



# GPS Operations CGSIC Brief

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This briefing is UNCLASSIFIED



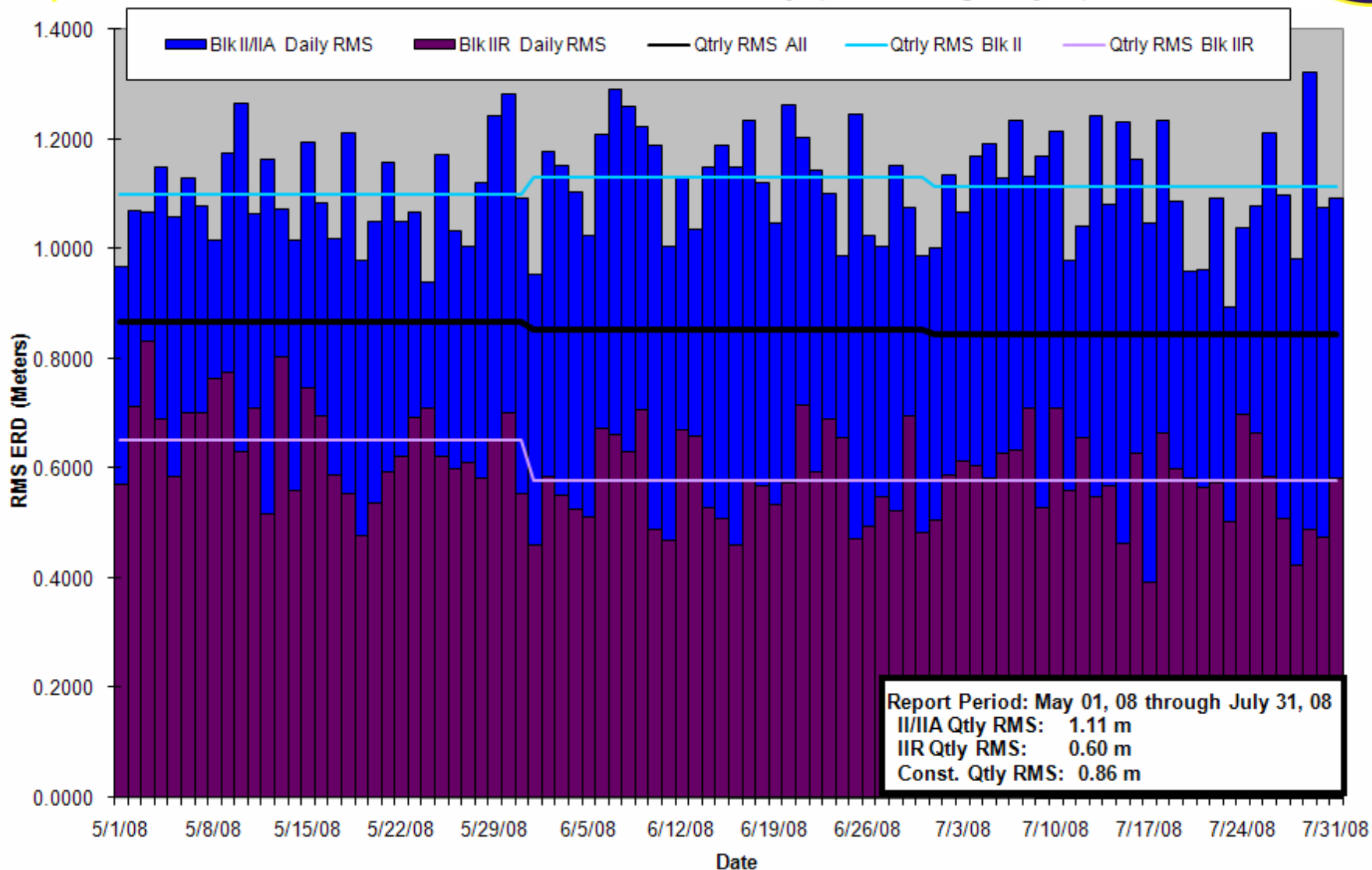
# Overview



- Navigation and Timing Performance
  - Navigation Performance
  - Time Transfer Performance
- Constellation Status



