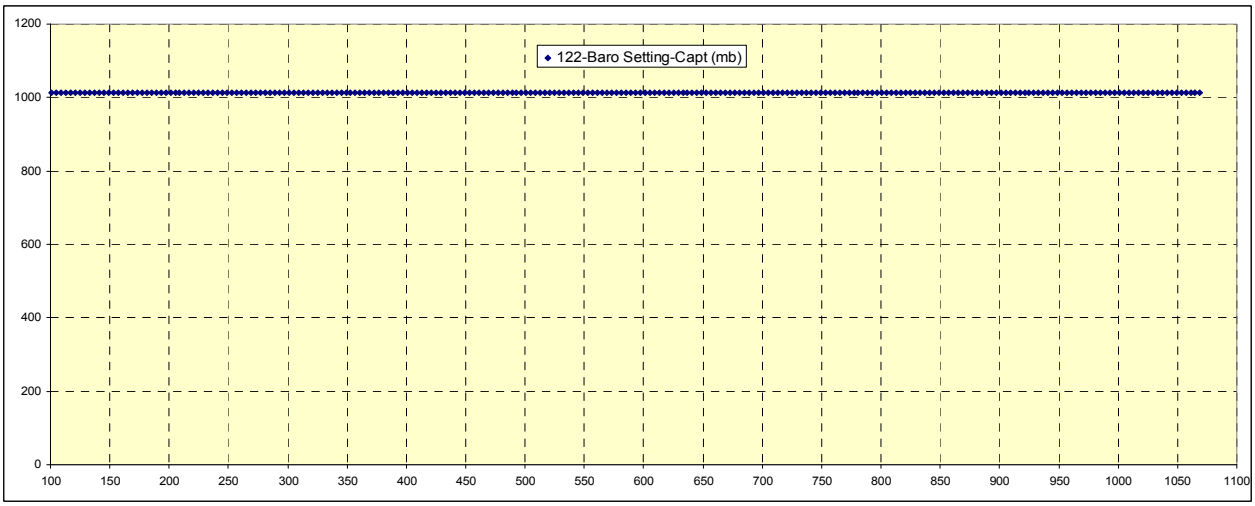
1. Aircraft Performance/ Control



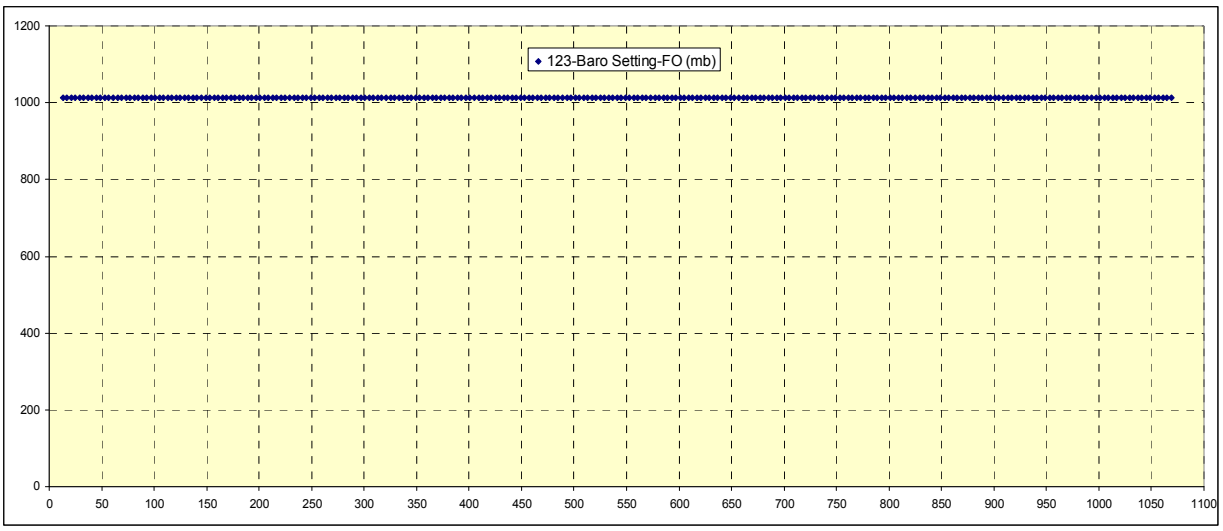
106 AOA L



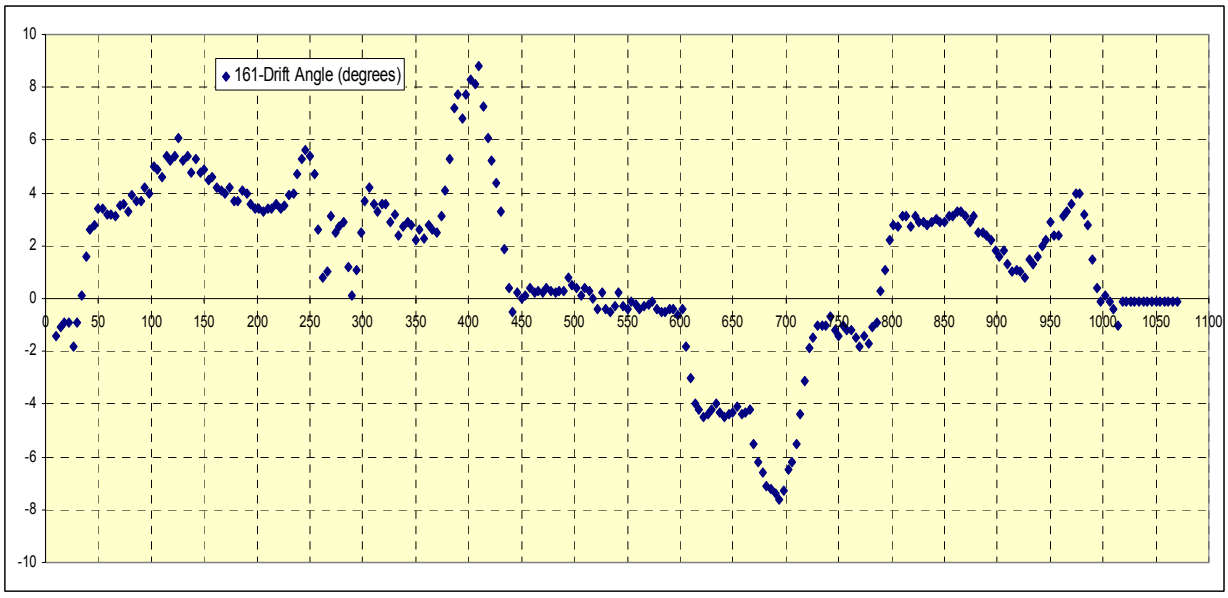
107 AOA R



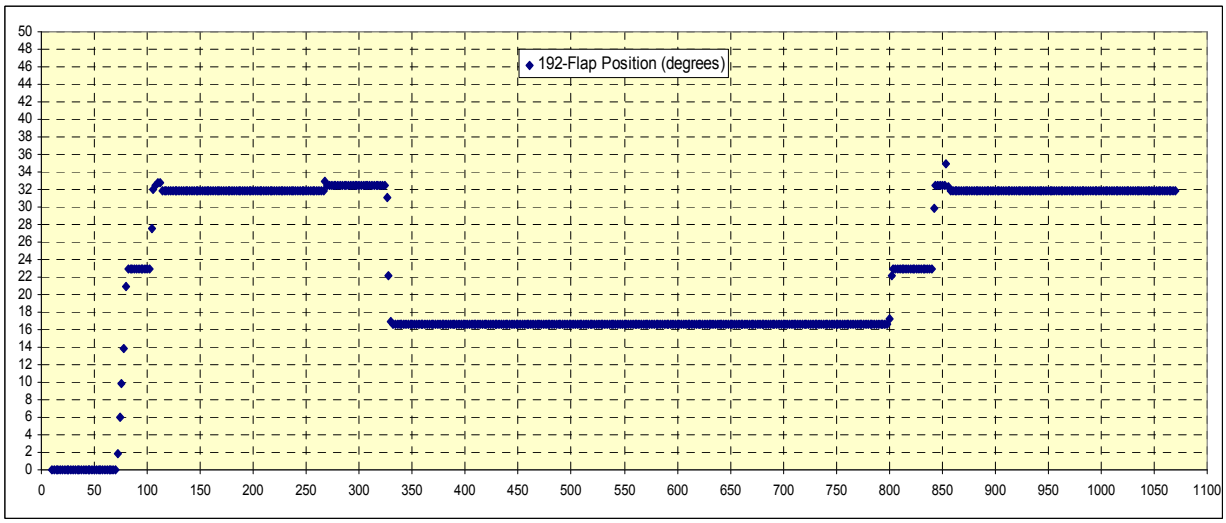
122 Baro Setting Capt



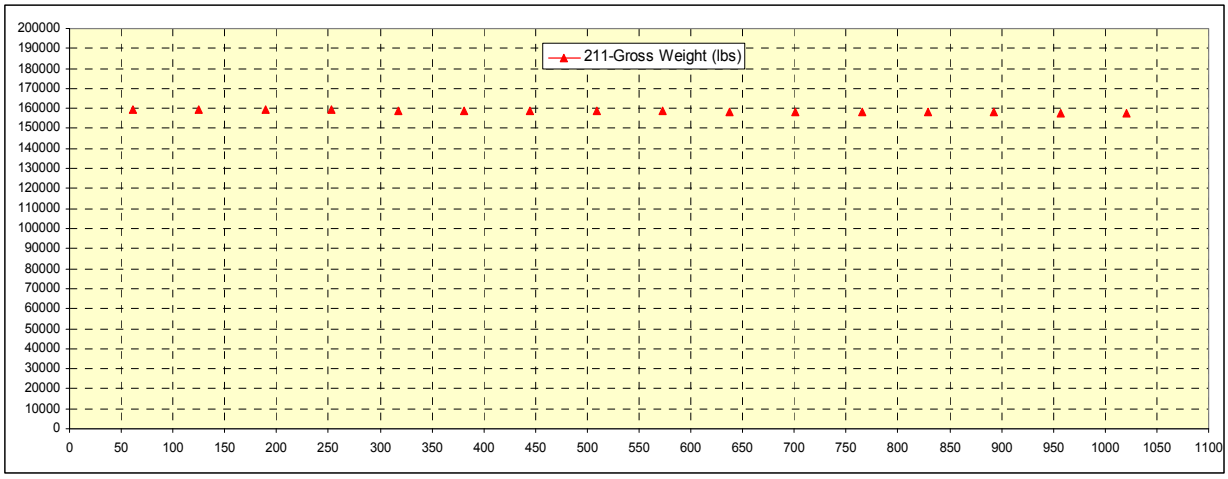
123 Baro Setting F/O



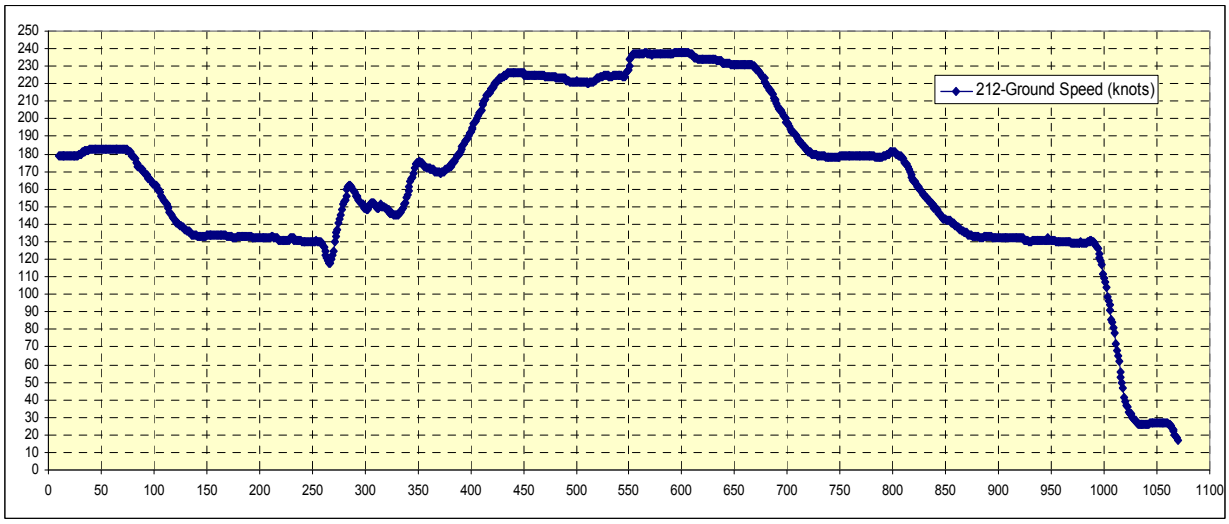
161 Drift Angle



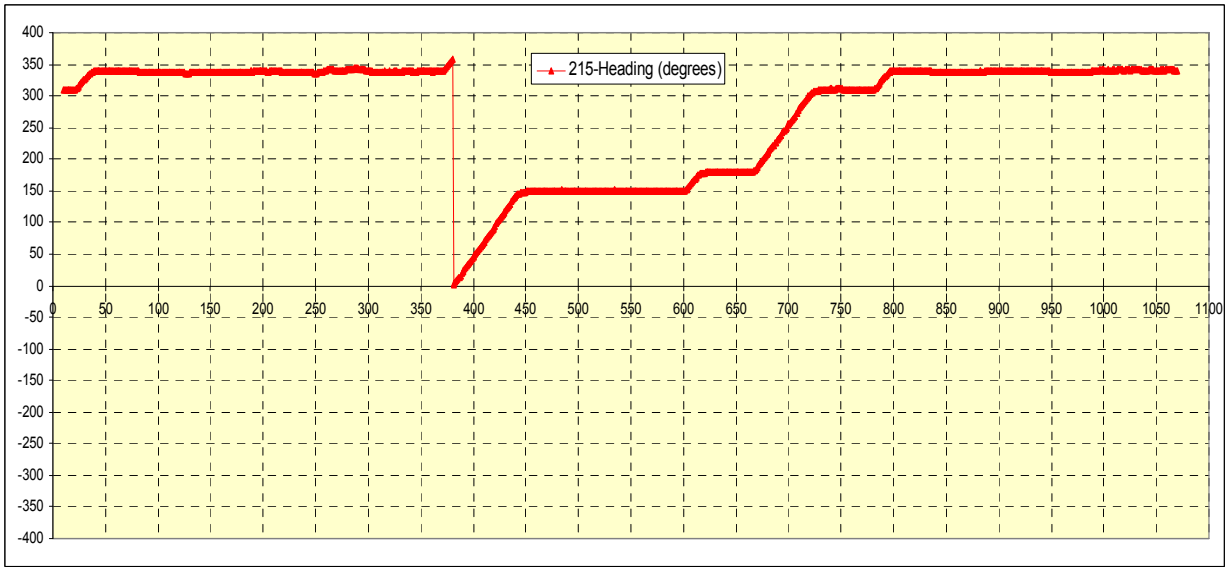
192 Flaps position



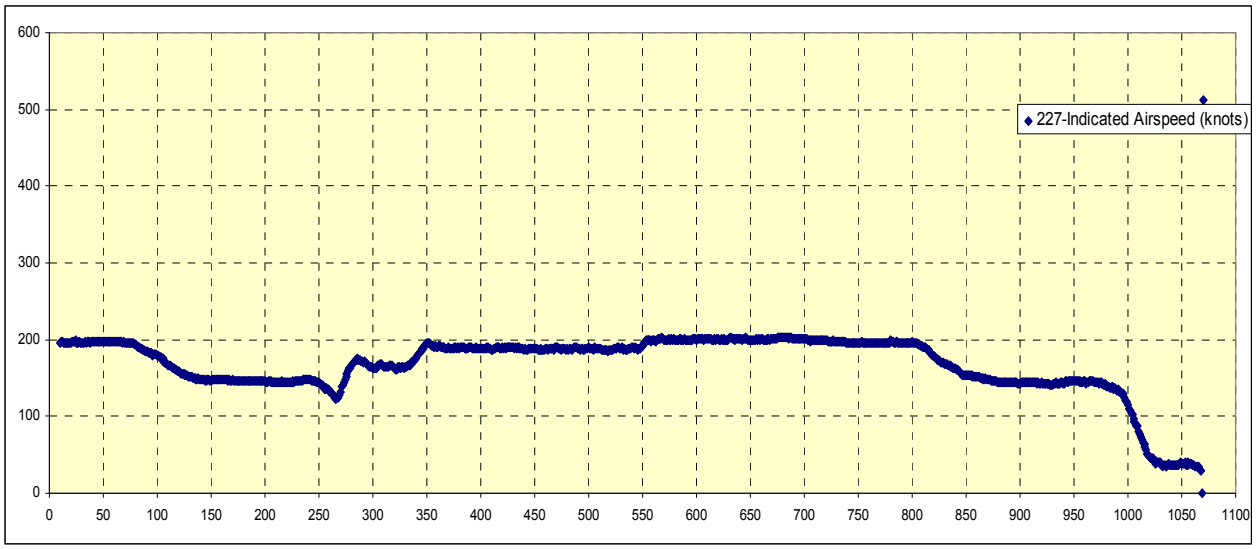
211 Gross Weight lbs



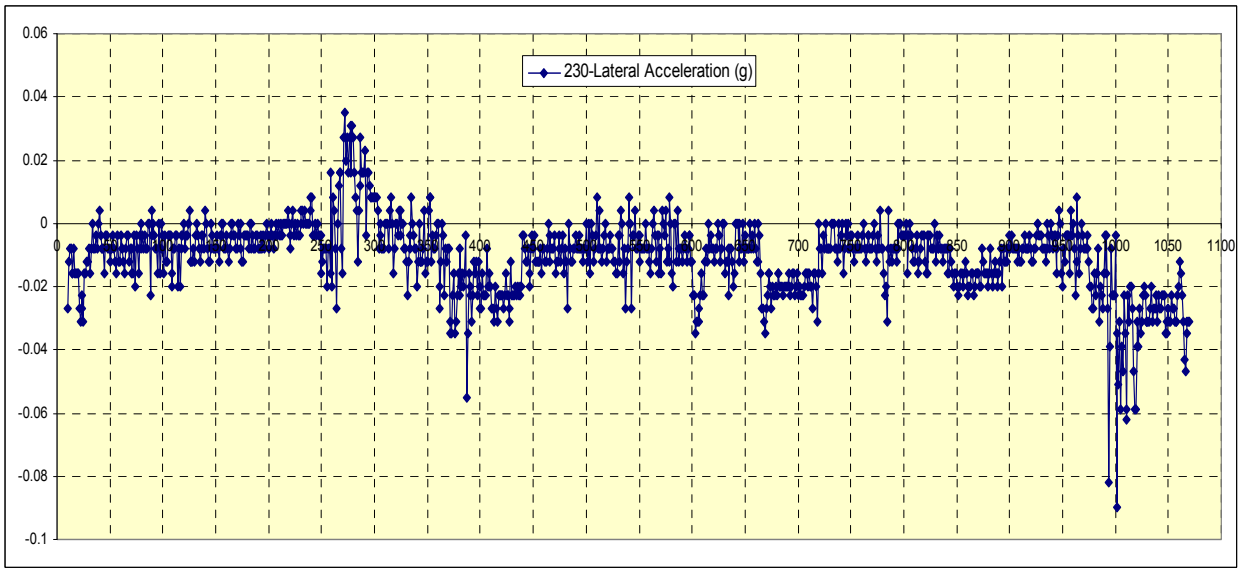
212 Ground Speed kts



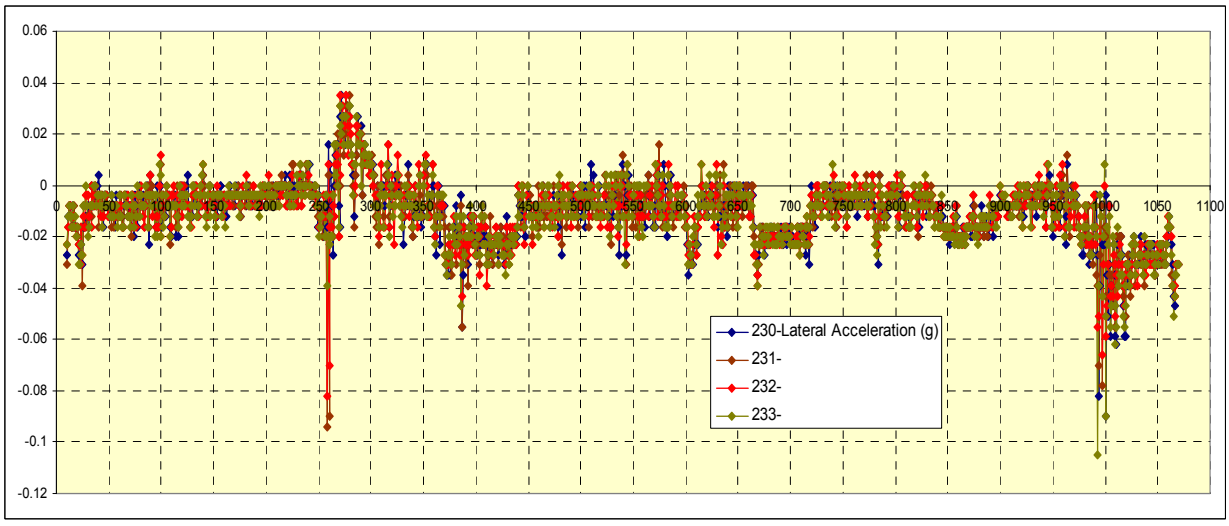
215 Heading (Degrees)



