UNCLASSIFIED Change Topic: Public Signals-in-Space (SiS) Updates

Change Topic: Public Signals-in-Space (SiS) Updates

This change package accommodates the text changes to support the proposed solution (see table below) within the public Signals-in-Space (SiS) documents. All comments must be submitted in Comments Resolution Matrix (CRM) form.

The columns in the WAS/IS table following this page are defined below:

Section Number: This number indicates the location of the text change within the document.

Proposed Heading: Contains existing and/or proposed changes to section titles and/or the titles to new sections

(WAS) <Document Title>: Contains the baseline text of the impacted document.

Proposed Object Text: Contains proposed changes to baseline text.

Proposed Rationale: Contains the supporting information to explain the reason for the proposed changes.

PROBLEM STATEMENT:

There are eight areas of obsolete/ambiguous language in the Signals-in-Space (SiS) specifications (mean anomaly equation, convolutional encoding, LNAV special messages reference, Universal Coordinated Time Offset Error (UTCOE), User Range Accuracy (URA) Note #3, Right Ascension Angle Language, and the signal health versus navigation data terminology, publication errors). If this language were interpreted incorrectly it could result in UE developers designing receivers that don't work.

SOLUTION: (Proposed)

Resolve the obsolete/ambiguous language in the areas above to avoid the potential for misinterpretation.

Note: For the changes with respect to IS-GPS-200F, IRN-001 there are <u>eight</u> areas that are being amended:

- i. Convolutional encoding, (2 proposed changes)
- ii. Coordinated Universal Coordinated Time Offset Error (UTCOE), (1 proposed change)
- iii. User Range Accuracy (URA) Note #3, (1 proposed change)
- iv. LNAV special messages reference, (2 proposed changes)
- v. Right Ascension Angle Language, (1 proposed change)
- vi. Signal health versus navigation data terminology, (1 proposed change)
- vii. Mean Anomaly Equation, (1 proposed change)

viii. Publication Errors (69 proposed changes)

Start of WAS/IS for IS-GPS-200F, IRN-001 Changes

Section Number	IS-GPS-200 RevF IRN001 (17 Apr 2012) Navstar GPS Space Segment/Navigation User Interfaces	Proposed Object Heading	Proposed Public Signals-in-Space (SiS) Updates Object Text	Proposed Rationale
3.2.1	Users shall only use non-dummy satellites as defined via current broadcast almanac. See Section 20.3.3.5.1.2.2 and/or Section 30.3.3.4 and/or Section 40.3.3.5.1.2.2 for the definition of information about the almanac.		Users shall only use non-dummy satellites as defined via current broadcast almanac. See Section 20.3.3.5.1.2 and/or Section 40.3.3.5.1.2 for the definition of information about dummy satellites in the almanac.	Corrected section number references from 20.3.3.5.1.2.2 to 20.3.3.5.1.2 and from 40.3.3.5.1.2.2 to 40.3.3.5.1.2 and removed reference to section 30.3.3.4, and also added the clarification "definition of information about dummy satellites in the almanac".
3.2.1.1	The PRN P-code for SV ID number i, for i = 1 to 37, is a ranging code, P _i (t), of 7 days in length at a chipping rate of 10.23 Mbps. The 7 day sequence is the modulo-2 sum of two sub- sequences referred to as X1 and X2 _i ; their lengths are 15,345,000 chips and 15,345,037 chips, respectively. The X2 _i sequence is an X2 sequence selectively delayed by 1 to 37 chips thereby allowing the basic code generation technique to produce a set of 37 mutually exclusive P-code sequences of 7 days in length. Assignment of these code phase segments by SV ID number is given in Table 3-Ia. (NOTE: previous versions of this document reserved PRNs 33 through 37 for other uses. Due to increased system capability, PRNs 33 through 37 are being redesignated to allow for use by SVs.) An initial almanac collected from P(Y)-code in the upper PRNs must be obtained from PRNs 35 or 36.		The PRN P-code for SV ID number i, for i = 1 to 37, is a ranging code, P _i (t), of 7 days in length at a chipping rate of 10.23 Mbps. The 7 day sequence is the modulo-2 sum of two sub-sequences referred to as X1 and X2 _i ; their lengths are 15,345,000 chips and 15,345,037 chips, respectively. The X2 _i sequence is an X2 sequence selectively delayed by 1 to 37 chips thereby allowing the basic code generation technique to produce a set of 37 mutually exclusive P-code sequences of 7 days in length. Assignment of these code phase segments by SV ID number is given in Table 3-Ia. (NOTE: previous versions of this document reserved PRNs 33 through 37 for other uses. Due to increased system capability, PRNs 33 through 37 are being redesignated to allow for use by SVs.) An initial almanac collected from P(Y)-code in the upper PRNs must be obtained from PRNs 35, 36, or 38 through 63.	Receiver manufacturers may interpret that obtaining the initial almanacs for the upper PRNs for P(Y) code can only be done from PRNs 35 and 36. This is not true-almanacs for LNAV-U (LNAV-Upper)

Section Number	IS-GPS-200 RevF IRN001 (17 Apr 2012) Navstar GPS Space Segment/Navigation User Interfaces	Proposed Object Heading	Proposed Public Signals-in-Space (SiS) Updates Object Text	Proposed Rationale may be obtained from
				PRNs 35, 36, or 38 through 63.
3.2.1.1.1	An expanded set of 26 P-code PRN sequences are generated by circularly shifting 26 of the original 37 sequences (over one week) by an amount corresponding to 1 day. These expanded sequences are therefore time shifted (i.e. offset) versions of 26 of the original sequences. Assignment of these expanded code phase segments by SV ID number is given in Table 3-Ib. Additional PRN P-code sequences with assigned PRN numbers are provided in Section 6.3.7, Table 6-I.		An expanded set of 26 P-code PRN sequences are generated by circularly shifting 26 of the original 37 sequences (over one week) by an amount corresponding to 1 day. These expanded sequences are therefore time shifted (i.e. offset) versions of 26 of the original sequences. Assignment of these expanded code phase segments by SV ID number is given in Table 3-Ib. Additional PRN P-code sequences with assigned PRN numbers are provided in Section 6.3.6, Table 6-I.	Due to the renumbering of the Section in IS-200 to stay consistent with IS-200, Rev E, the additional PRN P-Code sequences (Table 6-I) can now be found in Section 6.3.6, not 6.3.7.
3.2.1.3	 The PRN C/A-Code for SV ID number i is a Gold code, G_i(t), of 1 millisecond in length at a chipping rate of 1023 Kbps. The G_i(t) sequence is a linear pattern generated by the modulo-2 addition of two sub-sequences, G1 and G2_i, each of which is a 1023 chip long linear pattern. The epochs of the Gold code are synchronized with the X1 epochs of the P-code. As shown in Table 3-Ia, the G2_i sequence is a G2 sequence selectively delayed by preassigned number of chips, thereby generating a set of different C/A-codes. Assignment of these by GPS PRN signal number are given in Table 3-Ia and Table 3-Ib. An initial almanac collected from C/A Code in the upper PRNs must be obtained from PRNs 35, 36, or 38 through 63. CS will prevent the simultaneous transmission of PRNs 34 and 37 of C/A code. 		The PRN C/A-Code for SV ID number i is a Gold code, G _i (t), of 1 millisecond in length at a chipping rate of 1023 Kbps. The G _i (t) sequence is a linear pattern generated by the modulo-2 addition of two sub- sequences, G1 and G2 _i , each of which is a 1023 chip long linear pattern. The epochs of the Gold code are synchronized with the X1 epochs of the P-code. As shown in Table 3-Ia, the G2 _i sequence is a G2 sequence selectively delayed by pre-assigned number of chips, thereby generating a set of different C/A-codes. Assignment of these by GPS PRN signal number are given in Table 3-Ia and Table 3-Ib. An initial almanac collected from C/A Code in the upper PRNs must be obtained from PRNs 35, 36, or 38 through 63. CS <i>will prevent</i> the simultaneous transmission of PRNs 34 and 37 of C/A code.	Fixed italics emphasis on "will prevent". The italics place an emphasis on the CS preventing the simultaneous transmission of PRNs 34 and 37.
3.2.1.3.1	An expanded set of 26 C/A-code PRN sequences are identified in Table 3-Ib using "G2 Delay" and "Initial G2 Setting" which is not the same as the method used in Table 3-Ia. The two-tap coder implementation method referenced and used in Table 3-Ia is not used in Table 3-Ib due to its limitation in generating C/A-code sequences. The "G2 Delay" specified in Table 3-Ib may be accomplished by using the "Initial G2 Setting" as the initialization vector for the G2 shift register of Figure 3-9. Assignment of these expanded code phase segments by SV ID number is given in Table 3-Ib. Additional PRN C/A-code sequences with		An expanded set of 26 C/A-code PRN sequences are identified in Table 3-Ib using "G2 Delay" and "Initial G2 Setting" which is not the same as the method used in Table 3-Ia. The two-tap coder implementation method referenced and used in Table 3-Ia is not used in Table 3-Ib due to its limitation in generating C/A-code sequences. The "G2 Delay" specified in Table 3-Ib may be accomplished by using the "Initial G2 Setting" as the initialization vector for the G2 shift register of Figure 3-9. Assignment of these expanded code phase segments by SV ID number is given in Table 3-Ib. Additional PRN C/A-code sequences with assigned PRN numbers are provided in Section 6.3.6.1,	Due to the renumbering of the Section in IS-200 to stay consistent with IS-200, Rev E, the additional

