



Positioning, Navigation and Timing Mission Review Package – Read Me First

Template Version 19c – May 16, 2025

COMBINED DIRECTORATE/STAKEHOLDER REVIEW

30-Sep-2025

DOCUMENT CLASSIFICATION

UNCLASSIFIED

REQUEST FOR CHANGE (RFC) NUMBER

RFC-00544

RFC TITLE

Eccentric Anomaly Rate Fix and No Cost Items

GOVERNMENT POC

Daniel Stevenson, SSC/CGEV, 310.653.3531

SE&I POC

Tony Anthony, Integration & Tech Baseline, 310.418.7693

CM POC

Zena Walker, CM/DM, 310.386.1964

Read Me First



BLUF – What We Propose Changing/Adding

- Technical Changes
 - CNAV Eccentric Anomaly Rate equations - Corrected
 - Makes a small improvement to the SV velocity which then improves the PNT solutions when using CNAV signals
 - IAURA (Integrity Assured User Range Accuracy) for LNAV signals - Defined
- Administrative Improvements
 - Normalized notation for powers of 10 - across public GPS documents
 - Council of Science Editors (CSE) Manual 9th Edition, Chapter 12 Scientific Notation
 - Normalized notation for how we express multiplication of scalar values – now implied
 - “*” No more
 - “x” Only for powers of 10 scientific notation
 - “.” Only for vector and matrix multiply
 - Restored formulas that were no longer displaying correctly
 - Replaced tables that had row and column alignment problems
 - Small wording clarifications and improvements that most engineers are already interpreting correctly



BLUF – What You Need To Know for Review

- Limited to public interface documents only
- Limited to items that are not technically controversial and should not involve mandatory cost on GPS programs to implement
 - Any item that has mandatory cost or has technical controversy, is likely to be cut from this RFC. If you review these potential changes and believe some of them will result in mandatory costs, please contact the Government and SE&I POCs
- Review Comments Due December 19, 2025
 - Use the supplied .xlsx Comment Resolution Matrix (CRM) file for your comments
 - Please submit comments to the Space Systems Command GPS Requirements Section (SSC/CGEPR) workflow at SSC.CGE.PICWG@us.af.mil



RFC-000544: Eccentric Anomaly Rate Fix and No Cost Items

DISCOVERY EVENT: 13-May-2025 Public ICWG

RFC CHANGE TYPE: Correction or Clarification to Baseline / As-Built or As-Designed Baseline Update from XML

1) PROBLEM STATEMENT:

1. The Eccentric Anomaly Rate formula in all documents that describe this CNAV formula are incorrect
2. There are requirements and description changes from RFC-495A and RFC-502 which did not make it into the requirements baseline but are still correct and would help civil user equipment engineers make better civil receivers. This includes a number of Core CEI description changes that were worked out, but did not make it into RFC-502.
3. PRAT Item 2020-03 to normalize the use of scientific notation across the Public GPS interface documents has only been partially implemented
4. During the last Public ICWG, it became apparent that the Public interface documents do not use a uniform method of documenting multiplication in formulas
5. RFC-515 made a number of changes to XML which still need to be made to ICD-GPS-870 to ensure that Public users of XML are executing XML correctly

2) SOLUTION:

1. The Eccentric Anomaly Rate formula will be corrected in all CNAV Public documents (PRAT 2025-02, Concern 1445)
2. The changes from RFCs-495A and 502 would be added into the requirements baseline (PRAT 2021-03)
3. The changes needed to normalize the use of scientific notation in the Public GPS interface documents will be completed (PRAT 2020-03)
4. The few places that used "*" or "x" to denote multiplication of scalar values would be normalized to what is used across the Public Signal-In-Space documents
5. The XML to ICD-GPS-870 would be completed so it describes the as-built XML system (Concern 1354)
6. There is one vetted change in IS-GPS-200 which should be included in this RFC



DOORS IDs by Solution Statement (Cheat Sheet)

Primary Solution Statement	PCN-IS-200N_RFC544		PCN-IS-705J_RFC544		PCN-IS-800J_RFC544		PCN-ICD-870E_RFC544	
	DOORS ID	Redline Page	DOORS ID	Redline Page	DOORS ID	Redline Page	DOORS ID	Redline Page
1. Eccentric Anomaly Rate	IS200-554	54, 55	IS705-243	31, 32	IS800-181	14		
	IS200-1730	63	IS705-1594	39	IS800-1011	22		
2. Core CEI	IS200-2140	6			IS800-1188	34		
	IS200-1513	8	IS705-1515	11	IS800-912	34		
	IS200-1649	8	IS705-1524	12	IS800-920	35		
	IS200-1639	12	IS705-1521	16	IS800-917	38, 39		
3. Scientific Notation	IS200-2041	1			IS800-635	2	ICD870-234	15
	IS200-300	15					ICD870-237	18
	IS200-1925	20	IS705-1686	1			ICD870-239	21
	IS200-366	23					ICD870-307	25
	IS200-367	26	IS705-218	19	IS800-120	8		
	IS200-370	34	IS705-639	19	IS800-1094	8		
	IS200-397	36						
	IS200-451	42			IS800-213	26		
	IS200-460	44			IS800-1108	26		
	IS200-1943	45						
	IS200-551	49	IS705-240	23	IS800-180	12		
	IS200-553	51	IS705-242	27	IS800-160	10		
	IS200-555	59	IS705-244	36	IS800-182	19		
	IS200-610	68	IS705-302	44	IS800-263	31		
	IS200-612	71	IS705-313	47	IS800-260	28		
	IS200-654	76	IS705-355	57	IS800-263	30		
	IS200-674	79	IS705-375	59	IS800-297	33		
	IS200-678	80	IS705-379	60	IS800-105	3		
	IS200-1981	82	IS705-1680	61	IS800-1139	6		

Blue means a corresponding edit all the way across



DOORS IDs by Solution Statement – cont.

Primary Solution Statement	PCN-IS-200N RFC544		PCN-IS-705J RFC544		PCN-IS-800J RFC544		PCN-ICD-870E RFC544	
	DOORS ID	Redline Page	DOORS ID	Redline Page	DOORS ID	Page	DOORS ID	Redline Page
4. Multiplication	IS200-97	2						
	IS200-450	39						
	IS200-572	65	IS705-261	41	IS800-190	24		
			IS705-313	47				
	IS200-623	73	IS705-324	49				
			IS705-352	51				
			IS705-1721	52				
5. XML							ICD870-727	6, 7
6. Administrative Fixes	IS200-18	1	IS705-1496	7	IS800-8	1	ICD870-10	1
	IS200-1006	15	IS705-241	25	IS800-1122	1	ICD870-67	1
	IS200-319	16	IS705-354	54	IS800-1123	2		
	IS200-368	29	IS705-356	59				
	IS200-1726	32	IS705-1544	46	IS800-954	27		
	IS200-1946	47						
	IS200-1729	61						
	IS200-1617	70						
LNAV IAURA/URA	IS200-157	4						
	IS200-158	5						
	IS200-159	5						
	IS200-1292	7						
	IS200-1946	8	IS705-1704	20				
	IS200-2025	19						

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