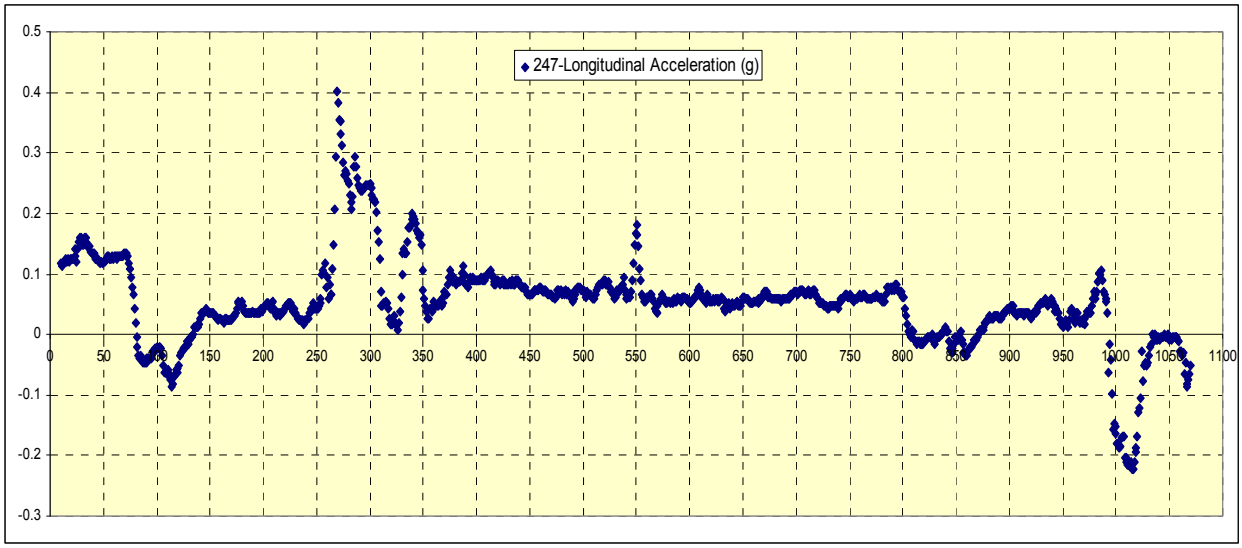
227 IAS knots



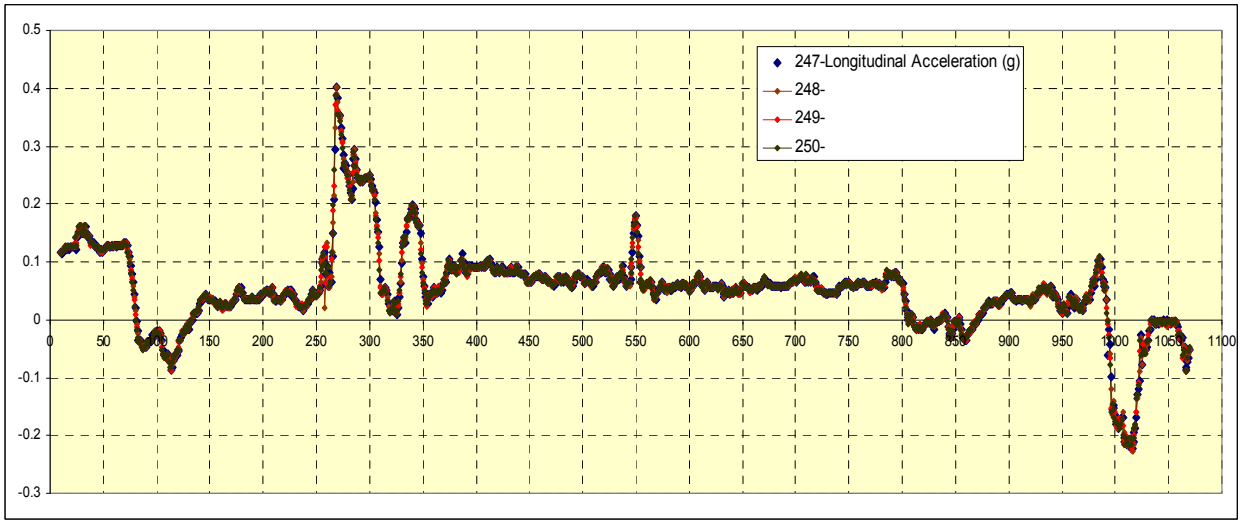
230 Lateral Acceleration



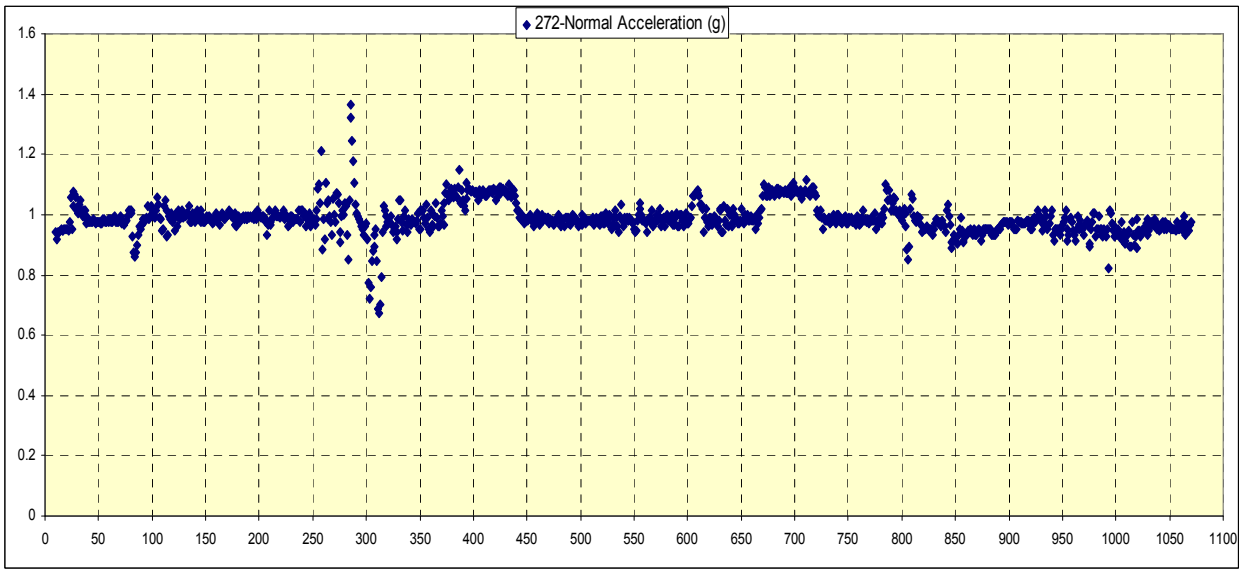
230 Lateral Acceleration



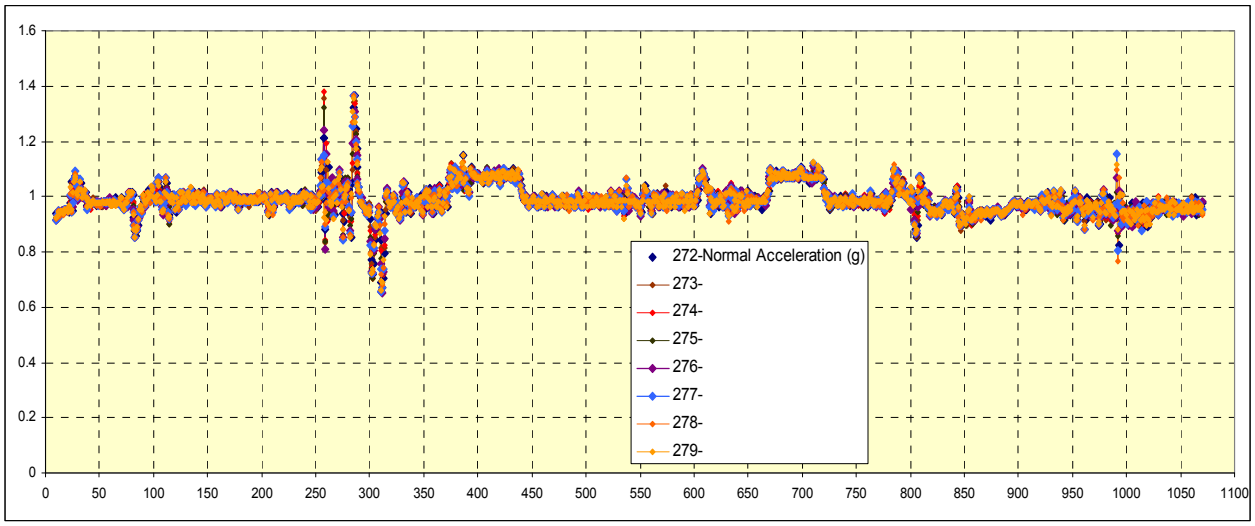
247 Longitudinal Acceleration



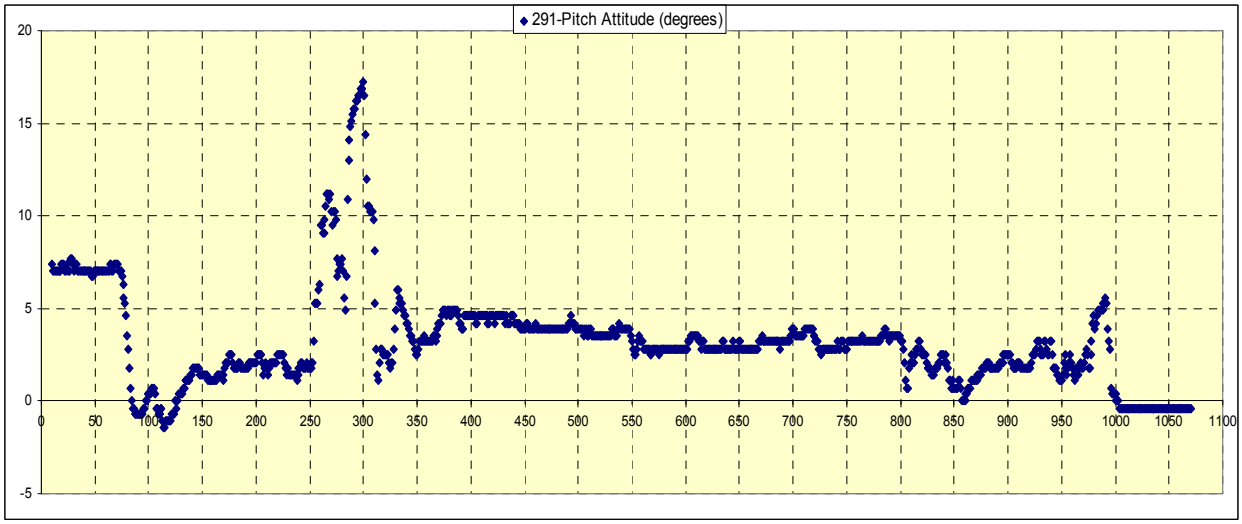
247 Longitudinal Acceleration



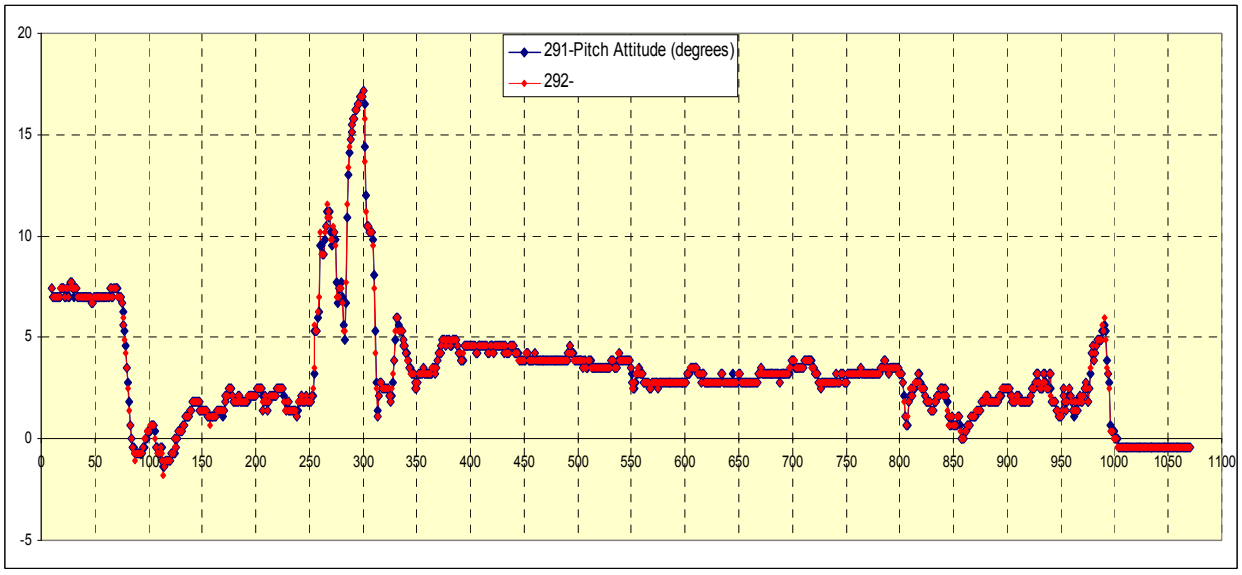
272 Normal Acceleration



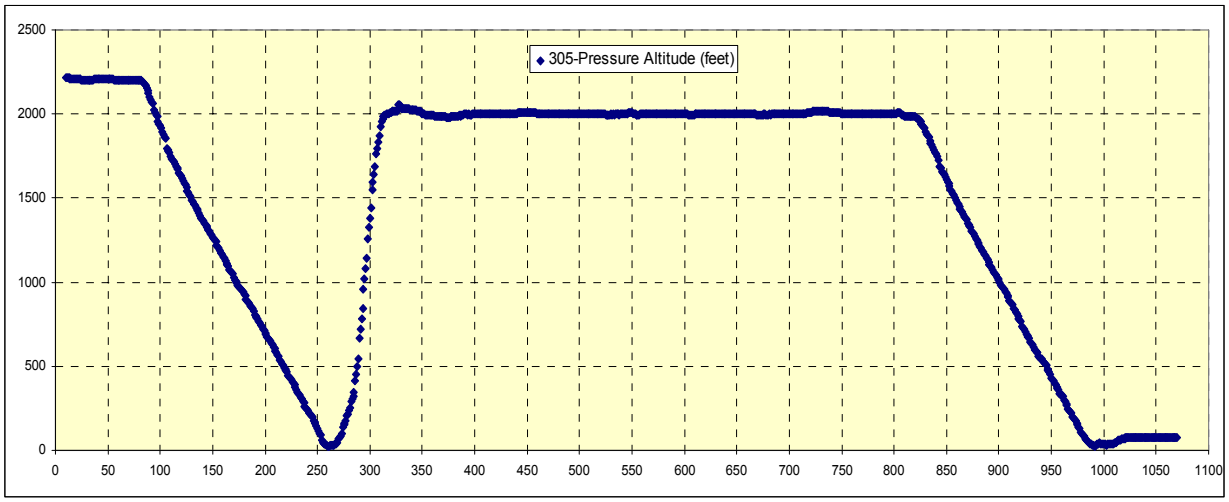
272 Normal Acceleration



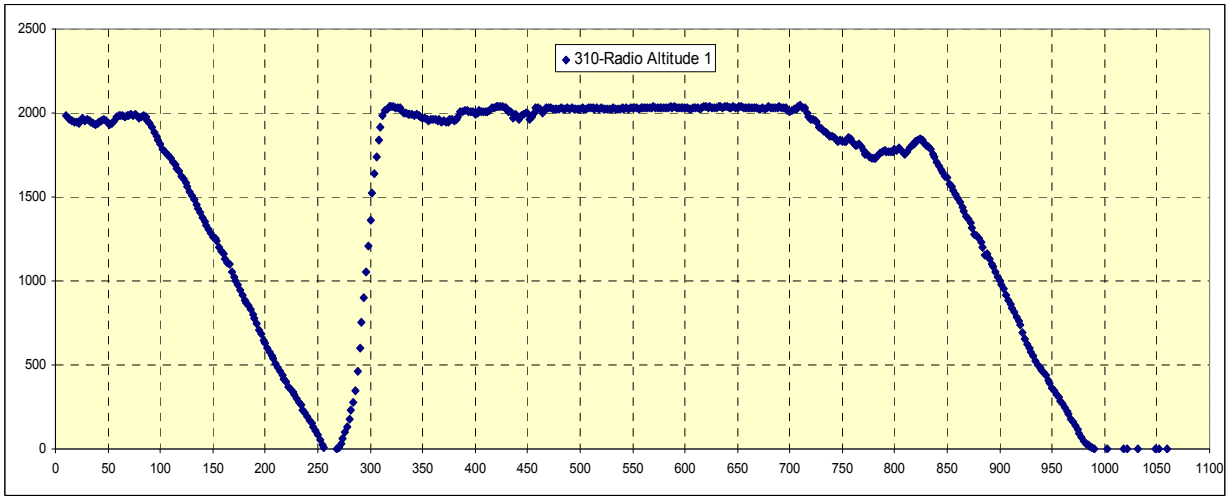
291 Pitch Attitude degrees



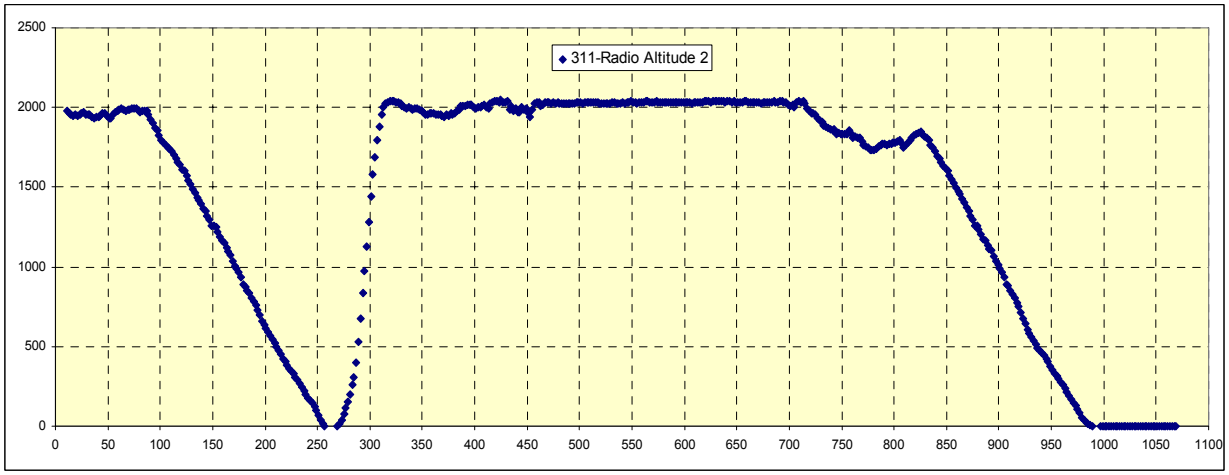
291 Pitch Attitude degrees



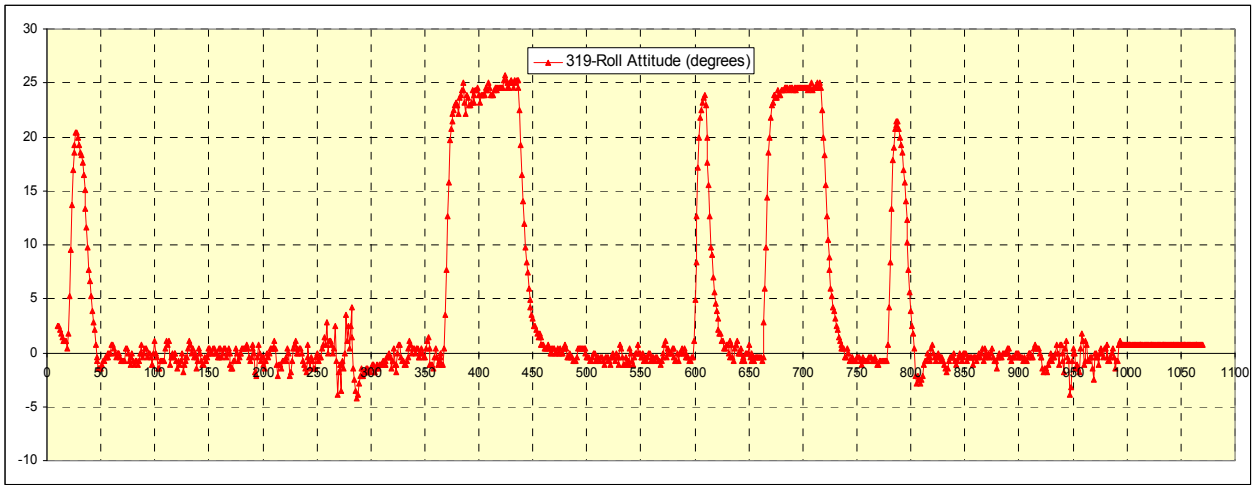
305 Press Altitude ft



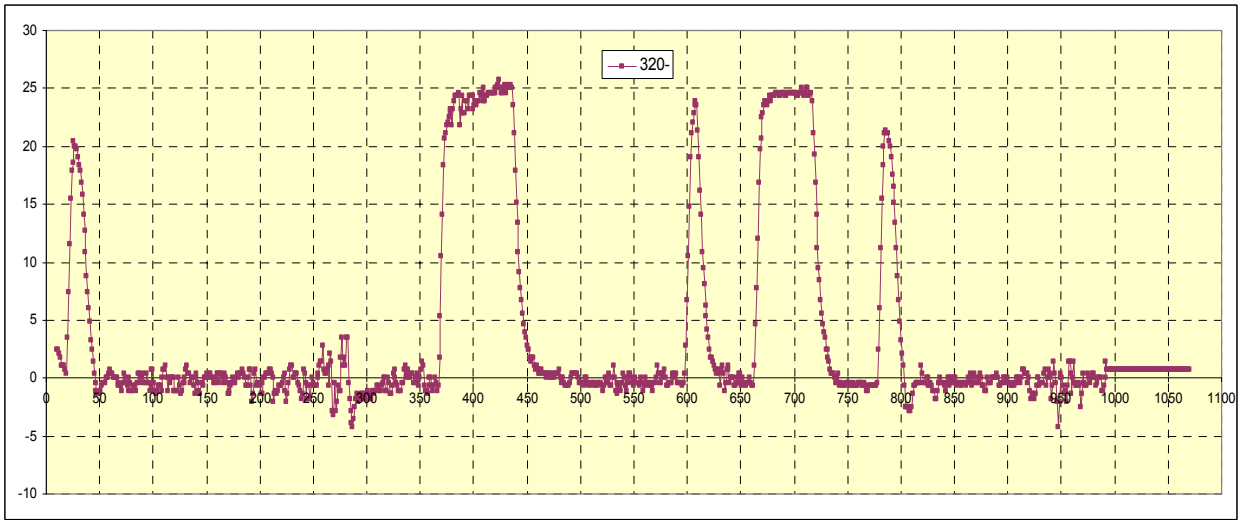
310 Radio Altitude 1 ft



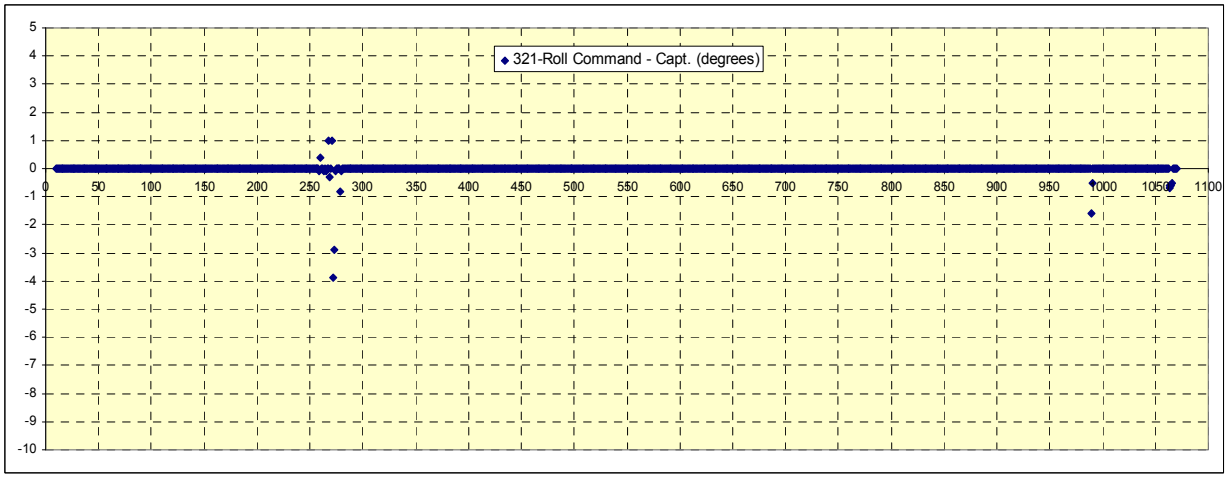
310 Radio Altitude 2 ft



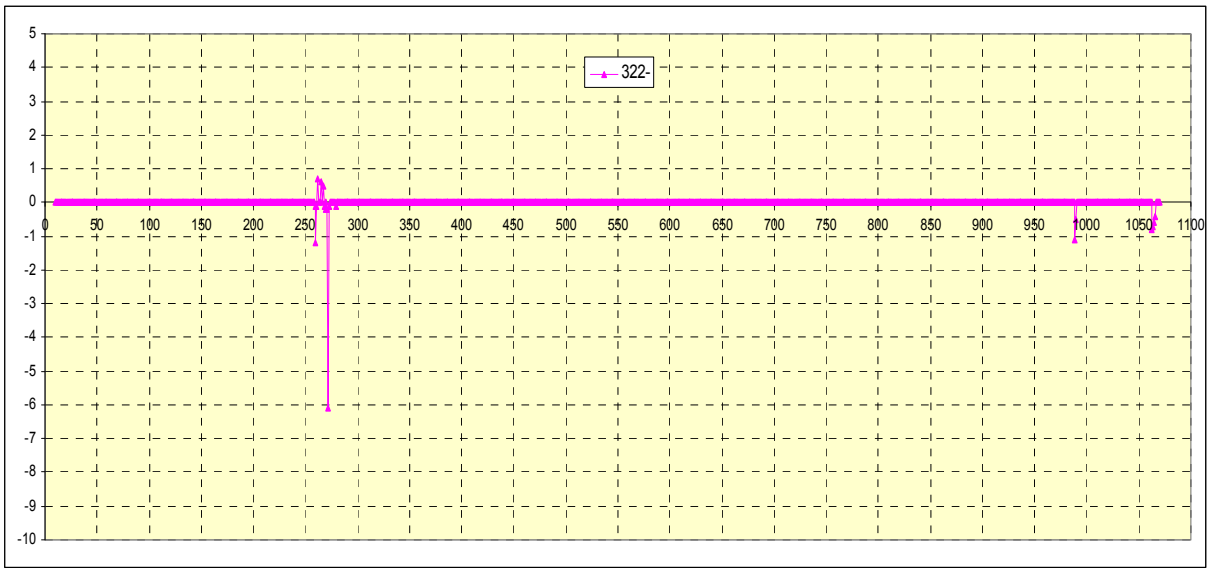
319 Roll Attitude angle degrees



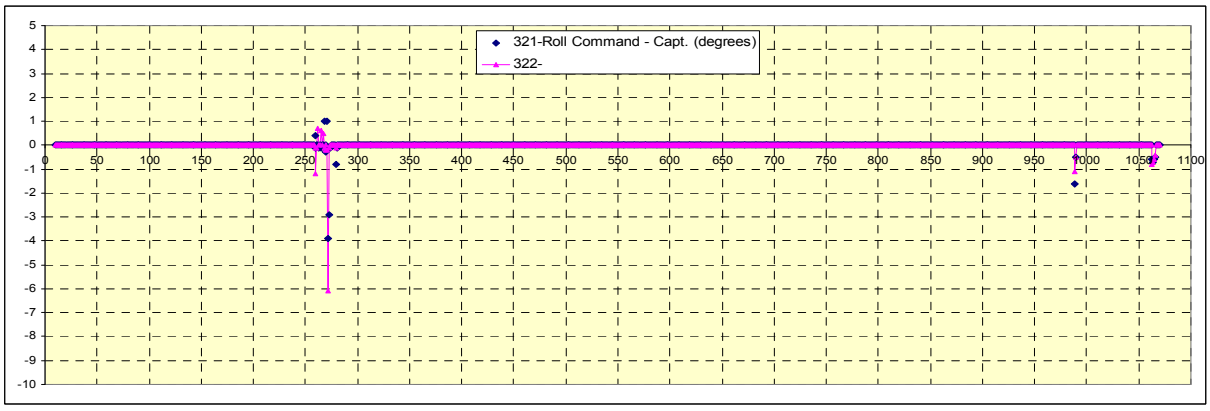
320 Roll Attitude angle



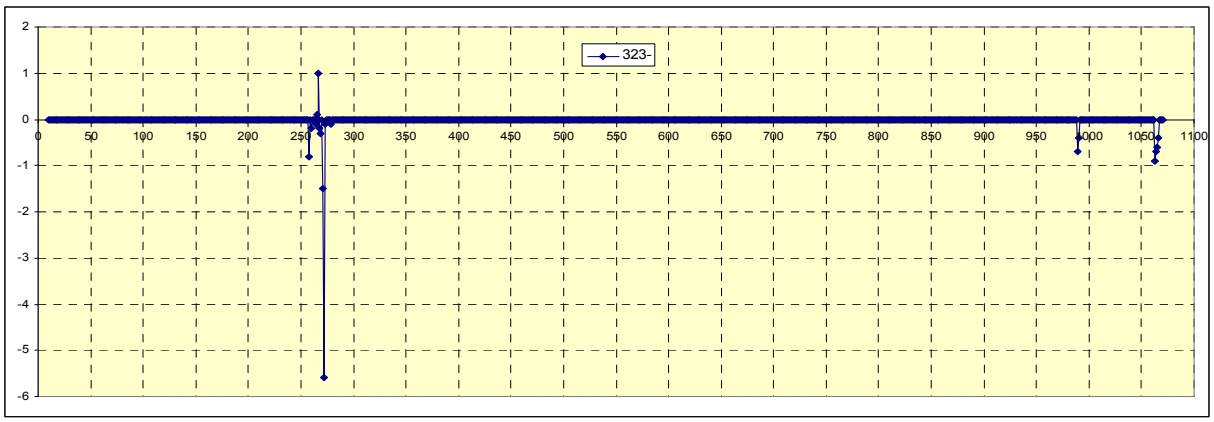
321 Roll Command Capt degrees



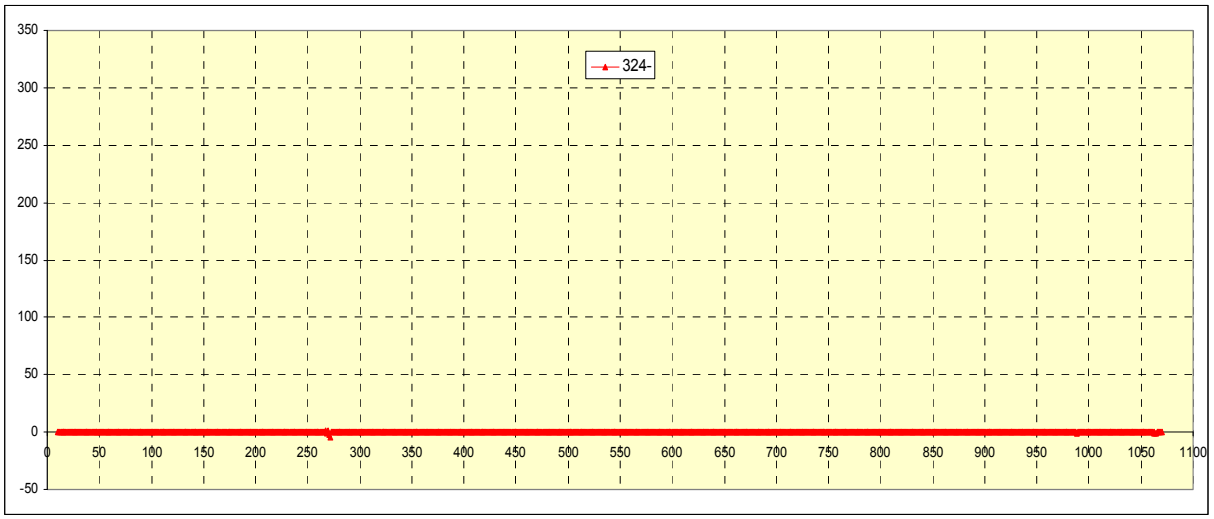
321 Roll Command Capt degrees



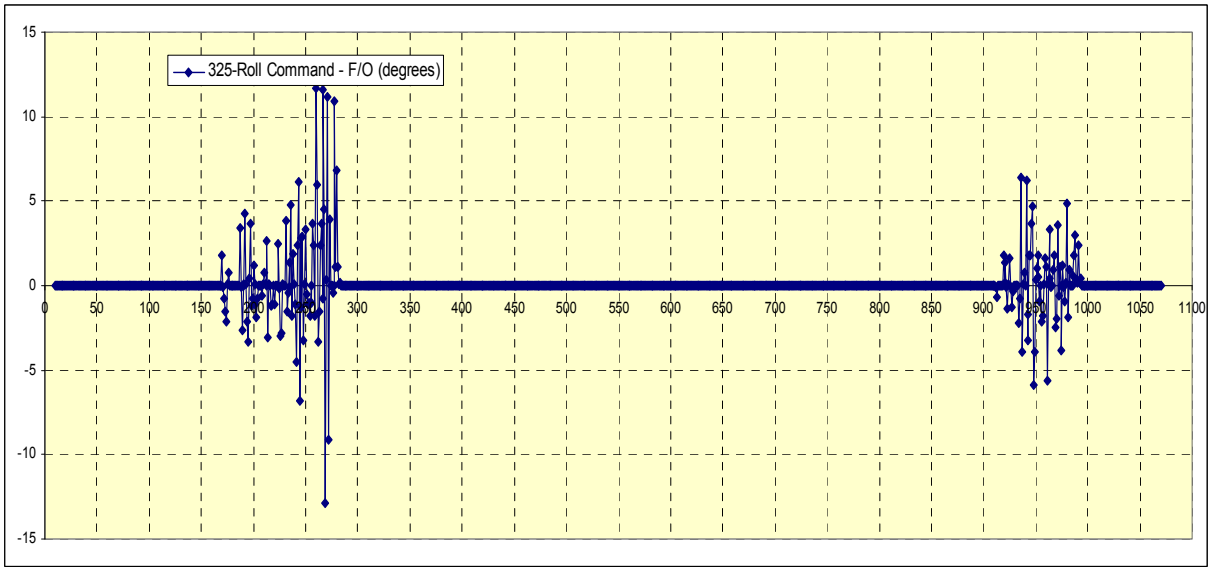
321-322 Roll Command Capt degrees



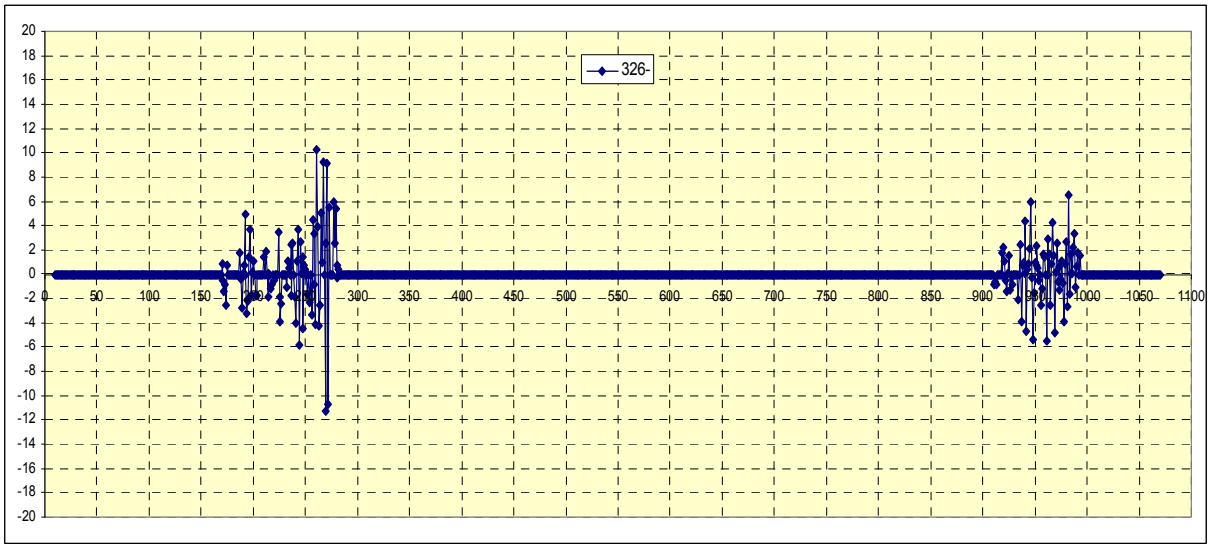
323 Roll Command Capt degrees



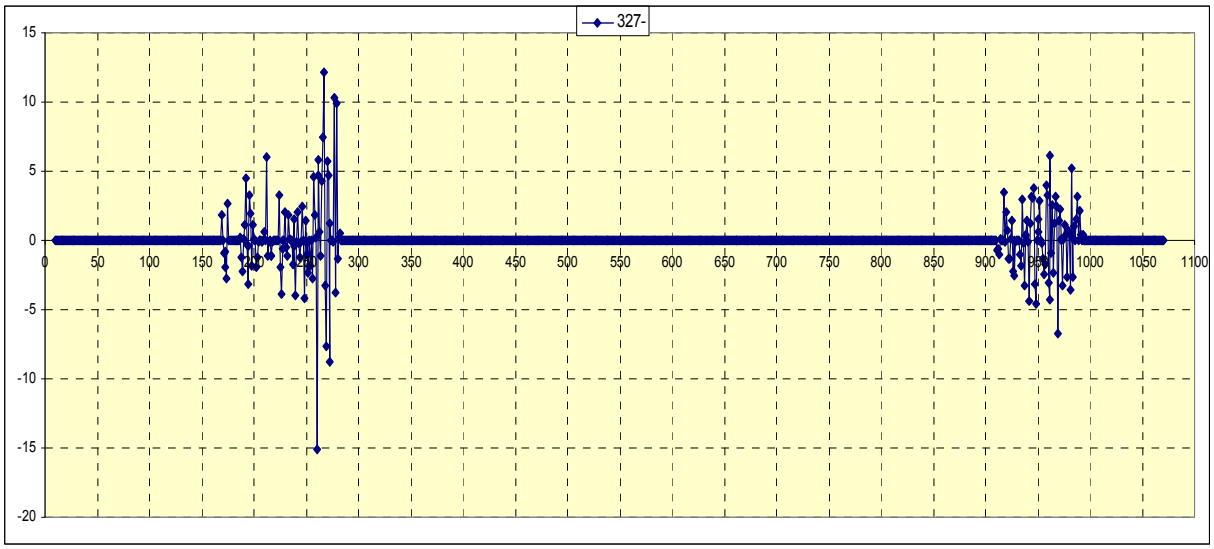
324 Roll Command Capt degrees