Section	IS-GPS-200 RevF IRN001 (17 Apr 2012) Navstar GPS Space Segment/Navigation User	Proposed	Proposed Public Signals-in-Space (SiS) Updates Object Text	Proposed
Number	Interfaces	Object		Rationale
		Heading		
	assigned PRN numbers are provided in Section 6.3.7.1, Table 6-I.		Table 6-I.	PRN P-Code
				sequences
				(Table 6-I) can
				now be found
				in Section
				6.3.6.1, not
				6.3.7.1.
				Section 6.3.7.1
				has been
				changed to
				6.3.6.1.
3.2.1.4.1		Expanded		The header
	Expanded L2 CM Code (GPS III)	L2 CM		appeared as
		Code		'Expanded L2
		(GPS III		CM Code (GPS
		and		III and
		subseque		subsequent
		nt blocks)		blocks)' in IS-
				GPS-200, Rev E
				and should
				appear as such
				in IS-GPS-200F,
				IRN-001.
				However, this
				change should
				be made to
				(GPS III) since
				'(GPS III and
				subsequent
				blocks)' implies
				that this will be
				the design for
				any SV beyond
				GPS III.
3.2.1.4.1	An expanded set of 26 L2 CM-Code PRN sequences are identified with assignment of initial		An expanded set of 26 L2 CM-Code PRN sequences are identified with assignment of initial states by	Due to the
	states by SV ID number in Table 3-IIb. Additional PRN L2 CM-code sequence pairs are		SV ID number in Table 3-IIb. Additional PRN L2 CM-code sequence pairs are provided in Section	renumbering of

Section	IS_GDS_200 PovE IPN001 (17 Apr 2012) Novstor GDS Space Segment (Novigation Licer	Droposod	Proposed Public Signals in Space (SiS) Undates Object Text
Number	Interfaces	Ohiost	Toposed Public Signals-III-Space (SIS) Opuates Object Text
Number	Interfaces	Object	
		Heading	
	provided in Section 6.3.7.3, Table 6-II.		6.3.6.3, Table 6-II.
3.2.1.5.1	Expanded I 2 CL-Code (GPS III)	Expanded	
		L2 CL-	
		Code	
		(GPS III	
		and	
		subseque	
		TIL DIOCKS)	

Proposed Rationale
the Section in IS-200 to stay consistent with IS-200, Rev E, the additional PRN L2 CM- code sequences (Table 6-II) can now be found in Section 6.3.6.3, not 6.3.7.3.
Section 6.3.7.3 has been changed to 6.3.6.3.
The header appeared as 'Expanded L2 CL Code (GPS III and subsequent blocks)' in IS- GPS-200, Rev E and should appear as such in IS-GPS-200F, IRN-001. However, this change should be made to (GPS III) since '(GPS III and subsequent blocks)' implies

Section Number	IS-GPS-200 RevF IRN001 (17 Apr 2012) Navstar GPS Space Segment/Navigation User Interfaces	Proposed Object Heading	Proposed Public Signals-in-Space (SiS) Updates Object Text	Proposed Rationale
3.2.1.5.1	An expanded set of 26 L2 CL-Code PRN sequences are identified with assignment of initial		An expanded set of 26 L2 CL-Code PRN sequences are identified with assignment of initial states by SV	that this will be the design for any SV beyond GPS III. Due to the
	states by SV ID number in Table 3-IIb. Additional PRN L2 CL-code sequence pairs are provided in Section 6.3.7.3, Table 6-I I.		ID number in Table 3-IIb. Additional PRN L2 CL-code sequence pairs are provided in Section 6.3.6.3, Table 6-II.	renumbering of the Section in IS-200 to stay consistent with IS-200, Rev E, the additional PRN L2 CM- code sequences (Table 6-II) can now be found in Section 6.3.6.3, not 6.3.7.3. Section 6.3.7.3 has been changed to 6.3.6.3.

Section Number	IS-GPS Interfa	5-200 R aces	evF IRN00	1 (17 Apr 2012	2) Navsta	r GPS Spa	ce Segn	nent/Navigati	ion User	Proposed Object Heading	Prop	osed Pu	blic Signals	s-in-Space (SiS)) Update	s Object T	ext			Proposed Rationale
3 2 1 5 1				Toble 3 Io	Code Phase	Assignmer	ate (chaot	1 of 2			Table 3 In Code Dhese Assignments (sheet 1 of 2)							The "exclusive		
5.2.1.5.1			675 6 551 I			Code I	lelav	First	First							Code Delay		1 OI 2) First F	First	or" in the notes
			GPS PRN Signal	Code Phase S	election	Chij	ps	10 Chips	12 Chips				GPS PRN Signal	Code Phase S	election	Chi	ps	10 Chips	12 Chips	section of Table
		No.	No.	C/A(G2 _i)***	(X2 _i)	C/A	Р	Octal*	Octal			No.	No.	C/A(G2 _i)***	(X2 _i)	C/A	Р	Octal*	Octal	3-la is listed
		1	1			-	1		P						1		1	U/A	P	twice and only
				$2 \oplus 6$ $3 \oplus 7$		5		1440 1620	4444					$2 \oplus 6$ $3 \oplus 7$		5		1440	4444 4000	needs to be
		$\frac{2}{3}$	3	$4 \oplus 8$	3	7	$\frac{2}{3}$	1710	4000			3	$\frac{2}{3}$	$4 \oplus 8$	3	7	$\frac{2}{3}$	1020	4000	listed once
		4	4	5 🕀 9	4	8	4	1744	4333			4	4	5 🕀 9	4	8	4	1744	4333	listed once.
		5	5	1 🕀 9	5	17	5	1133	4377			5	5	1 ⊕ 9	5	17	5	1133	4377	
		6	6	2	6	18	6	1455	4355			6	6	2	6	18	6	1455	4355	
		7	7	$1 \oplus 8$	7	139	7	1131	4344			7	7	$1 \oplus 8$	7	139	7	1131	4344	
		8	8	$2 \oplus 9$	8	140	8	1454	4340			8		$2 \oplus 9$ $3 \oplus 10$	8	140	8	1454	4340	
		10	10	$3 \oplus 10$ $2 \oplus 3$	9 10	251	10	1620	4342			10	10	$3 \oplus 10$ $2 \oplus 3$	10	251	10	1620	4342 4343	
		10	10	$3 \oplus 4$	10	252	10	1642	4343			11	11	$3 \oplus 4$	10	252	11	1642	-5-5	
		12	12	$5 \oplus 6$	12	254	12	1750	i i			12	12	$5 \oplus 6$	12	254	12	1750		
		13	13	6 🕀 7	13	255	13	1764				13	13	6 🕀 7	13	255	13	1764		
		14	14	7 🕀 8	14	256	14	1772				14	14	7 🕀 8	14	256	14	1772		
		15	15	8 🕀 9	15	257	15	1775				15	15	8 ⊕ 9	15	257	15	1775		
		16	16	$9 \oplus 10$	16	258	16	1776				16	16	$9 \oplus 10$	16 17	258	16	1//6		
		1/	1/	$1 \oplus 4$ $2 \oplus 5$	17	469	1/	1150				17	1/	$1 \oplus 4$ $2 \oplus 5$	1/	409	1/	1467		
		19	19	$3 \oplus 6$	19	470	19	1633	4343			10	10	$3 \oplus 6$	10	471	19	1633	4343	
		* *** NO1	In the octa digit (1) octal rep The two-t TE #1: The c	al notation for the represents a "1" resentation of the code for PI ** C ap coder utilized I $\oplus =$ " ode phase assignm C/A and a s	first 10 chi for the first remaining 9 RN Signal A VA Codes f here is only set o exclusive c ments consti pecific P co	ps of the C/2 chip and the C/2 chips. (For Assembly N or 34 and 37 an example f valid C/A r"⊕ = "excl tute insepar ode phase, a	A code as le last thr or exampl o. 1 are: 7 are iden impleme codes. usive or able pairs s shown a	s shown in this co ee digits are the c e, the first 10 chip 1100100000). tical. entation that gener s, each consisting above.	lumn, the first conventional ps of the C/A rates a limited of a specific			* *** NO	In the octa digit (1) octal rep The two-t IE #1: The c	al notation for the represents a "1" resentation of the code for P ** C ap coder utilized I ode phase assignm C/A and a s	first 10 chi for the firs remaining RN Signal $\forall A \text{ Codes } 1$ here is only set o $\oplus = "e$ ments const pecific P o	ps of the C/ t chip and tl 9 chips. (Fe Assembly N for 34 and 3 7 an example of valid C/A <u>xclusive or</u> itute insepar ode phase, a	A code as ne last thr or exampl lo. 1 are: 7 are iden e implema codes. rable pairs as shown a	s shown in this correct digits are the le, the first 10 ch 1100100000). ntical. entation that gene s, each consisting above.	olumn, the first conventional ips of the C/A erates a limited g of a specific	
3.2.2	During of L2 C of CNA rates v comm symbo comm	g the in C signal AV data which a anded ols per s anded	itial period , Block IIR- a, D _c (t). Mo re selectal to be mod second (sp to be mod	l of Block IIR-N M may module preover, the N ple by ground o ulo-2 added to s) (rate ½ conv ulo-2 added to	1 SVs ope o-2 add tl AV data, command o the L2 C rolutional o the L2 C	ration, pr he NAV da D(t), can b d. D(t) wit M-code, c encoding M-code.	ior to Ir ata, D(t) be used th a dat or D(t) v g of 25 k The res	nitial Operation), to the L2 CM in one of two a rate of 50 bp with a symbol ops NAV data) ultant bit-train	nal Capability I-code instead different data os can be rate of 50 can be n is combined		<del< td=""><td>.ETE></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>This mode no longer reflects the accurate operation of GPS IIR-M and should be deleted.</td></del<>	.ETE>								This mode no longer reflects the accurate operation of GPS IIR-M and should be deleted.

