GLS/LPV Flight Validation

Airports Authority of India

Madan Lal,
Jt.GM(CNS)-FIU

GBAS/SBAS Implementation Workshop
Seoul,Republic of Korea,3-5 June,2019

GLS/LPV Flight Validation

- Requirements of Flight Validation
- Capability of Airports authority of India to undertake Flight validation
- AAI Status of Flight validation in India
- Challenges

Requirements of Flight Validation

GNSS *flight inspection requirements*

- *ICAO Doc 8071 Vol II defines the requirements for flight inspection of GNSS procedures and validation of the instrument flight procedures.*

Requirements of SBAS : India GAGAN GPS Aided Geo Augmented Navigation (Chapter 3, ICAO Doc 8071 Vol-II):

- *Validation of Procedure design according to chapter 5 instrument flight procedure validation.*
- *Fly the full procedure from initial approach to missed approach.*
- *Visual verification of Missed Approach Point (MAPt)*
- *Check flyability of procedure and obstacle clearance.*
- *Check for Interferences.*
- *Check GNSS signal quality.*
- *Verify FAS data and CRC for LPV procedures.*

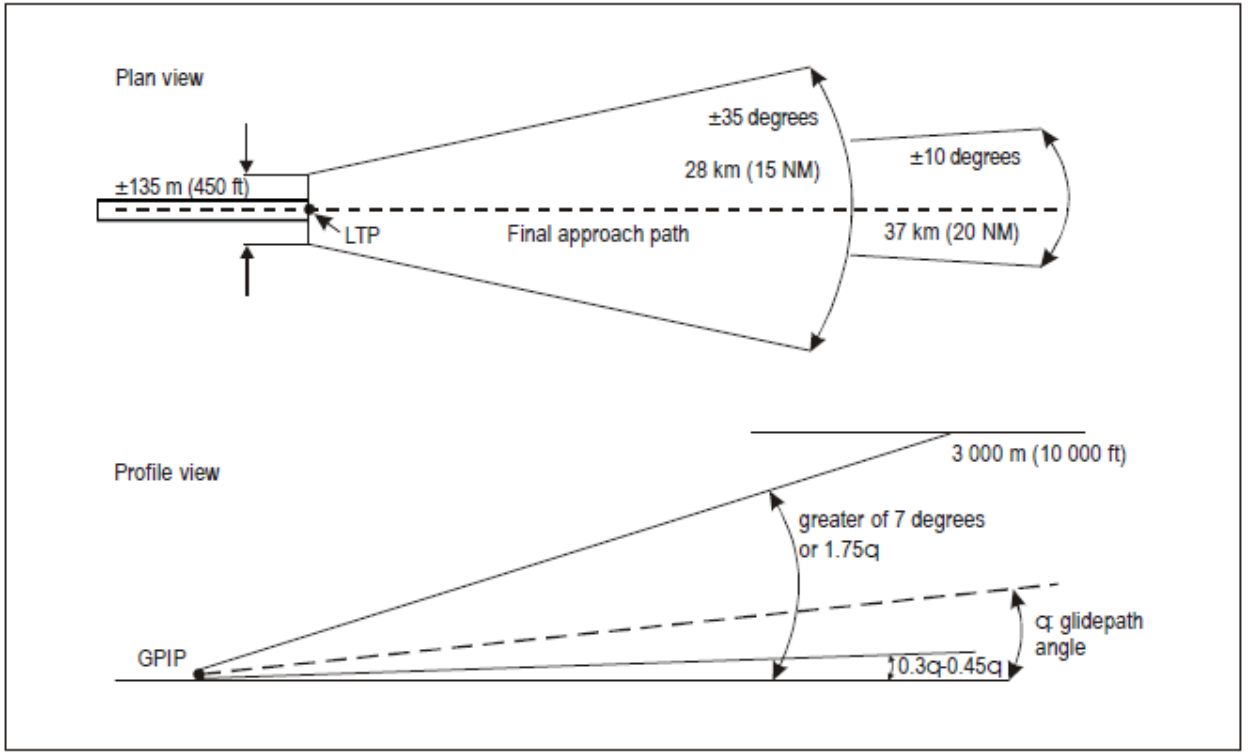
Requirements GBAS (Chapter 4, ICAO Doc 8071 Vol-II):

- *Validation of Procedure design according to chapter 5 instrument flight procedure validation.*
- *Check flyability of procedure and obstacle clearance.*
- *Check for Interferences.*
- *Measure VDB Coverage.*
- *Check GNSS signal quality.*
- *Verify FAS data and CRC.*

Requirements GBAS (Chapter 4, ICAO Doc 8071 Vol-II):

- *Flight Inspection procedures for GBAS:*
- *VDB coverage arc +/- 10 deg @ 20NM.*
- *VDB coverage arc +/- 35 deg @ 15NM.*
- *VDB coverage Level runs from 21NM @ 10000ft.*
- *VDB coverage Level runs from 21NM @ 2000ft Final Approach path.*
- *Logging of VDB signal strength and GNSS signal quality*

Coverage Area Approach



GPIP — glide path intersection point
LTP — landing threshold point

Why Flight Inspection of GNSS?

GNSS signal itself can not be calibrated, but the following data must be verified / measured:

- *Verification that all procedure data are correct*
- *Flyability*
- *Terrain / Obstacle clearance check*
- *RF Interference check*
- *Continental Drift / Earthquakes can invalidate previous checked FAS data.*
- *New Obstacles can be a safety issue.*

Sensors Required

- *Aircraft should be equipped to fly procedure.*
- *SBAS capable cockpit equipment.*
- *(For GBAS - guidance is normally provided to cockpit from FIS installed GBAS receiver)*
- *The Flight Inspection System (FIS) must be equipped to analyze received signals.*

Capability of Airports authority of India to undertake Flight validation

Capability of AAI

- Airports Authority of India is having fleet of;
  - One Beechcraft B-350 aircraft with GPS 4000S receiver capable to receive WAAS,EGNOS,MSAS and GAGAN signals.
  - FMC 3000 with upgraded software to carry out procedure validation.
  - Fitted with AFIS AD-200 having GBAS receiver GNLU 930 *Multi Mode Receiver used for GBAS and SBAS flight inspection*, capable of flight inspection of Radio Navigational aids, Flight validation of GBAS and SBAS.

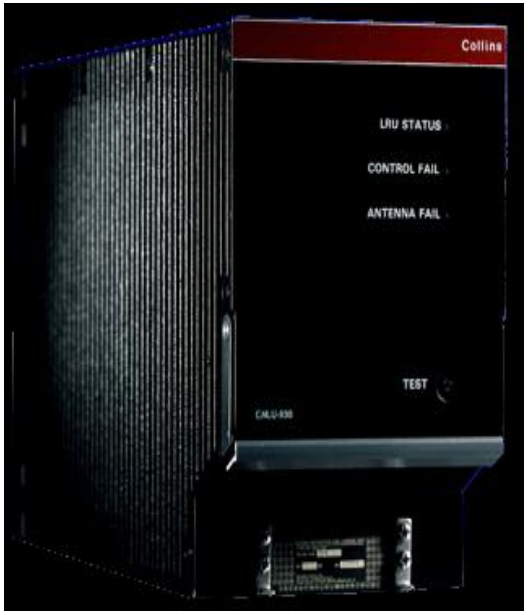
Capability of AAI

- Two Dornier DO-228 aircrafts fitted with AFIS AD-200 capable for Flight Inspection of Ground Radio Navigation Aids and SBAS procedures.
- FIU flight crew is trained to fly LPV IAPs.
- FIU aircraft (B-350) is equipped to record LPV IAP flight path and reproduce the same for documentation.
- **LPV procedures can be flight evaluated by FIU (B-350)aircraft**.