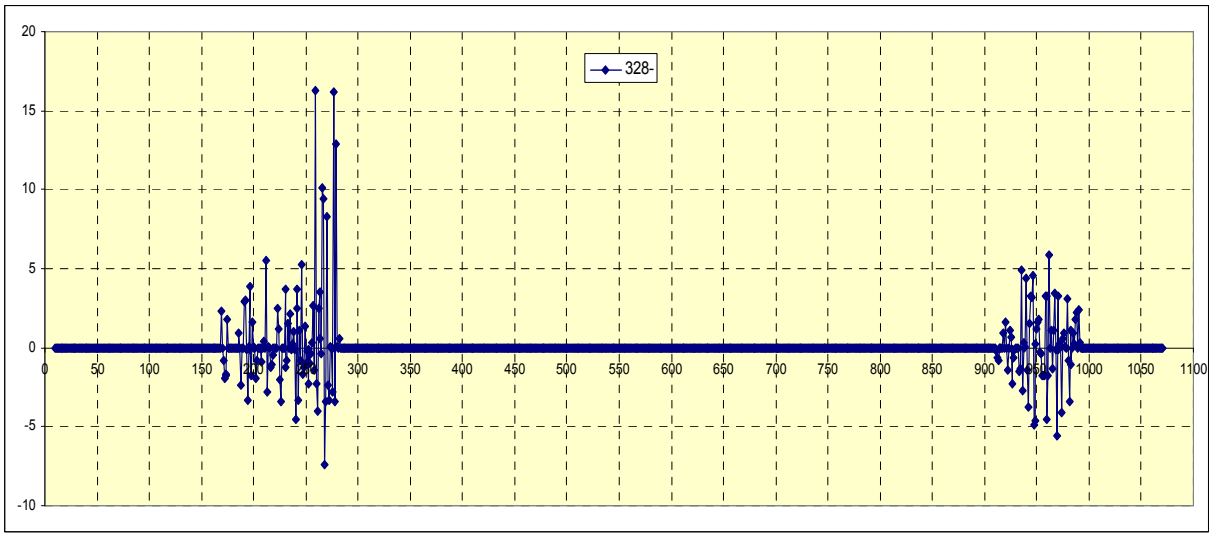
325 Roll Command F/O degrees



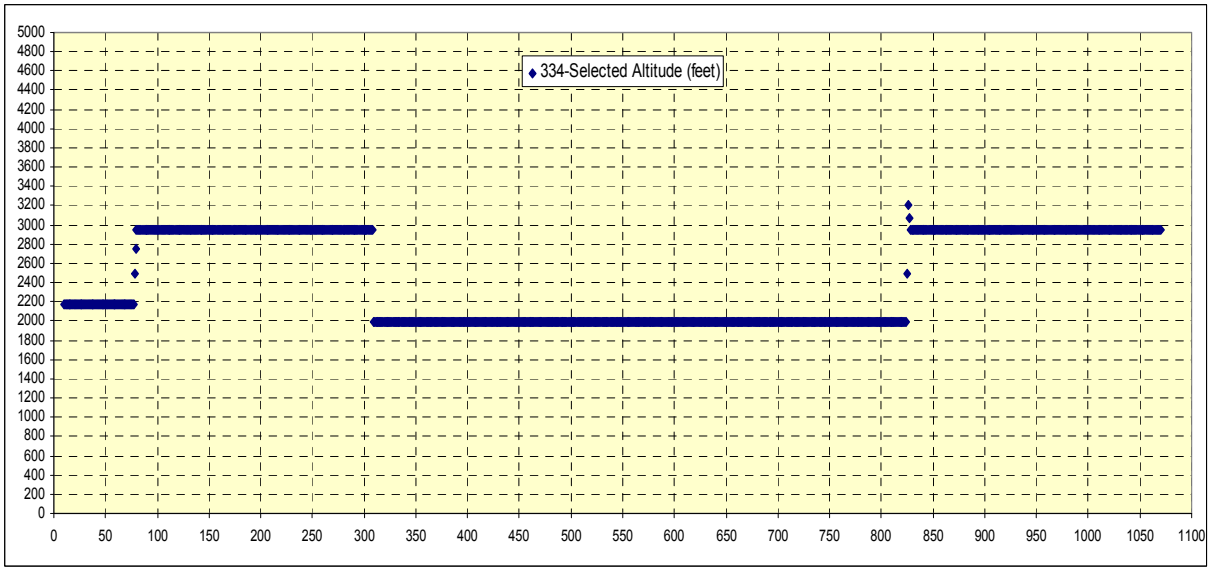
326 Roll Command Capt degrees



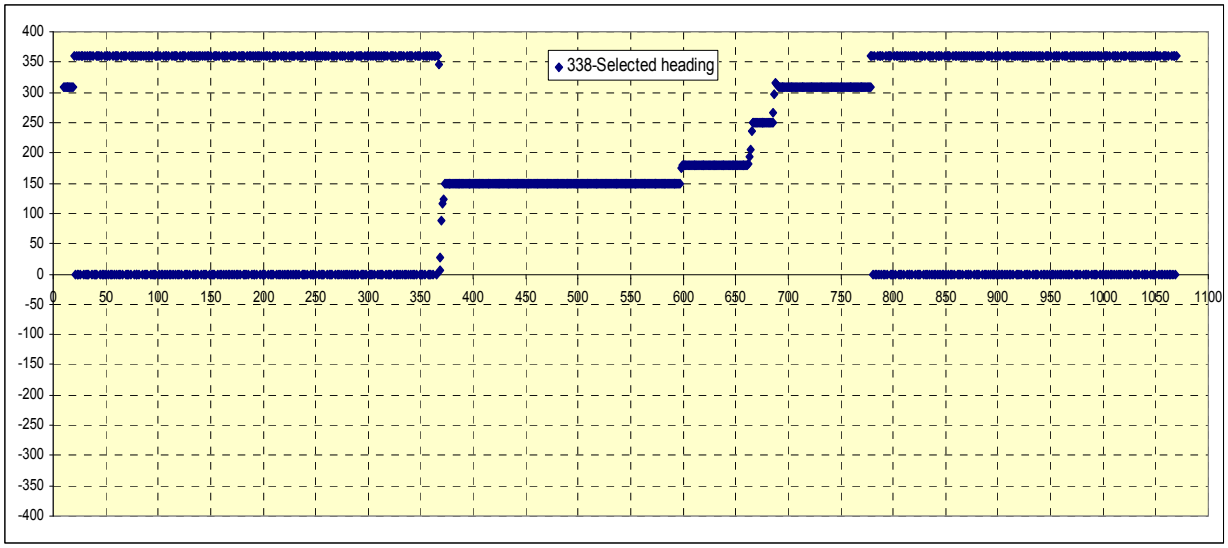
327 Roll Command Capt degrees



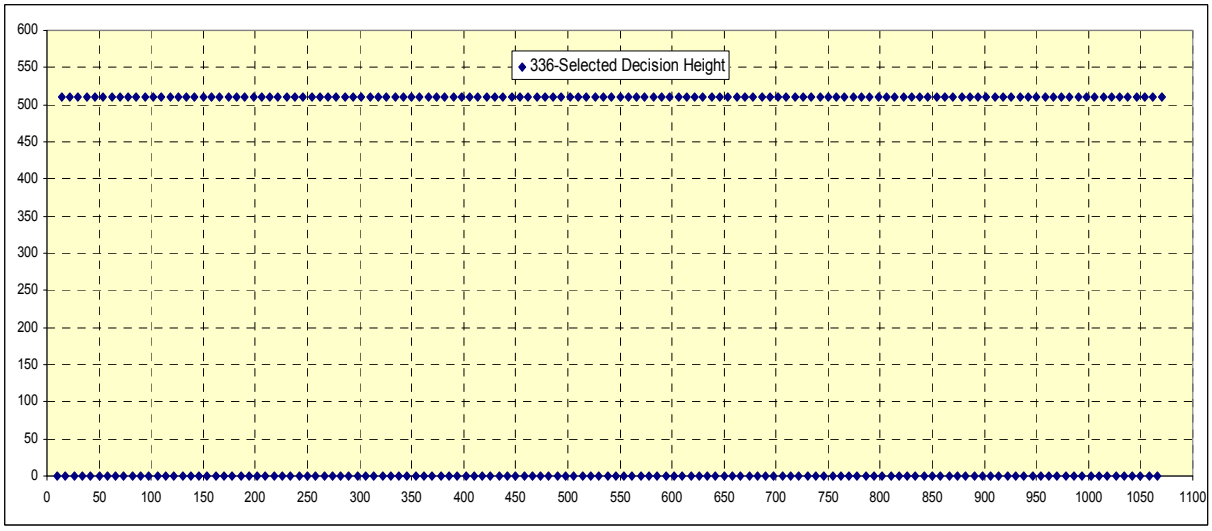
328Roll Command Capt degrees



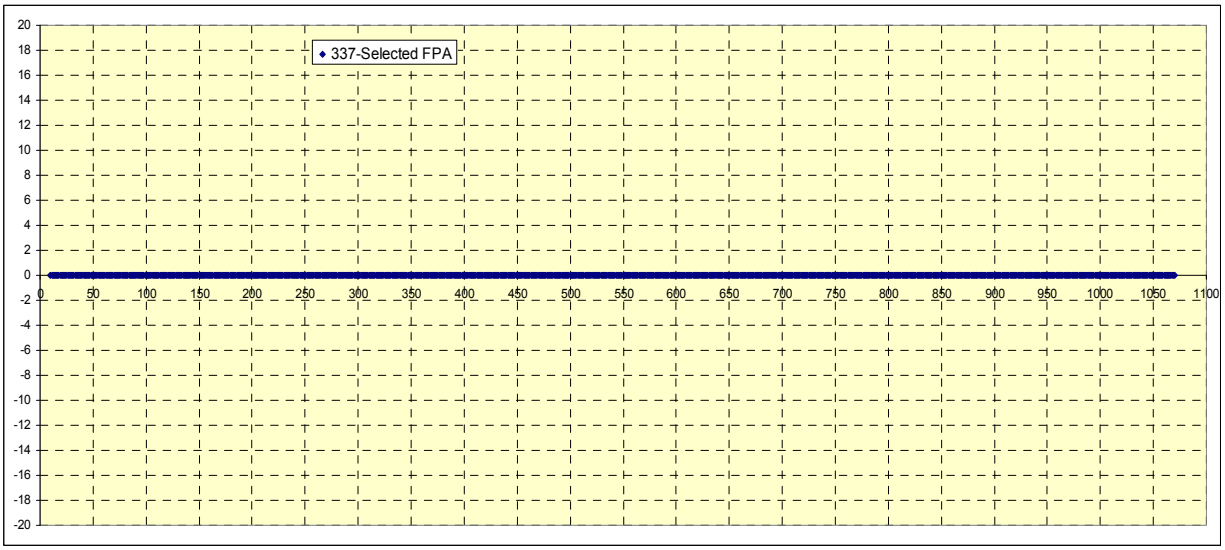
334 Selected Altitude feet



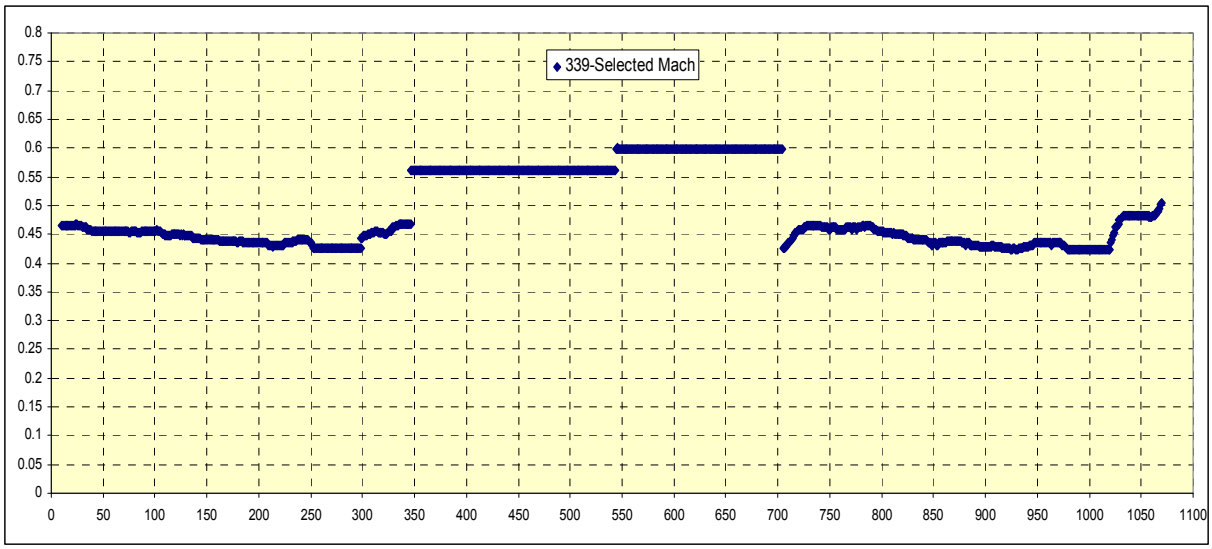
334 Selected Altitude feet



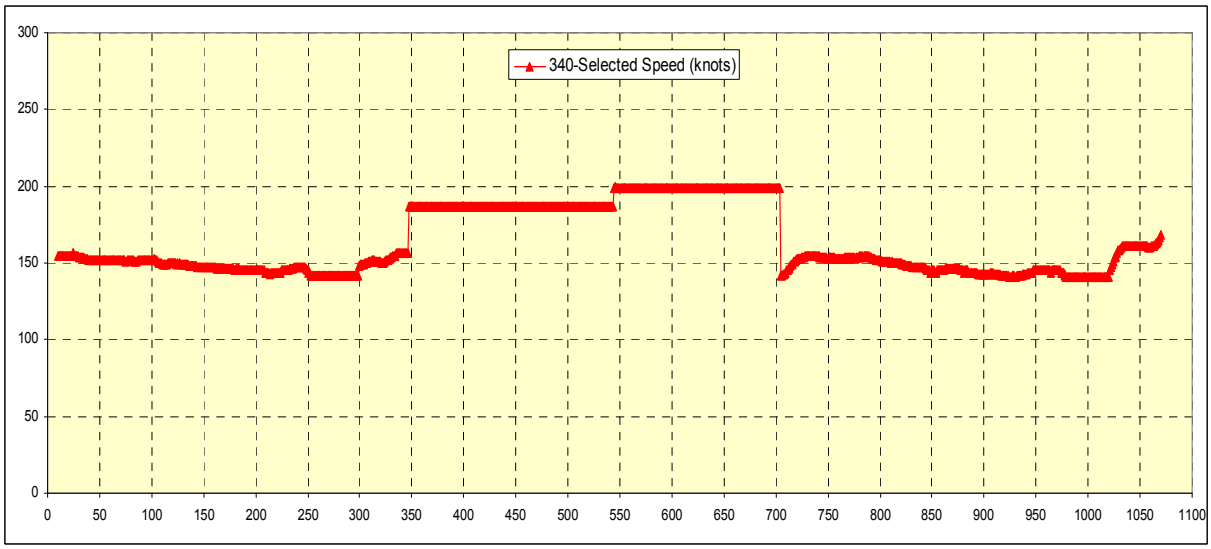
334 Selected Decision Height feet



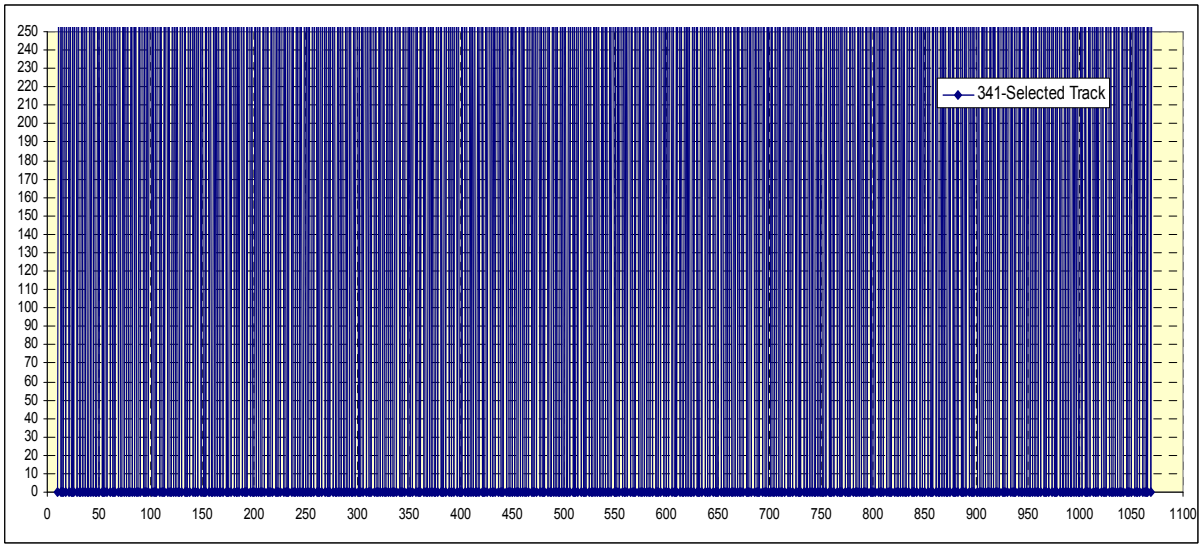
337 Selected FPA



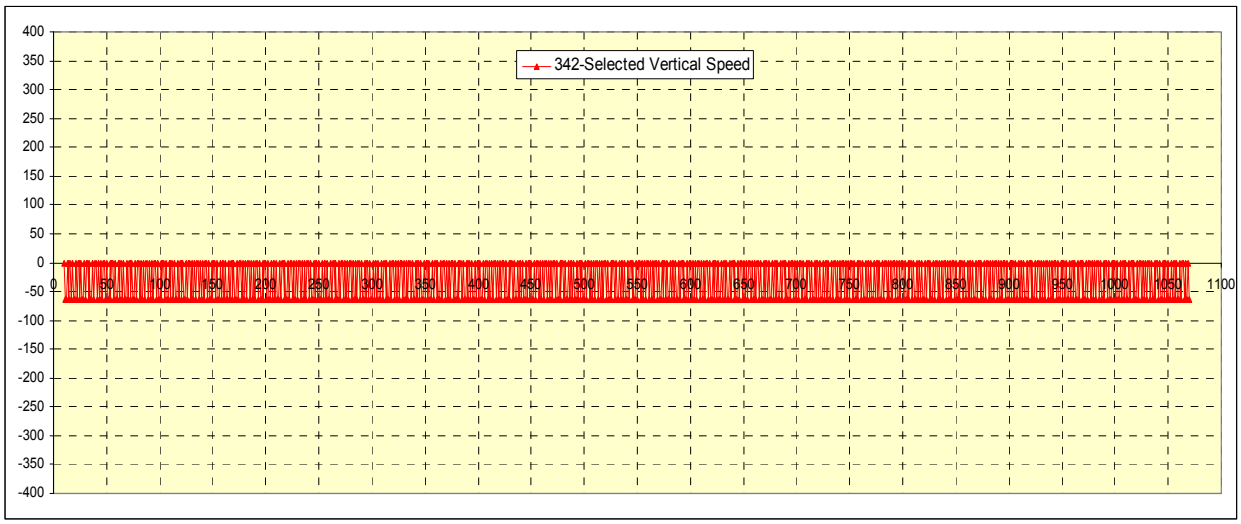
339 Selected Mach



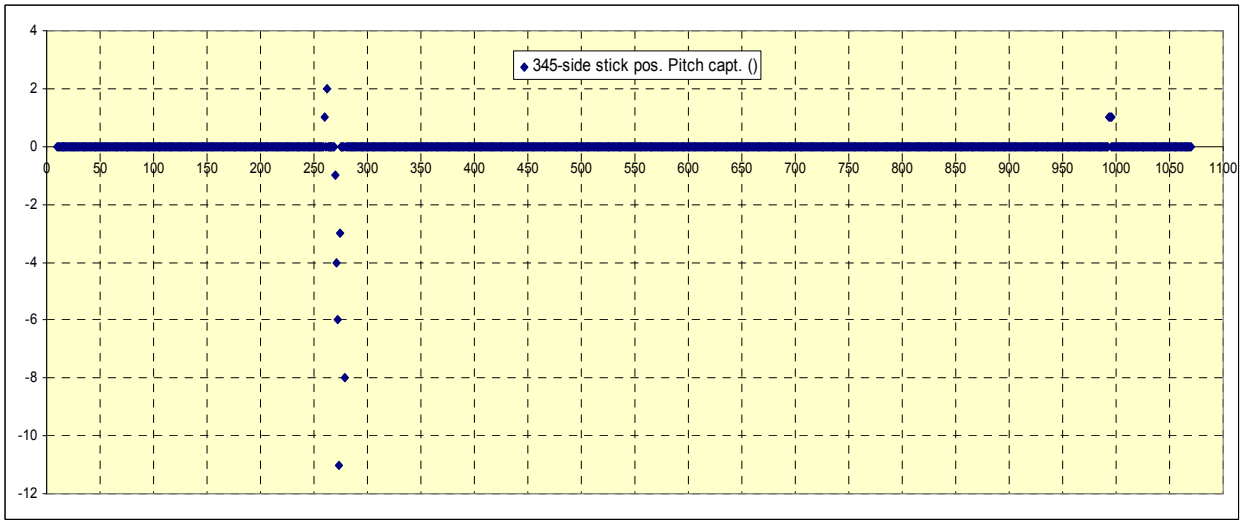
340 Selected speed kts



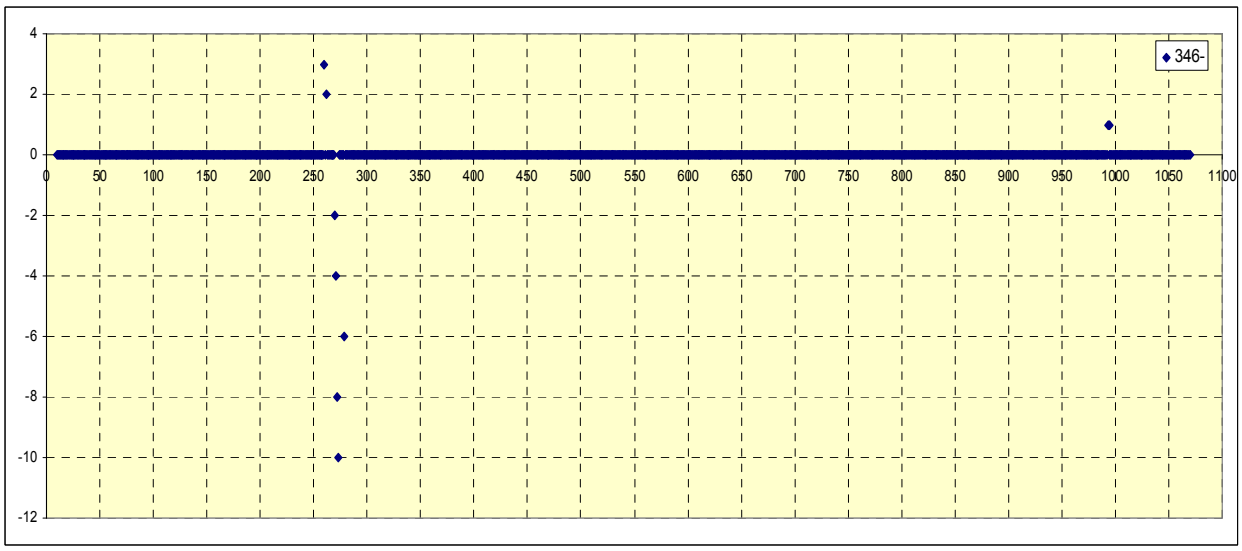
341 Selected Tracks



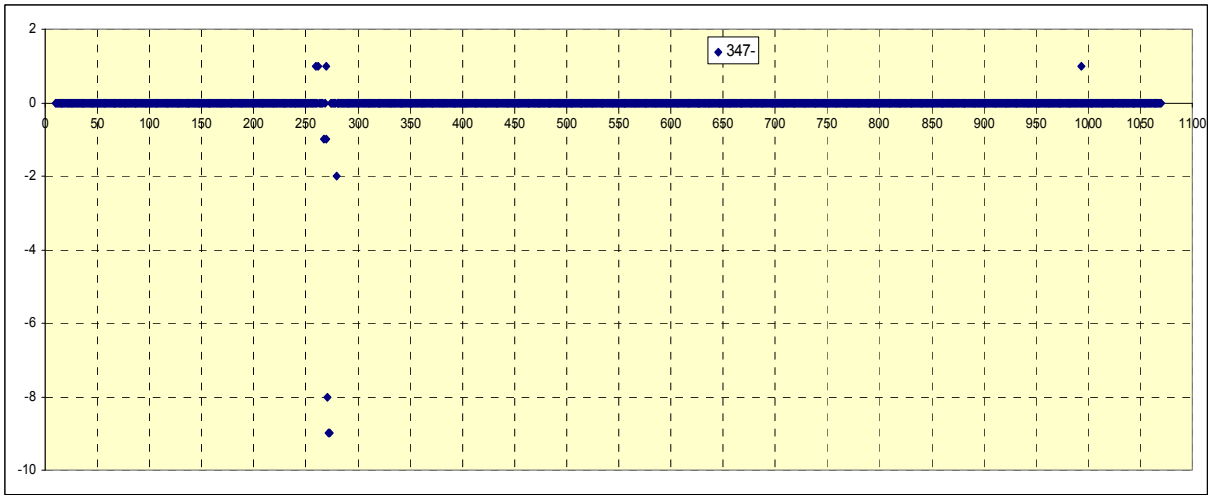
342 Selected Vertical Speed



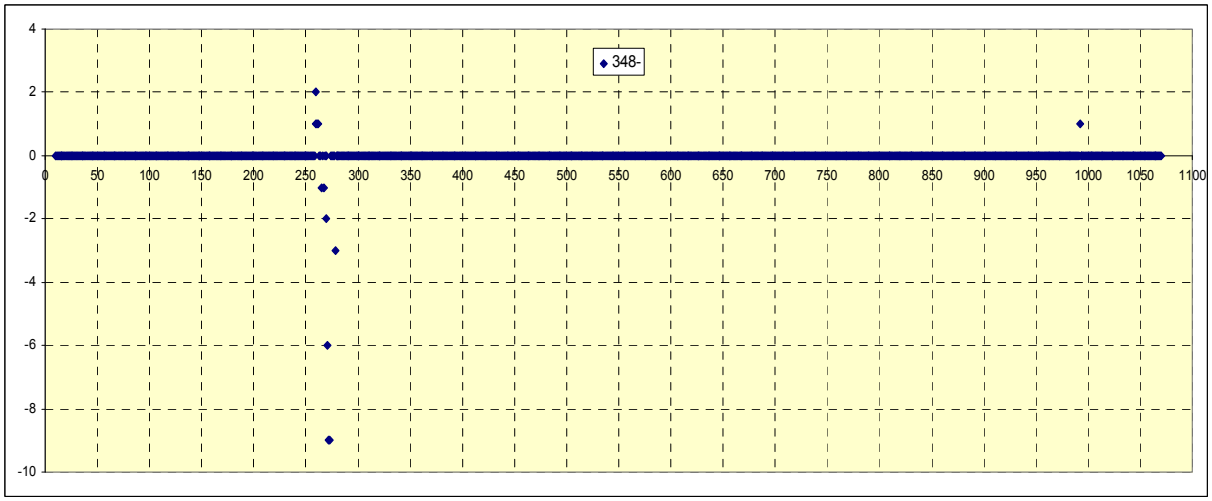
345 Side Stick Pos Pitch Capt



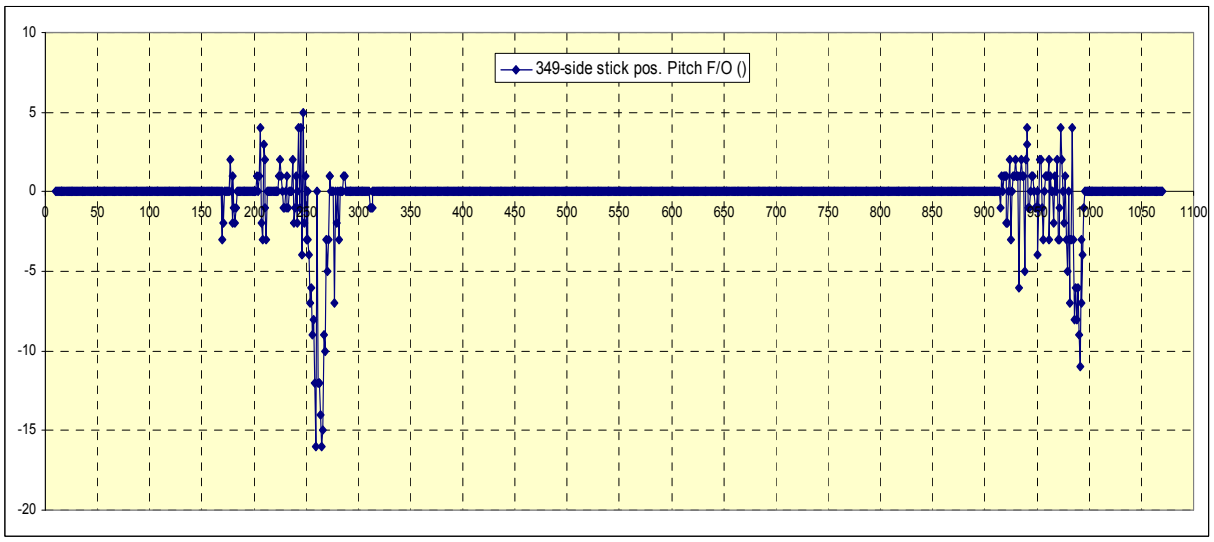
346 Side Stick Pos Pitch Capt



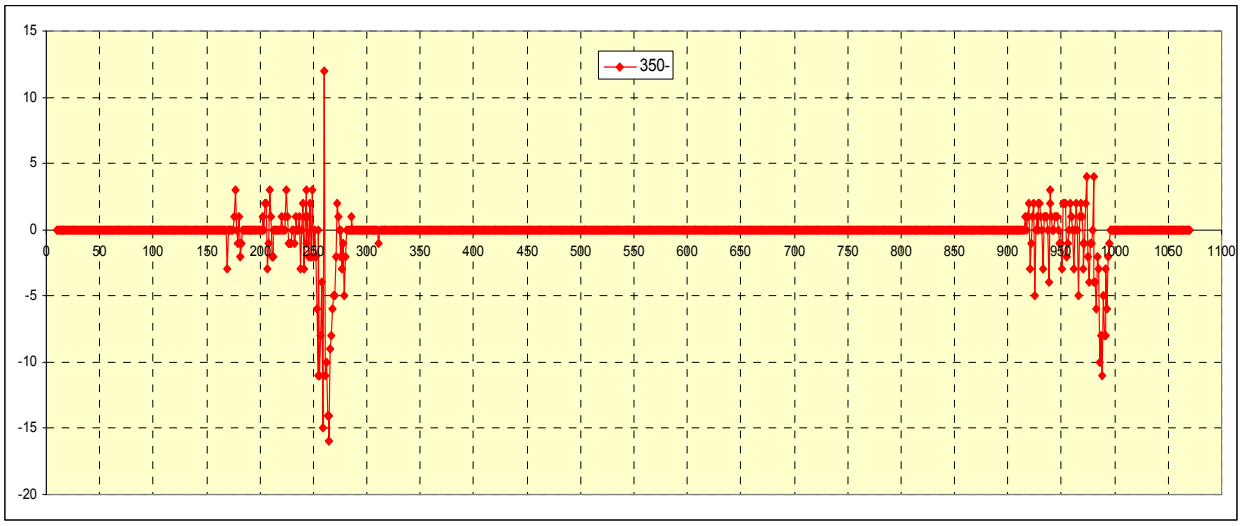
347 Side Stick Pos Pitch Capt



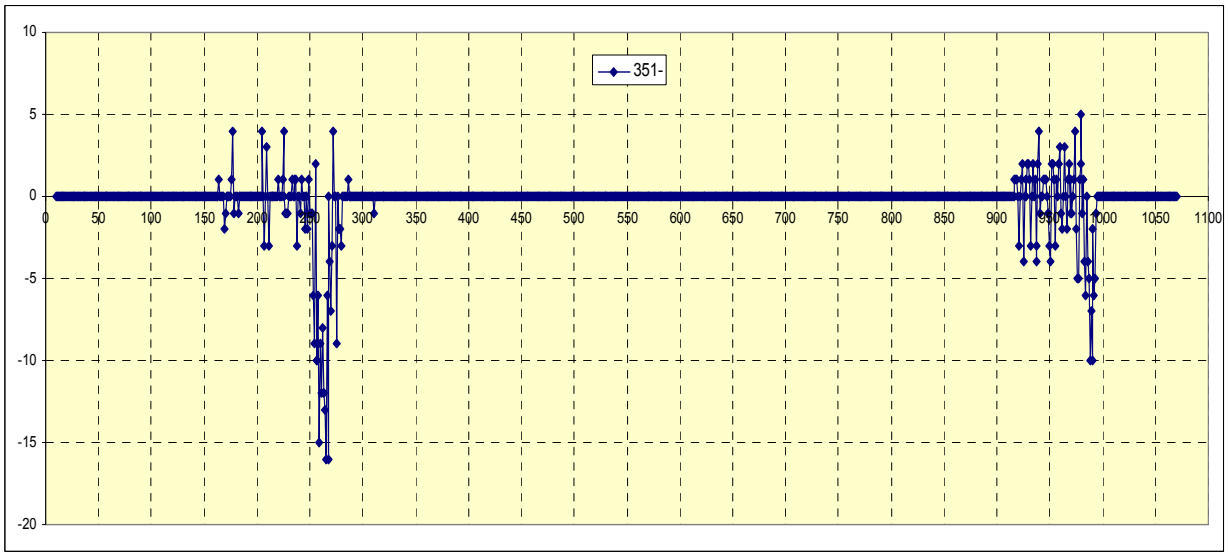
348 Side Stick Pos Pitch Capt



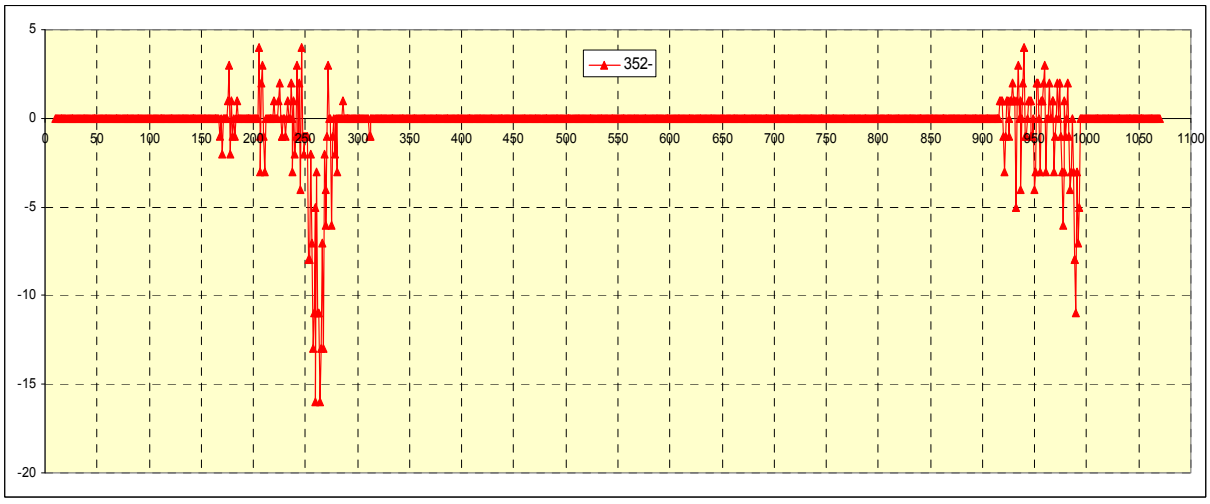
349 Side Stick Pos Pitch F/O



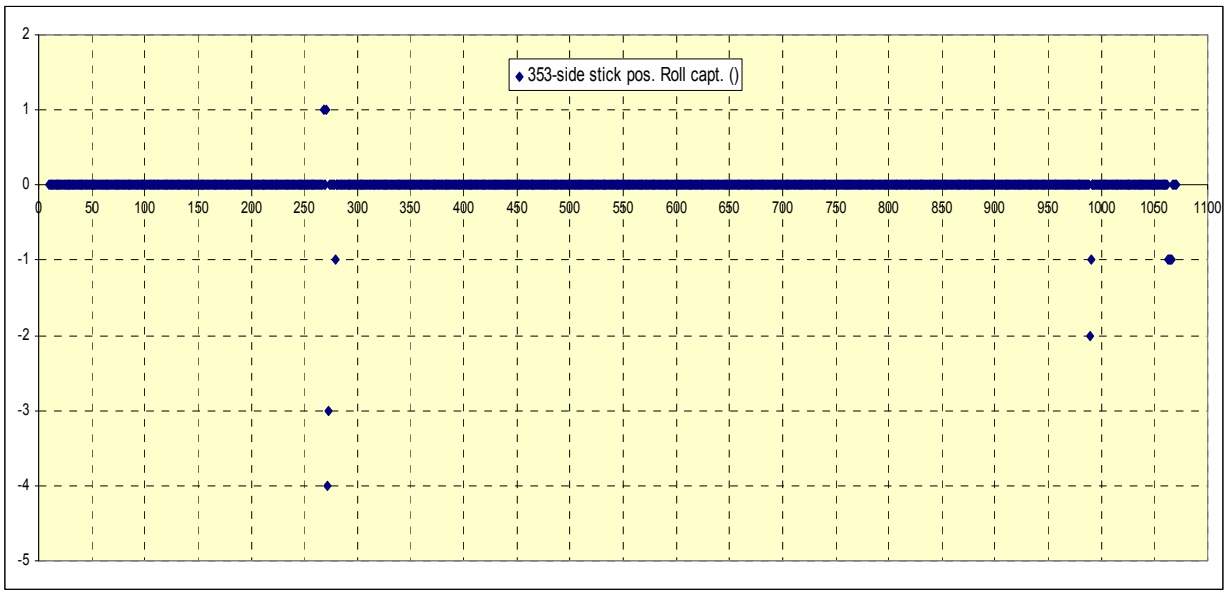
350 Side Stick Pos Pitch F/O



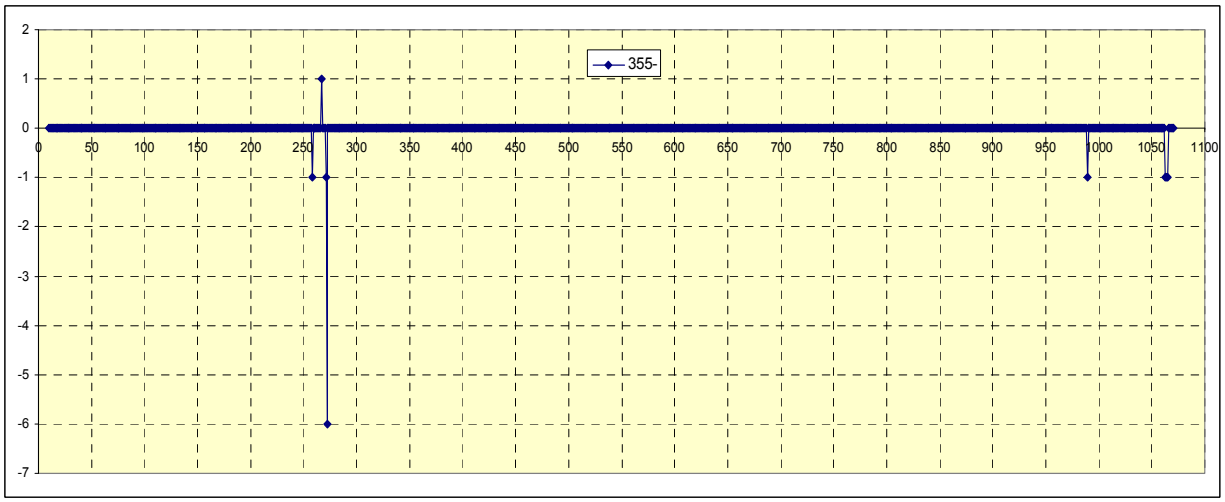