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	with L2 CL-code usi between L2 CM ⊕ o L2 carrier.	ng chip by cl data and L2 (nip time-division m CL chips). This mult	nultiplexing m tiplexed bit-tr	nethod (i.e. alternating rain is used to modulate the							
3.2.3		Tat	ole 3-III. Signa	al Configuration				Tal	ble 3-III. Signa	al Configuration		The deletion of
	SV Diodra		L1		L2**		SV Blocks		L1		L2**	the "L2CM
	SV BIOCKS	In-Phase*	Quadrature-Phase*	In-Phase*	Quadrature-Phase*		SV Blocks	In-Phase*	Quadrature-Phase*	In-Phase*	Quadrature-Phase*	CL" signal is no
	Block II/IIA/IIR	$P(Y) \oplus D(t)$	C/A⊕D(t)	$\begin{array}{c} P(Y) \oplus D(t) \\ or \\ P(Y) \\ or \\ C/A \oplus D(t) \end{array}$	Not Applicable		Block II/IIA/IIR	$P(Y) \oplus D(t)$	$C/A \oplus D(t)$	$P(Y) \oplus D(t)$ or P(Y) or $C/A \oplus D(t)$	Not Applicable	longer a valid 'separate' mode and is deleted.
	Block IIR-M***	$P(Y) \oplus D(t)$	C/A⊕D(t)	$P(Y) \oplus D(t)$ or P(Y)	L2 CM \oplus D(t) with L2 CL or L2 CM \oplus D'(t) with L2 CL or C/A \oplus D(t)		Block IIR-M/IIF/ and GPS III	$P(Y) \oplus D(t)$	$C/A \oplus D(t)$	$P(Y) \oplus D(t)$ or P(Y)	$\begin{array}{c} L2 \ CM \oplus D_C(t) \ with \ L2 \ CL \\ or \\ C/A \oplus D(t) \\ or \\ C/A \end{array}$	Block IIR-M also does not perform "L2CM
	Block IIR-M/IIF/ and GPS III	$P(Y) \oplus D(t)$	C/A ⊕ D(t)	$\begin{array}{c} P(Y) \oplus D(t) \\ or \\ P(Y) \end{array}$	C/A $L2 CM \oplus D_{C}(t) \text{ with } L2 CL$ or $C/A \oplus D(t)$ or C/A		Notes: 1) The co 2) It should be n	onfiguration iden oted that there a signal o	tified in this table reflec show all available cod re no flags or bits in the ption is broadcast for L2 \oplus = "exclusive-or" (ts only the conter es/signals on L1/. navigation messa 2 Civil (L2 C) sig modulo-2 additio	nt of Section 3.2.3 and does not L2. age to directly indicate which nal.	CL" thus leaving the only valid IIR-M operation in
	Notes: 1) The co 2) It sho	nfiguration iden uld be noted that which D'(t) = NA $D_C(t) = CN$	tified in this table reflect show all available code t there are no flags or bit signal option is broadcar \oplus = "exclusive-or" (D(t) = NAV dat AV data at 25 bps with F [AV data at 25 bps with]	ts only the conter es/signals on L1/l ts in the navigatic st for L2 Civil (L modulo-2 additio ata at 50 bps EC encoding rest FEC encoding rest	nt of Section 3.2.3 and does not L2. on message to directly indicate 2 C) signal. n) ulting in 50 sps sulting in 50 sps		* Terminol quadra ** The two car	D _C (t) = ogy of "in-phase ature relationshi rrier component br	CNAV data at 25 bps v e" and "quadrature-phase p of the carrier compone s on L2 may not have th oadcast on same phase (with FEC encodir e" is used only to ents (i.e. 90 degre e phase quadratur ref. Section 3.3.1	ng resulting in 50 sps b identify the relative phase ses offset of each other). re relationship. They may be 5).	the second row as "C/A ⊕ D(t)" and C/A for L2. Both of these operations are listed in Row 3- titled "Block UB-M-IJE/ and
	* Terminol quadr ** The two ca *** Possible si opera	ogy of ''in-phase ature relationshi rrier component: br gnal configuration tion, prior to Ini	e" and "quadrature-phase p of the carrier compone s on L2 may not have the oadcast on same phase (on for Block IIR-M only tial Operational Capabil	e" is used only to ents (i.e. 90 degre e phase quadratur ref. Section 3.3.1 during the initial ity of L2 C signal	identify the relative phase es offset of each other). re relationship. They may be .5). l period of Block IIR-M SVs l. See paragraph 3.2.2.							GPS III. Row #2 can be deleted. In the Notes section, the "D'(t) = NAV Data at 25 bps with FEC encoding resulting in 50

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		Heading		
				sps is also
				deleted since
				D'(t) is no
				longer a
				separate
				convolutional
				encoded
				signal." is also
				deleted since
				D'(t) is no
				longer a valid
				signal.
				In the Notes
				section, the
				verbiage "***
				Possible signal
				configuration
				for Block IIR-M
				only during the
				initial period of
				Block IIR-M SVs
				operation,
				prior to Initial
				Operational
				Capability of
				L2C signal. See
				paragraph
				3.2.2" is
				deleted since
				"L2CM
				with L2 CL" is
				no longer a
				valid
				configuration.
22151	For Block IIP. M. IIF, and subsequent blocks of SVs, the two L2 carrier components shall be		For Block IIP-M. IIE and subsequent blocks of SVs, the two L2 carrier components shall be either in	The term
J.J.I.J.I	either in phase quadrature or in the same phase (within ±100 milliradians) - see paragraph		phase quadrature or in the same phase (within ±100 milliradians) - see paragraph 3.3.1.5.3 for	L2P(Y) was