## GPS Constellation RMS ERD Performance -- May 1, 2008 through July 31, 2008

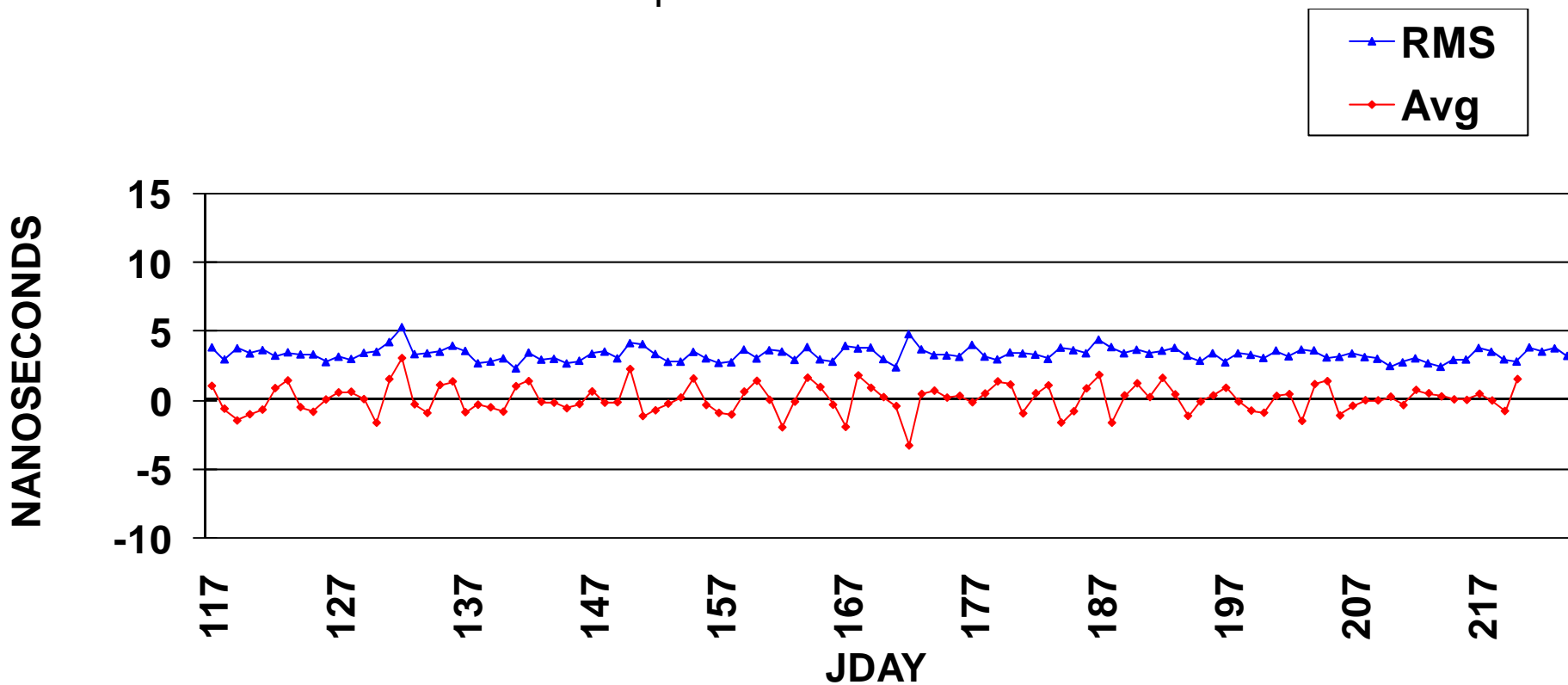


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# UTC TIME TRANSFER

Specification 28ns





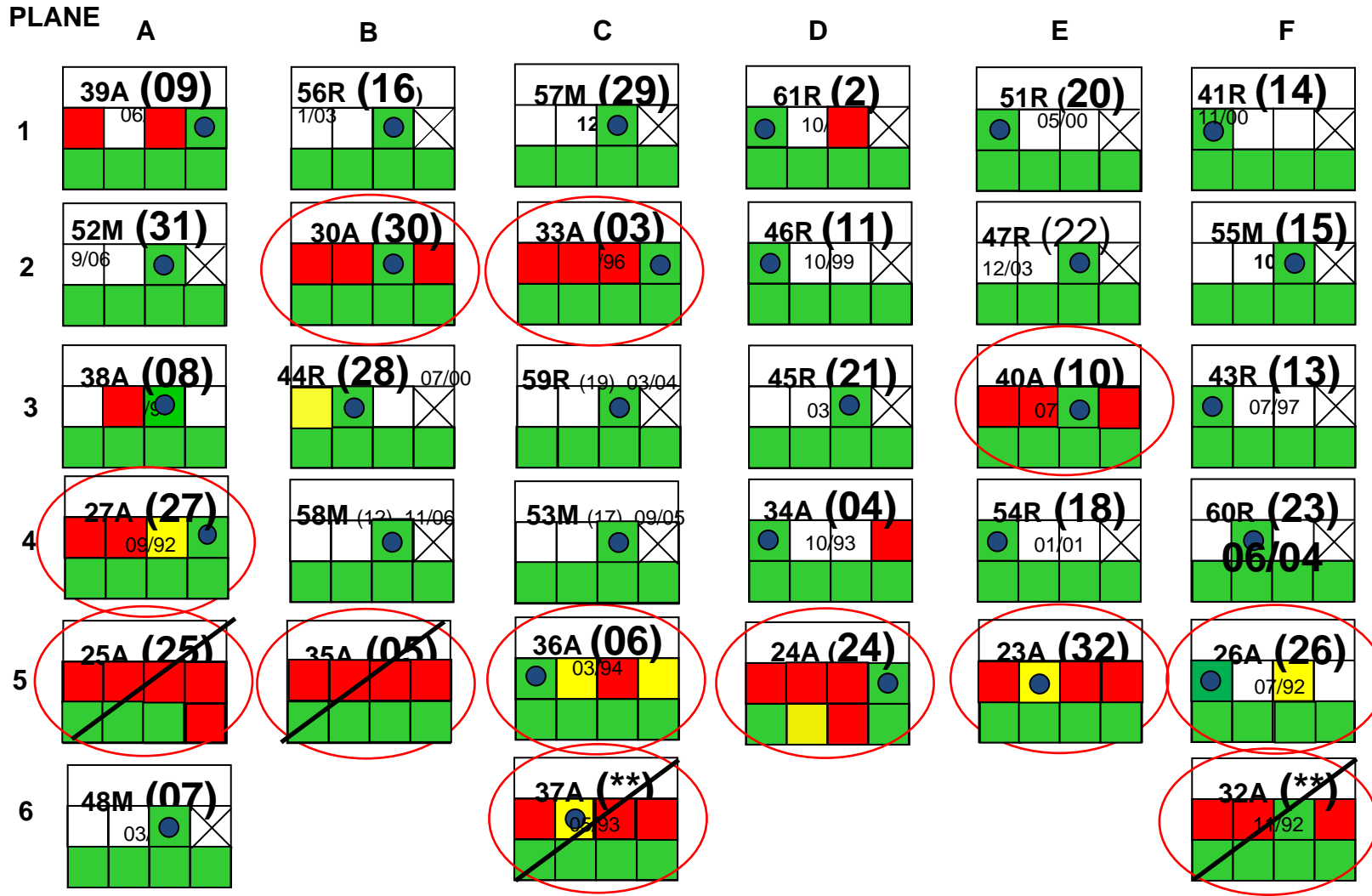
GPS Space and Control  
Clock and Reaction Wheel  
Performance Status

**Watch List**

Clock*	SVN (PRN)		launch date	
	1	2	3	4
Wheel	1	2	3	4

\* II/IIA = Rb, Rb, Cs, Cs  
IIR = Rb, Rb, Rb  
Diagonal Line = Unhealthy

Clock	Wheel
meets spec	functional
watch list	watch list
dead	dead
unused	unused
in use	in use