POST ENABLE STATUS OF SBAS SERVICE PROVIDERS ON CONTROL DISPLAY UNIT(CDU)

GNLU 930

- *Collins GNLU-930 Multi Mode Receiver often used for GBAS and SBAS flight inspection. The unit operates with dedicated flight inspection firmware to support the output of extensive data related to flight inspection of GPS, SBAS and GBAS procedures.*



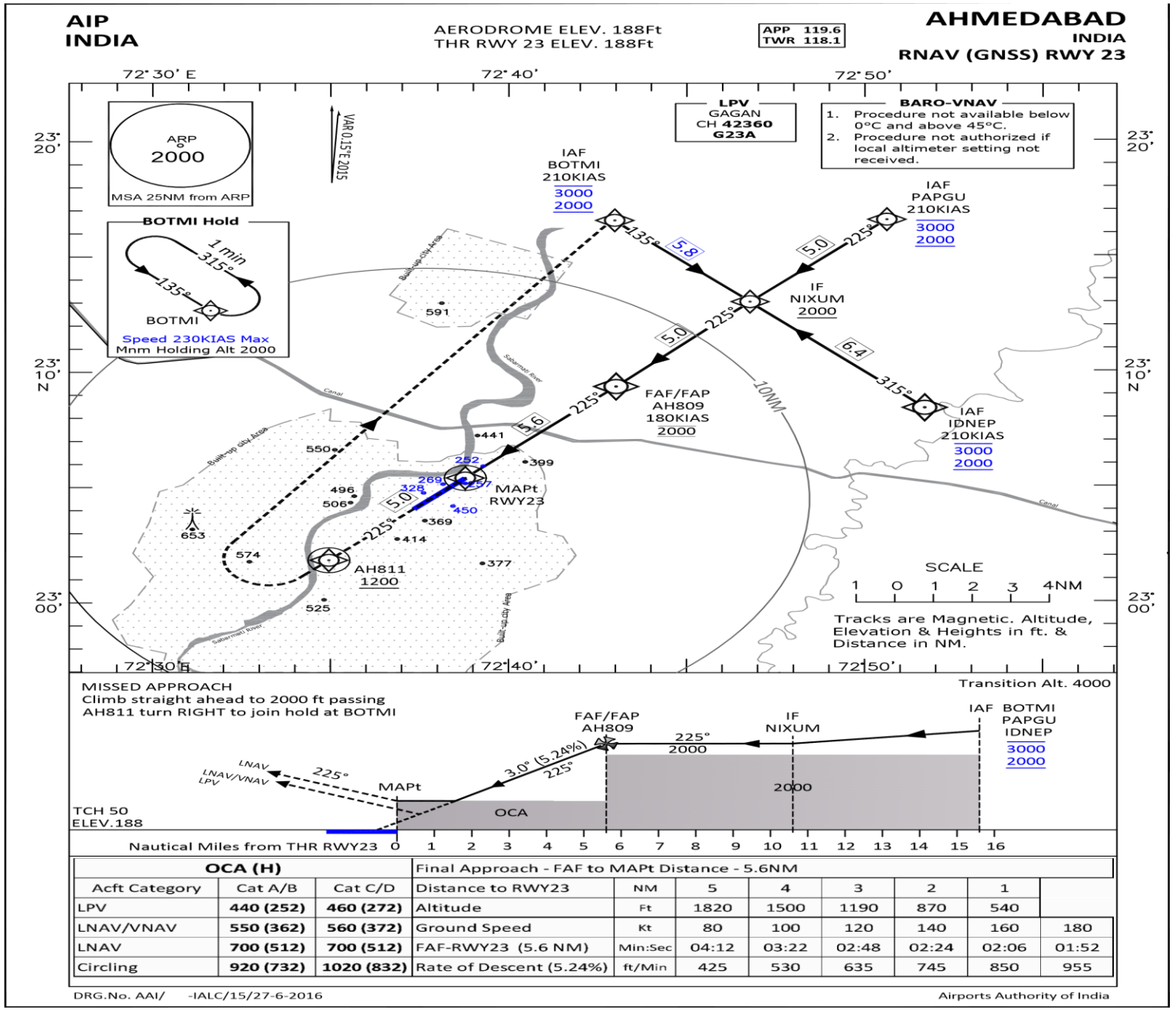
Spectrum Analysis

- *Spectrum Analyser is used for detection of interference in GPS band and VDB band (GBAS)*

Status of Flight validation in India

AAI Status on GLS/LPV Procedure validation

- GLS Flight Validation
  - Procedures design under process by AAI.
- LPV procedure Validation
  - 48 Procedures for 24 airports submitted by AAI(ATM) to DGCA, India.
  - LPV procedure of Ahmedabad airport RWY 23 Validated by B-350(VT-FIU) aircraft on 16/05/2019.



OCA (H)			Final Approach - FAF to MAPt Distance - 5.6NM							
Acft Category	Cat A/B	Cat C/D	Distance to RWY23	NM	5	4	3	2	1	
LPV	**440 (252)**	**460 (272)**	Altitude	Ft	1820	1500	1190	870	540	
LNAV/VNAV	**550 (362)**	**560 (372)**	Ground Speed	Kt	80	100	120	140	160	180
LNAV	**700 (512)**	**700 (512)**	FAF-RWY23 (5.6 NM)	Min:Sec	04:12	03:22	02:48	02:24	02:06	01:52
Circling	**920 (732)**	**1020 (832)**	Rate of Descent (5.24%)	ft/Min	425	530	635	745	850	955

DRG.No. AAI/ -IALC/15/27-6-2016

Airports Authority of India

VAAH RNP APCH (LPV) RWY23 - Coding Table

Serial No.	Path Descriptor	Waypoint Identifier	Fly Over	Course ^{0}M (^{0}T)	Mag Var (Deg)	Distance (NM)	Turn Direction	Altitude (Ft)	Speed Limit (Kt)	Vertical Angle/TCH	Navigation Specification
10	IF	BOTMI						+2000/-3000	210		
20	TF	NIXUM	-	135.13(134.98)	+0.1521	5.82	R	+2000		-	RNP APCH
10	IF	PAPGU						+2000/-3000	210		
20	TF	NIXUM	-	224.52(224.68)	+0.1521	5.00	-	+2000		-	RNP APCH
10	IF	IDNEP						+2000/-3000	210		
20	TF	NIXUM	-	314.49(314.64)	+0.1521	6.37	L	+2000		-	RNP APCH
30	TF	AH809	-	224.52(224.68)	+0.1521	5.00	-	2000	180		RNP APCH
40	TF	RW23	Y	224.52(224.68)	+0.1521	5.53	-	460	-	-3.00/50	RNP APCH
50	CF	AH811	Y	224.52(224.68)	+0.1521	5.00	-	+1200	-	-	RNP APCH
60	DF	BOTMI		-	-	-	R	+2000	-		RNP APCH
70	HM	BOTMI		135.13(134.98)	+0.1521		L	+2000			