351 Side Stick Pos Pitch F/O



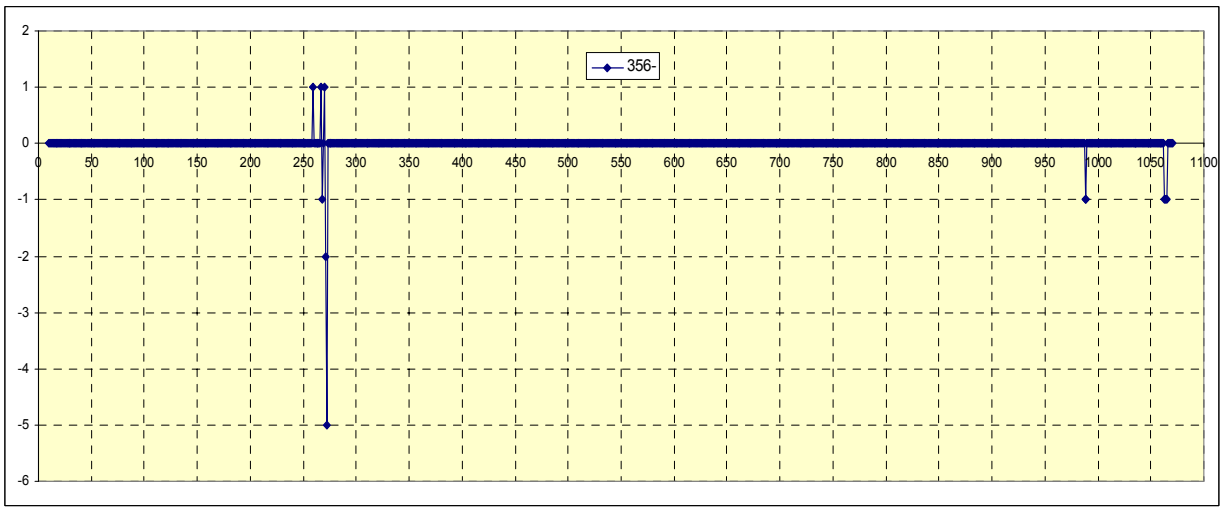
352 Side Stick Pos Pitch F/O



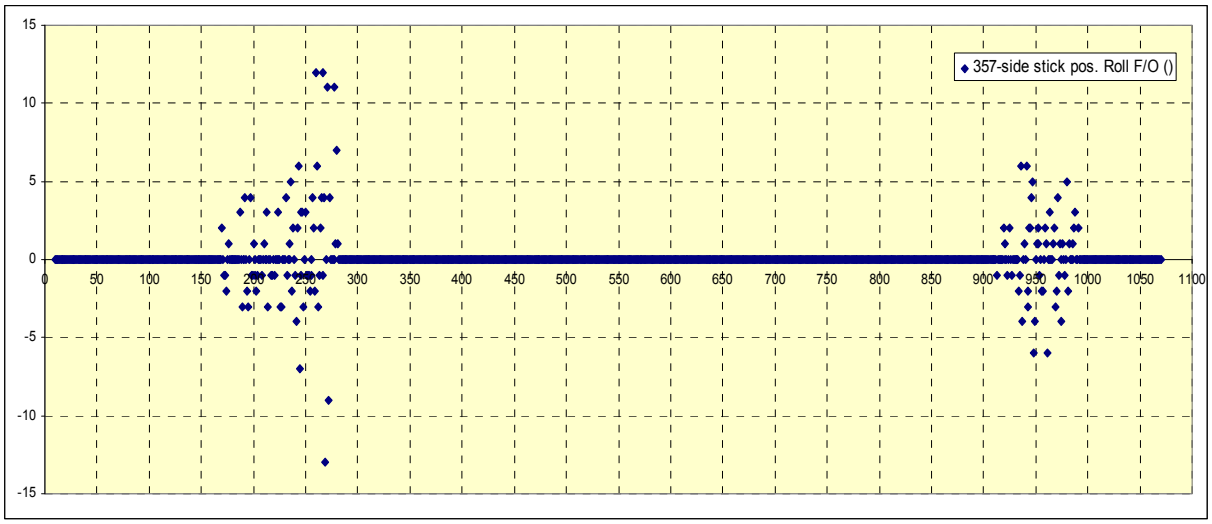
353 Side Stick Pos Roll Capt



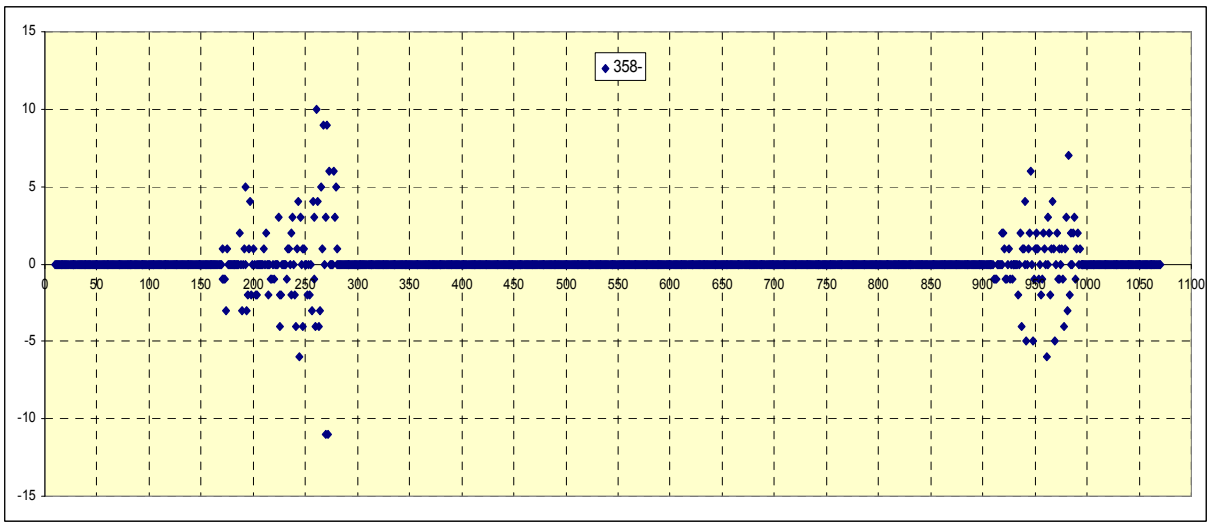
353 Side Stick Pos Roll Capt



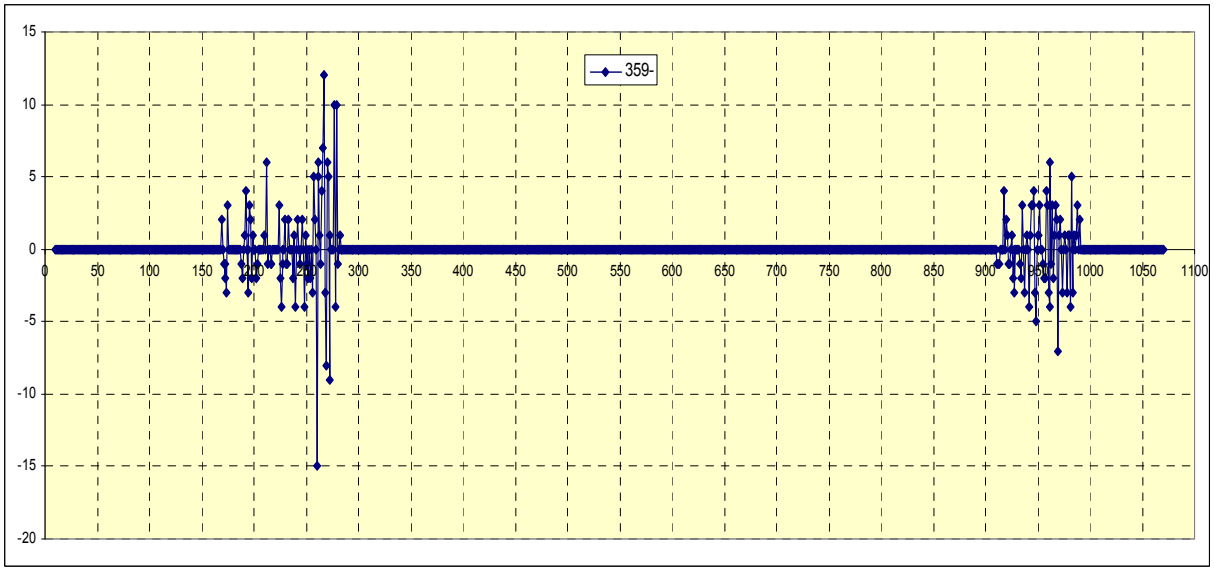
356 Side Stick Pos Roll Capt



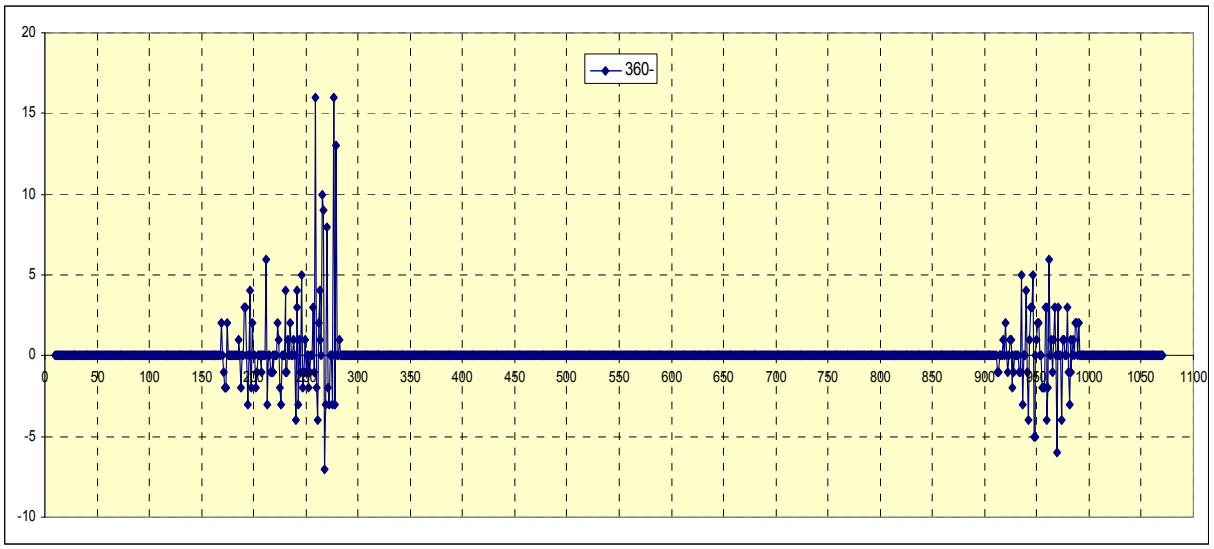
363 Side Stick Pos Roll F/O



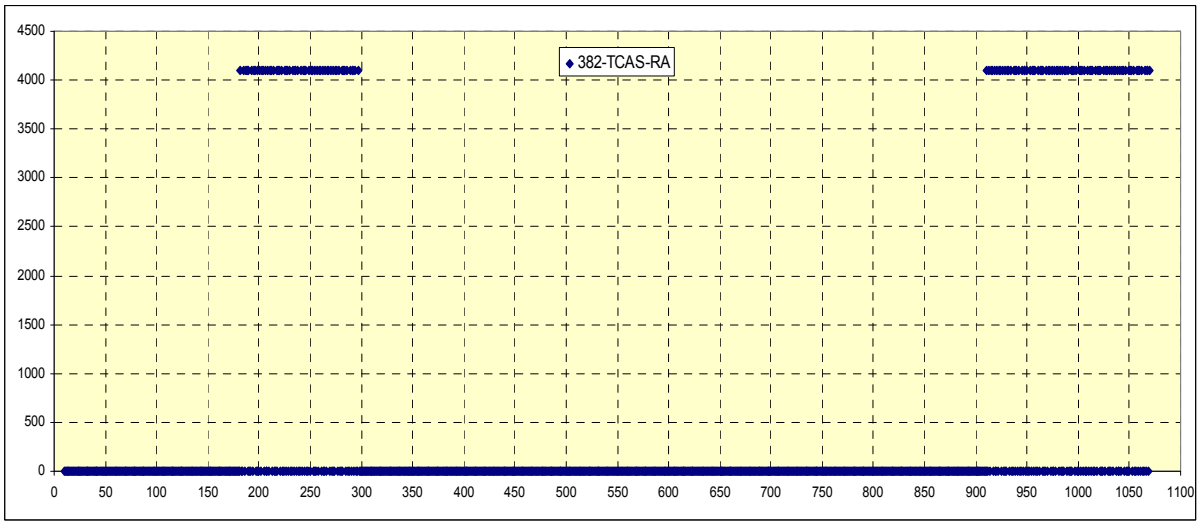
358 Side Stick Pos Roll F/O



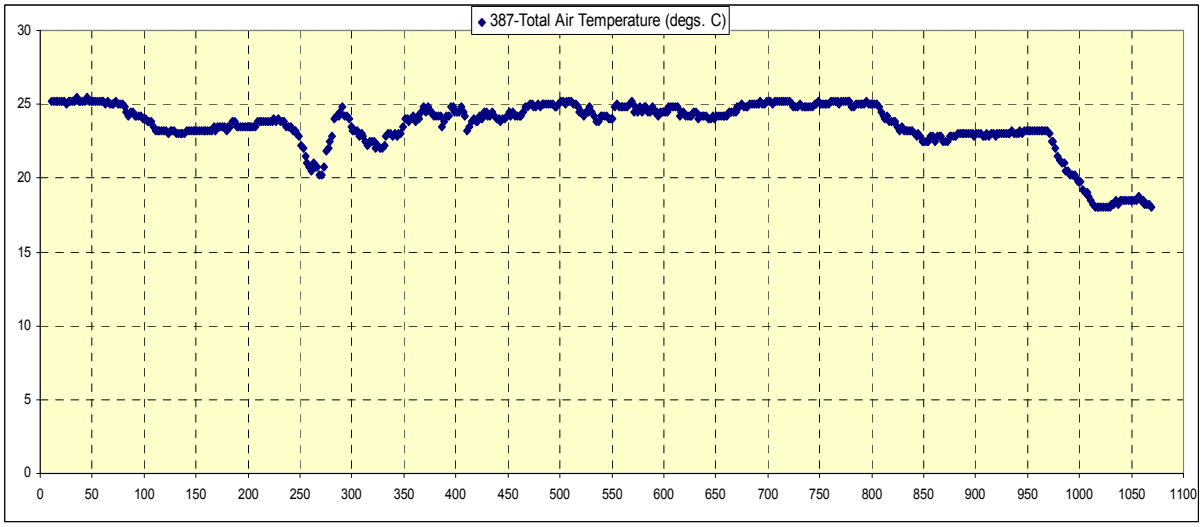
359 Side Stick Pos Roll F/O



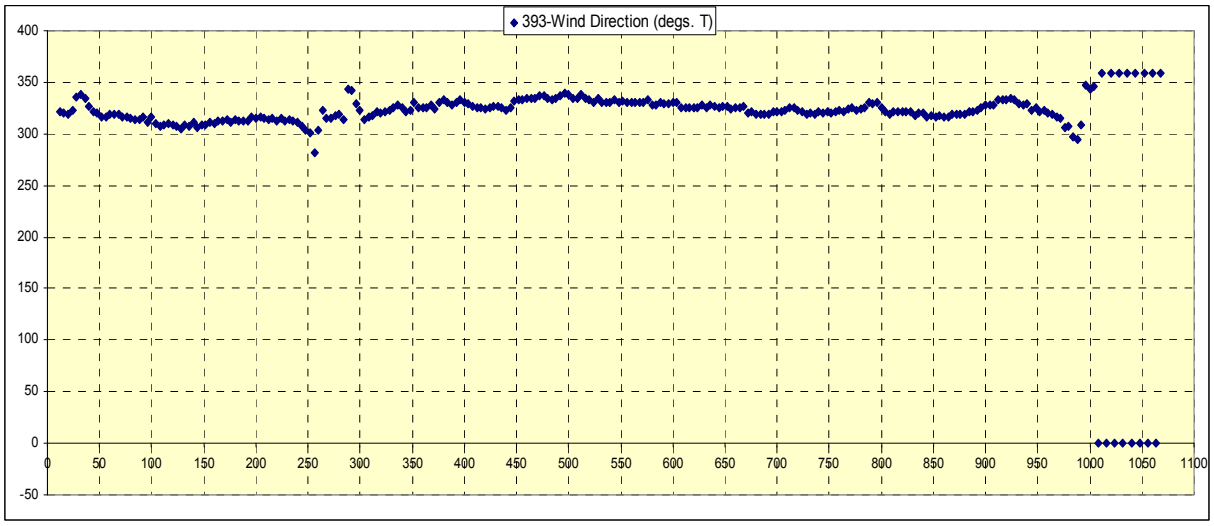
360 Side Stick Pos Roll F/O



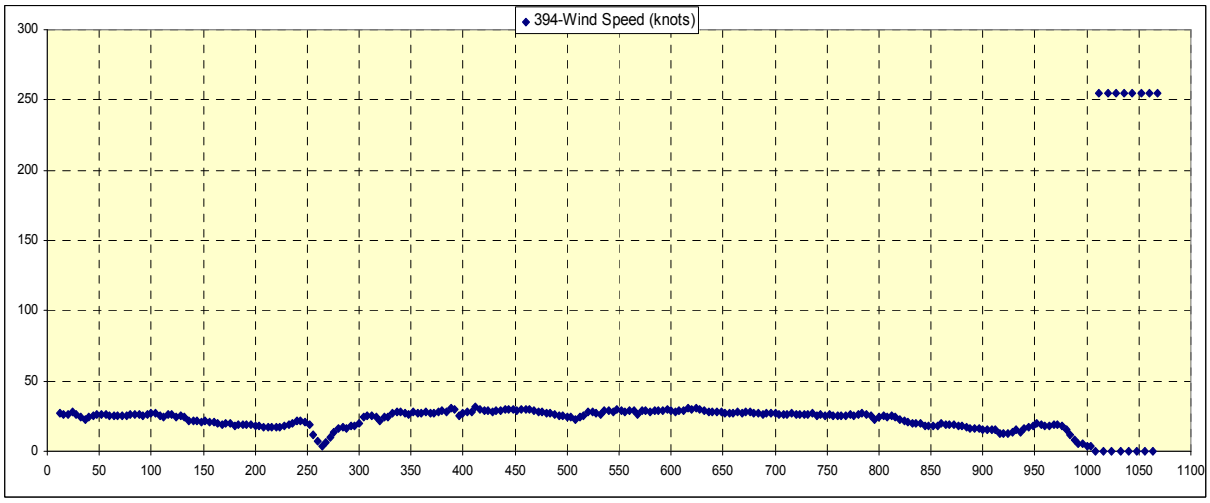
382 TCAS RA



387 TAT degree



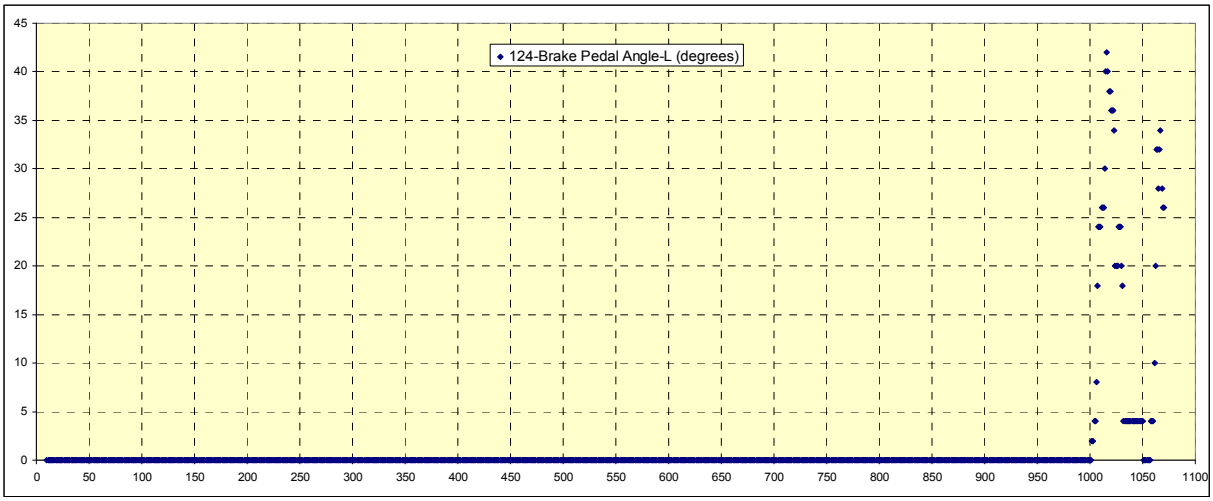
393 Wind Direction degrees



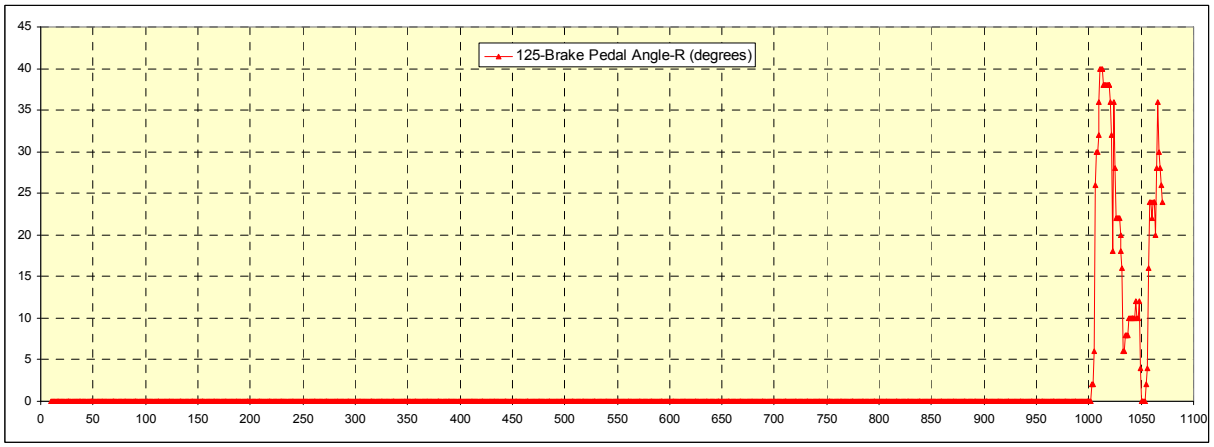
393 Wind speed kts

2. Systems Parameters:

2.1 Landing Gears

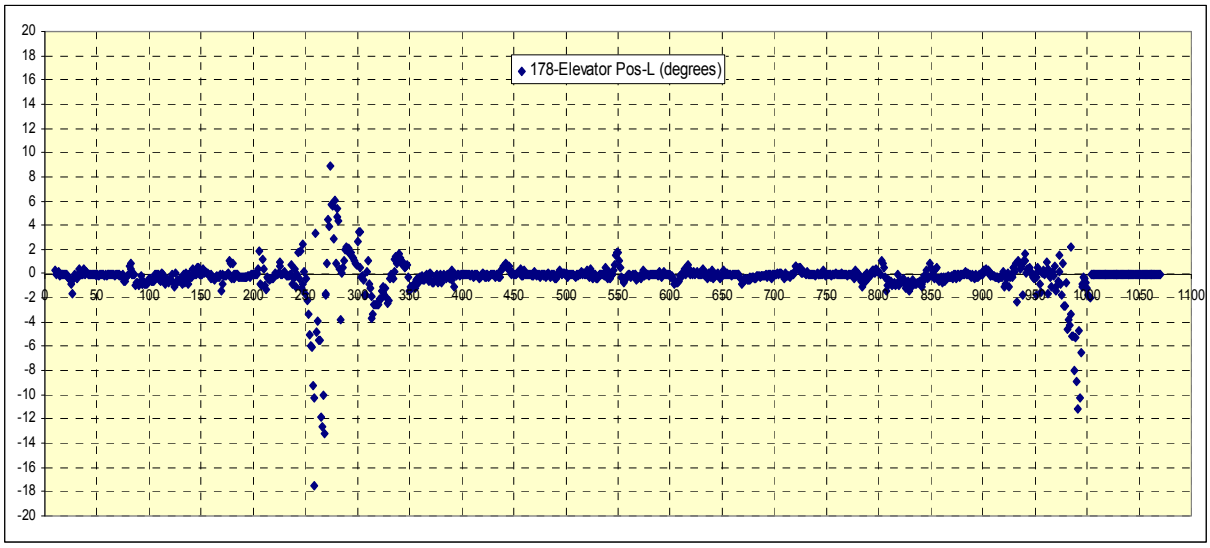


124 Brake Pedal Angle degrees

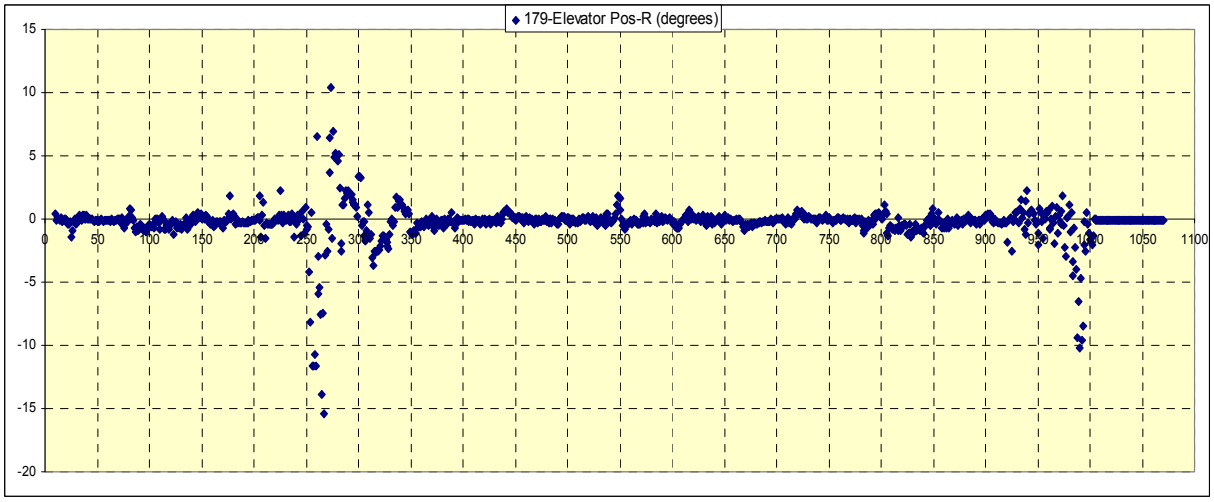


125 Brake Pedal Angle R degrees

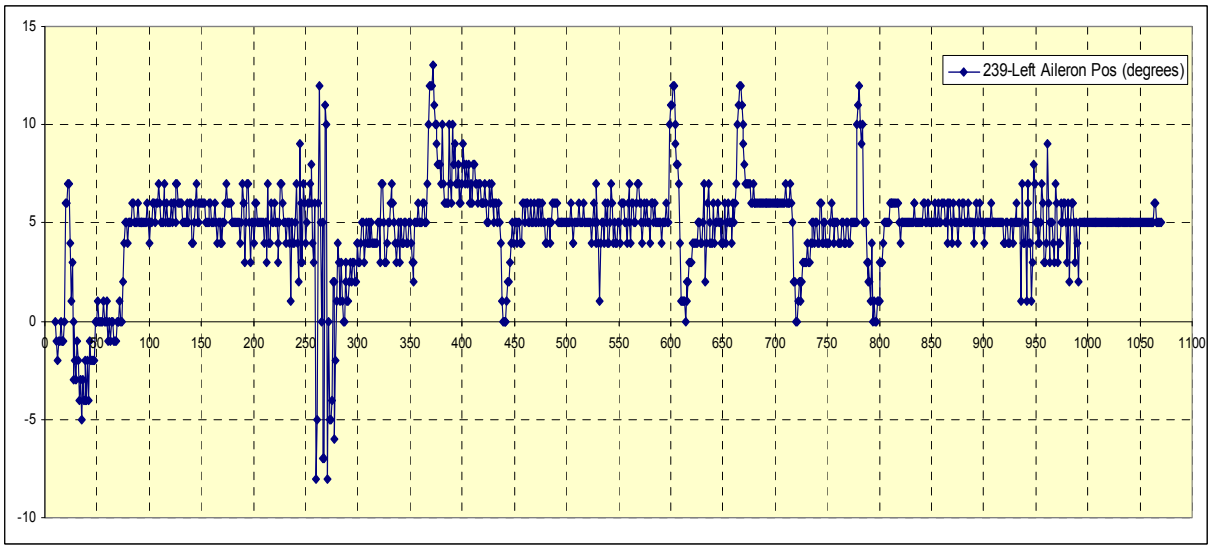
2.2 Flight Controls



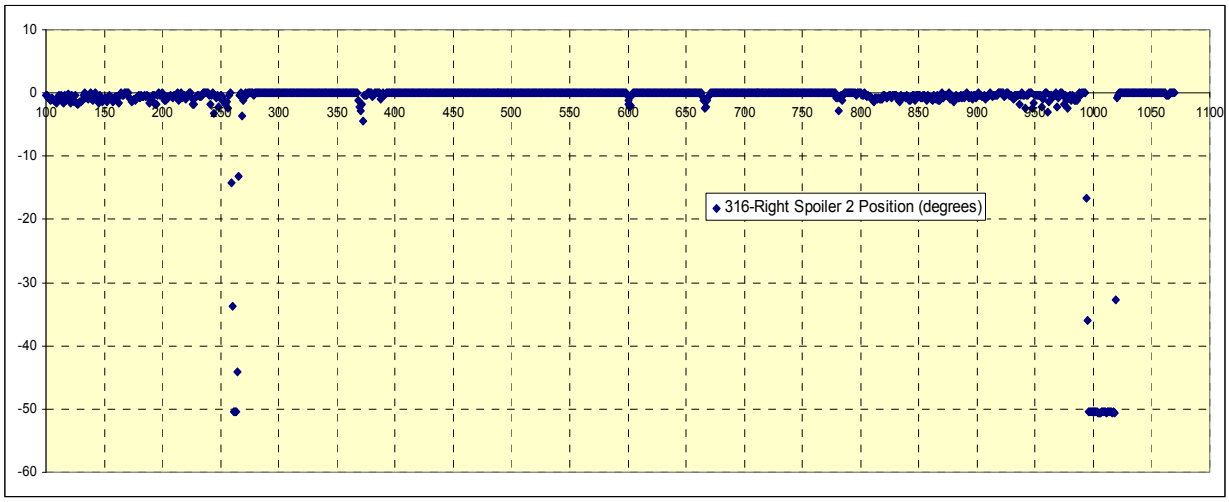
178 Elevator Pos –L degrees



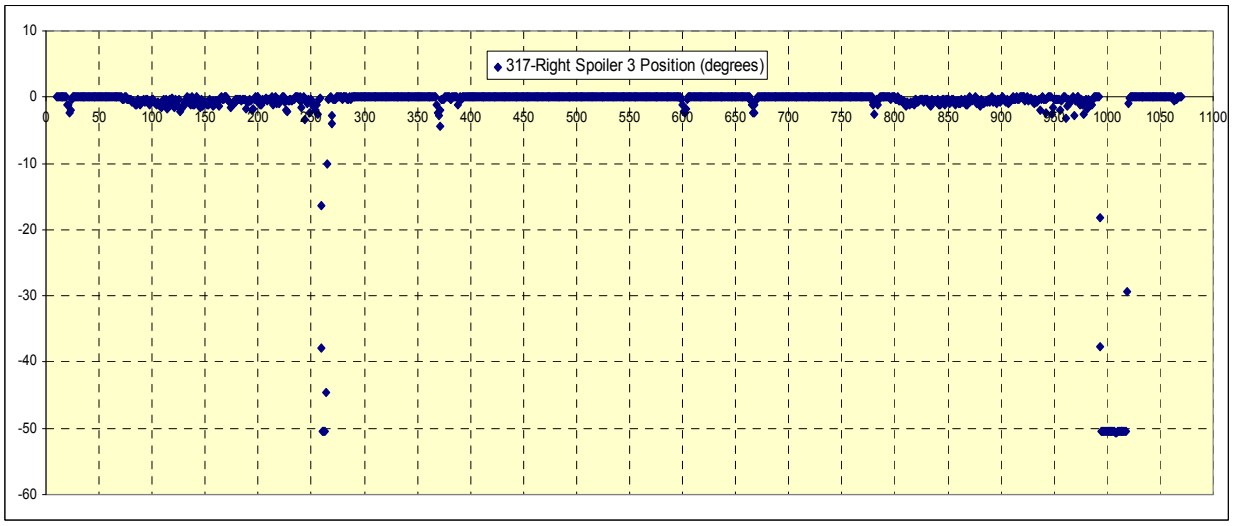
179 Elevator Pos –L degrees



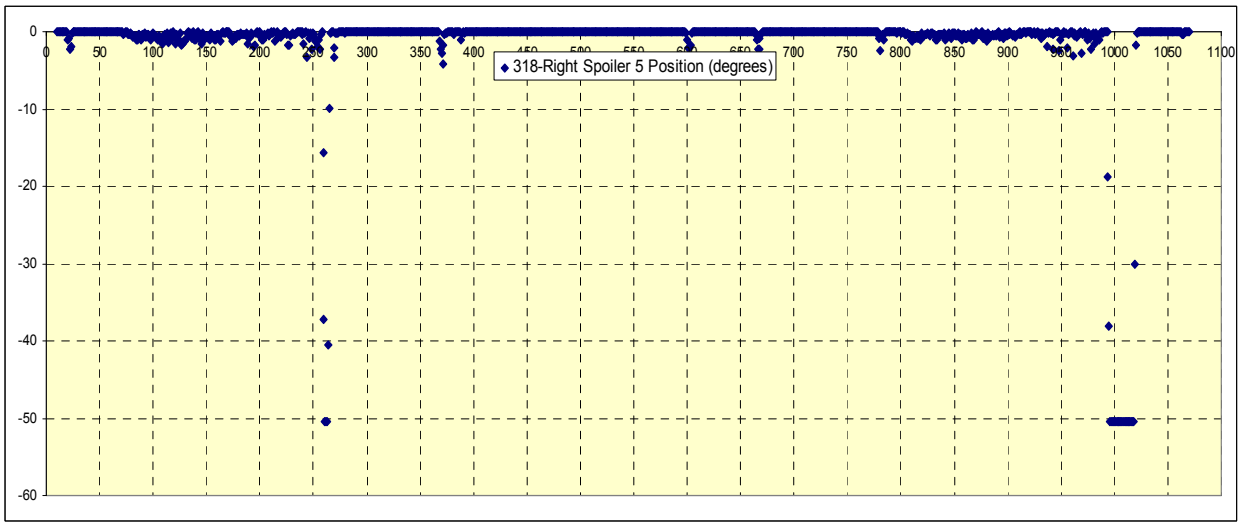
239 Left Aileron Pos Degrees Elevator Pos –L degrees