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	3.3.1.5.3 for additional information. The civil signal carrier component is modulated by any one of three (IIF) or four (IIR-M) different bit trains as described in paragraph 3.2.3. The resultant composite transmitted signal phases will vary as a function of the binary state of the modulating signals as well as the signal power ratio and phase quadrature relationship. Beyond these considerations, additional carrier components in Block IIR-M, IIF, and subsequent blocks of SVs will result in composite transmitted signal phase relationships other than the nominal special case of Table 3-IV. The current phase relationship of the two L2 carrier components (L2C and L2 P(Y)) shall be indicated by means of bit 273 of the CNAV Type 10 Message (See section 30.3.3), where zero indicates phase quadrature, with the L2C lagging the L2 P(Y) by 90 degrees, and one indicates that L2C and L2 P(Y) are inphase. If the CNAV message is not available, then the L2C and L2 P(Y) shall be fixed in phase quadrature.		additional information. The civil signal carrier component is modulated by any one of three (IIF) or four (IIR-M) different bit trains as described in paragraph 3.2.3. The resultant composite transmitted signal phases will vary as a function of the binary state of the modulating signals as well as the signal power ratio and phase quadrature relationship. Beyond these considerations, additional carrier components in Block IIR-M, IIF, and subsequent blocks of SVs will result in composite transmitted signal phase relationships other than the nominal special case of Table 3-IV. The current phase relationship of the two L2 carrier components (L2C and L2P(Y)) shall be indicated by means of bit 273 of the CNAV Type 10 Message (See section 30.3.3), where zero indicates phase quadrature, with the L2C lagging the L2P(Y) by 90 degrees, and one indicates that L2C and L2P(Y) are in-phase. If the CNAV message is not available, then the L2C and L2P(Y) shall be fixed in phase quadrature.	inadvertently changed to L2 P(Y) (L2 space P(Y)) in 4 instances in RevF. The term has been changed back to L2P(Y).
3.3.1.8	All transmitted signals for a particular SV shall be coherently derived from the same on- board frequency standard. On the L1 carrier, the chip transitions of the modulating signals, C/A and L1 P(Y), and on the L2 carrier the chip transitions of L2 P(Y) and L2C, shall be such that the average time difference between the chips on the same carrier do not exceed 10 nanoseconds. The variable time difference shall not exceed 1 nanosecond (95% probability), when including consideration of the temperature and antenna effect changes during a vehicle orbital revolution. Corrections for the bias components of the time difference are provided to the US in the CNAV message using parameters designated as ISCs (reference paragraph 30.3.3.1.1).		All transmitted signals for a particular SV shall be coherently derived from the same on-board frequency standard. On the L1 carrier, the chip transitions of the modulating signals, C/A and L1P(Y), and on the L2 carrier the chip transitions of L2P(Y) and L2C, shall be such that the average time difference between the chips on the same carrier do not exceed 10 nanoseconds. The variable time difference shall not exceed 1 nanosecond (95% probability), when including consideration of the temperature and antenna effect changes during a vehicle orbital revolution. Corrections for the bias components of the time difference are provided to the US in the CNAV message using parameters designated as ISCs (reference paragraph 30.3.3.1.1).	The terms L1P(Y) and L2P(Y) was inadvertently changed to L1 P(Y) and L2 P(Y) (L1 space P(Y) and L2 space P(Y)) in RevF. The terms have been changed back to L1P(Y) and L2P(Y)
3.3.2.1	For PRN codes 1 through 37, the P _i (t) pattern (P-code) is generated by the modulo-2summation of two PRN codes, X1(t) and X2(t - iT), where T is the period of one P-code chipand equals $(1.023E7)^{-1}$ seconds, while i is an integer from 1 through 37. This allows thegeneration of 37 unique P(t) code phases (identified in Table 3-Ia) using the same basiccode generator.Expanded P-code PRN sequences, P _i (t) where $38 \le i \le 63$, are described as follows:P _i (t) = P _{i-37} (t - T) where T will equal 24 hours)therefore, the equation is		For PRN codes 1 through 37, the P _i (t) pattern (P-code) is generated by the modulo-2 summation of two PRN codes, X1(t) and X2(t - iT), where T is the period of one P-code chip and equals $(1.023E7)^{-1}$ seconds, while i is an integer from 1 through 37. This allows the generation of 37 unique P(t) code phases (identified in Table 3-Ia) using the same basic code generator. Expanded P-code PRN sequences, P _i (t) where $38 \le i \le 63$, are described as follows: P _i (t) = P _{i-37} (t - T) where T will equal 24 hours) therefore, the equation is	Fixed section reference number in the sentence "Section 6.3.7.1 provides a selected subset of additional P- , L2 CM-, L2 CL- , and the C/A- code

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	$P_i(t) = P_{L_{37x}}(t + i * 24 hours),$ where i is an integer from 64 to 210, x is an integer portion of (i-1)/37.As an example, the P-code sequence for PRN 38 is the same sequence as PRN 1 shifted 24hours into a week (i.e. 1st chip of PRN 38 at beginning of week is the same chip for PRN 1 at24 hours after beginning of week). The list of expanded P-code PRN assignments isidentified in Table 3-Ib.The linear G_i(t) pattern (C/A-code) is the modulo-2 sum of two 1023-bit linear patterns, G1and G2_i. The latter sequence is selectively delayed by an integer number of chips toproduce many different G(t) patterns (defined in Tables 3-Ia and 3-Ib).The C _{MJ} (t) pattern (L2 CM-code) is a linear pattern which is reset with a specified initialstate every code count of 10230 chips. Different initial states are used to generatedifferent C _{MJ} (t) patterns (defined in Tables 3-IIa and 3-IIb).The C _{L,i} (t) pattern (L2 CL-code) is also a linear pattern but with a longer reset period of767250 chips. Different initial states are used to generate different C _{LJ} (t) patterns (definedin Tables 3-Ia and 3-IIb).For a given SV ID, two different initial states are used to generate different C _{LJ} (t) and C _{MJ} (t)patterns.Section 6.3.7.1 provides a selected subset of additional P-, L2 CM-, L2 CL-, and the C/A-codesequences with assigned PRN numbers.		 P_i(t) = P_{i-37x}(t + i * 24 hours), where i is an integer from 64 to 210, x is an integer portion of (i-1)/37. As an example, the P-code sequence for PRN 38 is the same sequence as PRN 1 shifted 24 hours into a week (i.e. 1st chip of PRN 38 at beginning of week is the same chip for PRN 1 at 24 hours after beginning of week). The list of expanded P-code PRN assignments is identified in Table 3-lb. The linear G_i(t) pattern (C/A-code) is the modulo-2 sum of two 1023-bit linear patterns, G1 and G2_i. The latter sequence is selectively delayed by an integer number of chips to produce many different G(t) patterns (defined in Tables 3-la and 3-lb). The C_{M,i}(t) pattern (L2 CM-code) is a linear pattern which is reset with a specified initial state every code count of 10230 chips. Different initial states are used to generate different C_{M,i}(t) patterns (defined in Tables 3-la and 3-lb). The C_{L,i}(t) pattern (L2 CL-code) is also a linear pattern but with a longer reset period of 767250 chips. Different initial states are used to generate different C_{L,i}(t) and C_{M,i}(t) patterns. Section 6.3.6 provides a selected subset of additional P-, L2 CM-, L2 CL-, and the C/A-code sequences with assigned PRN numbers. 	sequences with assigned PRN numbers" to "Section 6.3.6 provides a selected subset of additional P- , L2 CM-, L2 CL- , and the C/A- code sequences with assigned PRN numbers."
3.3.2.1 3.3.2.1	The linear G _i (t) pattern (C/A-code) is the modulo-2 sum of two 1023-bit linear patterns, G1 and G2 _i . The latter sequence is selectively delayed by an integer number of chips to produce many different G(t) patterns (defined in Table 3-I). The C _{M,i} (t) pattern (L2 CM-code) is a linear pattern which is reset with a specified initial state every code count of 10230 chips. Different initial states are used to generate different C _{M,i} (t) patterns (defined in Table 3-II).		<pre></pre> <pre><</pre>	Text has been repeated as a result of a publication error and is unnecessary. Text has been repeated as a result of a publication

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				unnecessary.
3.3.2.1	The $C_{L,i}(t)$ pattern (L2 CL-code) is also a linear pattern but with a longer reset period of 767250 chips. Different initial states are used to generate different $C_{L,i}(t)$ patterns (defined in Table 3-II).		<delete></delete>	Text has been repeated as a result of a publication error and is unnecessary.
3.3.2.1	For a given SV ID, two different initial states are used to generate different $C_{L,i}(t)$ and $C_{M,i}(t)$ patterns.		<delete></delete>	Text has been repeated as a result of a publication error and is unnecessary.
3.3.2.1	Section 6.3.7.1 provides a selected subset of additional P-, L2 CM-, L2 CL-, and the C/A-code sequences with assigned PRN numbers.		<delete></delete>	Text has been repeated as a result of a publication error and is unnecessary.