VAAH RNP APCH (LPV) RWY23 - Holding

Path Terminator	Holding Fix	Inbound Track ^{0}M (^{0}T)	Max Speed (Kt IAS)	Min/ Max Holding Altitude (Ft)	Time/ Dist outbound	Turn Direction
HM	BOTMI	135.13(134.98)	230	2000/FL140	1 min	LT

VAAH RNP APCH (LPV) RWY23 - Waypoint Coordinates

Waypoint	Function	Latitude	Longitude
BOTMI	IAF/Holding Fix	231655.46N	0724219.62E
PAPGU	IAF	231623.22N	0725038.41E
IDNEP	IAF	230819.52N	0725144.26E
NIXUM	IF	231249.20N	0724649.35E
AH809	FAF	230915.18N	0724300.40E
RW23	MAPt	230518.47N	0723847.23E
AH811	MATF	230144.35N	0723458.59E

VAAH RNP APCH (LNAV) RWY23 - Coding Table

Serial No.	Path Descriptor	Waypoint Identifier	Fly Over	Course ^{0}M (^{0}T)	Mag Var (Deg)	Distance (NM)	Turn Direction	Altitude (Ft)	Speed Limit (Kt)	Vertical Angle/TCH	Navigation Specification
10	IF	BOTMI						+2000/-3000	210		
20	TF	NIXUM	-	135.13(134.98)	+0.1521	5.82	R	+2000		-	RNP APCH
10	IF	PAPGU						+2000/-3000	210		
20	TF	NIXUM	-	224.52(224.68)	+0.1521	5.00	-	+2000		-	RNP APCH
10	IF	IDNEP						+2000/-3000	210		
20	TF	NIXUM	-	314.49(314.64)	+0.1521	6.37	L	+2000		-	RNP APCH
30	TF	AH809	-	224.52(224.68)	+0.1521	5.00	-	2000	180		RNP APCH
40	TF	RW23	Y	224.52(224.68)	+0.1521	5.53	-	700	-	-3.00/50	RNP APCH
50	CF	AH811	Y	224.52(224.68)	+0.1521	5.00	-	+1200	-	-	RNP APCH
60	DF	BOTMI		-	-	-	R	+2000	-		RNP APCH
70	HM	BOTMI		135.13(134.98)	+0.1521		L	+2000			

VAAH RNP APCH (LNAV) RWY23 - Holding

Path Terminator	Holding Fix	Inbound Track ^{0}M (^{0}T)	Max Speed (Kt IAS)	Min/ Max Holding Altitude (Ft)	Time/ Dist outbound	Turn Direction
HM	BOTMI	135.13(134.98)	230	2000/FL140	1 min	LT

VAAH RNP APCH (LNAV) RWY23 - Waypoint Coordinates

Waypoint	Function	Latitude	Longitude
BOTMI	IAF/Holding Fix	231655.46N	0724219.62E
PAPGU	IAF	231623.22N	0725038.41E
IDNEP	IAF	230819.52N	0725144.26E
NIXUM	IF	231249.20N	0724649.35E
AH809	FAF	230915.18N	0724300.40E
RW23	MAPt	230518.47N	0723847.23E
AH811	MATF	230144.35N	0723458.59E

VAAH RNP APCH (VNAV) RWY23 - Coding Table

Serial No.	Path Descriptor	Waypoint Identifier	Fly Over	Course ^{0}M (^{0}T)	Mag Var (Deg)	Distance (NM)	Turn Direction	Altitude (Ft)	Speed Limit (Kt)	Vertical Angle/TCH	Navigation Specification
10	IF	BOTMI						+2000/-3000	210		
20	TF	NIXUM	-	135.13(134.98)	+0.1521	5.82	R	+2000		-	RNP APCH
10	IF	PAPGU						+2000/-3000	210		
20	TF	NIXUM	-	224.52(224.68)	+0.1521	5.00	-	+2000		-	RNP APCH
10	IF	IDNEP						+2000/-3000	210		
20	TF	NIXUM	-	314.49(314.64)	+0.1521	6.37	L	+2000		-	RNP APCH
30	TF	AH809	-	224.52(224.68)	+0.1521	5.00	-	2000	180		RNP APCH
40	TF	RW23	Y	224.52(224.68)	+0.1521	5.53	-	560	-	-3.00/50	RNP APCH
50	CF	AH811	Y	224.52(224.68)	+0.1521	5.00	-	+1200	-	-	RNP APCH
60	DF	BOTMI		-	-	-	R	+2000	-		RNP APCH
70	HM	BOTMI		135.13(134.98)	+0.1521		L	+2000			

VAAH RNP APCH (VNAV) RWY23 - Holding

Path Terminator	Holding Fix	Inbound Track ^{0}M (^{0}T)	Max Speed (Kt IAS)	Min/ Max Holding Altitude (Ft)	Time/ Dist outbound	Turn Direction
HM	BOTMI	135.13(134.98)	230	2000/FL140	1 min	LT

VAAH RNP APCH (VNAV) RWY23 - Waypoint Coordinates

Waypoint	Function	Latitude	Longitude
BOTMI	IAF/Holding Fix	231655.46N	0724219.62E
PAPGU	IAF	231623.22N	0725038.41E
IDNEP	IAF	230819.52N	0725144.26E
NIXUM	IF	231249.20N	0724649.35E
AH809	FAF	230915.18N	0724300.40E
RW23	MAPt	230518.47N	0723847.23E
AH811	MATF	230144.35N	0723458.59E

Input data

Operation Type	0
SBAS Provider	3
Airport Identifier	VAAH
Runway	23
Runway Direction	0
Approach Performance Designator	0
Route Indicator	
Reference Path Data Selector	0
Reference Path Identifier	G23A
LTP/FTP Latitude	230518.4665N
LTP/FTP Longitude	0723847.2300E
LTP/FTP Ellipsoidal Height (metres)	2.0
FPAP Latitude	230356.5550N
Delta FPAP Latitude (seconds)	-81.9115
FPAP Longitude	0723719.7105E
Delta FPAP Longitude (seconds)	-87.5195
Threshold Crossing Height	50.0
TCH Units Selector	0
Glidepath Angle (degrees)	3.00
Course Width (metres)	105.00
Length Offset (metres)	40
HAL (metres)	40.0
VAL (metres)	50.0

Output data

Data Block	30 08 01 01 16 17 00 00 01 33 32 07 05 93 E8 09 7C 2D 2D 1F 14 14 11 80 FD 41 54 FD F4 01 2C 01 64 05 C8 FA 79 C9 54 85
Calculated CRC Value	79C95485

Required Additional Data

ICAO Code	VA
LTP/FTP Orthometric Height (metres)	57.3
FPAP Orthometric Height (metres)	54.6