# Constellation Status Summary



Total SVs in Category

Changes Since Last Update

- 19 (+0) SVs past design life
- 15 (+0) SVs past pre-launch mean life estimate (MLE)
- 18 (+0) SVs one component away from nav mission failure
- 8 (+0) SVs one component away from bus failure
- Anomaly Summary
  - SVN 25 set unhealthy
  - SVN 35 set unhealthy



# IIA Vehicles On Last Clock

SVN	Slot	1st Clock	Last Clock	Storage time for current clock (Years)	Clock operating time (Years)	Operational Clock	Clocks Remaining	Current Age of Vehicle (Years)
23		5-Dec-90	1-Jan-04	13.1	4.7	Rb #2	None	17.8
24		13-Jul-91	7-Sep-00	9.2	8.0	Cs #4	None	17.2
25		15-Mar-92	25-Dec-05	13.8	2.7	Rb #1	None	16.5
27	A4	24-Sep-92	20-May-05	12.7	3.3	Cs #4	None	16.0
30	B2	27-Sep-96	2-Jun-06	9.7	2.3	Cs #3	None	12.0
32		5-Dec-92	19-Aug-96	3.7	12.1	Cs #3	None	15.8
33	C2	3-Apr-96	1-Jan-07	10.8	1.7	Cs#4	None	12.4