		Proposed Rationale
$\begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} $		Fixed figure for clarity. The terms "X1 Generator," "Code Select Device," and "Remote Command" have been repaired.
₩ bit train, D _c (t), is rate ½ hen modulo-2 added to th	encoded e L2 CM-	This mode no longer reflects the accurate operation of GPS IIR-M and should be deleted.

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3.3.3.1.1	ENCODED DATA BLOCK ENCODED DATA BLOCK DECODED BY DATA BLOCK DECODED BY USER'S DECODING DELAY EARLY SV 12 SECOND EPOCHS Figure 3-15. Convolutional transmit/Decoding Timing Relationships		ENCODED DATA BLOCK TRANSMITTED ON L2 DATA BLOCK DECODED BY USER BY USER EARLY EARLY Figure 3-15. Convolutional transmit/Decoding Timing Relationships	Publication error during Word export. Figure is now correct in Word/PDF. The terms "Encoded Data Block Received by User," "Data Block Decoded by User," and Encoded Data Block Transmitted on L2," have been repaired.
3.3.4	The NAV data contains the requisite data for relating GPS time to UTC. The accuracy of this data during the transmission interval shall be such that it relates GPS time (maintained by the MCS of the CS) to UTC (USNO) within 90 nanoseconds (one sigma). This data is generated by the CS; therefore, the accuracy of this relationship may degrade if for some reason the CS is unable to upload data to a SV. At this point, it is assumed that alternate sources of UTC are no longer available, and the relative accuracy of the GPS/UTC relationship will be sufficient for users. Range error components (e.g. SV clock and position) contribute to the GPS time transfer error, and under normal operating circumstances (two frequency time transfers from SV(s) whose navigation message indicates a URA of eight meters or less), this corresponds to a 97 nanosecond (one sigma) apparent uncertainty at the SV. Propagation delay errors and receiver equipment biases unique to the user add to this time transfer uncertainty.		The NAV data contains the requisite data for relating GPS time to UTC. This data is generated by the CS; therefore, the accuracy of this relationship may degrade if for some reason the CS is unable to upload data to a SV.	The text "The accuracy of this data during the transmission interval shall be such that it relates GPS time (maintained by the MCS of the CS) to UTC (USNO) within 90 nanoseconds (one sigma)"

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Proposed
Rationale
has been
deleted. The
rationale is that
the time
accuracy stated
(90ns- one
sigma) is not
aligned to the
PPS PS and the
SPS PS (40ns).
Also removing
text starting
from "At this
point" as it
can be
misleading to
the reader.

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6.1	AI	-	Availability Indicator		AI	-	Availability Indicator
	AODO	-	Age of Data Offset		AODO	-	Age of Data Offset
	A-S	-	Anti-Spoofing		A-S	-	Anti-Spoofing
	Autonav	-	Autonomous Navigation		Autonav	-	Autonomous Navigation
	BPSK	-	Bi-Phase Shift Key		BPSK	-	Bi-Phase Shift Key
	CDC	-	Clock Differential Correction		CDC	-	Clock Differential Correction
	CNAV	-	Civil Navigation		CNAV	-	Civil Navigation
	cps	-	cycles per second		cps	-	cycles per second
	CRC	-	Cyclic Redundancy Check		CRC	-	Cyclic Redundancy Check
	CS	-	Control Segment		CS	-	Control Segment
	DC	-	Differential Correction		DC	-	Differential Correction
	Db	-	Power ratio of a signal to a (unmodulated) carrier signal, expressed in decibels		dBc	-	Power ratio of a signal to a (unmod in decibels
	dBi	-	Decibel with respect to isotropic antenna		dBi	-	Decibel with respect to isotropic an
	dBW	-	Decibel with respect to 1 W		dBW	-	Decibel with respect to 1 W
	DN	-	Day Number		DN	-	Day Number
	EAROM	-	Electrically Alterable Read-Only Memory		EAROM	-	Electrically Alterable Read-Only M
	ECEF	-	Earth-Centered, Earth-Fixed		ECEF	-	Earth-Centered, Earth-Fixed
	ECI	-	Earth-Centered, Inertial		ECI	-	Earth-Centered, Inertial
	EDC	-	Ephemeris Differential Correction		EDC	-	Ephemeris Differential Correction
	EOE	-	Edge-of-Earth		EOE	-	Edge-of-Earth
	EOL	-	End of Life		EOL	-	End of Life
	ERD	-	Estimated Range Deviation		ERD	-	Estimated Range Deviation
	FEC	-	Forward Error Correction		FEC	-	Forward Error Correction
	GGTO	-	GPS/GNSS Time Offset		GGTO	-	GPS/GNSS Time Offset
	GNSS	-	Global Navigation Satellite System		GNSS	-	Global Navigation Satellite System
	GPS	-	Global Positioning System		GPS	-	Global Positioning System

		Proposed Rationale
		The dBc term was inadvertently changed to DB in RevF. Modifying the term back to dBc.
ulated) carrier signal, expressed		
tenna		
emory		
	1	

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6.2.1	User Range Accuracy (URA) is a statistical indicator of the GPS ranging accuracy obtainable with a specific signal and SV. URA provides a conservative RMS estimate of the user range error (URE) in the associated navigation data for the transmitting SV. It includes all errors for which the Space and Control Segments are responsible. Whether the integrity status flag is 'off' or 'on', 4.42 times URA bounds the instantaneous URE under all conditions with 1-(1e-5) per hour probability ('legacy' level of integrity assurance). When the integrity status flag is 'on', 5.73 times URA bounds the instantaneous URE under all conditions with 1-(1e-8) per hour probability ('enhanced' level of integrity assurance). Integrity properties of the URA are specified with respect to the scaled (multiplied by either 4.42 or 5.73 as appropriate) upper bound values of the URA index or to the scaled composite of the upper bound values of all component URA indexes.		User Range Accuracy (URA) is a statistical indicator of the GPS ranging accuracy obtainable with a specific signal and SV. URA provides a conservative RMS estimate of the user range error (URE) in the associated navigation data for the transmitting SV. It includes all errors for which the Space and Control Segments are responsible. Whether the integrity status flag is 'off' or 'on', 4.42 times URA bounds the instantaneous URE with 1-(1e-5) per hour probability ('legacy' level of integrity assurance). When the integrity status flag is 'on', 5.73 times URA bounds the instantaneous URE with 1-(1e-8) per hour probability ('enhanced' level of integrity assurance). Integrity properties of the URA are specified with respect to the scaled (multiplied by either 4.42 or 5.73 as appropriate) upper bound values of the URA index or to the scaled composite of the upper bound values of all component URA indexes.	Removing "under all conditions" in two instances. The text URA applies "under all conditions" contradicts the text found in Note #3 of Section 6.2.1 which details conditions under which URA does not apply.
6.2.1	Note #3: The above integrity assured probability values do not apply if: (a) an alert is issued to the users before the instantaneous URE exceeds either of the scaled URA bounds, or (b) an alert is issued to the users no more than 8.0 seconds after the instantaneous URE exceeds the 4.42 times URA bound, and (c) if the integrity status flag is 'on' and an alert is issued to the users no more than 5.2 seconds after the instantaneous URE exceeds the 5.73 times URA bound. In this context, an "alert" is defined as any indication or characteristic of the conveying signal, as specified elsewhere in this document, which signifies to users that the conveying signal may be invalid or should not be used, such as the health bits not indicating operational-healthy, broadcasting non-standard code, parity error, etc.		Note #3: The above integrity assured probability values do not apply if: (a) an alert is issued to the users before the instantaneous URE exceeds either of the scaled URA bounds; or (b) if the integrity status flag is 'off' an alert is issued to the users no more than 8.0 seconds after the instantaneous URE exceeds the 4.42 times URA bound; or (c) if the integrity status flag is 'on' an alert is issued to the users no more than 8.0 seconds after the instantaneous URE exceeds the 4.42 times URA bound; or (d) if the integrity status flag is 'on' an alert is issued to users no more than 5.2 seconds after the instantaneous URE exceeds the 5.73 times URA bound. In this context, an "alert" is defined as any indication or characteristic of the conveying signal, as specified elsewhere in this document, which signifies to users that the conveying signal may be invalid or should not be used, such as the health bits not indicating operational-healthy, broadcasting non-standard code, parity error, etc.	The (b) and (c) conditions of this requirement have been rewritten since condition (b) and (c) must happen together for the conditions to apply. However, condition (b) states the integrity status flag must be 'on' and condition 'c'

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states the integrity status flag must be 'off' at the same time for the conditions to apply. The text has been rewritten to reflect the conditions are separate. These 3 conditions have now been decomposed into 4 conditions to decrease ambiguity.