EUROCONTROL FAS DB tool Version 3.0.1

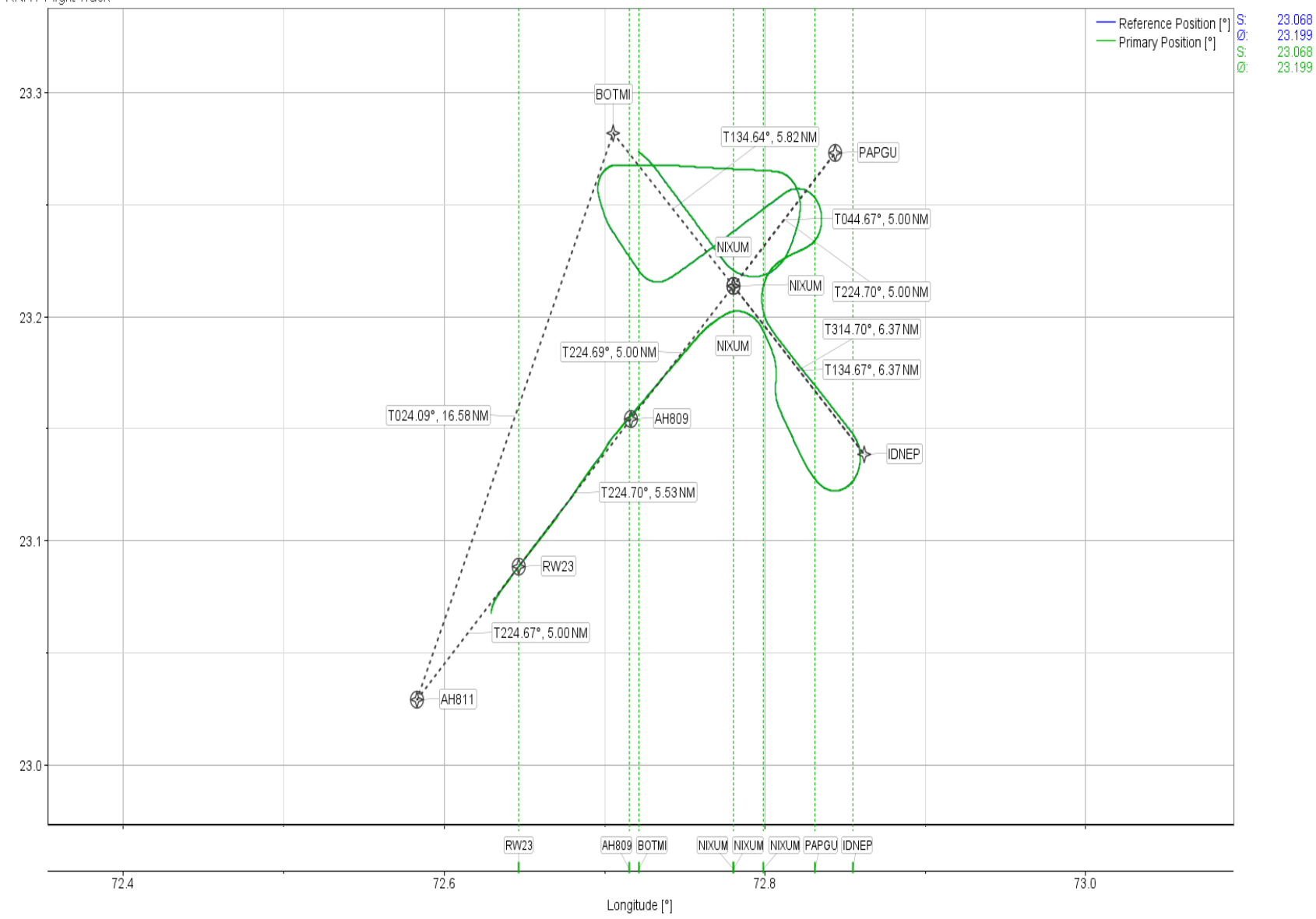
RNAV GNSSREC AC 'VT-FIU'; Company 'AAI'; Operator 'KKS'; Regulations 'ICAO'; Schedule 'Periodic'; Database: 'India'

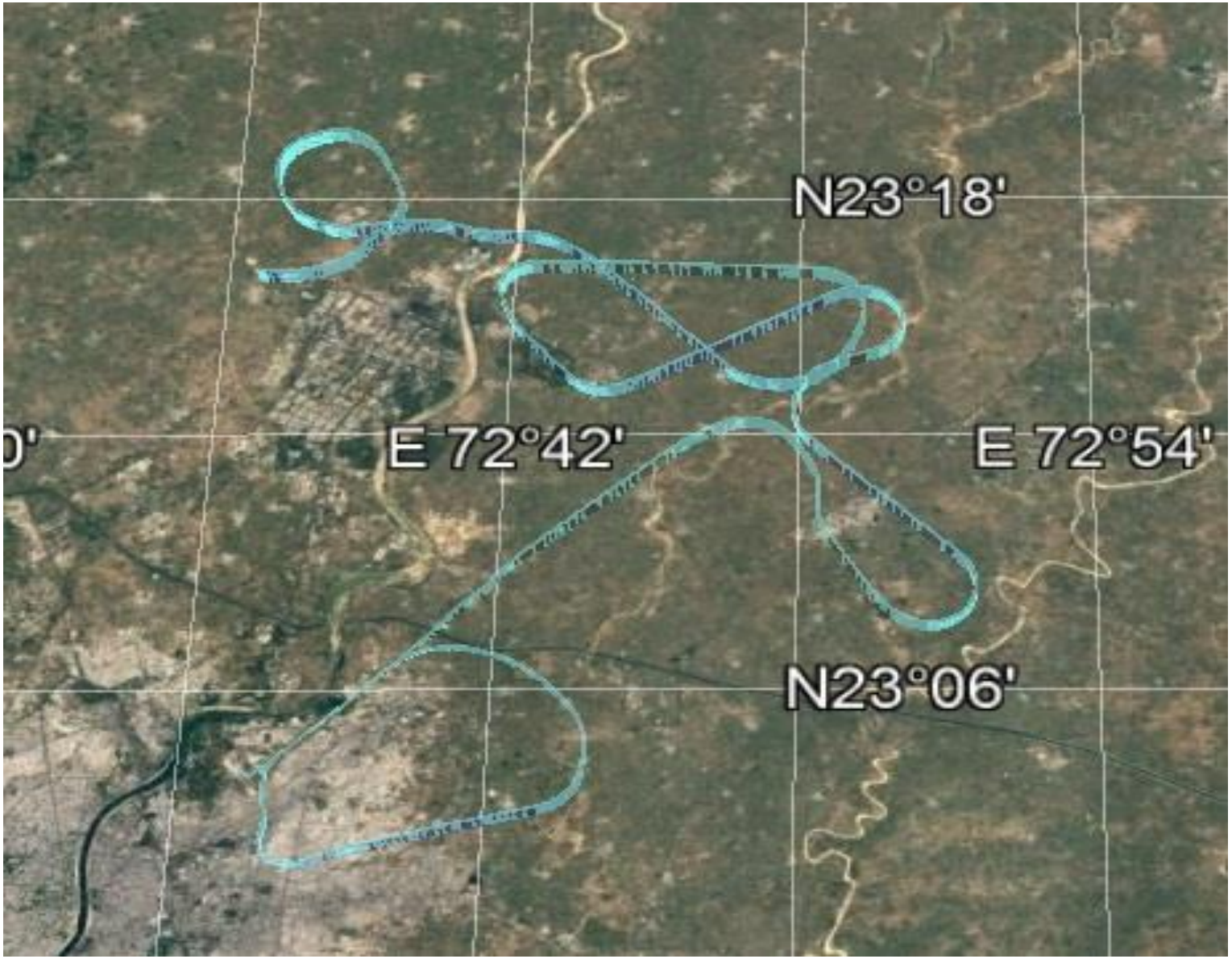
FIS GNSS, 10 Wpts: BOTMI NIXUM PAPGU NIXUM IDNEP NIXUM AH809 RW23 AH811 BOTMI