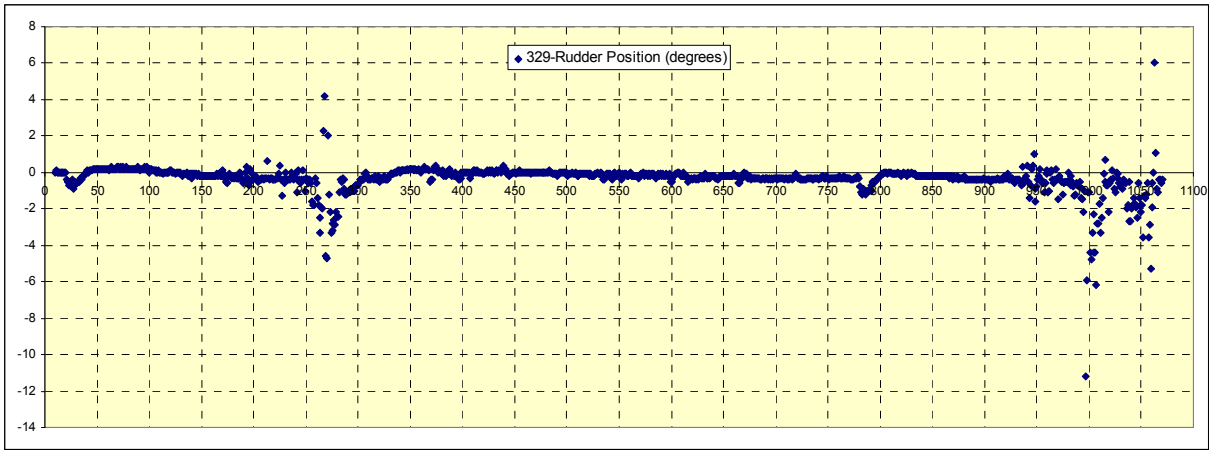
316 Right Spoiler 2 Position degrees



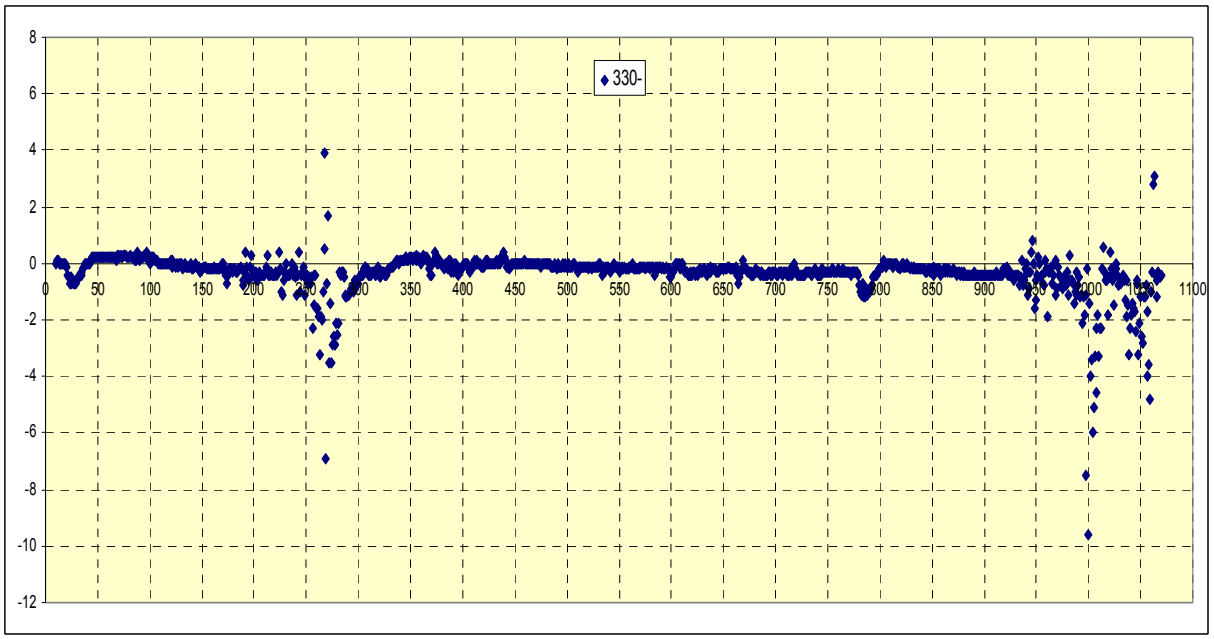
317 Right Spoiler 3 Position degrees



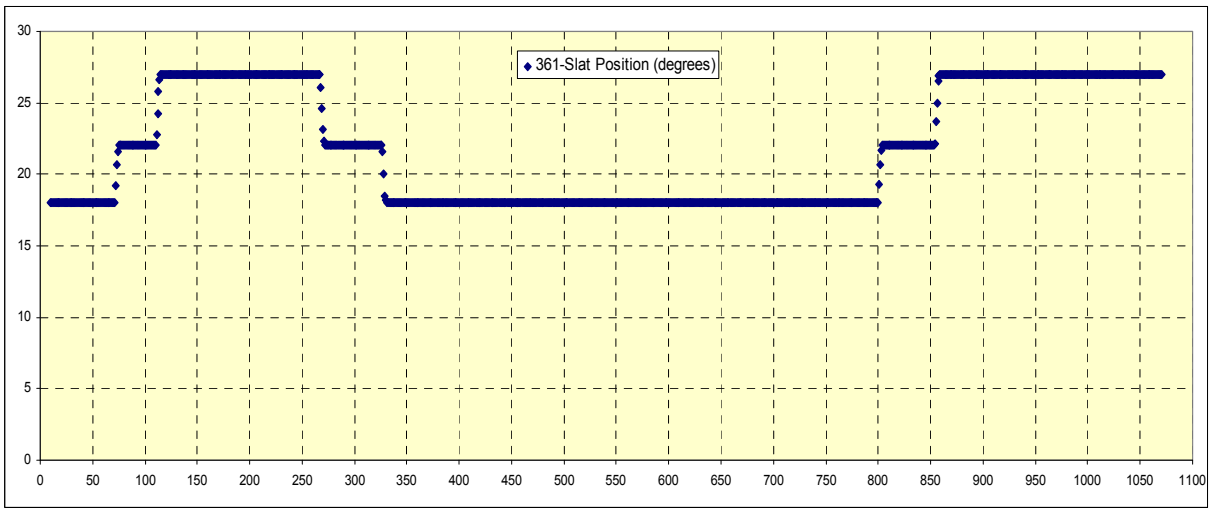
318 Right Spoiler 5 Position degrees



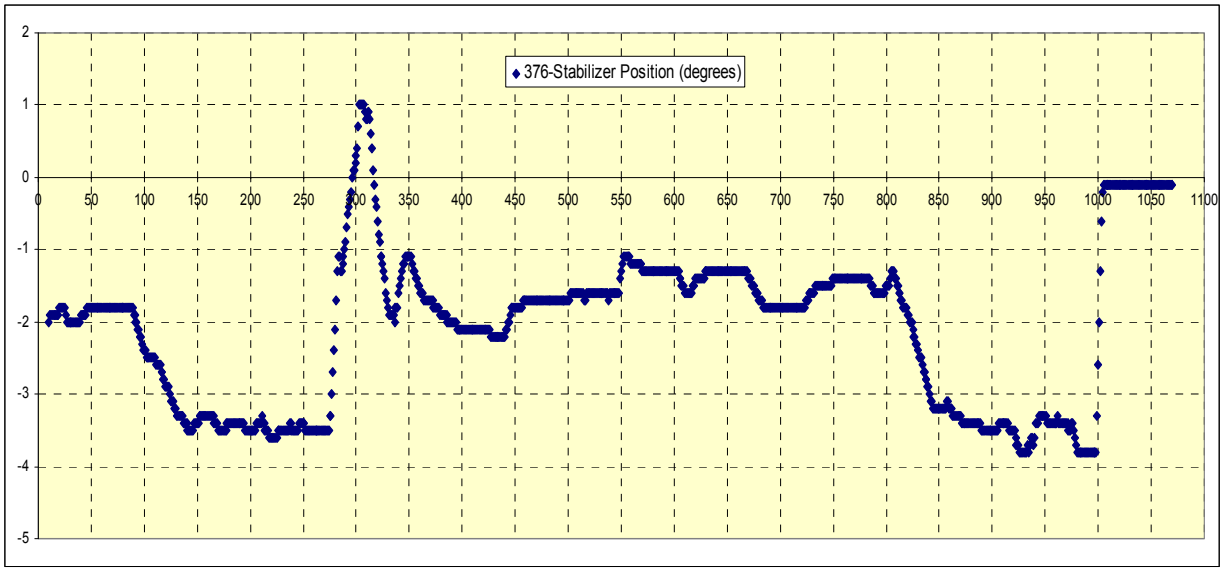
329 Rudder Position Degrees



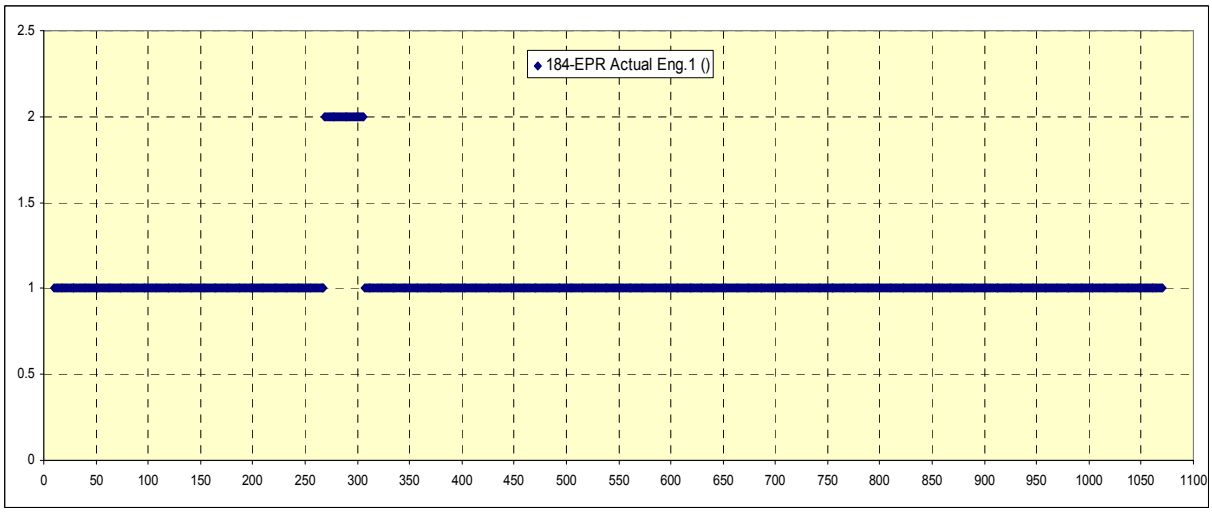
330 Rudder Position Degrees



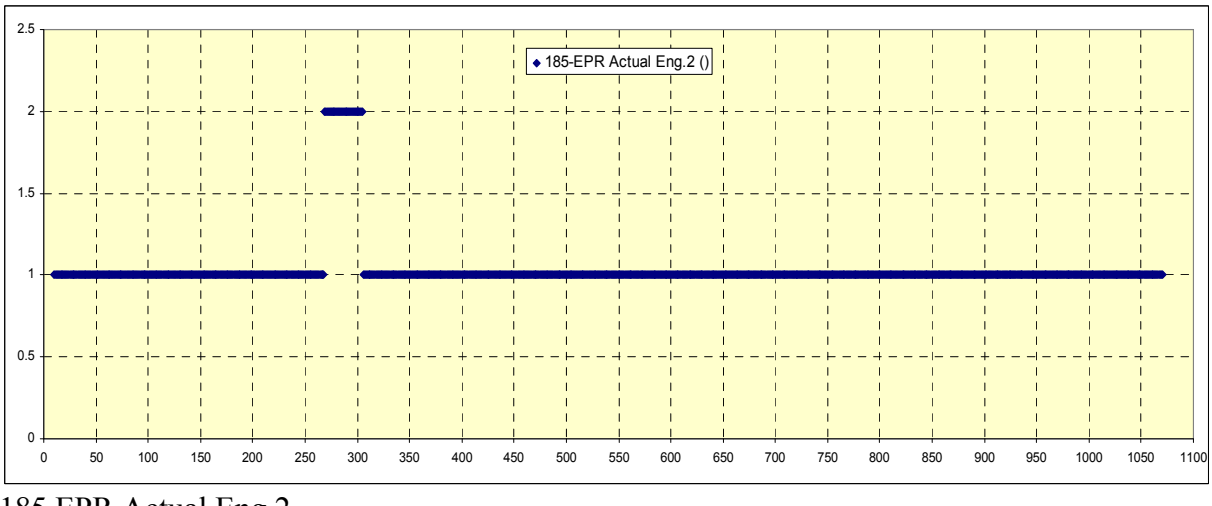
361 Slat Position degrees



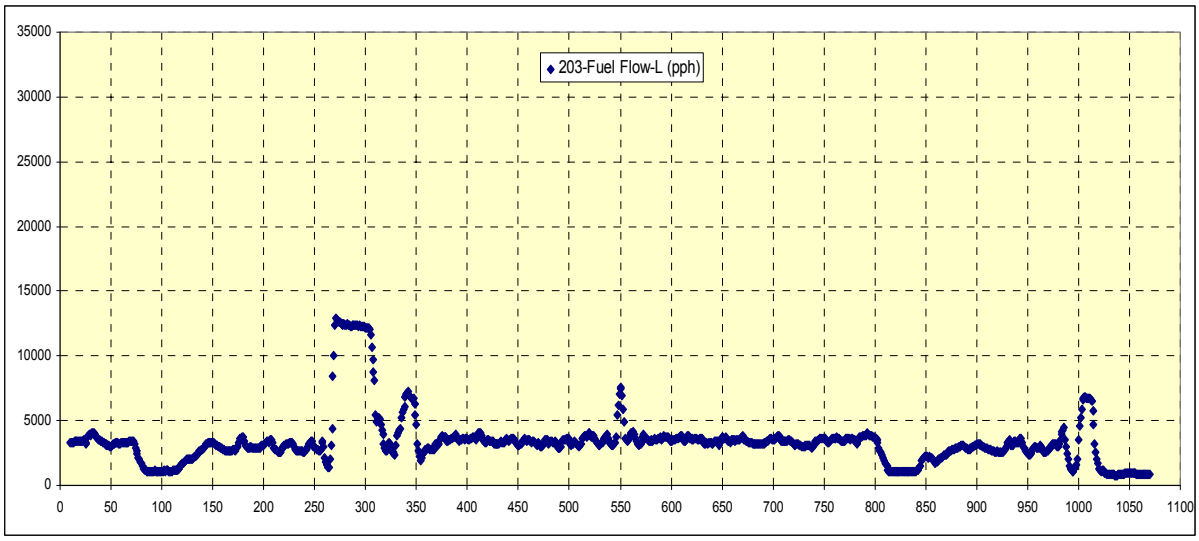
2.3 Power Plant



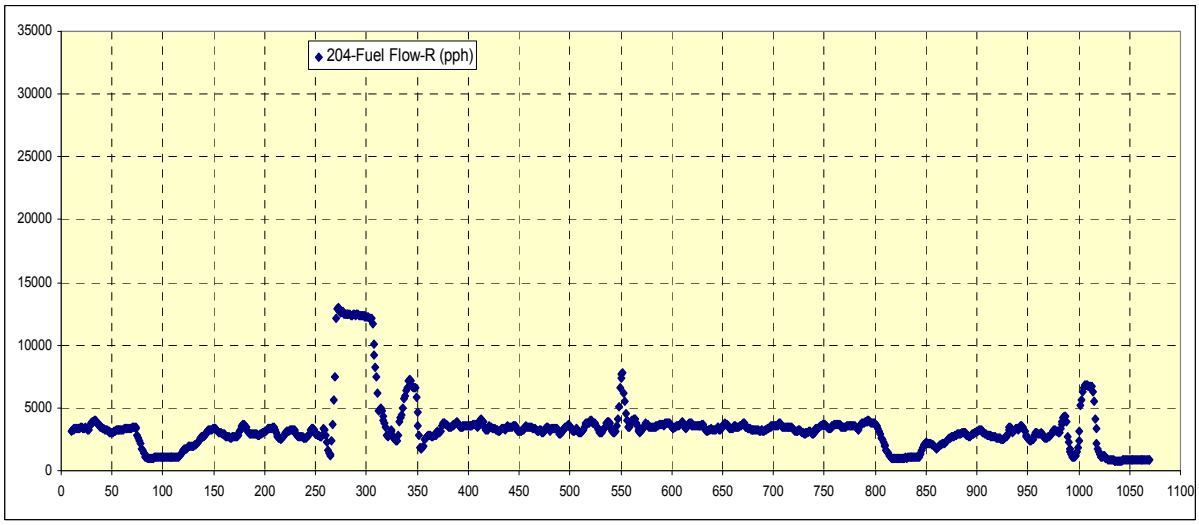
184 EPR Actual Eng 1



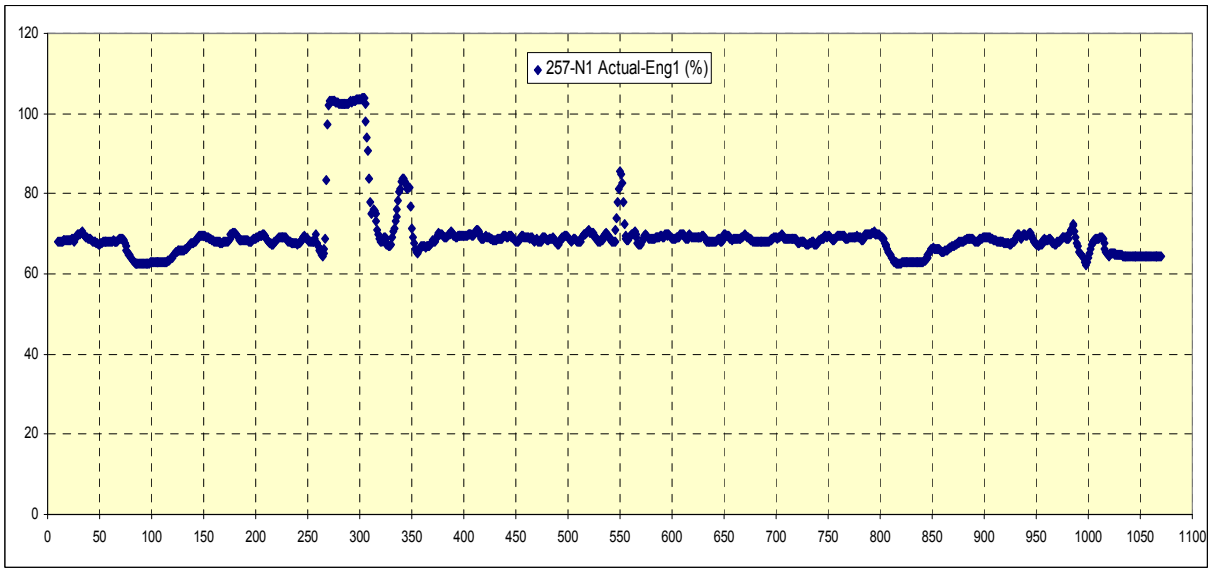
185 EPR Actual Eng 2



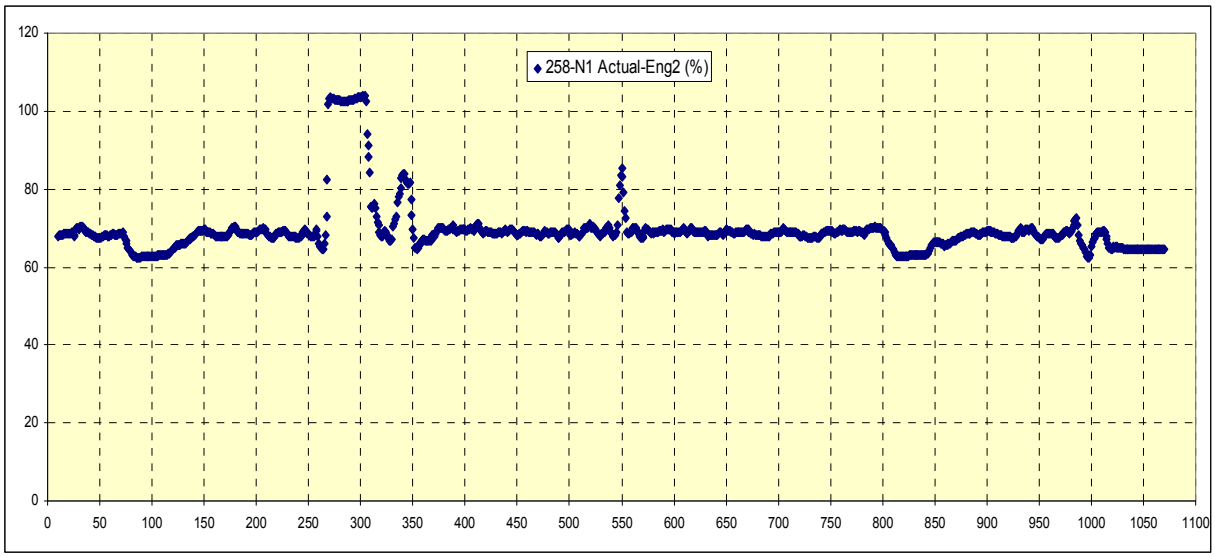
203 Furl Flow L pph



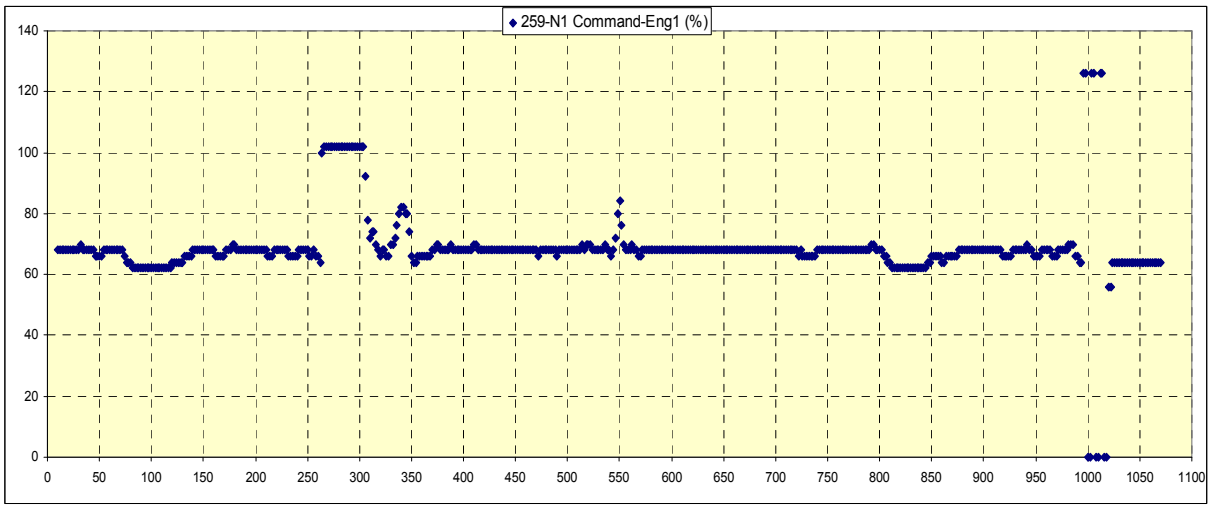
204 Fuel Flow R pph



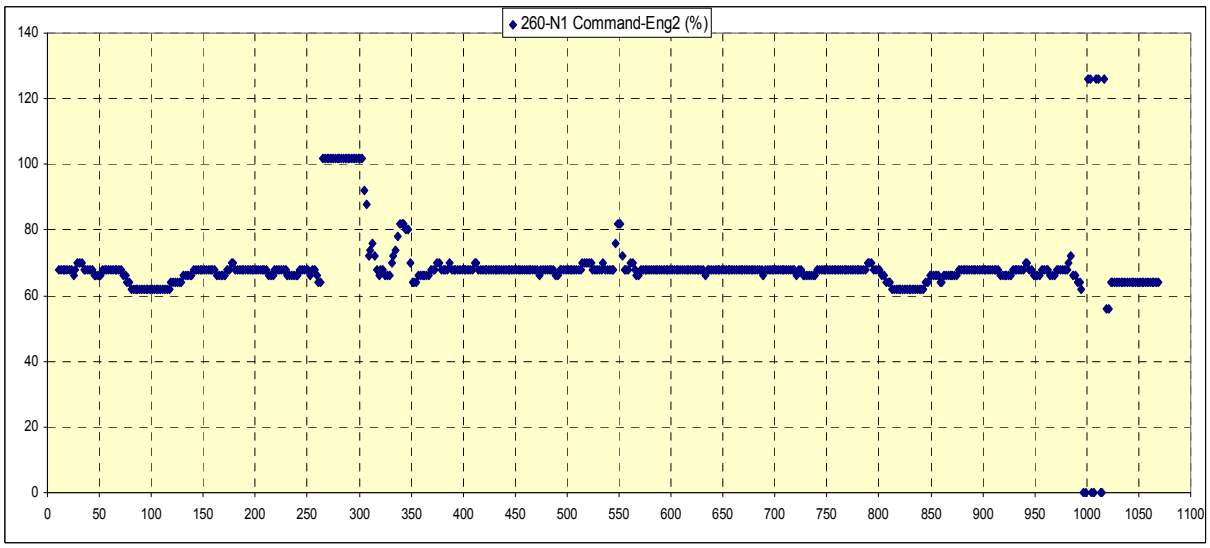
257 N1 Actual Eng 1 %



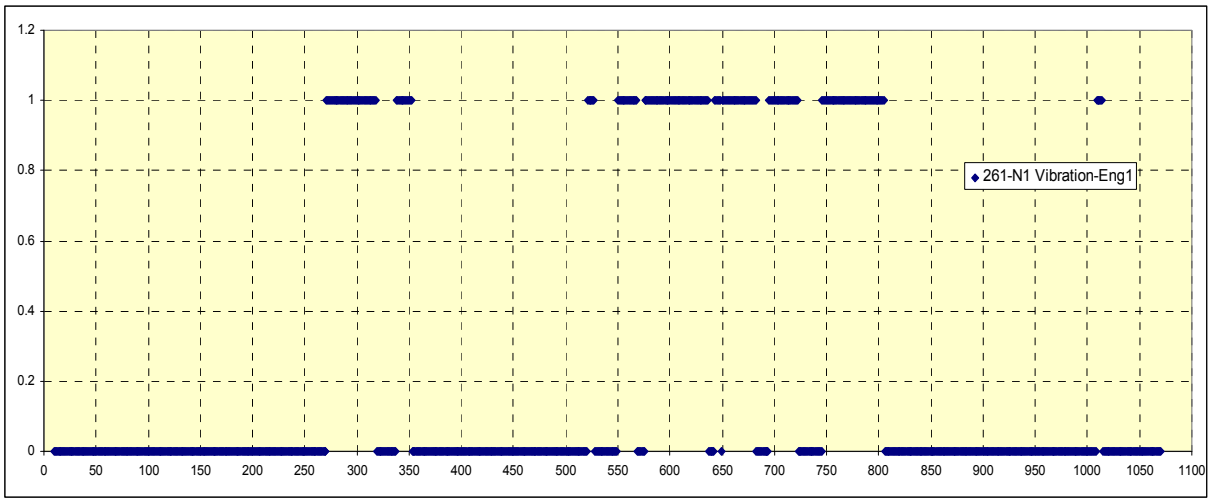
257 N1 Actual Eng 2 %