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Number	Interfaces	Object		Rationale
		Heading		
		IIR/IIR-M)		both 6.3.3.1
		and		(Block IIA Mode
		Extended		(Block IIR/IIR-
		Navigatio		M) and 6.3.3.2,
		n Mode		"Extended
		(Block II-		Navigation
		F).		Mode (Block II-
				F). This reverts
				to the
				numbering
				found in IS-200,
				Rev E.
6.2.2.1				
6.3.3.1		BIOCK IIA		Moved Block
		Mode		IIA mode
		(Block		(Section 6.3.3)
		IIR/IIR-		to Section
		M).		6.3.3.1 to list
				Block IIA Mode
				(Block IIR/IIR-
				M) and
				Extended
				Navigation
				Mode (Block II-
				F) in
				chronological
				order.
				All accoriated
				All associated
				Soction 6.2.2
				bas also moved
				to Soction
				0.3.3.1.
6.3.3.2		Extended		Moved
		Navigatio		Extended
		n Mode		Navigation
		(Block II-		Mode (Block II-
		(Block II-		Mode (Block II-

Heading	Rationale
including	
F).	F) from 6.3.4 to
	Section 6.3.3.2
	to list Block IIA
	Mode (Block
	IIR/IIR-M) and
	Extended
	Navigation
	Mode (Block II-
	F) in
	chronological
	order.
	All associated
	text with
	Section 6.3.4
	has also moved
	to Section
	6.3.3.2.
6.3.4 Extended	Moving Section
Extended Navigation Mode (Block II-F).	6.3.5
n Mode	"Extended
(GPS III).	Navigation
	Mode (GPS III)"
	to 6.3.4, which
	honors the
	RevE
	numbering.
	All associated
	text with
	Section 6.3.5
	has also moved
	to Section
	6.3.4.
635 Autonom	Moving Section
Extended Navigation Mode (GPS III).	636
Navigatio	"Autonomous

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		n Mode.		Navigation Mode" to 6.3.5, which honors the RevE numbering.
				All associated text with Section 6.3.6 has also moved to Section 6.3.5.
6.3.6	Autonomous Navigation Mode.	Additiona I PRN Code Sequence s		Moving Section 6.3.7 "Additional PRN Code Sequences" to 6.3.6, which honors the RevE numbering. All associated text with Section 6.3.6 has also moved to Section 6.3.7.
6.3.6.1		Additiona I C/A- code PRN sequence s.		Due to the renumbering of Sections 6.3.7 to 6.3.6, all associated sections from 6.3.7 have been moved to be part of

Number Interfaces Object Heading Image: Constraint of the second	Section	IS-GPS-200 RevF IRN001 (17 Apr 2012) Navstar GPS Space Segment/Navigation User	Proposed	Proposed Public Signals-in-Space (SiS) Updates Object Text
Heading 6.3.6.2 Additiona IP-Code PRN sequence	Number	Interfaces	Object	
6.3.6.2 Additiona I P-Code PRN sequence			Heading	
6.3.6.2 Additiona I P-Code PRN sequence sequence				
6.3.6.2 Additiona I P-Code PRN sequence				
6.3.6.2 Additiona I P-Code PRN sequence				
6.3.6.2 Additiona I P-Code PRN sequence sequence				
6.3.6.2 Additiona I P-Code PRN sequence sequence				
6.3.6.2 Additiona PRN PRN sequence Sequence				
6.3.6.2 Additiona I P-Code PRN sequence				
I P-Code PRN sequence	6.3.6.2		Additiona	
PRN sequence			l P-Code	
sequence			PRN	
			sequence	
S.			S.	
6.3.6.2.1 Additiona	6.3.6.2.1		Additiona	
I P-code			l P-code	
Generatio			Generatio	
n.			n.	

Proposed Rationale
6.3.6.
All associated text with Section 6.3.7.1 has also moved to Section 6.3.6.1
Due to the renumbering of Sections 6.3.7 to 6.3.6, all associated sections from 6.3.7 have been moved to be part of 6.3.6. All associated
text with Section 6.3.7.2 has also moved to Section 6.3.6.2
Due to the renumbering of Sections 6.3.7 to 6.3.6, all associated sections from 6.3.7 have been moved to be part of 6.3.6.
All associated

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				text with Section 6.3.7.2.1 has
				Section 6.3.6.2.1.