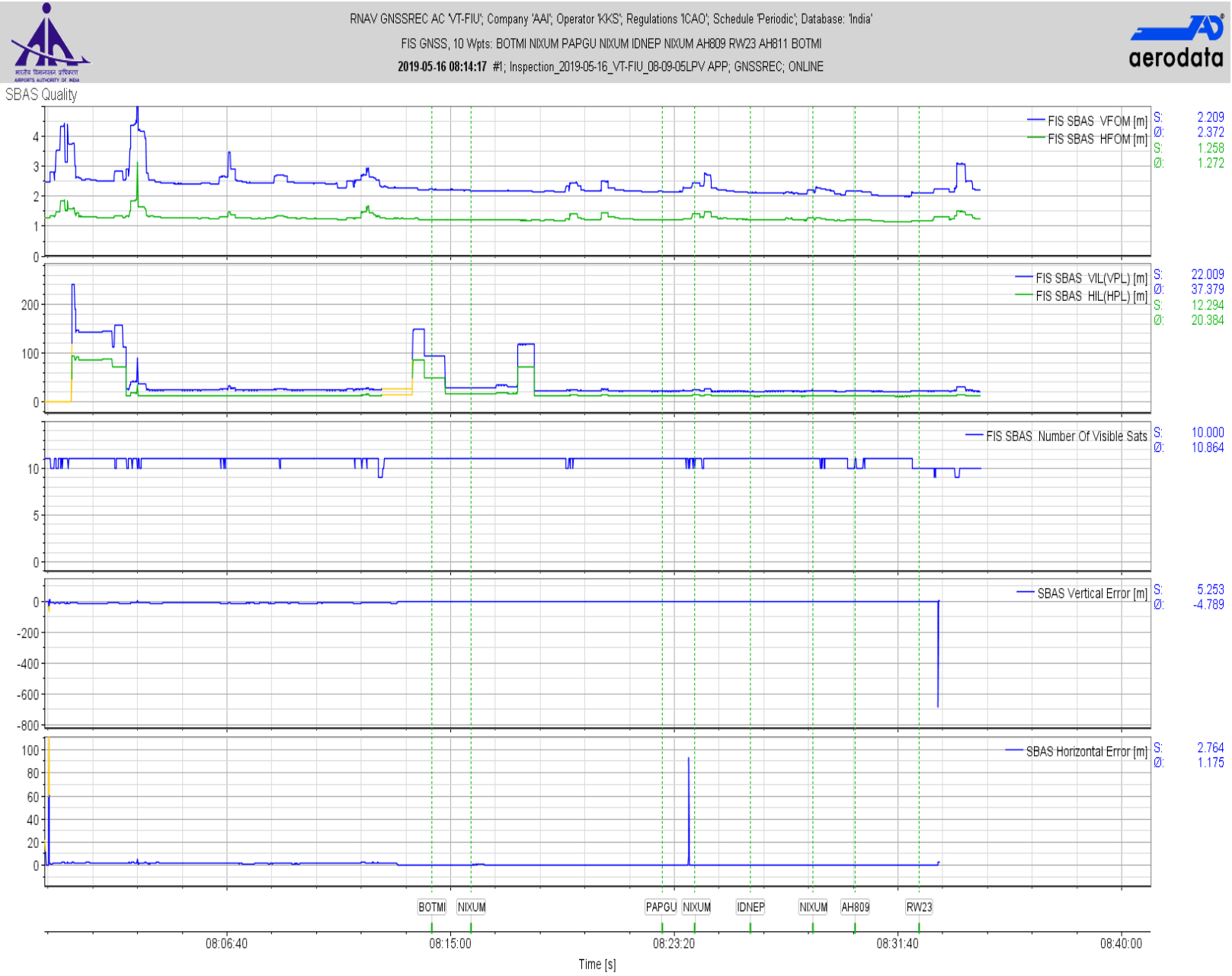
2019-05-16 08:14:17 #1; Inspection_2019-05-16_VT-FIU_08-09-05LPV APP; GNSSREC; ONLINE