35		21-Sep-93	8-Sep-05	12.0	3.0	Rb #1	None	15.0
36		18-Mar-94	19-Mar-04	10.0	4.5	Rb #1	None	14.5
37		20-May-93	21-Aug-07	14.3	1.1	Rb #2	None	15.3
40	E3	1-Aug-96	25-Mar-08	11.7	0.5	Cs #3	None	12.1

- **SVN 36: has a higher likelihood of failing due to its Rb clock being turned on with over 8 years of on-orbit storage**
- **SVN-37: being stored as on-orbit spare in LADO**
- **SVN-32: being stored as on-orbit spare in LADO**

**Bottom Line: 11 of 15 IIAs left are on their last clock**



# IIR/IIR(M) Clock Status



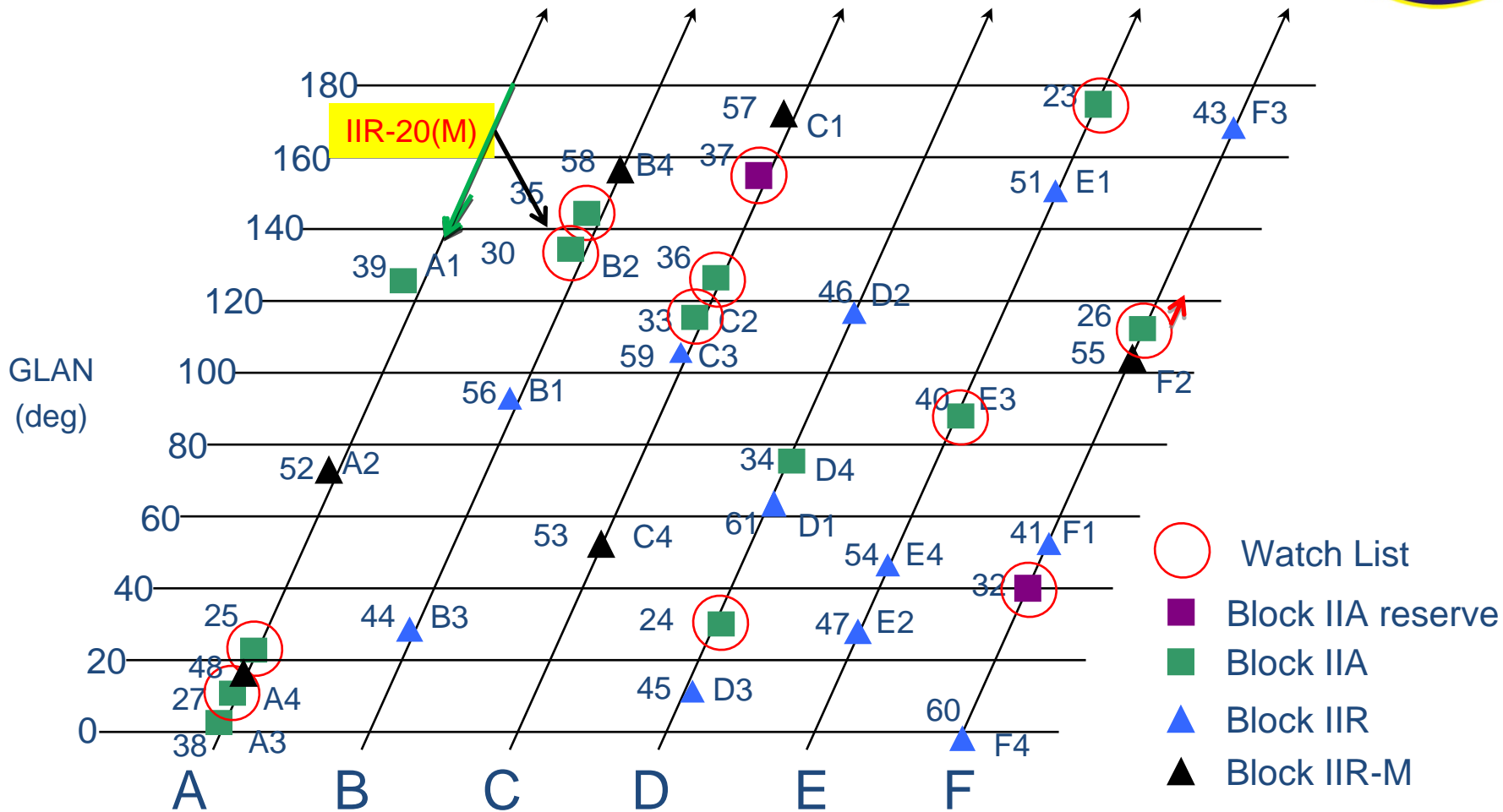
- No IIR/IIR(M) clock failures to date
- SVN 43:
  - First IIR launch, AFS 3 on for test purposes only
- SVN 44:
  - AFS 1 had a baseplate heater failure
  - Clock is assessed as viable
  - Performance could be slightly degraded during eclipse season
- SVN 61:
  - AFS 3 clock failure
  - Switched to AFS 1