PRN Signal No. 64 65 66 67 68 69 70 71	Table 6 G2 Delay (Chips) 729 695 780 801 788 732	-I Additi C/A Initial G2 Setting (Octal)* 0254 1602 1160 1114	First 10 Chips (Octal)** 1523 0175	hase Assignm X2 Delay (Chips)	P P-code Relative Advance	First 12 Chips
PRN Signal No. 64 65 66 67 68 69 70 71	G2 Delay (Chips) 729 695 780 801 788 732	C/A Initial G2 Setting (Octal)* 0254 1602 1160 1114	First 10 Chips (Octal)** 1523 0175	X2 Delay (Chips)	P P-code Relative Advance	First 12 Chips
PRN Signal No. 64 65 66 67 68 69 70 71	G2 Delay (Chips) 729 695 780 801 788 732	Initial G2 Setting (Octal)* 0254 1602 1160 1114	First 10 Chips (Octal)** 1523 0175	X2 Delay (Chips)	P-code Relative Advance	First 12 Chips
64 65 66 67 68 69 70 71	729 695 780 801 788 732	0254 1602 1160 1114	1523 0175	27	(Hours) ••	(Octal)
72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95	34 320 327 389 407 525 405 221 761 260 326 955 653 699 422 188 438 959 539 879 677 586 153 792 814 446	1342 0025 1523 1046 0404 1445 1054 0072 0262 0077 0521 1400 1010 1441 0365 0270 0263 0613 0277 1562 1674 1113 1245 0606 0136 0256 1550 1234 n for the first 10 of	$\begin{array}{c} 0617\\ 0663\\ 0435\\ 1752\\ 0254\\ 0731\\ 1373\\ 0332\\ 0723\\ 1705\\ 1515\\ 1700\\ 1256\\ 0377\\ 0767\\ 0336\\ 1412\\ 1507\\ 1514\\ 1164\\ 1500\\ 0215\\ 0103\\ 0664\\ 0532\\ 1171\\ 1641\\ 1521\\ 0227\\ 0543\\ \end{array}$	27 28 29 30 31 32 33 34 35 36 37 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 He or the initia	$\begin{array}{c} (110000) \\ P_{27}(1+24) \\ P_{28}(1+24) \\ P_{29}(1+24) \\ P_{30}(1+24) \\ P_{30}(1+24) \\ P_{31}(1+24) \\ P_{32}(1+24) \\ P_{32}(1+24) \\ P_{33}(1+24) \\ P_{33}(1+24) \\ P_{35}(1+24) \\ P_{35}(1+24) \\ P_{37}(1+24) \\ P_{37}(1+24) \\ P_{37}(1+48) \\ P_{2}(1+48) \\ P_{3}(1+48) \\ P_{4}(1+48) \\ P_{5}(1+48) \\ P_{6}(1+48) \\ P_{6}(1+48) \\ P_{6}(1+48) \\ P_{6}(1+48) \\ P_{6}(1+48) \\ P_{6}(1+48) \\ P_{10}(1+48) \\ P_{10}(1+48) \\ P_{11}(1+48) \\ P_{11}(1+48) \\ P_{12}(1+48) \\ P_{15}(1+48) \\ P_{16}(1+48) \\ P_{10}(1+48) $	$\begin{array}{c} 5112\\ 0667\\ 2111\\ 5266\\ 4711\\ 4166\\ 2251\\ 5306\\ 4761\\ 2152\\ 5247\\ 5736\\ 2575\\ 3054\\ 3604\\ 3520\\ 5472\\ 4417\\ 2025\\ 3230\\ 5736\\ 4575\\ 2054\\ 3204\\ 3720\\ 5572\\ 4457\\ 4005\\ 2220\\ 3332\\ 3777\\ 3555\\ \end{array}$
	83 84 85 86 87 88 89 90 91 92 93 94 95 * In th firs conve	85 699 84 422 85 188 86 438 87 959 88 539 89 879 90 677 91 586 92 153 93 792 94 814 95 446 * In the octal notation first digit (1/0) re conventional octal resonance of the conventional octal resonance octal resonance of the conventional octal reso	83 699 0270 84 422 0263 85 188 0613 86 438 0277 87 959 1562 88 539 1674 89 879 1113 90 677 1245 91 586 0606 92 153 0136 93 792 0256 94 814 1550 95 446 1234 * In the octal notation for the first 10 or first digit ($1/0$) represents a "1" or conventional octal representation of th for PRN S ** P _i (t+N): P-code sequence of the for PRN S	85 699 0270 1507 84 422 0263 1514 85 188 0613 1164 86 438 0277 1500 87 959 1562 0215 88 539 1674 0103 89 879 1113 0664 90 677 1245 0532 91 586 0606 1171 92 153 0136 1641 93 792 0256 1521 94 814 1550 0227 95 446 1234 0543 * In the octal notation for the first 10 chips of the C/A-coord first digit (1/0) represents a "1" or "0", respectively, for PRN Signal Assembly No ** P_i (t+N): P-code sequence of PRN number i sh	85099027013079844220263151410851880613116411864380277150012879591562021513885391674010314898791113066415906771245053216915860606117117921530136164118937920256152119948141550022720954461234054321* In the octal notation for the first 10 chips of the C/A-code or the initia first digit (1/0) represents a "1" or "0", respectively, for the first ch conventional octal representation of the remaining 9 chips. (For examp for PRN Signal Assembly No. 64 are: 1101** P _i (t+N): P-code sequence of PRN number i shifted by N hore	85 099 0270 1307 9 $P_{9}(t+48)$ 84 422 0263 1514 10 $P_{10}(t+48)$ 85 188 0613 1164 11 $P_{11}(t+48)$ 86 438 0277 1500 12 $P_{12}(t+48)$ 87 959 1562 0215 13 $P_{13}(t-48)$ 88 539 1674 0103 14 $P_{14}(t+48)$ 89 879 1113 0664 15 $P_{15}(t+48)$ 90 677 1245 0532 16 $P_{16}(t+48)$ 91 586 0606 1171 17 $P_{17}(t+48)$ 92 153 0136 1641 18 $P_{18}(t+48)$ 93 792 0256 1521 19 $P_{19}(t+48)$ 94 814 1550 0227 20 $P_{20}(t+48)$ 95 446 1234 0543 21 $P_{21}(t+48)$ *In the octal notation for the first 10 chips of the C/A-code or the initial settings as shown first digit (1/0) represents a "1" or "0", respectively, for the first chip and the last three conventional octal representation of the remaining 9 chips. (For example, the first 10 chips for PRN Signal Assembly No. 64 are: 1101010011).** $P_i(t+N)$: P-code sequence of PRN number i shifted by N hours. See Section 6.3

ection umber	IS-GPS-200 Interfaces	0 RevF IRNO	001 (17 Apr 2	2012) Navstar (GPS Space	Segment/Nav	igation User	Proposed Object Heading	Proposed F	Public Signals	s-in-Space (SiS	6) Updates Obje	ct Text			Propose Rationa
.6.2.1		Table 6	-I Additio	onal C/A-/P-Code I	Phase Assignn	nents (sheet 2 of 5)				Table 6	5-I Additi	ional C/A-/P-Code	Phase Assignn	nents (sheet 2 of 5)		Referen
			C/A			Р					C/A			Р		change
	PRN Signal No.	G2 Delay (Chips)	Initial G2 Setting (Octal)*	First 10 Chips (Octal)*	X2 Delay (Chips)	P-code Relative Advance (Hours) **	First 12 Chips (Octal)		PRN Signal No.	G2 Delay (Chips)	Initial G2 Setting (Octal)*	First 10 Chips (Octal)*	X2 Delay (Chips)	P-code Relative Advance (Hours) **	First 12 Chips (Octal)	6.3.7.2. Section
	96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 * In th fire converse	264 1015 278 536 819 156 957 159 712 885 461 248 713 126 807 279 122 197 693 632 771 467 647 203 145 175 52 21 237 235 re octal notation st digit (1/0) repentional octal repending the second repending the second repending the second repending the second rependence of the second re	0260 1455 1535 0746 1033 1213 0710 0721 1763 1751 0435 0735 0771 0140 0111 0656 1016 0462 1011 0552 0045 1104 0557 0364 1106 1241 0267 0232 1617 1076 1076	1517 0322 0242 1031 0744 0564 1067 1056 0014 0026 1342 1042 1006 1637 1666 1121 0761 1315 0766 1225 1732 0673 1220 1413 0671 0536 1510 1545 0160 0701 thips of the C/A-coor "0", respectively, the remaining 9 chip	$\begin{array}{c} 22 \\ 23 \\ 24 \\ 25 \\ 26 \\ 27 \\ 28 \\ 29 \\ 30 \\ 31 \\ 32 \\ 33 \\ 34 \\ 35 \\ 36 \\ 37 \\ 1 \\ 2 \\ 3 \\ 4 \\ 5 \\ 6 \\ 7 \\ 8 \\ 9 \\ 10 \\ 11 \\ 12 \\ 13 \\ 14 \\ \begin{array}{c} \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\$	$\begin{array}{c} P_{22}(t+48) \\ P_{23}(t+48) \\ P_{24}(t+48) \\ P_{25}(t+48) \\ P_{26}(t+48) \\ P_{26}(t+48) \\ P_{26}(t+48) \\ P_{20}(t+48) \\ P_{30}(t+48) \\ P_{30}(t+48) \\ P_{30}(t+48) \\ P_{31}(t+48) \\ P_{32}(t+48) \\ P_{33}(t+48) \\ P_{35}(t+48) \\ P_{35}(t+48) \\ P_{36}(t+48) \\ P_{36}(t+72) \\ P_{6}(t+72) \\ P_{6}(t+72) \\ P_{6}(t+72) \\ P_{6}(t+72) \\ P_{6}(t+72) \\ P_{6}(t+72) \\ P_{10}(t+72) \\ P_{10$	3444 7400 1422 2433 7037 1635 6534 5074 0614 6124 1270 2716 5165 0650 6106 5261 6752 5147 0641 6102 1263 2713 3167 3651 7506 5461 0412 6027 1231 2736 in this table, the e digits are the s of the C/A code		96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 * In t fir conv	264 1015 278 536 819 156 957 159 712 885 461 248 713 126 807 279 122 197 693 632 771 467 647 203 145 175 52 21 237 235	0260 1455 1535 0746 1033 1213 0710 0721 1763 1751 0435 0735 0771 0140 0111 0656 1016 0462 1011 0552 0045 1104 0557 0364 1106 1241 0267 0232 1617 1076 m for the first 10 oppresents a "1" or epresentation of t	1517 0322 0242 1031 0744 0564 1067 1056 0014 0026 1342 1042 1006 1637 1666 1121 0761 1315 0766 1225 1732 0673 1220 1413 0671 0536 1510 1545 0160 0701	$ \begin{array}{c} 22\\ 23\\ 24\\ 25\\ 26\\ 27\\ 28\\ 29\\ 30\\ 31\\ 32\\ 33\\ 34\\ 35\\ 36\\ 37\\ 1\\ 2\\ 3\\ 4\\ 5\\ 6\\ 7\\ 8\\ 9\\ 10\\ 11\\ 12\\ 13\\ 14\\ \begin{array}{c} 14\\ 12\\ 13\\ 14\\ \begin{array}{c} 16\\ 16\\ 16\\ 16\\ 16\\ 16\\ 16\\ 16\\ 16\\ 16\\$	$\begin{array}{c} (14001) \\ P_{22}(t+48) \\ P_{23}(t+48) \\ P_{23}(t+48) \\ P_{24}(t+48) \\ P_{25}(t+48) \\ P_{26}(t+48) \\ P_{29}(t+48) \\ P_{29}(t+48) \\ P_{30}(t+48) \\ P_{30}(t+48) \\ P_{31}(t+48) \\ P_{32}(t+48) \\ P_{33}(t+48) \\ P_{35}(t+48) \\ P_{35}(t+48) \\ P_{36}(t+48) \\ P_{36}(t+48) \\ P_{36}(t+48) \\ P_{36}(t+48) \\ P_{36}(t+48) \\ P_{36}(t+48) \\ P_{36}(t+72) \\ P_{6}(t+72) \\ P_{6}(t+72) \\ P_{6}(t+72) \\ P_{6}(t+72) \\ P_{6}(t+72) \\ P_{6}(t+72) \\ P_{10}(t+72) \\ P_{10}(t+72) \\ P_{10}(t+72) \\ P_{14}(t+72) \\ P_{14}(t+7$	$\begin{array}{c} 3444 \\ 7400 \\ 1422 \\ 2433 \\ 7037 \\ 1635 \\ 6534 \\ 5074 \\ 0614 \\ 6124 \\ 1270 \\ 2716 \\ 5165 \\ 0650 \\ 6106 \\ 5261 \\ 6752 \\ 5147 \\ 0641 \\ 6102 \\ 1263 \\ 2713 \\ 3167 \\ 3651 \\ 7506 \\ 5461 \\ 0412 \\ 6027 \\ 1231 \\ 2736 \\ \end{array}$ in this table, the e digits are the so of the C/A code	6.3.6.2.
	NOTE: TI	** P _i (t+N): I ne code phase a	P-code sequence of ssignments consti	of PRN number i sh itute inseparable pa <u>P code phase, as sl</u>	ifted by N ho irs, each consi hown above.	urs. See Section 6.3	3.7.2.1. 7/A and a specific		NOTE: T	** P _i (t+N): The code phase a	P-code sequence assignments const	of PRN number i sl titute inseparable pa <u>P code phase, as s</u>	hifted by N ho hirs, each consi hown above.	urs. See Section 6.	3.6.2.1. C/A and a specific	