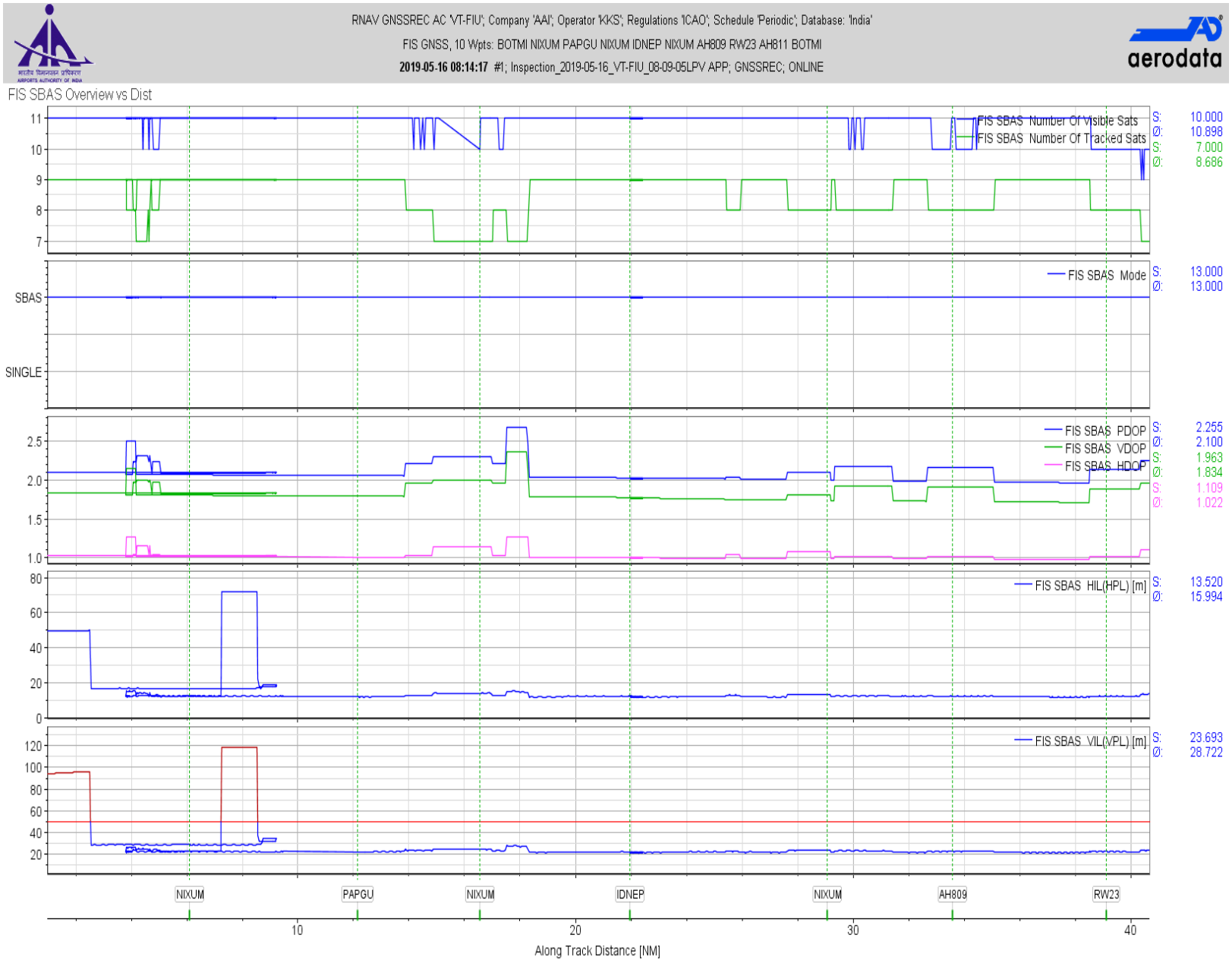
aerodata

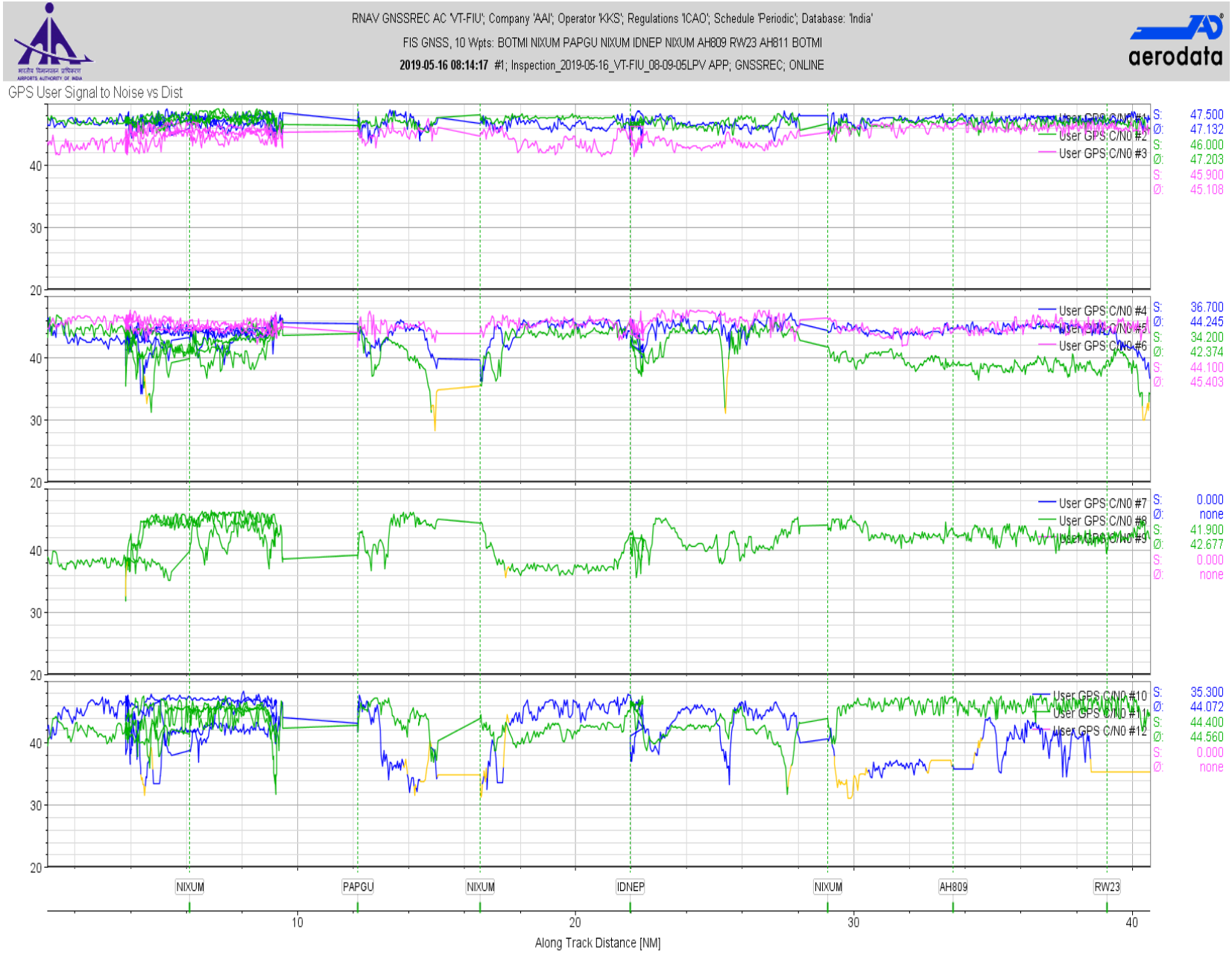
RNAV Flight Track

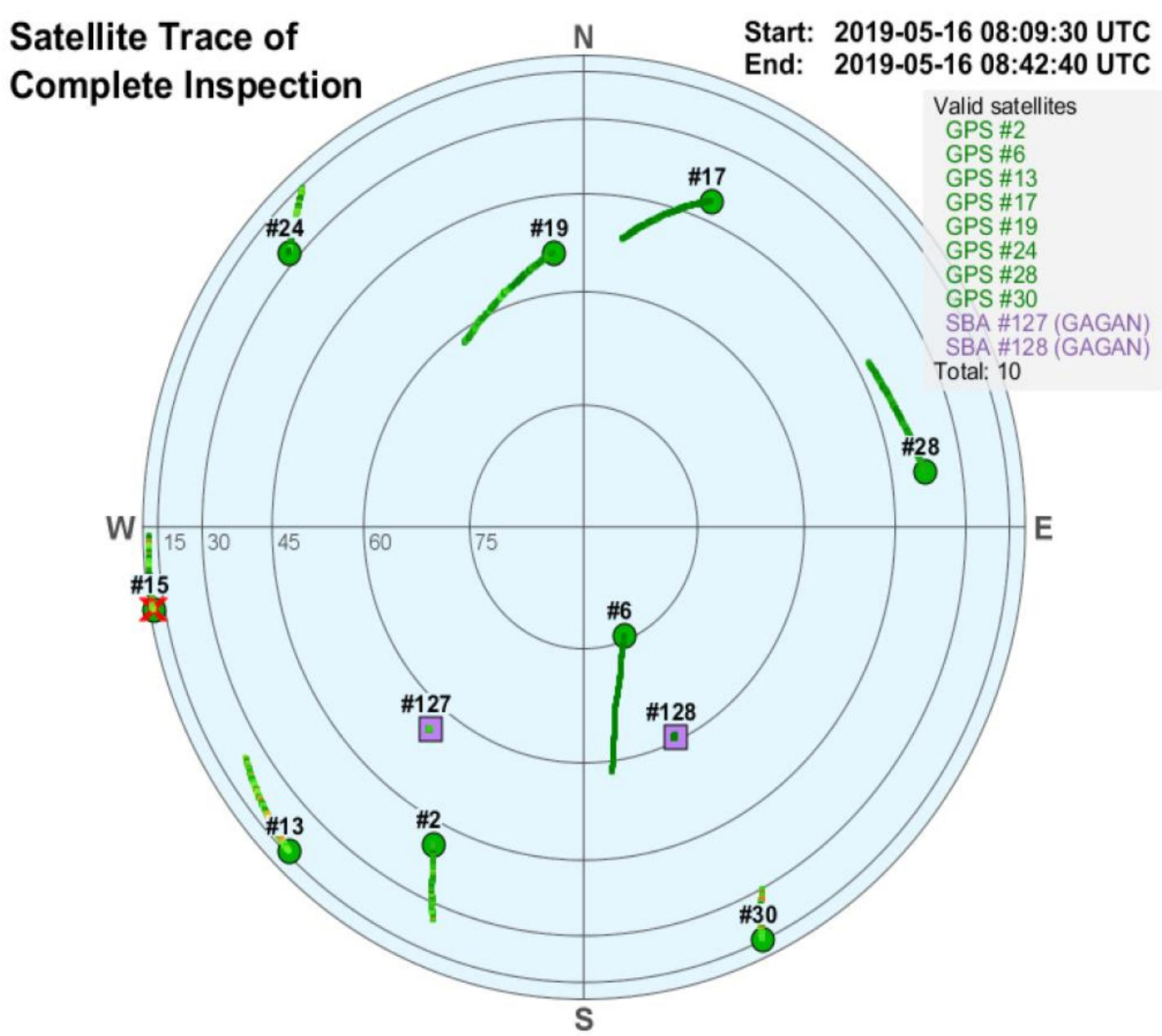



N23°18'
0'
E 72°42'
E 72°54'
N23°06'