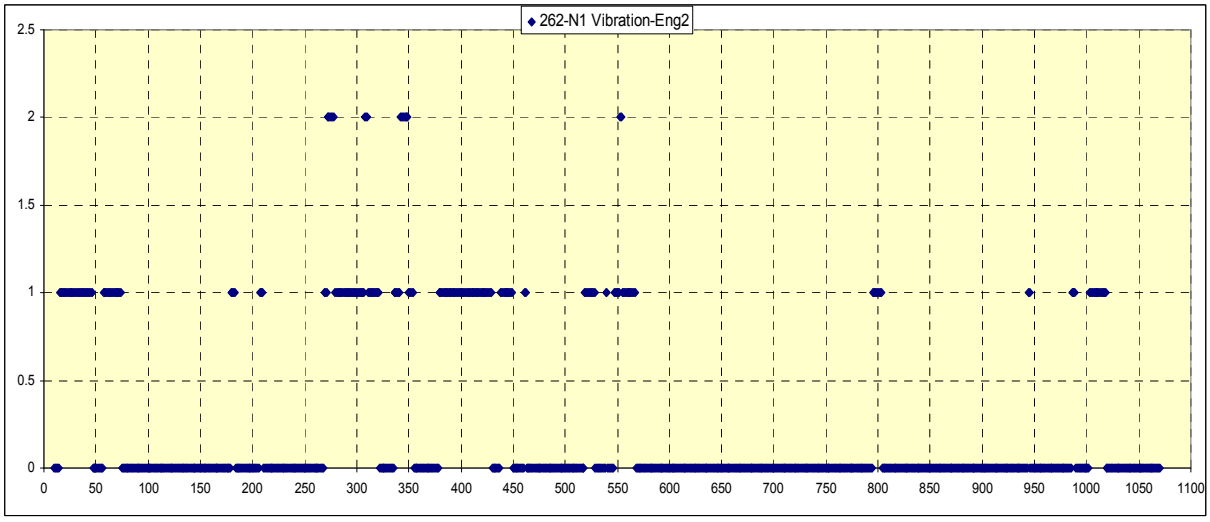
259 N1 Command Actual Eng 1 %



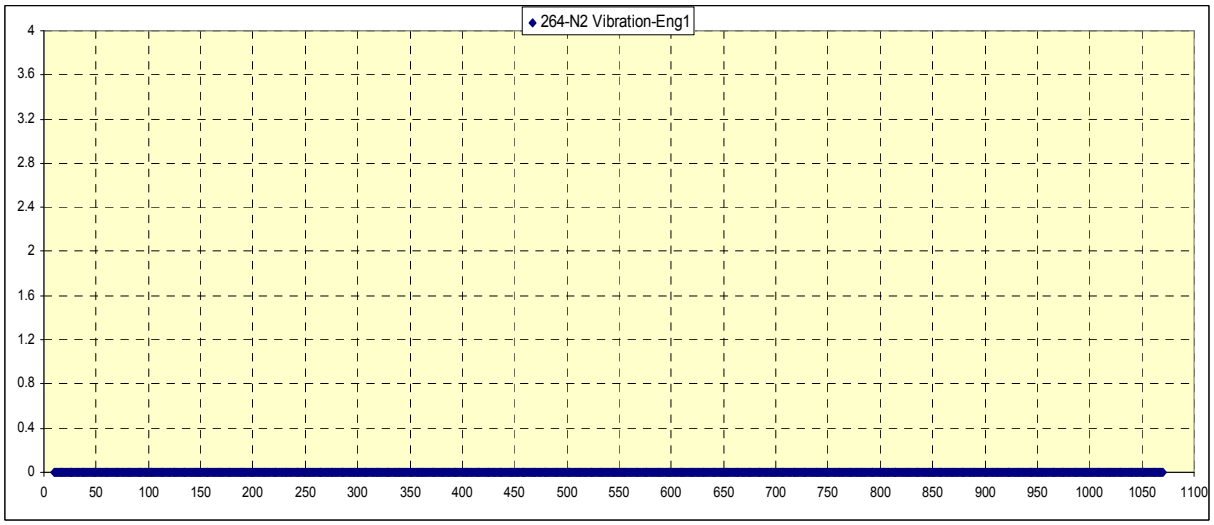
260 N1 Command Eng 2 %



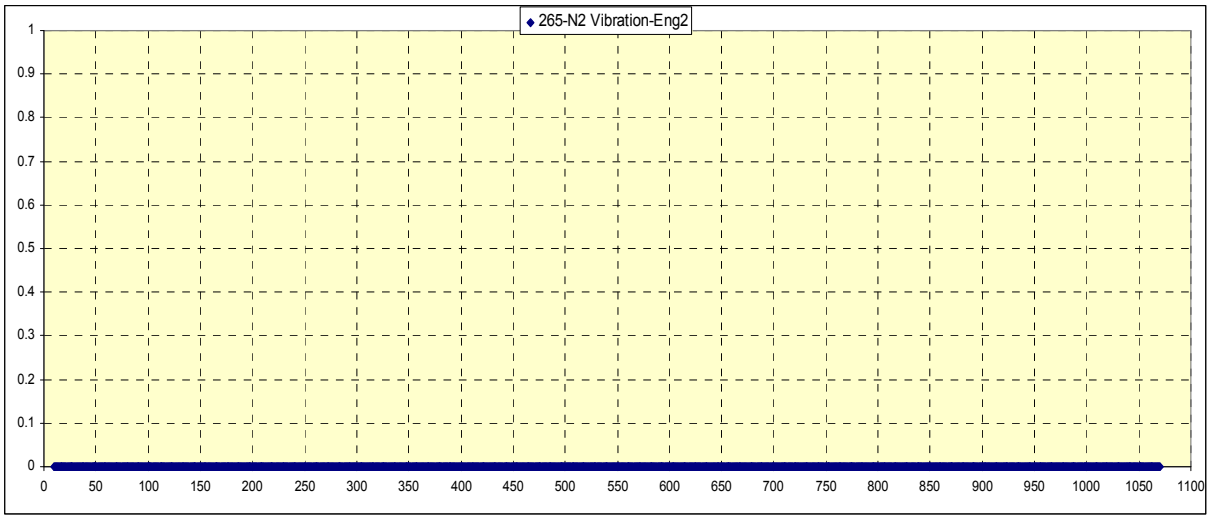
261 N1 Vibration Eng 1 %



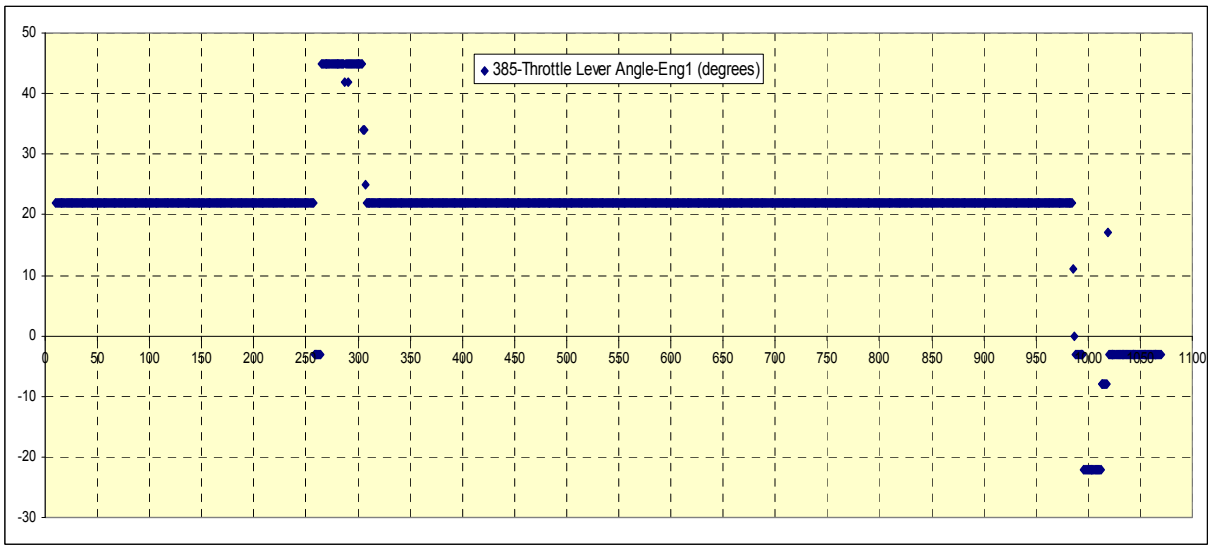
262 N1 Vibration Eng 2 %



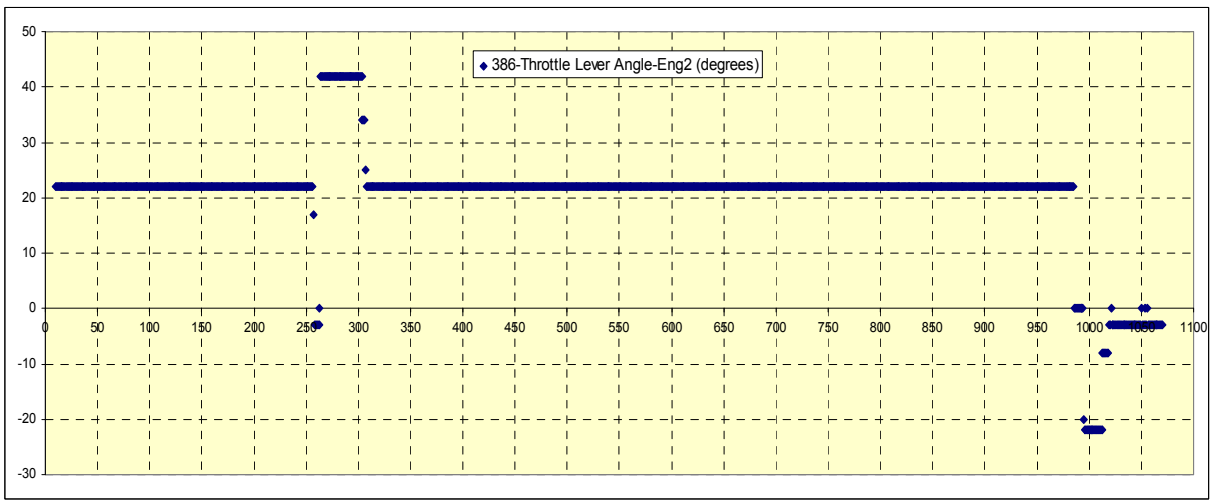
264 N2 Vibration Eng 1 %



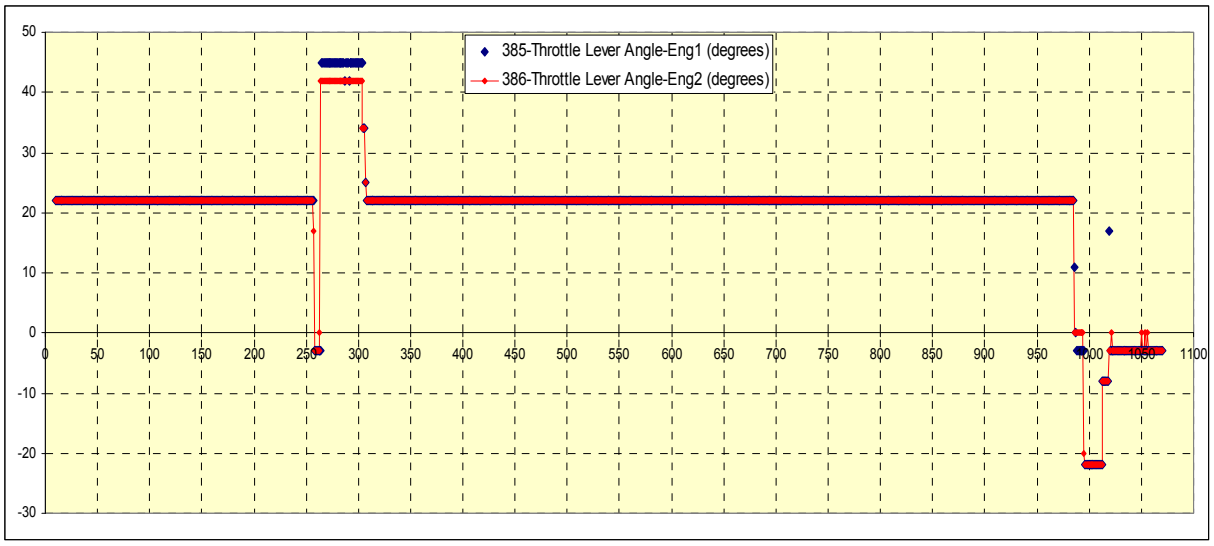
265 N2 Vibration Eng 2 %



385 TLA Eng 1

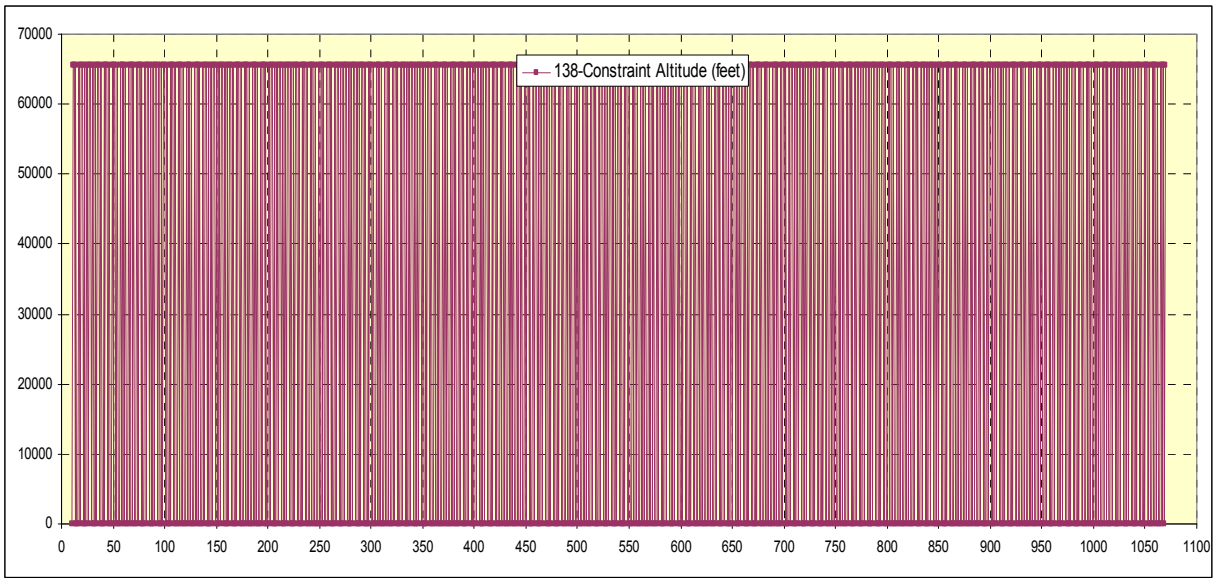


385 TLA Eng 2

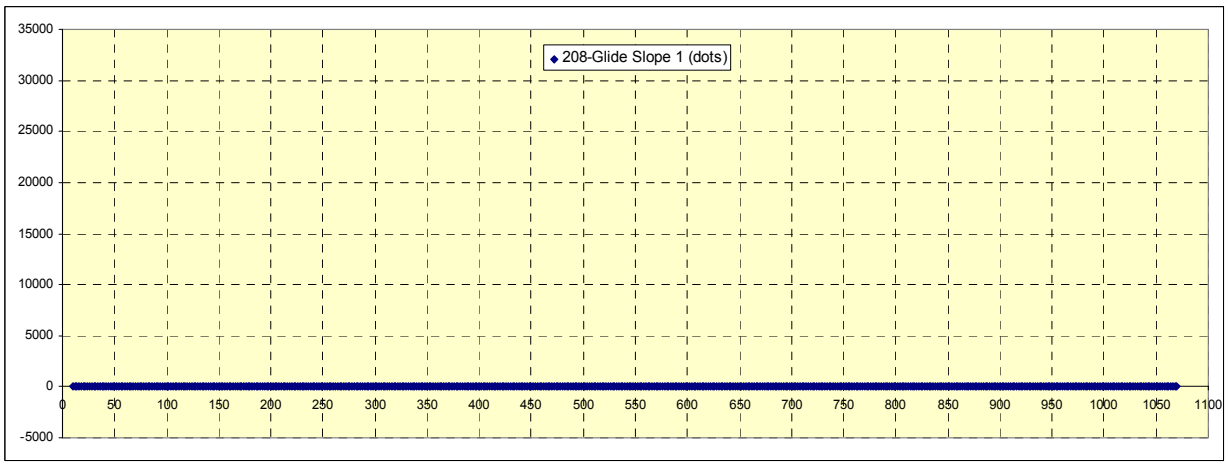


385-386 TLA Eng 1

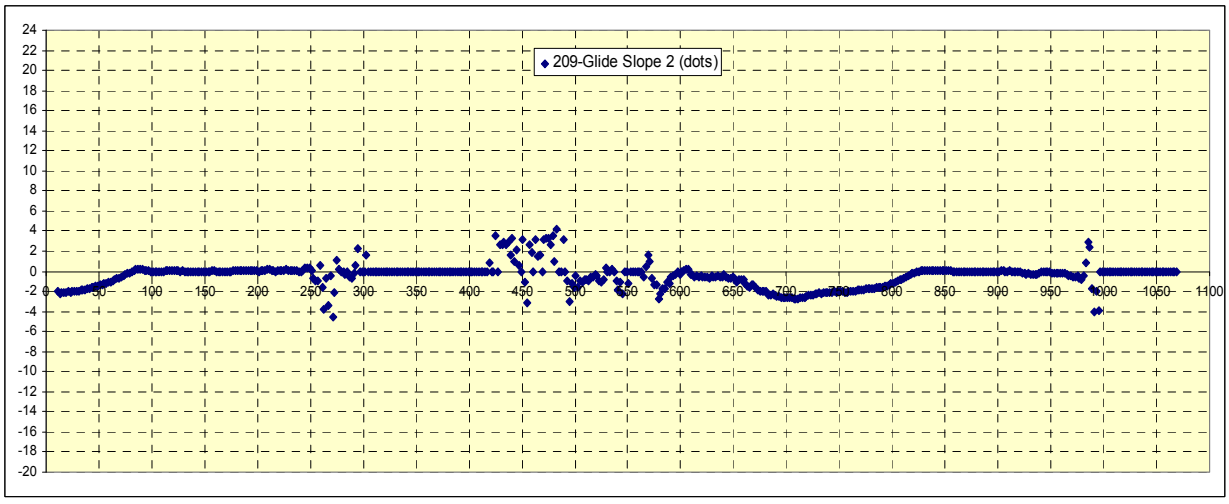
3 Miscellaneous:



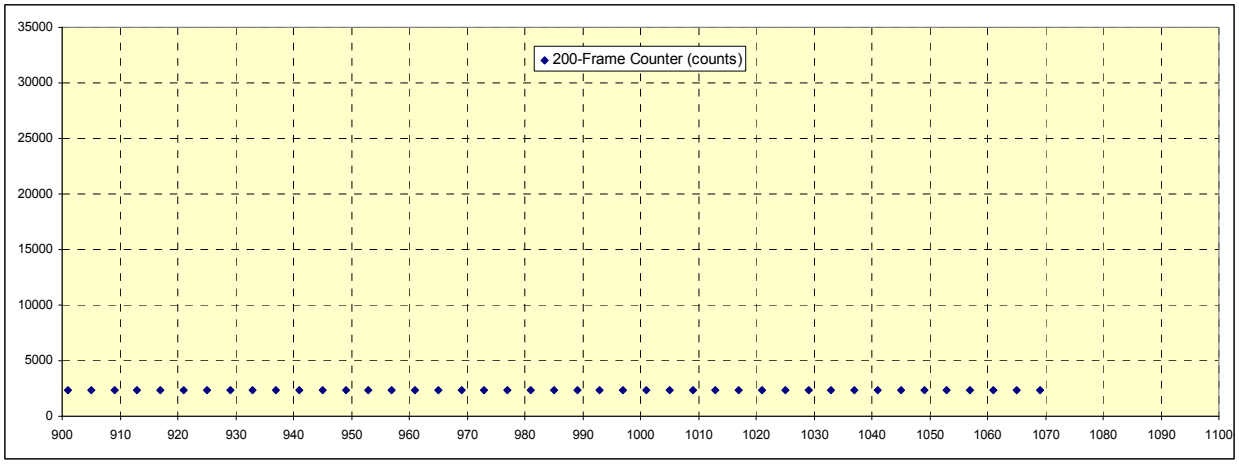
138 Constraints Altitude ft



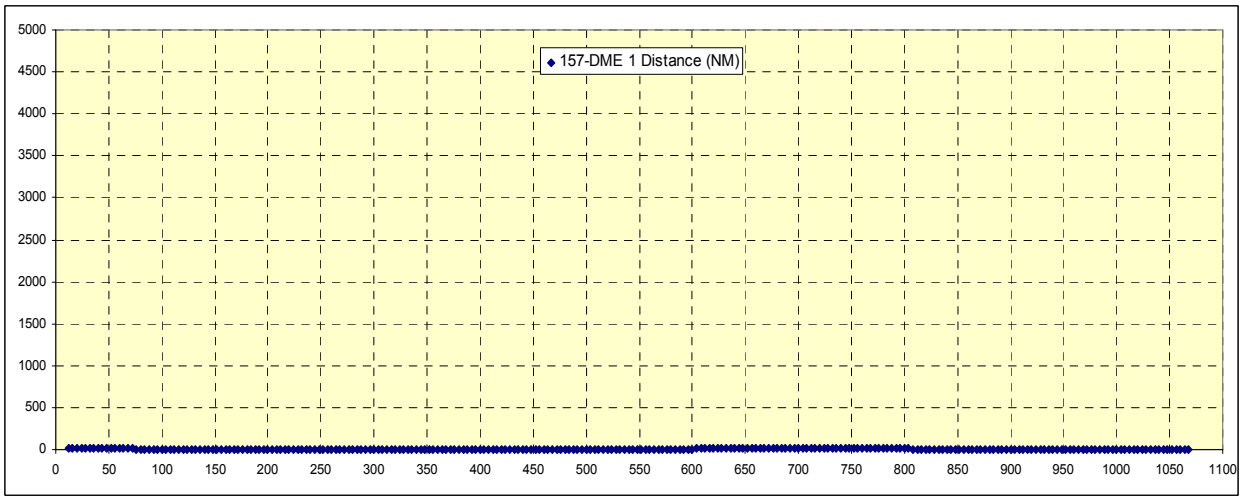
208 Glide Slope 1 dots



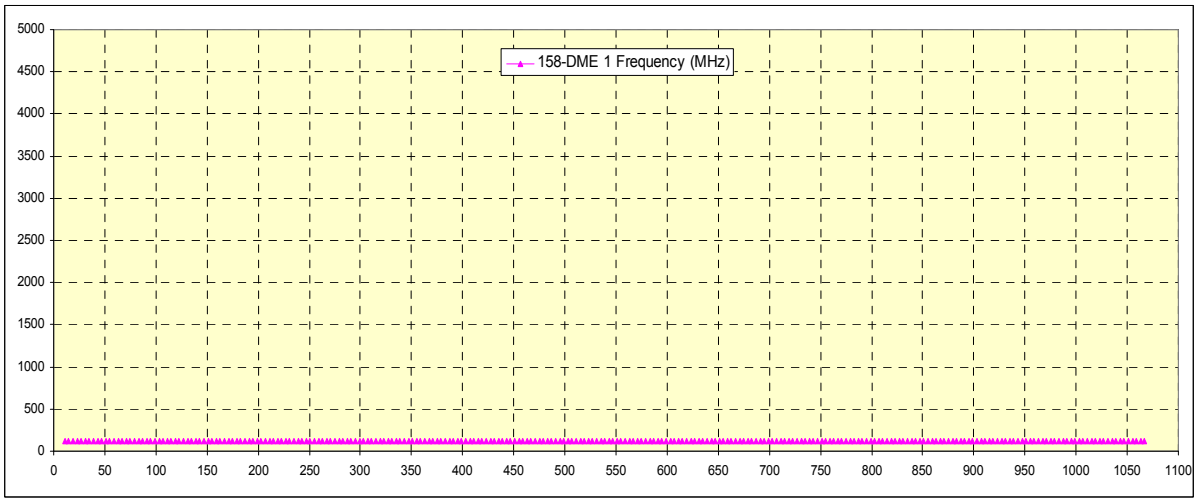
208 Glide Slope 2 dots



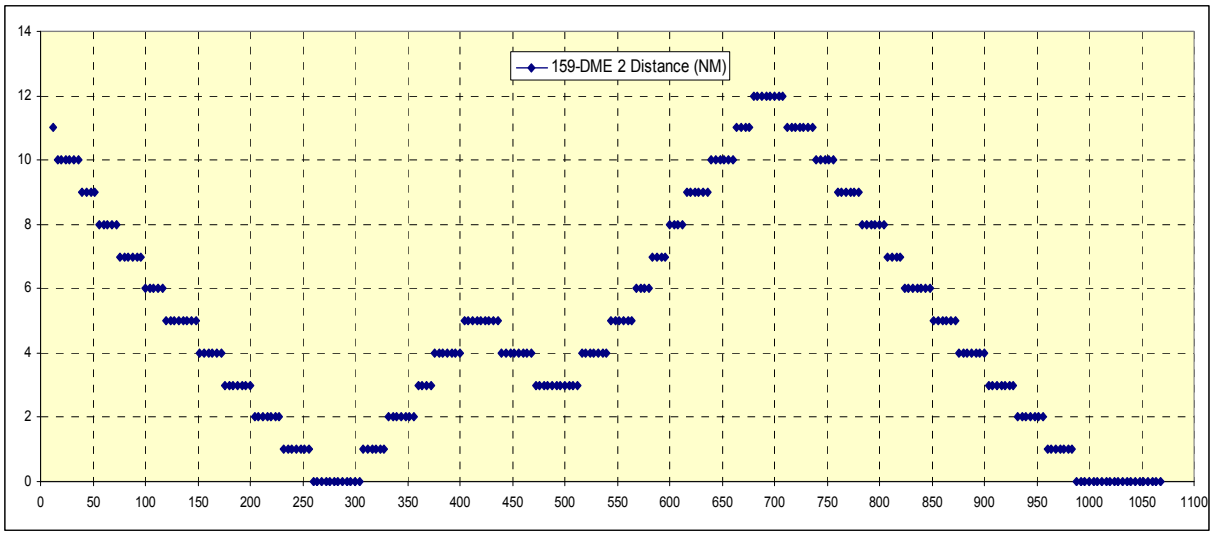
200 Frame Counter (counts)