SVN	Clock	Status	Date Active	Total Years in Use
41	AFS 1	On	15-Nov-00	7.83
43	AFS 1	On	13-Aug-97	11.09
	AFS 3	Off	7-Jul-98	0.87
44	AFS 1	Off	10-Aug-00	0.06
	AFS 2	On	14-Aug-00	8.08
45	AFS 3	On	4-Apr-03	5.44
46	AFS 1	On	21-Dec-99	8.73
47	AFS 3	On	24-Dec-03	4.72
48	AFS 3	On	19-Mar-08	0.48
51	AFS 1	On	17-May-00	8.33
52	AFS 3	On	29-Sep-06	1.95
53	AFS 3	On	29-Sep-05	2.95
54	AFS 1	On	7-Feb-01	7.60
55	AFS 3	On	22-Oct-07	0.89
56	AFS 3	On	6-Feb-03	5.60
57	AFS 3	On	23-Dec-07	0.72
58	AFS 3	On	21-Nov-06	1.81
59	AFS 3	On	24-Mar-04	4.47
60	AFS 2	On	28-Jun-04	4.21
61	AFS 1	On	27-Apr-08	0.38
	AFS 3	Off	10-Nov-04	3.47
ALL				89.68





# GPS Locations

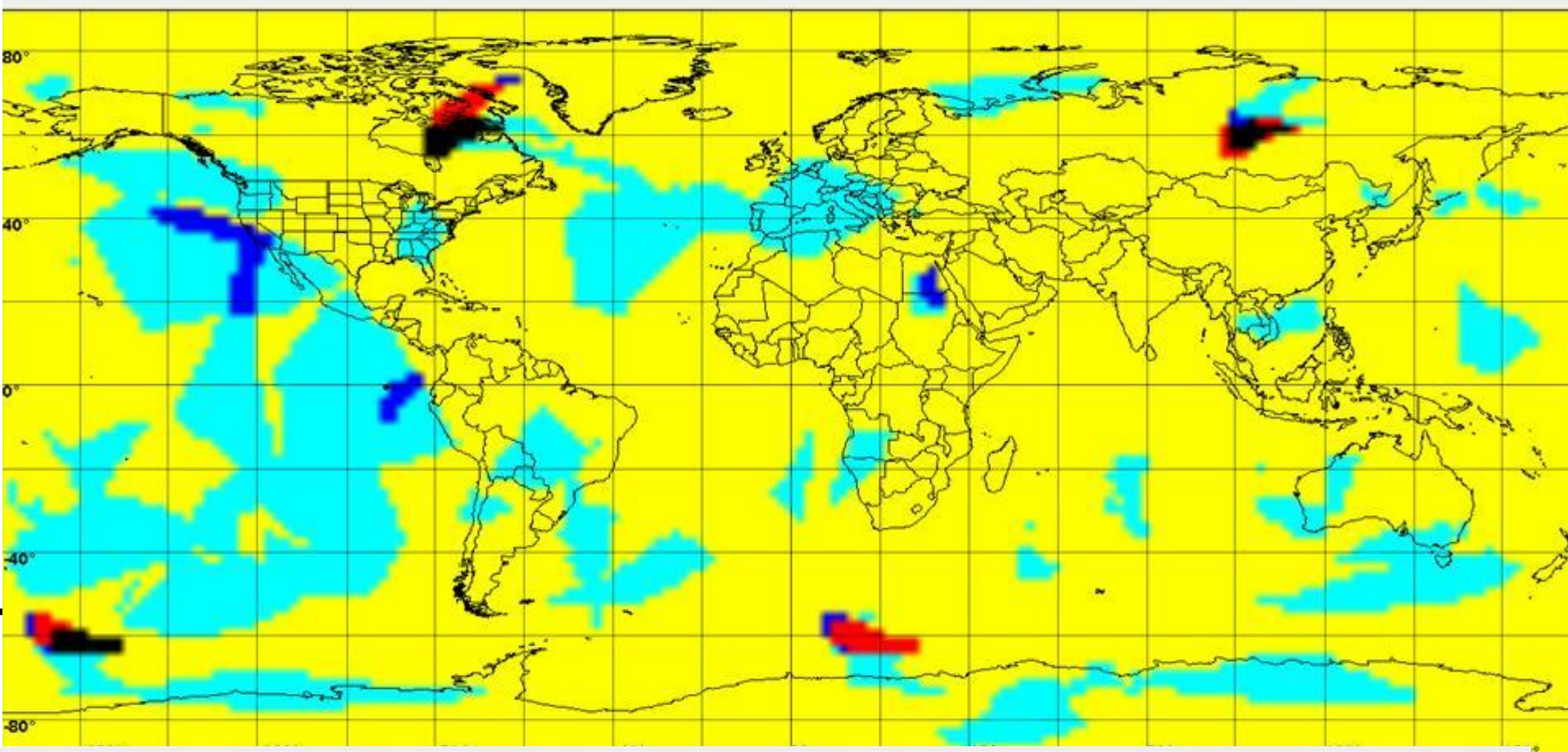


SVN-27 Rephase Start Nov '08 to b/u SVN-39

SVN-26 Rephase to F5 t/b Complete Apr '09



# World (Best 4) Max Position Error (m)



**Contour Legend**

Metric: Position Error Max(m)	Start Time: 08 Sep 2008 00:00:00Z	Number of Channels: 4	█ > 20.0 m
Production Date: 09/09/2008 05:00:56	End Time: 08 Sep 2008 23:59:00Z		█ 16.0 - 20.0
Almanac File: SEM week 472	Altitude: 0 ft HAE	Mask Angle: 5°	█ 12.0 - 16.0
SOF File: 2008_249_220548_v02	Latitude Increment: 02° 00' 00"		█ 8.0 - 12.0
PAF File: 2008_252_v03	Longitude Increment: 002° 00' 00"		█ 4.0 - 8.0

PRN: 5 Outage: 05 Aug 2008 23:38:00 to Until Further Notice PRN: 25 Outage: 26 Aug 2008 22:19:00 to Until Further Notice



# Summary



- Navigation and Timing Performance
  - Navigation Performance
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- Questions...