RNAV GNSSREC AC 'VT-FIU'; Company 'AAI'; Operator 'KKS'; Regulations 'ICAO'; Schedule 'Periodic'; Database: 'India'
FIS GNSS, 10 Wpts: BOTMI NIXUM PAPGU NIXUM IDNEP NIXUM AH809 RW23 AH811 BOTMI
2019-05-16 08:14:17 #1; Inspection_2019-05-16_VT-FIU_08-09-05LPV APP; GNSSREC; ONLINE
aerodata
SBAS Quality
FIS SBAS VFOM [m]
FIS SBAS HFOM [m]
S: 2.209
Ø: 2.372
S: 1.258
Ø: 1.272
FIS SBAS VIL(VPL) [m]
FIS SBAS HIL(HPL) [m]
S: 22.009
Ø: 37.379
S: 12.294
Ø: 20.384
FIS SBAS Number Of Visible Sats
S: 10.000
Ø: 10.864
SBAS Vertical Error [m]
S: 5.253
Ø: -4.789
SBAS Horizontal Error [m]
S: 2.764
Ø: 1.175
BOTMI
NIXUM
PAPGU
NIXUM
IDNEP
NIXUM
AH809
RW23
08:06:40
08:15:00
08:23:20
08:31:40
08:40:00
Time [s]


RNAV GNSSREC AC 'VT-FIU'; Company 'AAI'; Operator 'KKS'; Regulations 'ICAO'; Schedule 'Periodic'; Database: 'India'
FIS GNSS, 10 Wpts: BOTMI NIXUM PAPGU NIXUM IDNEP NIXUM AH809 RW23 AH811 BOTMI
2019-05-16 08:14:17 #1; Inspection_2019-05-16_VT-FIU_08-09-05LPV APP; GNSSREC; ONLINE
aerodata
FIS SBAS Overview vs Dist
FIS SBAS Number Of Visible Sats
FIS SBAS Number Of Tracked Sats
FIS SBAS Mode
SBAS
SINGLE
FIS SBAS PDOP
FIS SBAS VDOP
FIS SBAS HDOP
FIS SBAS HIL(HPL) [m]
FIS SBAS VIL(VPL) [m]
NIXUM
PAPGU
NIXUM
IDNEP
NIXUM
AH809
RW23
Along Track Distance [NM]


RNAV GNSSREC AC 'VT-FIU'; Company 'AAI'; Operator 'KKS'; Regulations 'ICAO'; Schedule 'Periodic'; Database: 'India'
FIS GNSS, 10 Wpts: BOTMI NIXUM PAPGU NIXUM IDNEP NIXUM AH809 RW23 AH811 BOTMI
2019-05-16 08:14:17 #1; Inspection_2019-05-16_VT-FIU_08-09-05LPV APP; GNSSREC; ONLINE
aerodata
GPS User Signal to Noise vs Dist
User GPS C/N0 #1
User GPS C/N0 #2
User GPS C/N0 #3
S: 47.500
Ø: 47.132
S: 46.000
Ø: 47.203
S: 45.900
Ø: 45.108
User GPS C/N0 #4
User GPS C/N0 #5
User GPS C/N0 #6
S: 36.700
Ø: 44.245
S: 34.200
Ø: 42.374
S: 44.100
Ø: 45.403
User GPS C/N0 #7
User GPS C/N0 #8
User GPS C/N0 #9
S: 0.000
Ø: none
S: 41.900
Ø: 42.677
S: 0.000
Ø: none
User GPS C/N0 #10
User GPS C/N0 #11
User GPS C/N0 #12
S: 35.300
Ø: 44.072
S: 44.400
Ø: 44.560
S: 0.000
Ø: none
40
30
20
NIXUM
PAPGU
NIXUM
IDNEP
NIXUM
AH809
RW23
10
20
30
40
Along Track Distance [NM]


Satellite Trace of
Complete Inspection
Start: 2019-05-16 08:09:30 UTC
End: 2019-05-16 08:42:40 UTC
Valid satellites
GPS #2
GPS #6
GPS #13
GPS #17
GPS #19
GPS #24
GPS #28
GPS #30
SBA #127 (GAGAN)
SBA #128 (GAGAN)
Total: 10
N
S
W
E
15
30
45
60
75
#24
#19
#17
#28
#15
#6
#127
#128
#13
#2
#30

RNav: Result Page

RNAV: RNAV;FMS#4; FlightPlan: BOTMI, NIXUM, PAPGU, NIXUM, IDNEP, NIXUM, AH809, RW23, AH811, BOTMI, Operator: KKS; Company: AAI; AC: VT-FIU; Regulations: ICAO; Date: 2019-05-16 Start: 08:14:17, Stop: 08:33:09; Software: AD-AFIS-200 V7.4.5; Inspection: Inspection_2019-05-16_VT-FIU_08-09-05LPV APP; GNSSREC; Database: 'India', last changed: 2019-05-16 08:08:53, created: 2017-11-30 10:43:34, Rev: 1.34

Flightplan											
#	From	Type	To	RAIM	RNP	VRNP	HAL	VAL	Dis-tance	True Track	VPA
					[NM]	[ft]	[m]	[m]	[NM]	[°]	[°]
1	BOTMI	TF	NIXUM	---	---	---	---	---	5.82	134.6	-0.00
2	NIXUM	TF	PAPGU	---	---	---	---	---	5.00	44.7	0.00
3	PAPGU	TF	NIXUM	---	---	---	---	---	5.00	224.7	-0.00
4	NIXUM	TF	IDNEP	---	---	---	---	---	6.37	134.7	-0.00
5	IDNEP	TF	NIXUM	---	---	---	---	---	6.37	314.7	0.00
6	NIXUM	TF	AH809	---	---	---	---	---	5.00	224.7	-0.00
7	AH809	TF	RW23	---	---	---	---	---	5.53	224.7	-2.22
8	RW23	TF	AH811	---	---	---	---	---	5.00	224.7	0.94
9	AH811	TF	BOTMI	---	---	---	---	---	16.58	24.1	0.46