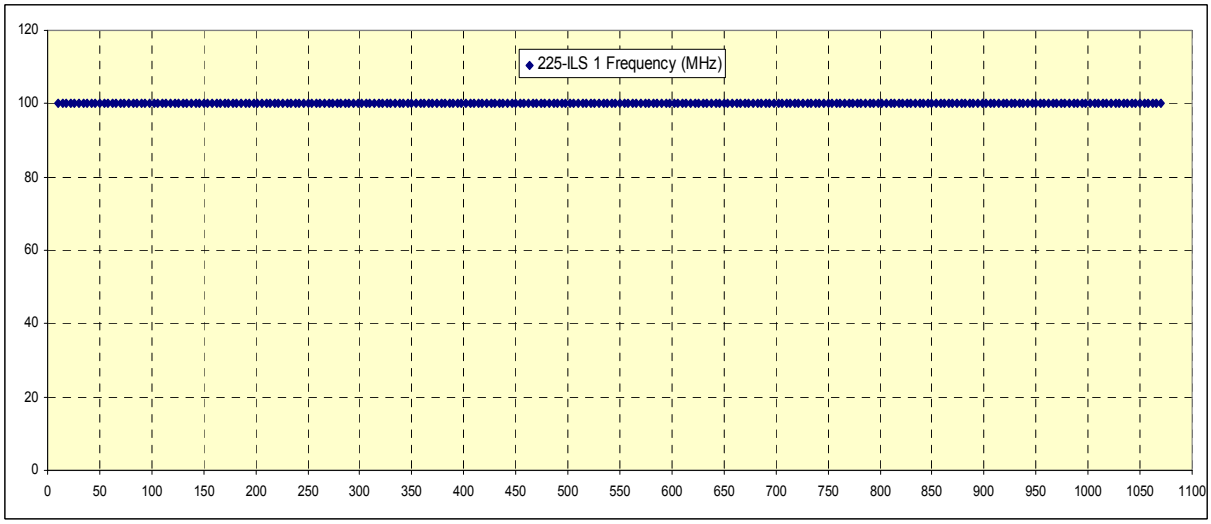
157 DME 1 Distance nm



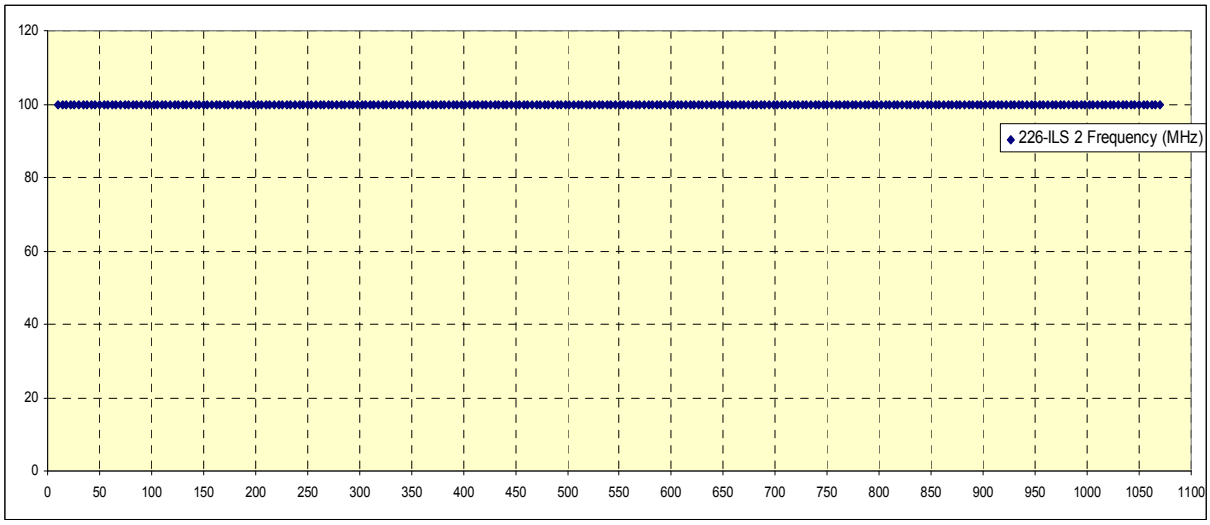
158 DME 1 Frequency MHz



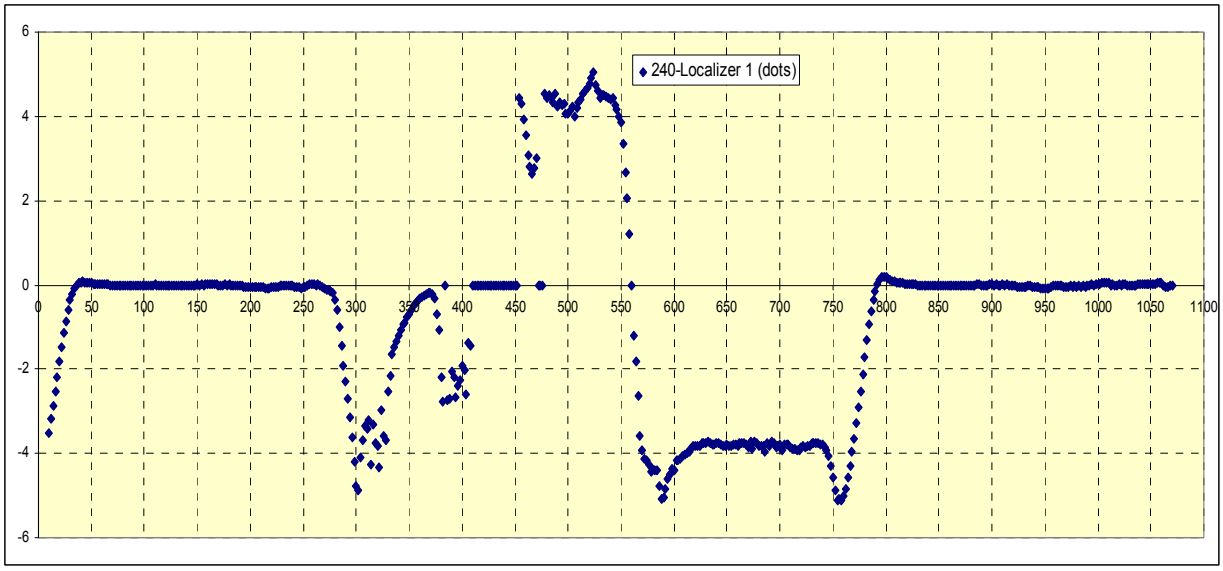
159 DME 2 Distance nm



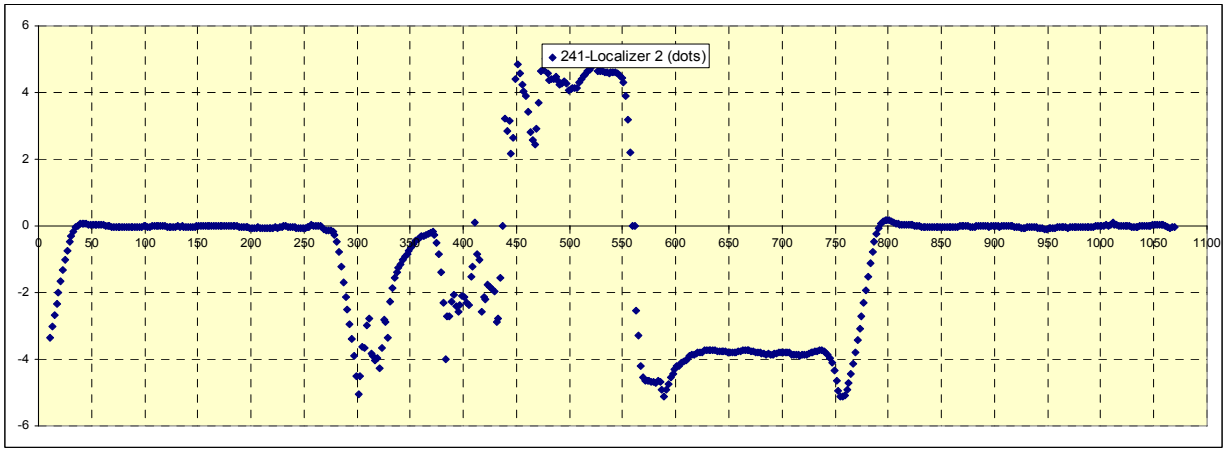
225 ILS 1 Frequency MHz



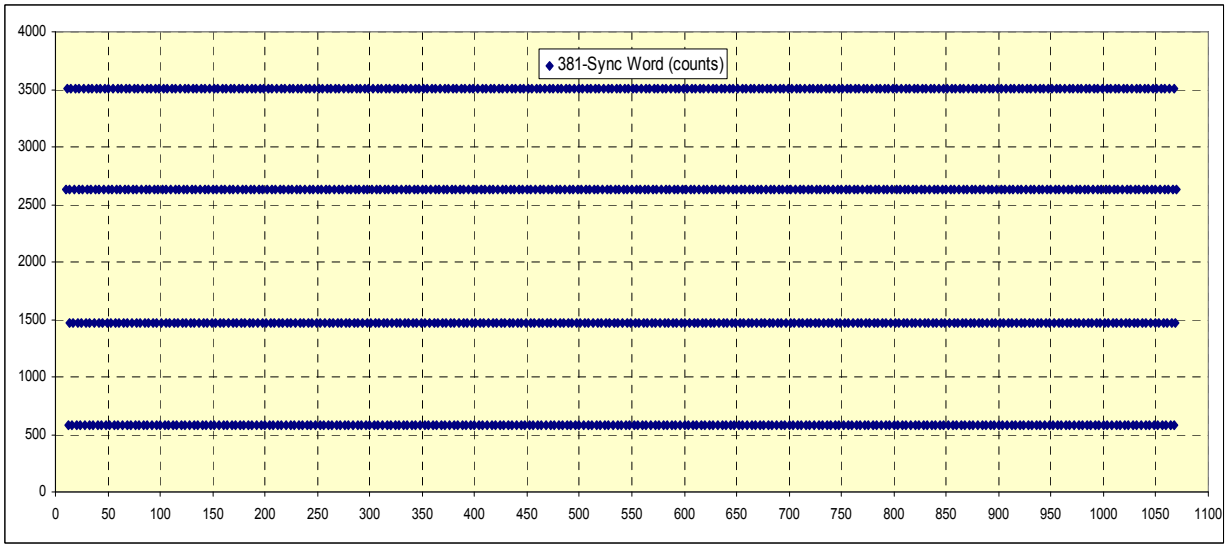
226 ILS 2 Frequency MHz



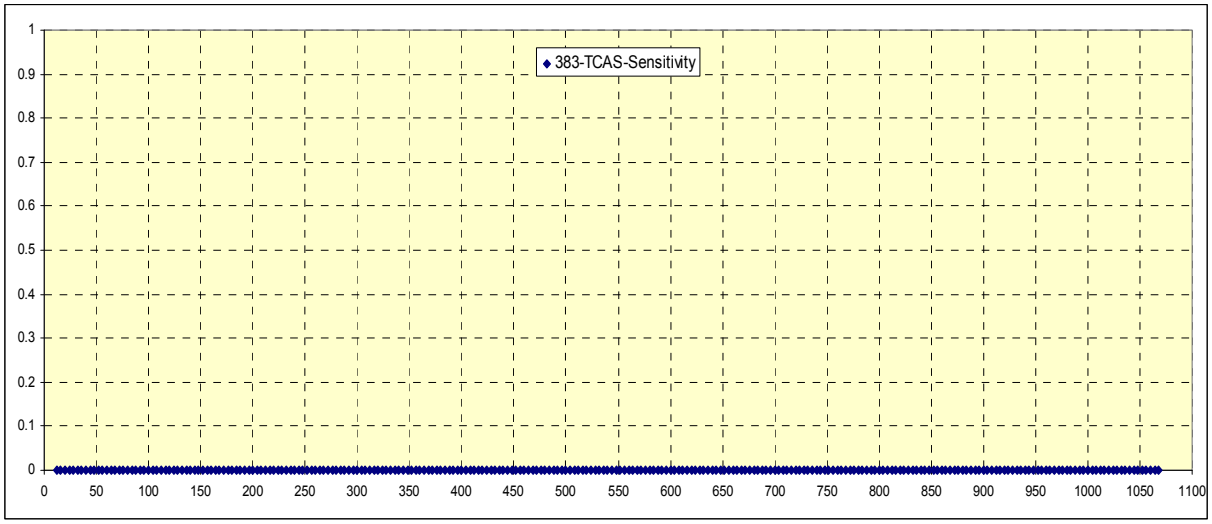
240 Localizer 1 dots



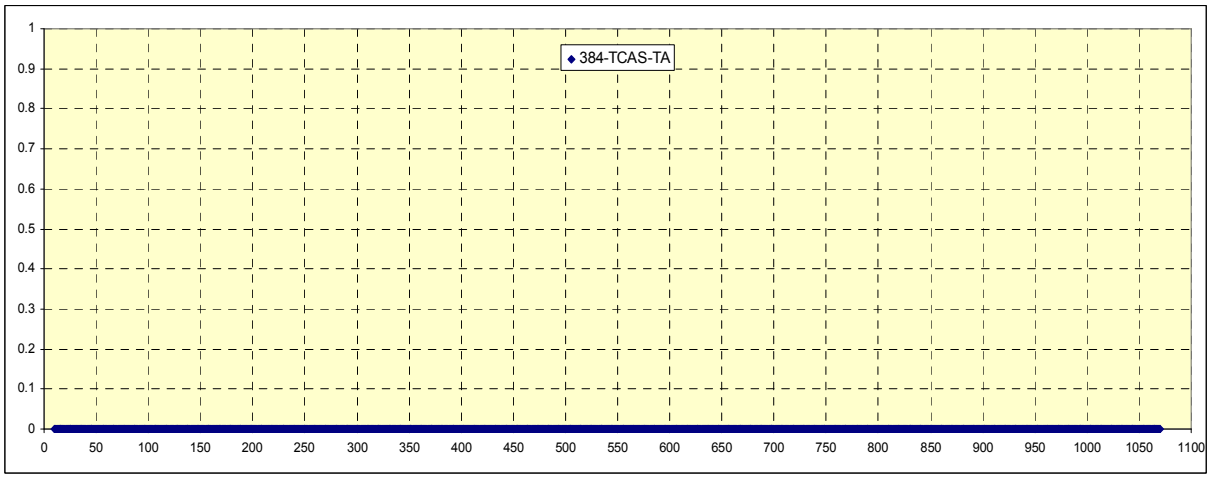
241 Localizer 2 dots



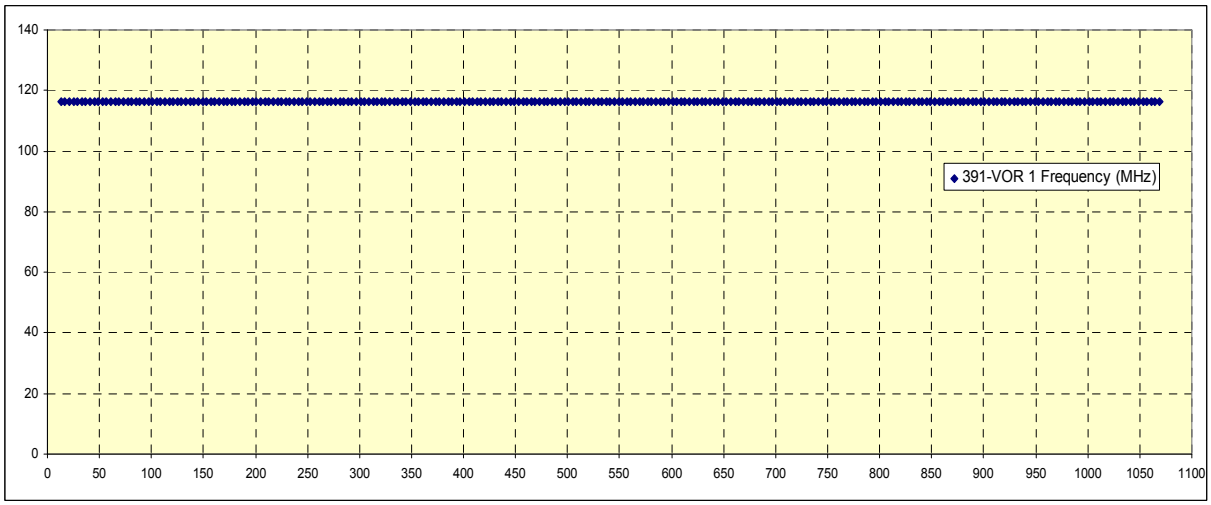
381 Sync World counts



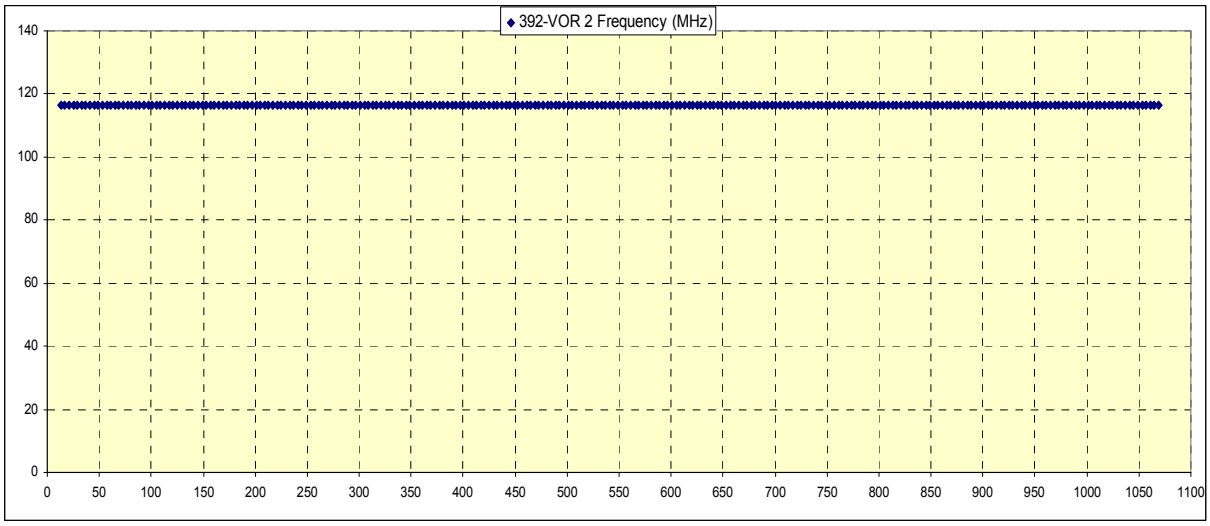
383 TCAS Sensitivity



384 TCAS TA

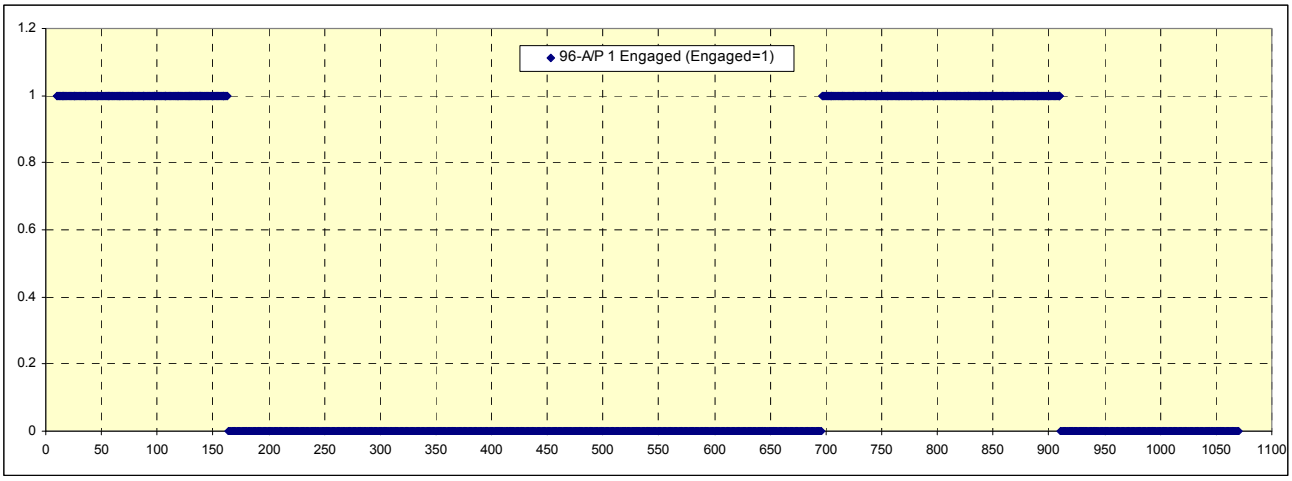


391 VOR 1 Frequency MHz

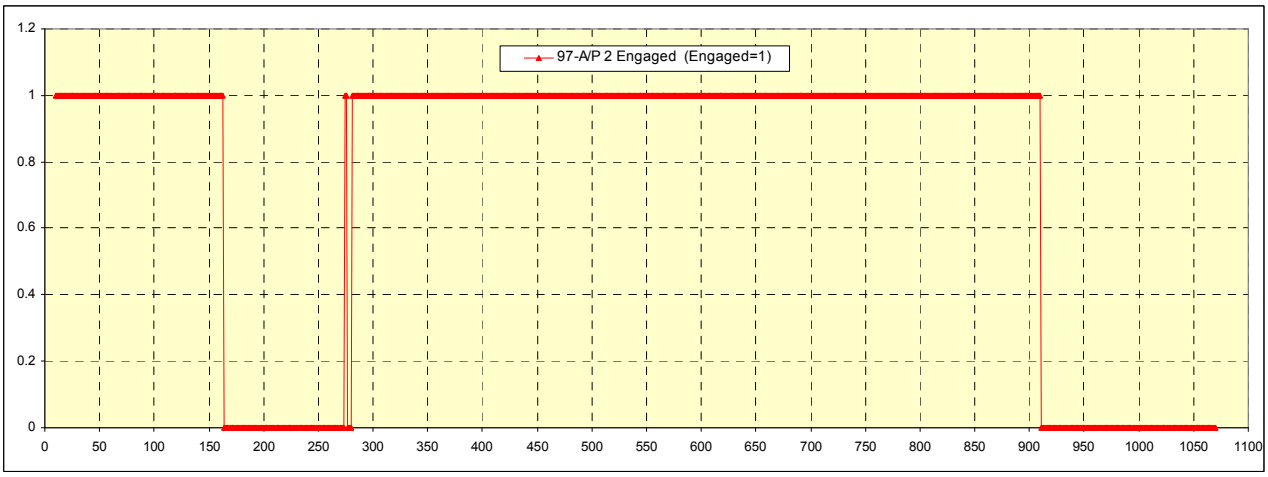


392 VOR 2 Frequency MHz

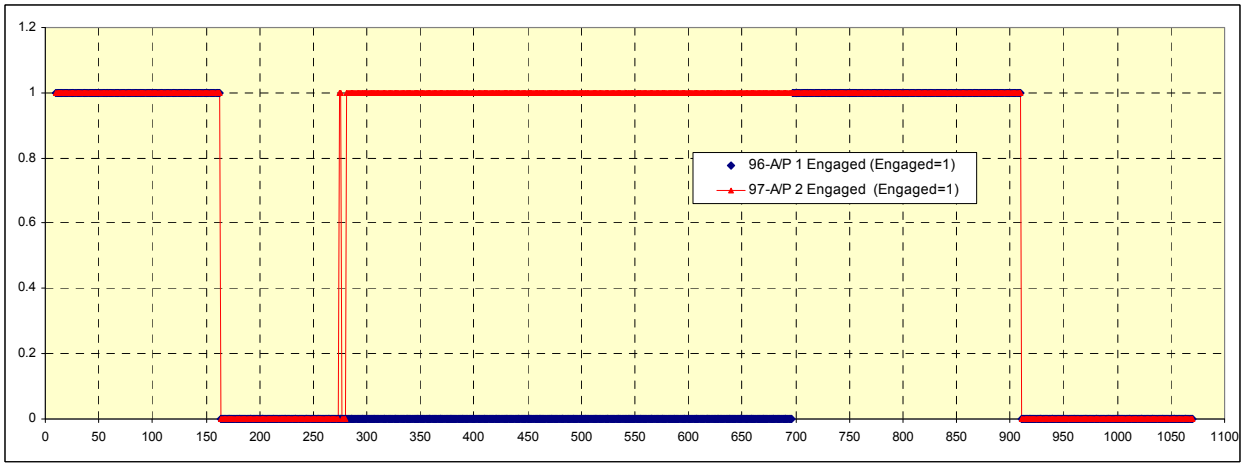
Exhibit #2b FDR plots, Discrete Parameters



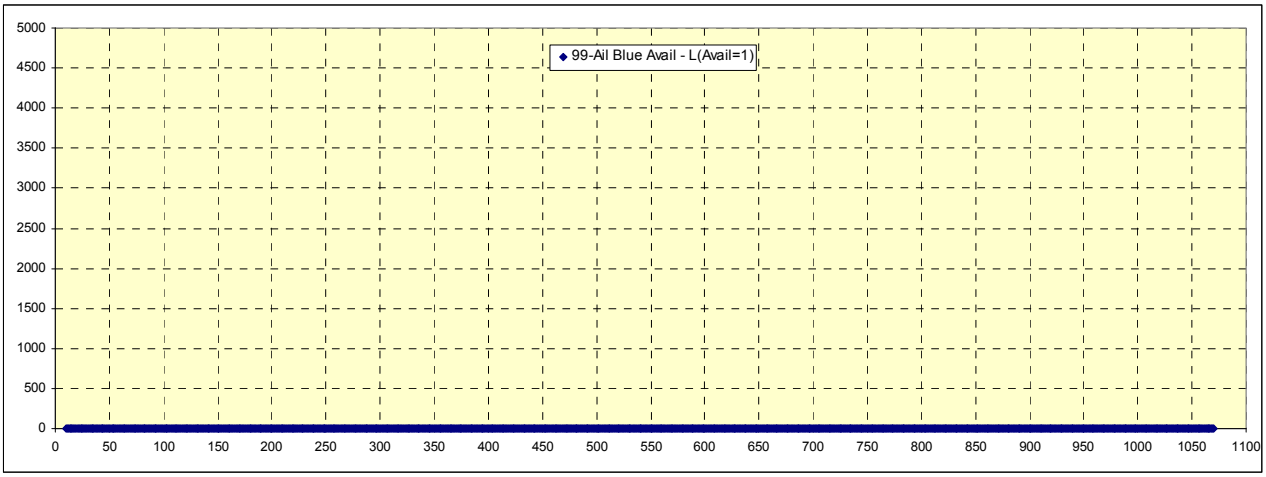
96- AP 1 Engaged (Engaged=1)



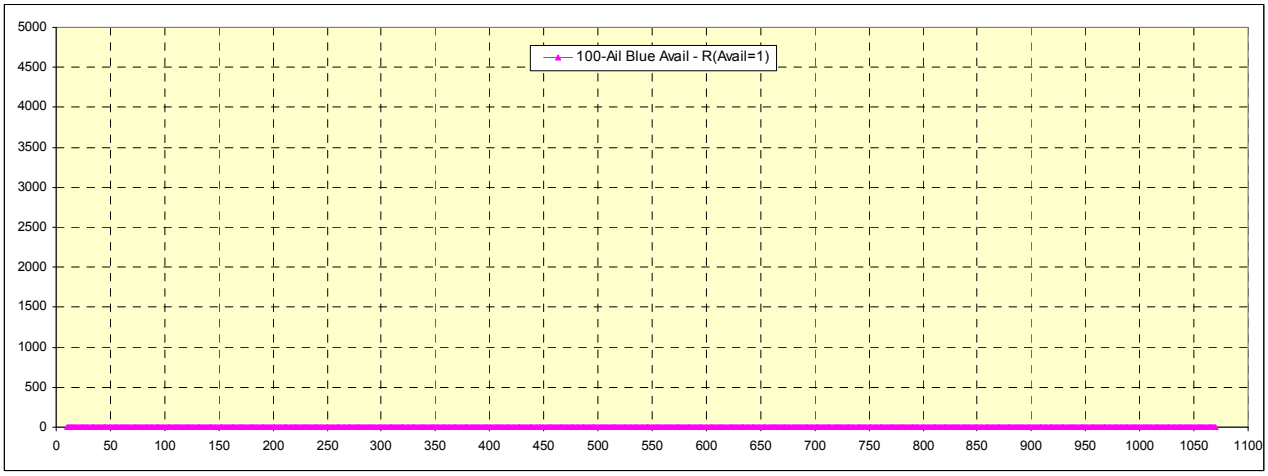
97-AP 2 Engaged (Engaged=1)



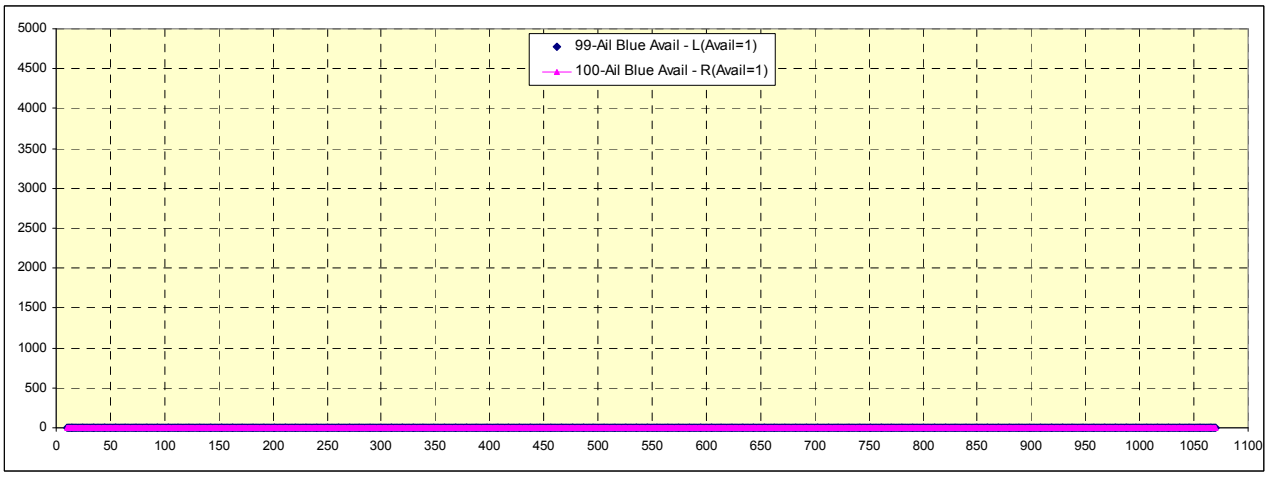
96, 97-AP 1,2 2 Engaged (Engaged=1)



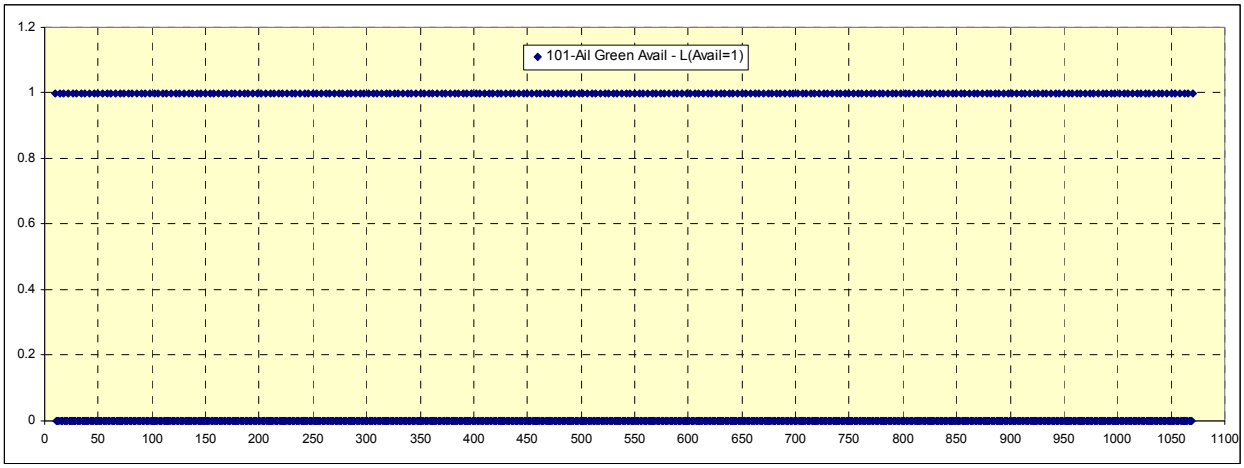
99-Ail Blue-L (Avail=1)



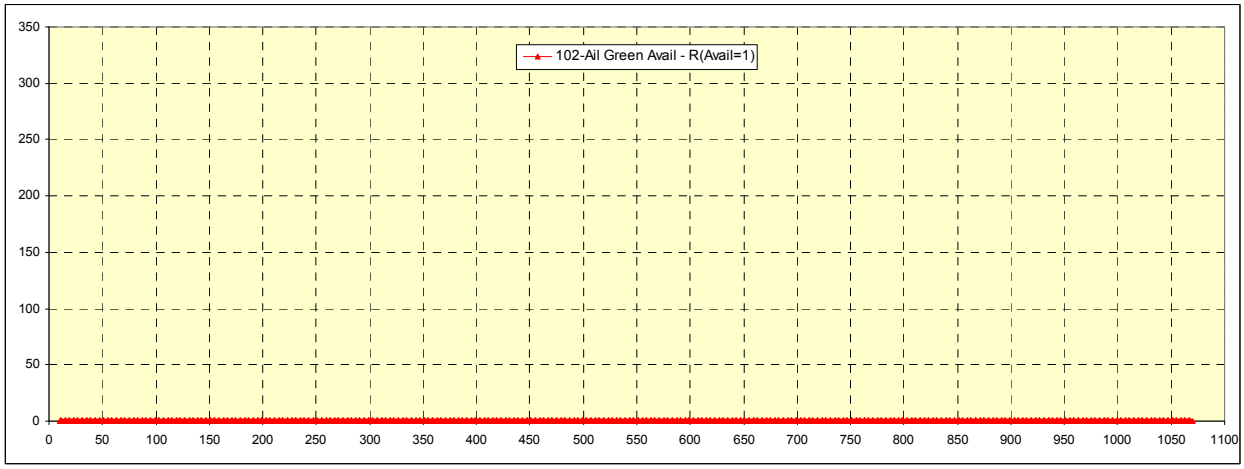
100-Ail Blue-R (Avail=1)



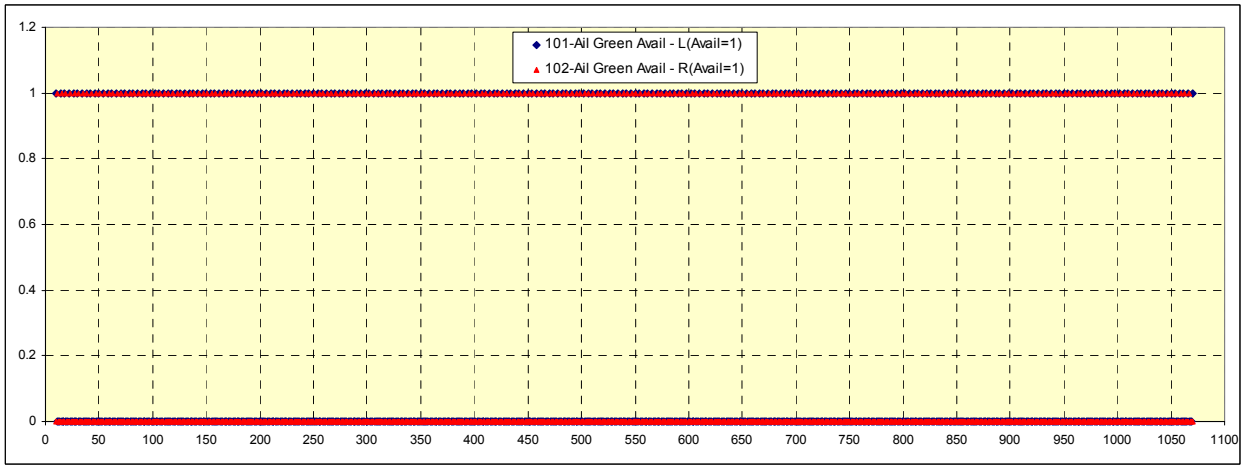
99, 100-Ail Blue-L,R (Avail=1)



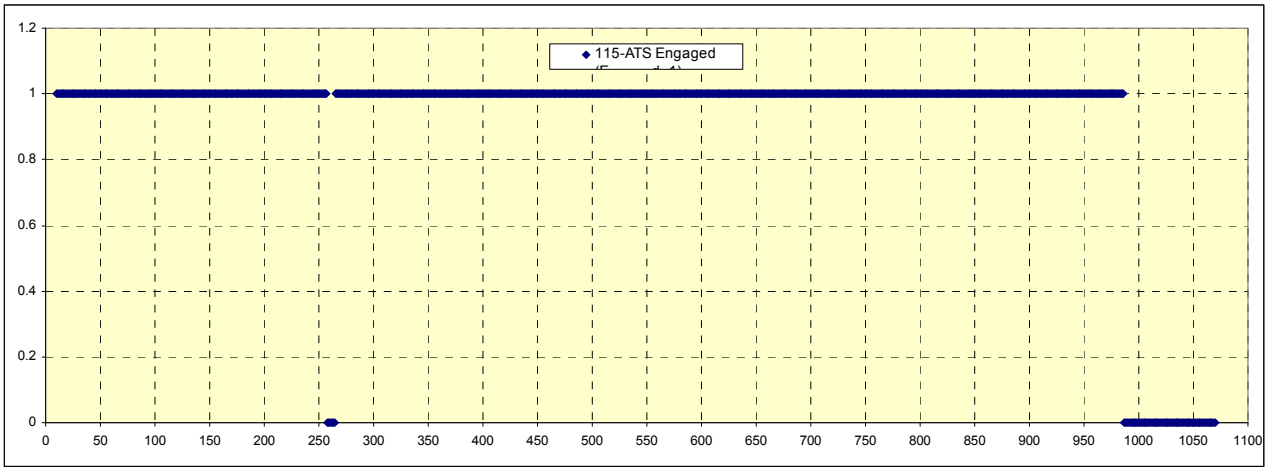
101-Ail green Avai L(Avail=1)



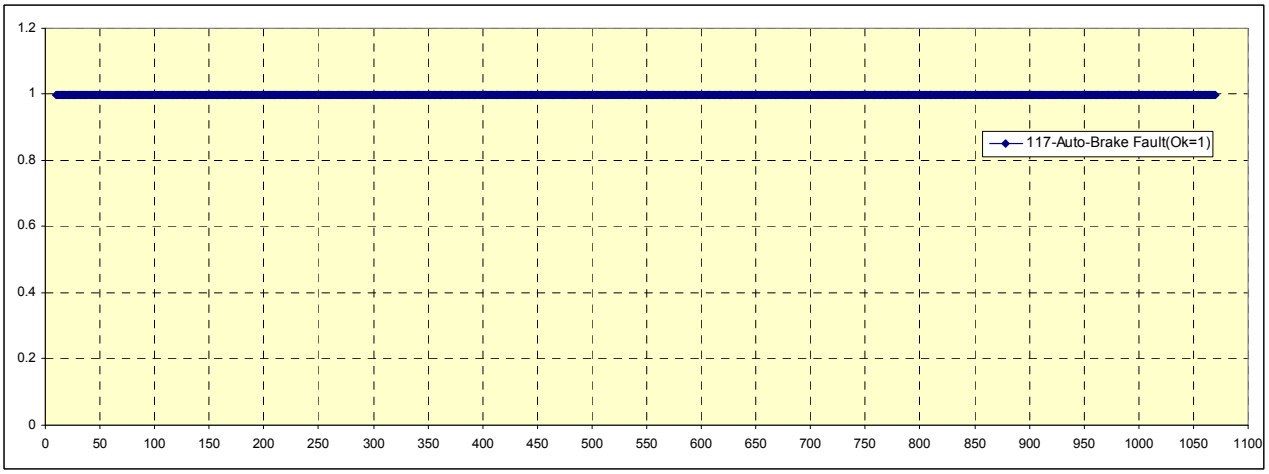
102-Ail green Avai R (Avail=1)



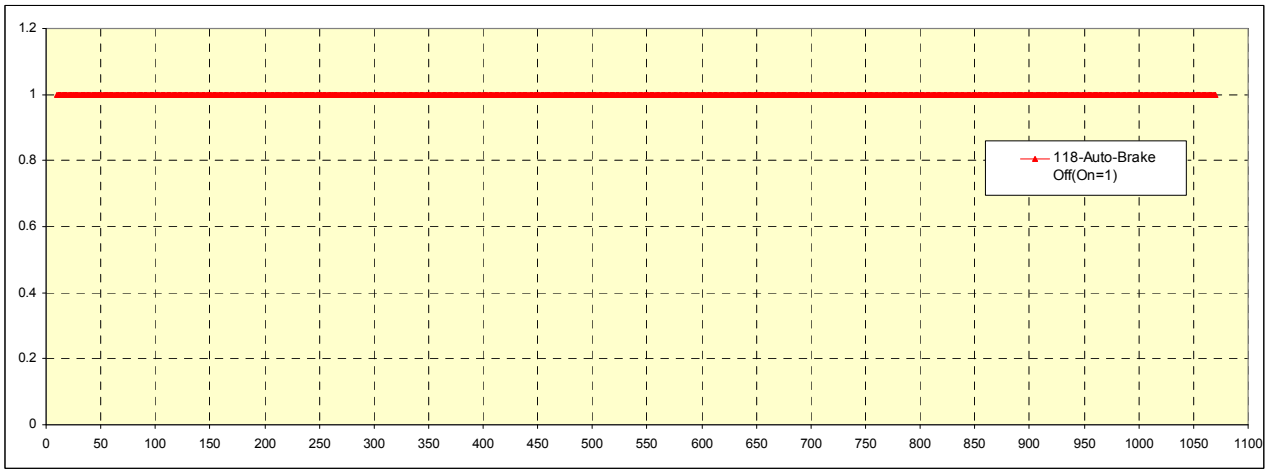
101, 102-Ail green Avai L, R (Avail=1)



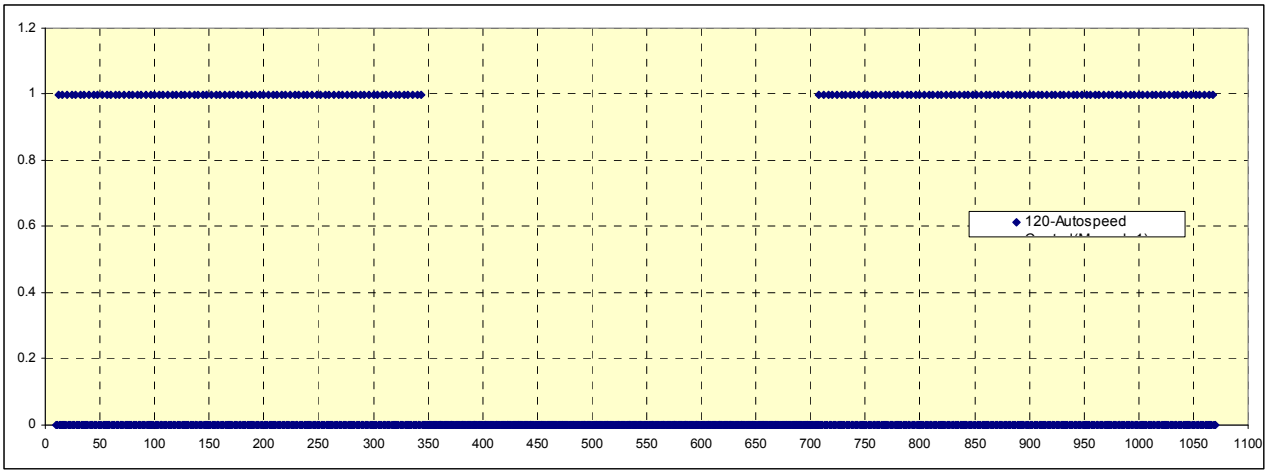
115 ATS Engaged



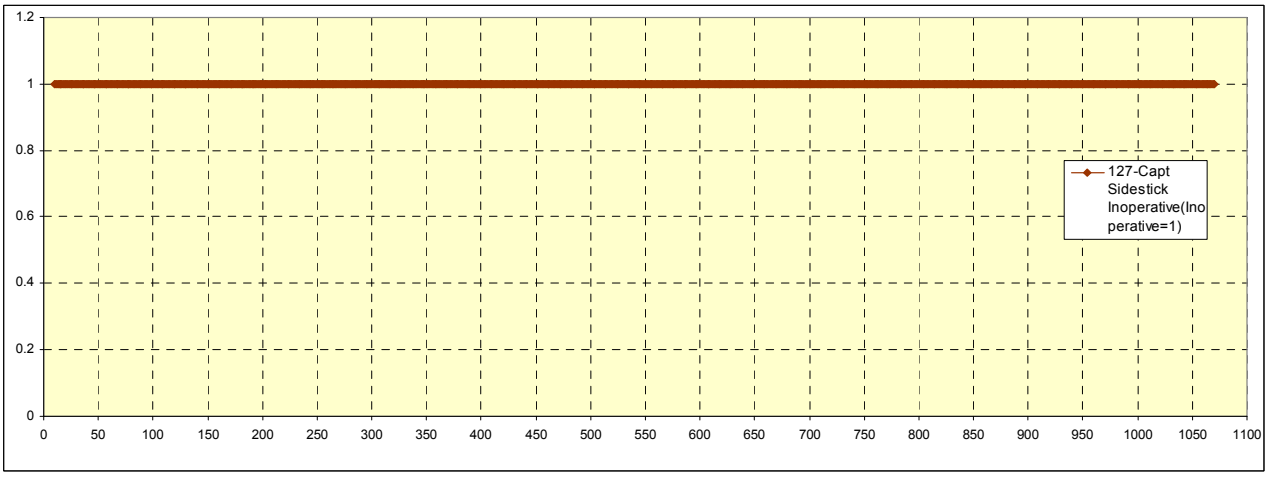
117 Auto brake Fault



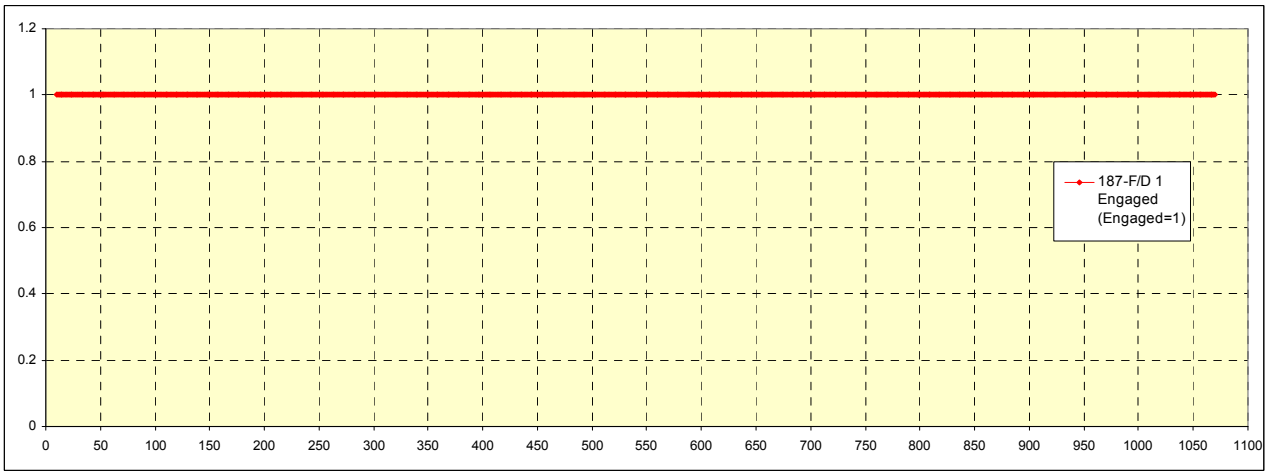
118 Auto brake Off (On=1)



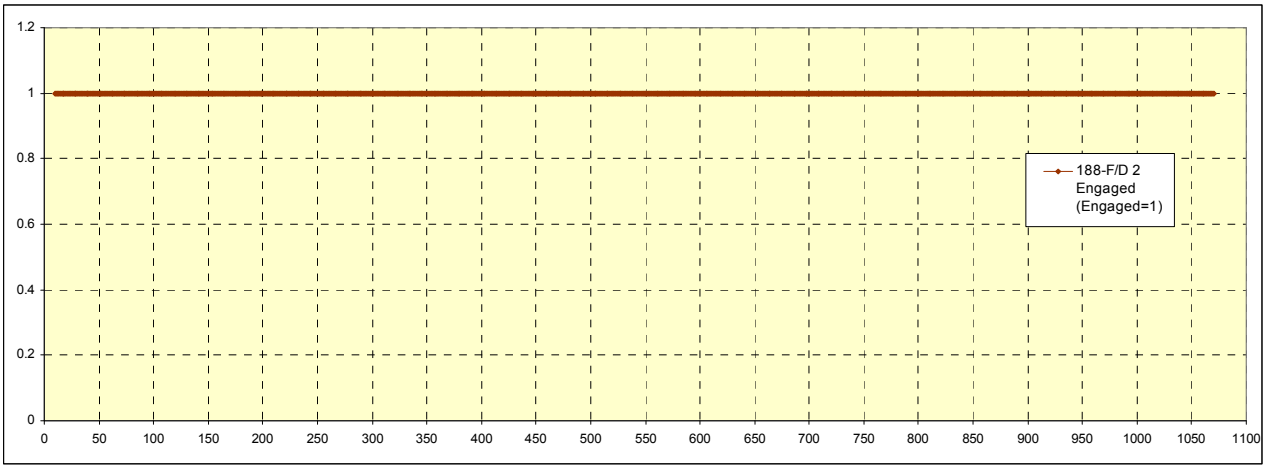
120 Autospeed



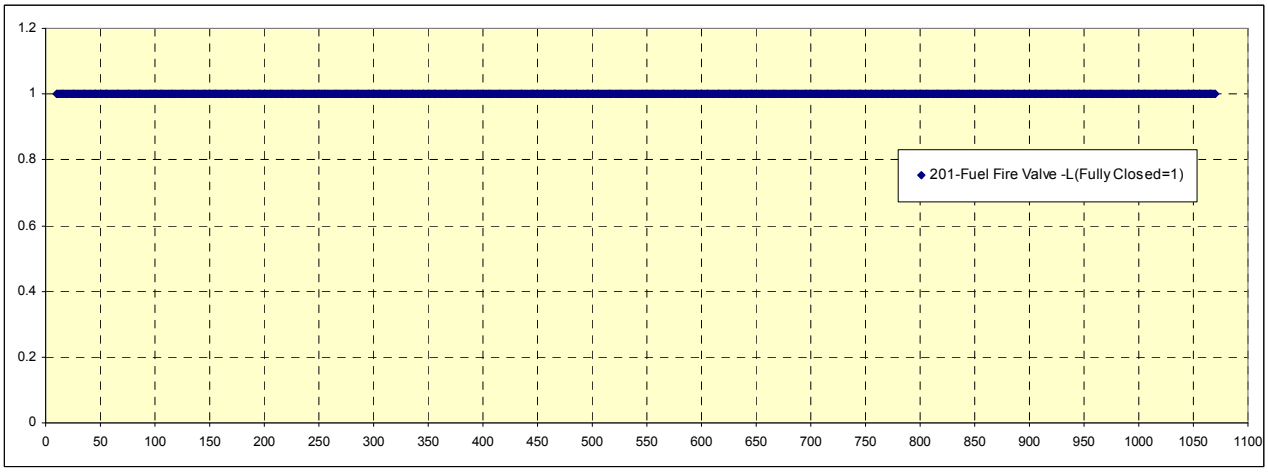
127 Captain Side Stick Inoperative



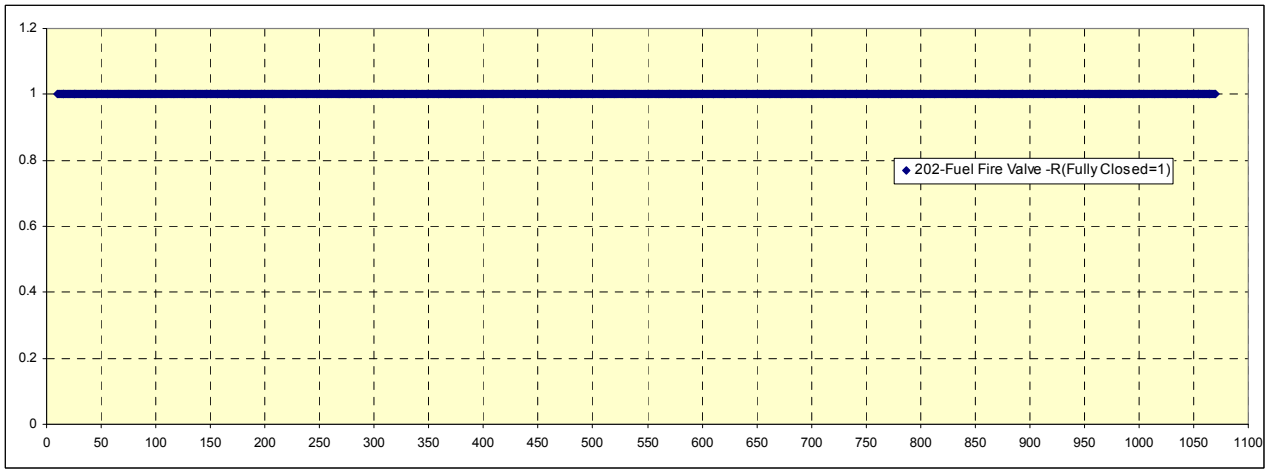
187 F/D 1 Engaged (Engaged=1)



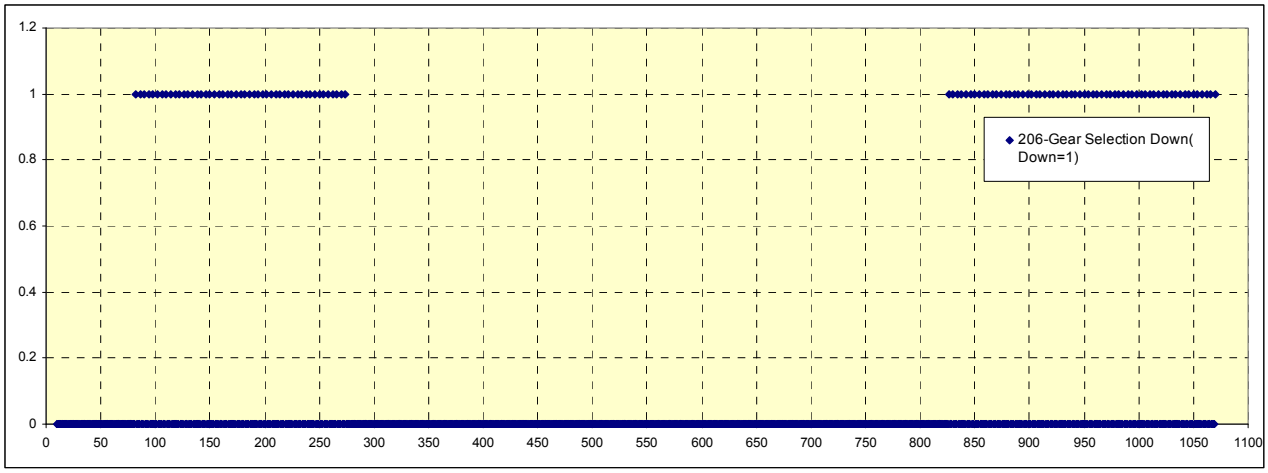
188 F/D 2 Engaged (Engaged=1)



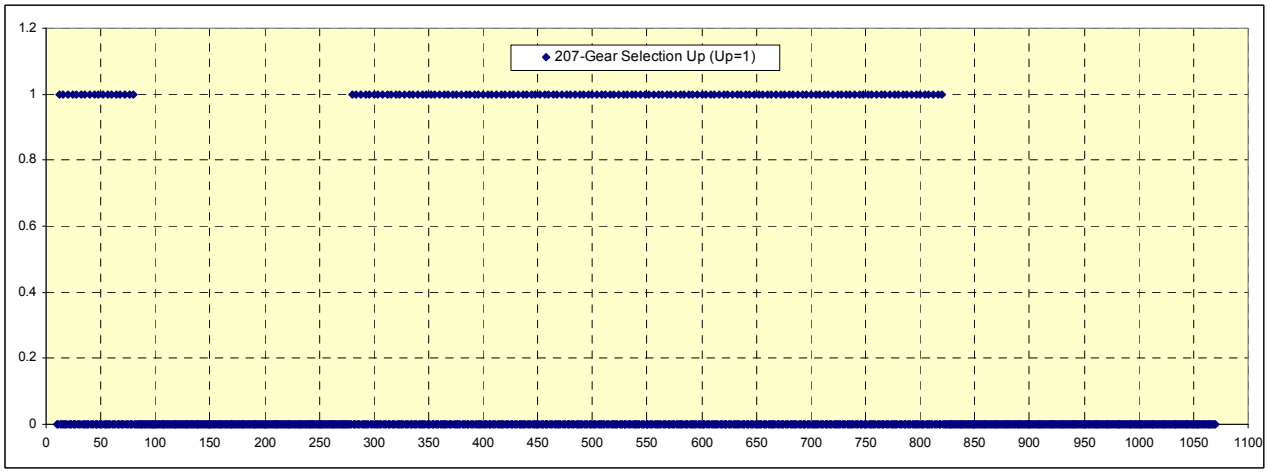
201 Fuel Fire Valve L



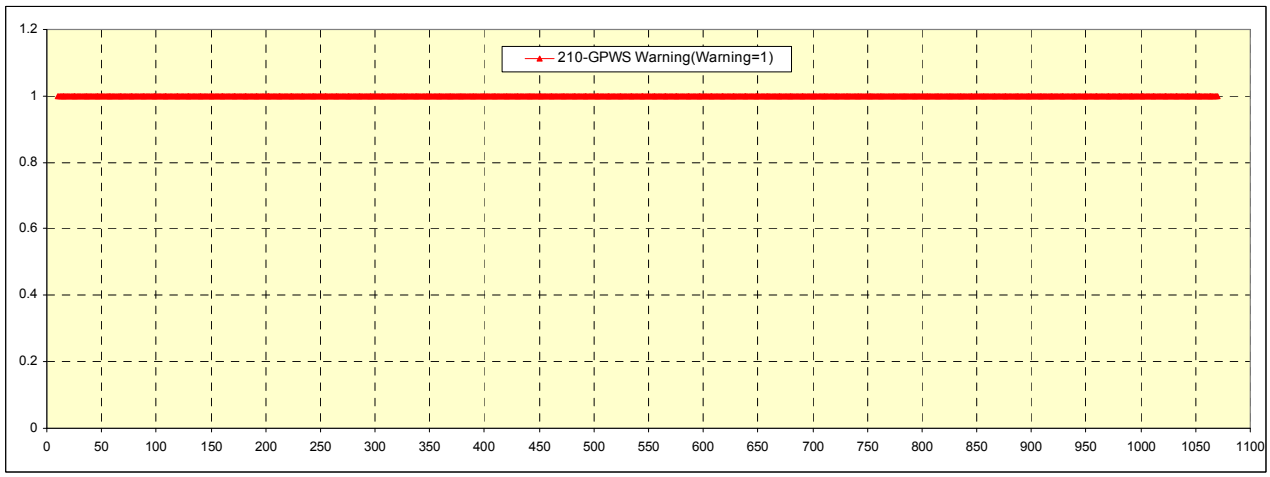
202 Fuel Fire Valve R



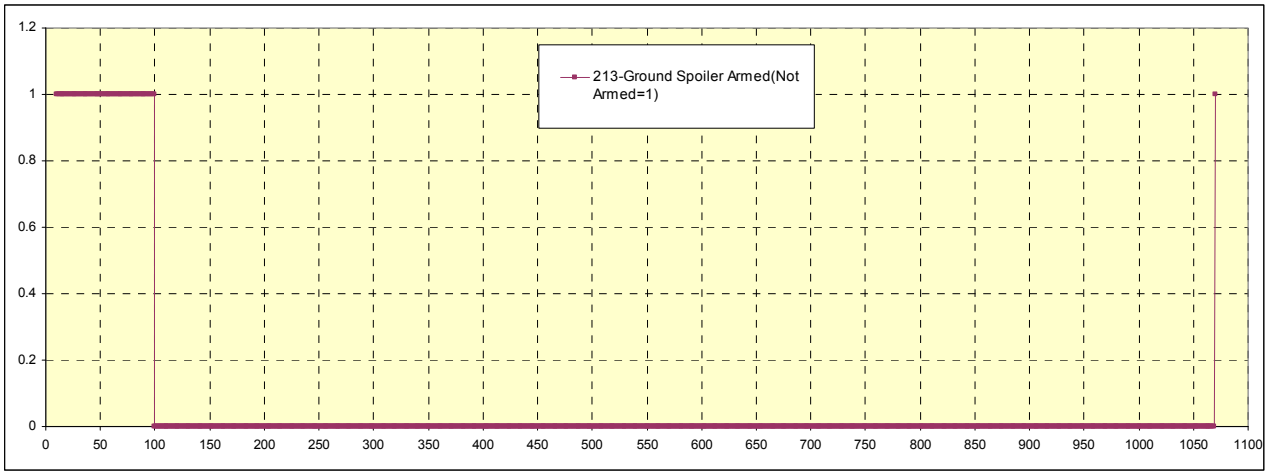
206 Gear Selection Down



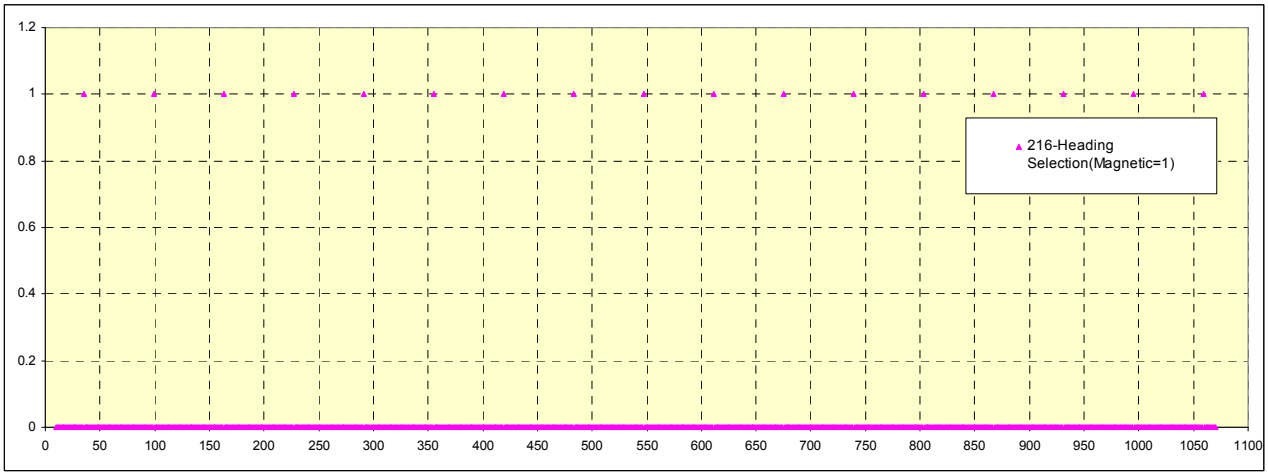
207 Gear Selection Up



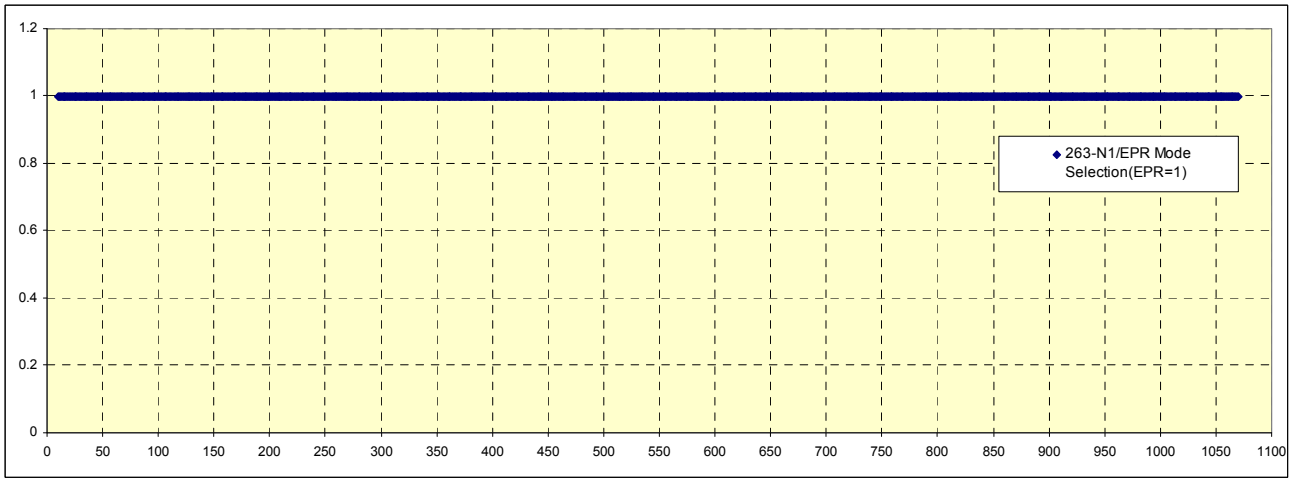
210 GPWS Warning



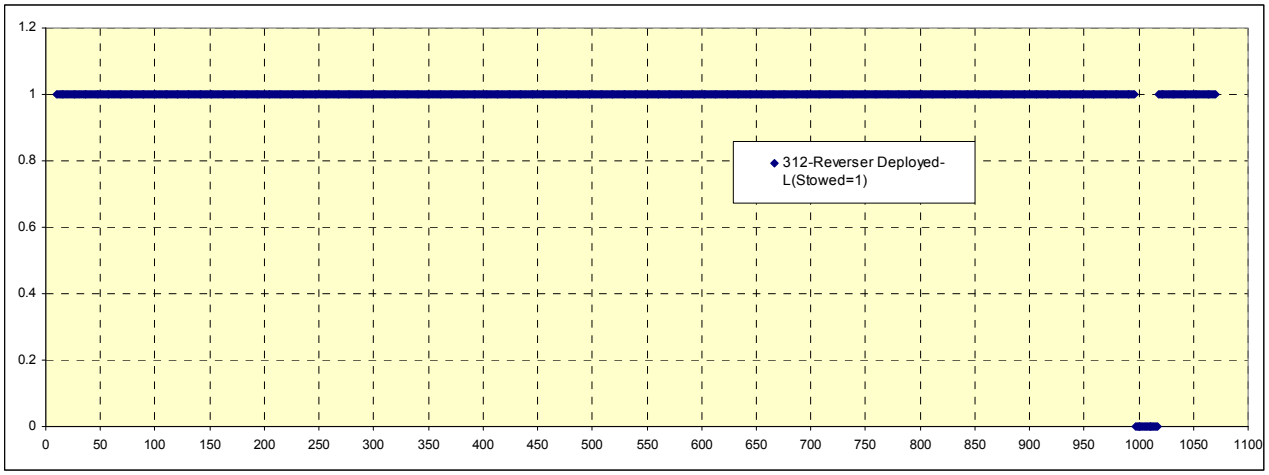
213 Ground Spoilers Armed



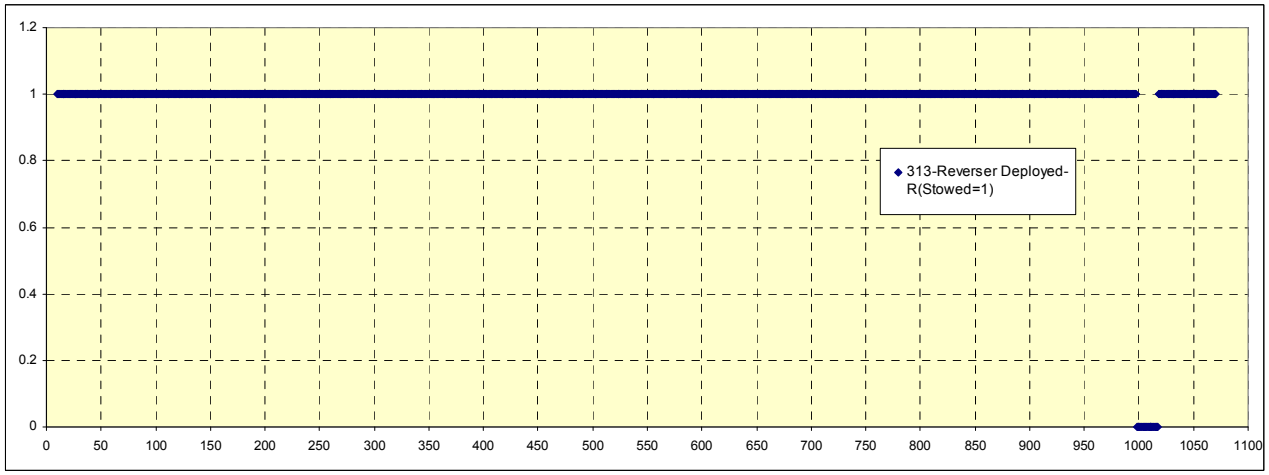
216 Ground Spoilers Armed



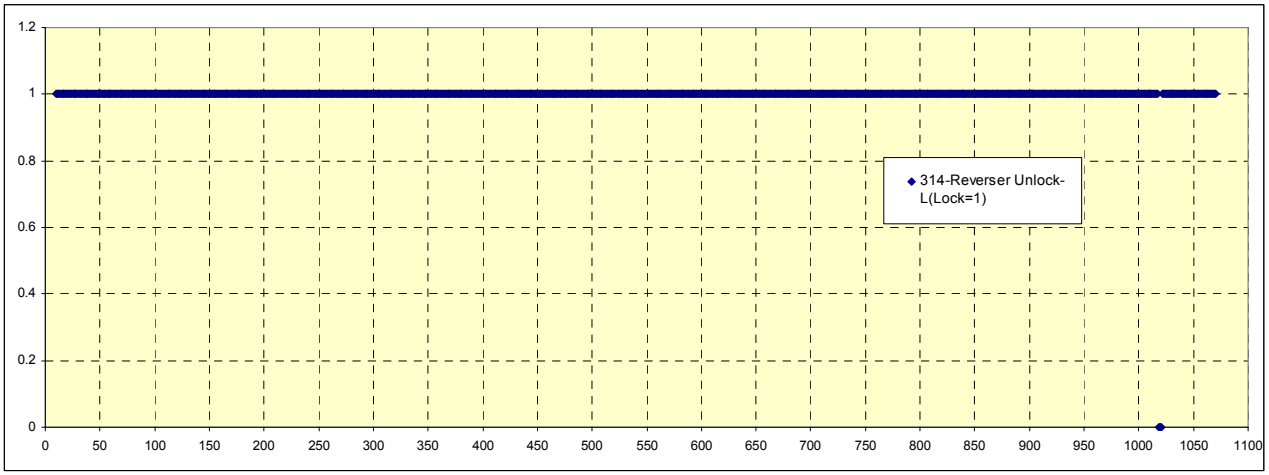
263 N1/EPR Mode Selection



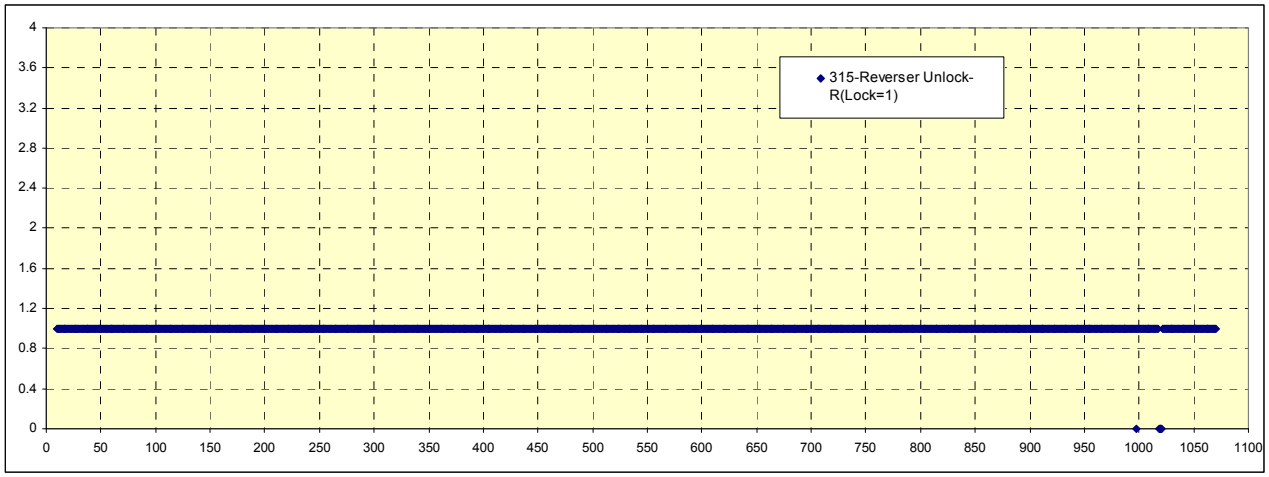
312 Reverser Deployed L



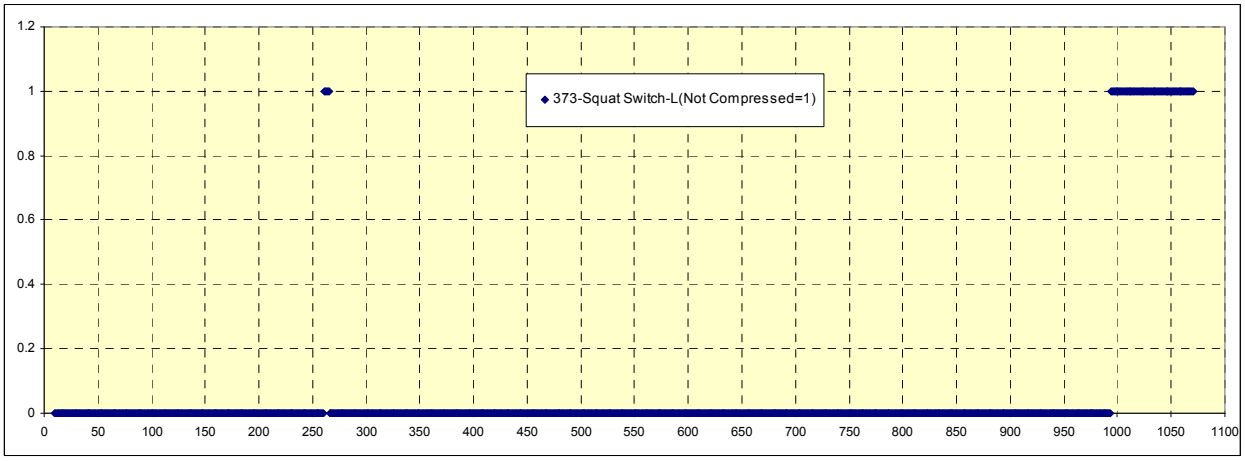
313 Reverser Deployed R



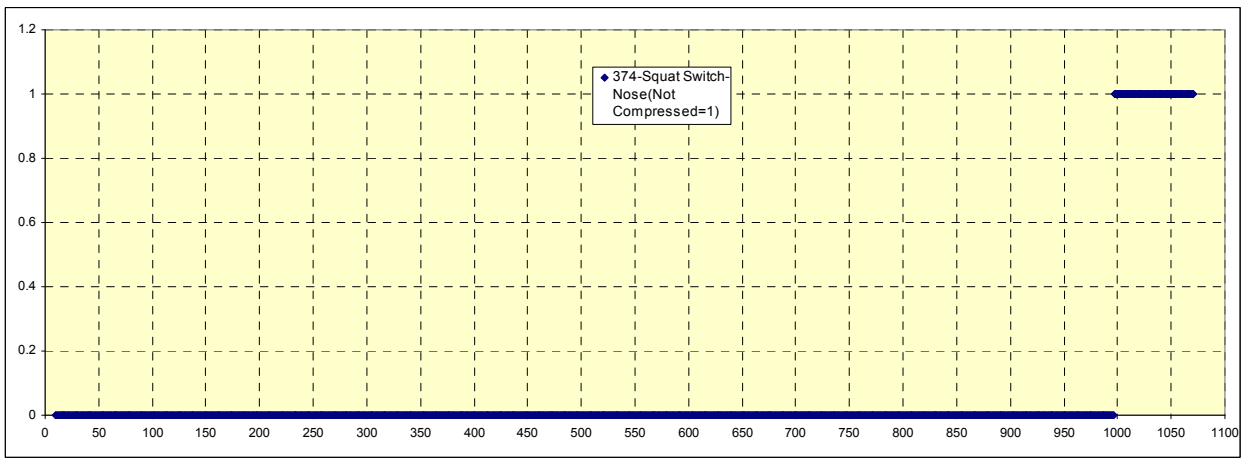
314 Reverser Unlocked L



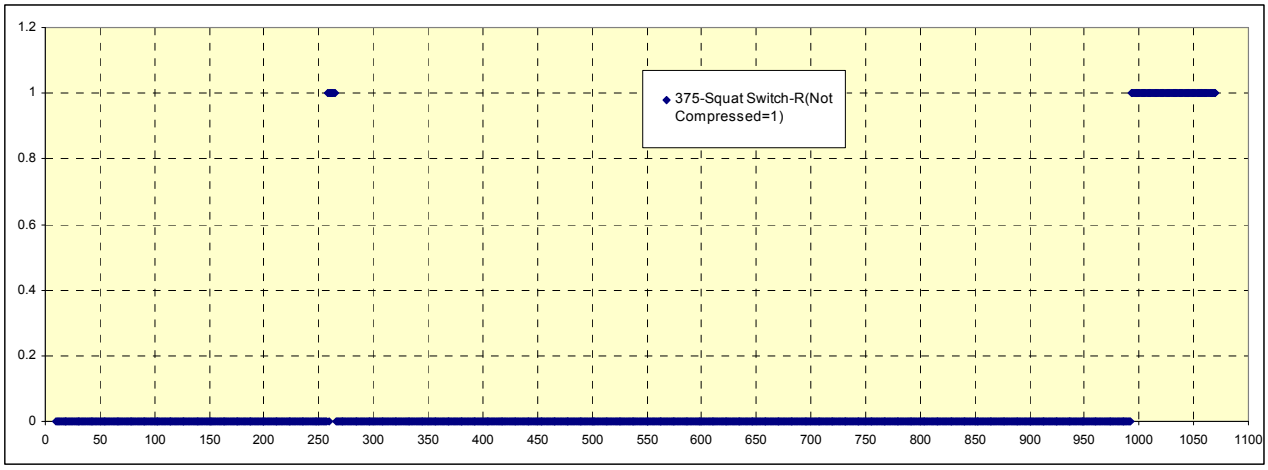
315 Reverser Unlocked R



373 Squat Switch L



374 Squat Switch Nose



375 Squat Switch R

Exhibit #3: Response from FATA regarding the Draft Final Report issued by Egyptian AAI

Exhibit #3: Response from FATA regarding the Draft Final Report issued by Egyptian AAI

From: Отдел ПЛГ ГВС [olg@uralfavt.ru]
Sent: 30 October 2013 11:02
To: diraai
Cc: r.chebrov@uralairlines.ru
Subject: FW: FW: [!! SPAM] FW: incident ,Airbus A321 aircraft tail strike, Registration VQ-BOC, Flight No. SVR3027 at Hurghada Airport on 28th February 2013.

From: r.chebrov [mailto:r.chebrov@uralairlines.ru]
Sent: Wednesday, October 30, 2013 2:43 PM
To: Отдел ПЛГ ГВС
Subject: Re: FW: [!! SPAM] FW: incident ,Airbus A321 aircraft tail strike, Registration VQ-BOC, Flight No. SVR3027 at Hurghada Airport on 28th February 2013.

Dear Sir,

Please accept our apology for a late comment.
We have studied the draft final report and appreciated a great job done by your investigation team.
We have no any significant comments on the content of the report but just few remarks.
1- As a result of internal investigation conducted by the Ural Airlines Flight Safety Department we got a report. The conclusions on the cause of the event were close to the ones published in your draft final report. In addition:
a) from pilots interrogation it was concluded - after touching down the RWY both pilots become sure that the aircraft bounced of RWY and was floating close to the ground. The same time DFDR data showed both landing gears compressed. It was found that probable cause of the illusion might be combination of very little bounce followed by soft touch down and abnormal pitch attitude at the time of the landing. FO was holding the aircraft nose high to prevent hard landing. This pilot technique was against the Airbus recommendation (FCTM) and the Company SOP for the case of bouncing at landing. The Captain failed to properly conduct his duties as a Pilot Non Flying for aircraft pitch monitoring at landing and timely announcing exceeding of this parameter.
b)- It was found that pilots were possibly affected by the fatigue influence of the long duty period and early time of the day but it was checked that the duty period of this flight was in strict compliance with Ural Airlines duty time regulations.
2- In few places in the draft final report Hurghada was spelled as Herghada and we are not sure if it is correct.

Any way as per ICAO Annex 13 we are going to inform you about an implementation of the final report safety recommendations.

With best regards,

With the best regards,
Vyacheslav Gora
Accredited Representative
State Inspector of the FATA Ural Regional office
The Federal Air Transport Agency (FATA)
Russian Federation
mailto:olg@uralfavt.ru
tel.: +7 922 163 53 72