Flight Parameters											
#	From	Type	To	Min. Alt.	Max. Alt.	Min. GS	Max. GS	Min. RoC	Max. RoC	Min. GoC	Max. GoC
				[ft]	[ft]	[kts]	[kts]	[ft/min]	[ft/min]	[°]	[°]
1	BOTMI	TF	NIXUM	2988	3027	181	195	-352	703	-1.0	2.2
2	NIXUM	TF	PAPGU	2957	3059	140	211	-539	543	-1.7	2.0
3	PAPGU	TF	NIXUM	2982	3038	168	188	-486	511	-1.5	1.7
4	NIXUM	TF	IDNEP	2946	3023	181	196	-635	635	-1.9	1.9
5	IDNEP	TF	NIXUM	2950	3029	175	196	-402	866	-1.2	2.6
6	NIXUM	TF	AH809	2802	3009	153	184	-1426	1426	-5.3	5.3
7	AH809	TF	RW23	101	2797	124	154	-1923	1923	-7.5	7.5
8	RW23	TF	AH811	83	827	124	146	-310	2115	-1.4	8.2
9	AH811	TF	BOTMI	---	---	---	---	---	---	---	---

Integrity: GNSS_GPS												
#	Max HDOP	Max VDOP	Max HPL	Max VPL	Max HFOM	Max VFOM	Max ATK Error	Max XTD Error	Max XTD	Min # SV Used	Min C/N0	RAIM Fault Time
			[m]	[m]	[m]	[m]	[NM]	[NM]	[NM]		[dBHz]	[s]
1	1.0	1.8	109	160	10.0	17.9	0.00	0.00	4.89	9	35.1	0
2	1.3	2.2	380	640	12.5	21.2	0.00	0.00	5.38	7	31.3	0
3	1.1	2.0	156	603	11.3	19.9	0.10	0.02	1.08	7	31.2	0
4	1.3	2.4	499	956	12.6	23.5	0.00	0.00	6.55	7	33.6	0
5	1.1	1.8	131	206	10.4	17.4	0.00	0.00	6.55	8	31.7	0
6	1.0	1.9	117	206	10.0	18.9	0.00	0.00	1.65	8	34.3	0
7	1.0	1.9	114	201	9.9	18.6	0.00	0.00	1.34	8	34.5	0
8	1.1	2.0	164	510	10.8	19.1	0.00	0.00	1.34	7	33.7	0
	1.3	**2.4**	**499**	**956**	**12.6**	**23.5**	**± 0.10**	**± 0.02**	**± 6.55**	**7**	**31.2**	**0**

Integrity: GNSS_SBAS - Primary = 128, Secondary = 127												
#	Max HDOP	Max VDOP	Max HPL	Max VPL	Max HFOM	Max VFOM	Max ATK Error	Max XTD Error	Max XTD	Min # SV Used	Min C/N0	RAIM Fault Time
			[m]	[m]	[m]	[m]	[NM]	[NM]	[NM]		[dBHz]	[s]
1	1.0	1.8	50	95	1.2	2.2	0.00	0.00	4.89	9	35.1	---
2	1.3	2.2	72	118	1.5	2.5	0.00	0.00	5.38	7	31.3	---
3	1.1	2.0	14	25	1.4	2.4	0.10	0.02	1.08	7	31.2	---
4	1.3	2.4	15	28	1.5	2.8	0.00	0.00	6.55	7	33.6	---
5	1.1	1.8	13	24	1.3	2.2	0.00	0.00	6.55	8	31.7	---
6	1.1	1.9	13	24	1.3	2.3	0.00	0.00	1.65	8	34.3	---
7	1.0	1.9	13	23	1.2	2.2	0.00	0.00	1.34	8	34.5	---
8	1.1	2.0	13	24	1.3	2.2	0.00	0.00	1.34	7	33.7	---
	1.3	**2.4**	**72**	**118**	**1.5**	**2.8**	**± 0.10**	**± 0.02**	**± 6.55**	**7**	**31.2**	---

Integrity: FIS GNSS												
#	Max HDOP	Max VDOP	Max HPL	Max VPL	Max HFOM	Max VFOM	Max ATK Error	Max XTD Error	Max XTD	Min # SV Used	Min C/N0	RAIM Fault Time
			[m]	[m]	[m]	[m]	[NM]	[NM]	[NM]		[dBHz]	[s]
1	1.0	1.8	109	160	10.0	17.9	0.00	0.00	4.89	9	35.1	0
2	1.3	2.2	380	640	12.5	21.2	0.00	0.00	5.38	7	31.3	0
3	1.1	2.0	156	603	11.3	19.9	0.10	0.02	1.08	7	31.2	0
4	1.3	2.4	499	956	12.6	23.5	0.00	0.00	6.55	7	33.6	0
5	1.1	1.8	131	206	10.4	17.4	0.00	0.00	6.55	8	31.7	0
6	1.0	1.9	117	206	10.0	18.9	0.00	0.00	1.65	8	34.3	0
7	1.0	1.9	114	201	9.9	18.6	0.00	0.00	1.34	8	34.5	0
8	1.1	2.0	164	510	10.8	19.1	0.00	0.00	1.34	7	33.7	0
	1.3	**2.4**	**499**	**956**	**12.6**	**23.5**	**± 0.10**	**± 0.02**	**± 6.55**	**7**	**31.2**	**0**

SBAS			
SBAS (128) C/N0 min [dbHz]	SBAS (128) No of MT6	SBAS (127) C/N0 min [dbHz]	SBAS (127) No of MT6
43.8	0	41.8	0

Waypoint list						
#	Name	Latitude	Longitude	Level	Altitude [ft]	Type
1	BOTMI	23° 16' 55.4600" N	72° 42' 19.6200" E	not below	2000.0	fly-by
2	NIXUM	23° 12' 49.2000" N	72° 46' 49.3500" E	not below	2000.0	fly-over
3	PAPGU	23° 16' 23.2200" N	72° 50' 38.4100" E	not below	2000.0	fly-over
4	NIXUM	23° 12' 49.2000" N	72° 46' 49.3500" E	not below	2000.0	fly-by
5	IDNEP	23° 08' 19.5200" N	72° 51' 44.2600" E	not below	2000.0	fly-by
6	NIXUM	23° 12' 49.2000" N	72° 46' 49.3500" E	not below	2000.0	fly-over
7	AH809	23° 09' 15.1800" N	72° 43' 00.4000" E	at	2000.0	fly-over
8	RW23	23° 05' 18.4700" N	72° 38' 47.2300" E	at	700.0	fly-over
9	AH811	23° 01' 44.3500" N	72° 34' 58.5900" E	not below	1200.0	fly-over
10	BOTMI	23° 16' 55.4600" N	72° 42' 19.6200" E	not below	2000.0	fly-by

Result Notes

2019-05-16 08:33:12

Date

Signature

Challenges

Challenges

- Database
  - Trial Nav Database of LPV procedures from Jeppesen(ARINC 424 Format) to Rockwell Collins FMS format.
  - AAI is in the process of acquiring Nav database of LPV procedures from Jeppesen(ARINC 424 Format),which will be converted into Rockwell Collins FMS format by M/S Rockwell collins to be used for flight validation by AAI.
  - The PDC is Dec,2019.


Jammu - Kashmir
Himachal Pradesh
Punjab
Uttarakhand
Haryana
Delhi
Uttar Pradesh
Rajasthan
Bihar
Arunachal Pradesh
Assam
Meghalaya
Thank You
Jharkhand
West Bengal
Gujarat
Madhya Pradesh
Chhattisgarh
Orissa
Maharashtra
Telangana
Andhra Pradesh
Karnataka
Tamil Nadu