Interface	OO REVF IRNO	01 (17 Apr 20	012) Navstar G	PS Space S	egment/Navig	gation User	Object Heading	Proposed P	ublic Signals	-in-Space (SiS	5) Updates Obje	ct Text			Pr Ra
	Table 6	-I Additi	onal C/A-/P-Code F	hase Assignm	ents (sheet 3 of 5)				Table 6	-I Additi	onal C/A-/P-Code I	Phase Assignm	nents (sheet 3 of 5)		Re
		C/A			Р					C/A			Р		Ia
PRN Signal No.	G2 Delay (Chips)	Initial G2 Setting (Octal)*	First 10 Chips (Octal)*	X2 Delay (Chips)	P-code Relative Advance (Hours) **	First 12 Chips (Octal)		PRN Signal No.	G2 Delay (Chips)	Initial G2 Setting (Octal)*	First 10 Chips (Octal)*	X2 Delay (Chips)	P-code Relative Advance (Hours) **	First 12 Chips (Octal)	6.3 Se
126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 * In	886 657 634 762 355 1012 176 603 130 359 595 68 386 797 456 499 883 307 127 211 121 118 163 628 853 484 289 811 202 1021	1764 0717 1532 1250 0341 0551 0520 1731 0706 1216 0740 1007 0450 0305 1653 1411 1644 1312 1060 1560 0035 0355 0335 1254 1041 0142 1641 1504 0751 1774	0013 1060 0245 0527 1436 1226 1257 0046 1071 0561 1037 0770 1327 1472 0124 0366 0133 0465 0717 0217 1742 1422 1442 0523 0736 1635 0136 0273 1026 0003	15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 1 2 3 4 5 6 7	$\begin{array}{c} P_{15}(t+72) \\ P_{16}(t+72) \\ P_{16}(t+72) \\ P_{19}(t+72) \\ P_{19}(t+72) \\ P_{20}(t+72) \\ P_{20}(t+72) \\ P_{21}(t+72) \\ P_{22}(t+72) \\ P_{23}(t+72) \\ P_{24}(t+72) \\ P_{26}(t+72) \\ P_{26}(t+72) \\ P_{20}(t+72) \\ P_{30}(t+72) \\ P_{30}(t+72) \\ P_{30}(t+72) \\ P_{31}(t+72) \\ P_{33}(t+72) \\ P_{33}(t+72) \\ P_{33}(t+72) \\ P_{34}(t+72) \\ P_{35}(t+72) \\ P_{36}(t+72) \\ P_{37}(t+72) \\ P_{36}(t+72) \\ P_{37}(t+72) \\ P_{37}(t+72) \\ P_{3}(t+96) \\ P_{2}(t+96) \\ P_{4}(t+96) \\ P_{5}(t+96) \\ P_{6}(t+96) \\ P_{7}(t+96) \\ \end{array}$	$\begin{array}{c} 7175 \\ 1654 \\ 6504 \\ 1060 \\ 2612 \\ 7127 \\ 5671 \\ 4516 \\ 4065 \\ 4210 \\ 4326 \\ 0371 \\ 6356 \\ 5345 \\ 0740 \\ 6142 \\ 1243 \\ 6703 \\ 5163 \\ 4653 \\ 4107 \\ 4261 \\ 0312 \\ 2525 \\ 7070 \\ 1616 \\ 2525 \\ 7070 \\ 1616 \\ 2525 \\ 7070 \\ 3616 \\ 7525 \end{array}$		126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 * In th firs	886 657 634 762 355 1012 176 603 130 359 595 68 386 797 456 499 883 307 127 211 121 118 163 628 853 484 289 811 202 1021 e octal notation t digit (1/0) rej	1764 0717 1532 1250 0341 0551 0520 1731 0706 1216 0740 1007 0450 0305 1653 1411 1644 1312 1060 1560 0035 0355 0355 0355 0355 0355 0355 0	$\begin{array}{c} 0013\\ 1060\\ 0245\\ 0527\\ 1436\\ 1226\\ 1257\\ 0046\\ 1071\\ 0561\\ 1037\\ 0770\\ 1327\\ 1472\\ 0124\\ 0366\\ 0133\\ 0465\\ 0717\\ 0217\\ 1742\\ 1422\\ 1442\\ 0523\\ 0736\\ 1635\\ 0136\\ 0273\\ 1026\\ 0003\\ \end{array}$	15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 1 2 3 4 5 6 7	$\begin{array}{c} P_{15}(t+72) \\ P_{16}(t+72) \\ P_{16}(t+72) \\ P_{19}(t+72) \\ P_{19}(t+72) \\ P_{20}(t+72) \\ P_{20}(t+72) \\ P_{21}(t+72) \\ P_{22}(t+72) \\ P_{23}(t+72) \\ P_{24}(t+72) \\ P_{25}(t+72) \\ P_{26}(t+72) \\ P_{26}(t+72) \\ P_{20}(t+72) \\ P_{30}(t+72) \\ P_{30}(t+72) \\ P_{31}(t+72) \\ P_{32}(t+72) \\ P_{33}(t+72) \\ P_{35}(t+72) \\ P_{35}(t+72) \\ P_{36}(t+72) \\ P_{36}(t+72) \\ P_{37}(t+72) \\ P_{36}(t+72) \\ P_{37}(t+72) \\ P_{36}(t+96) \\ P_{4}(t+96) \\ P_{5}(t+96) \\ P_{6}(t+96) \\ P_{7}(t+96) \\ \end{array}$	7175 1654 6504 1060 2612 7127 5671 4516 4065 4210 4326 0371 6356 5345 0740 6142 1243 6703 5163 4653 4107 4261 0312 2525 7070 1616 2525 7070 1616 2525 7070 3616 7525 in this table, the edigits are the	6.3
	** P _i (t+N): I	for PRN S -code sequence of	ignal Assembly No of PRN number i sh	64 are: 1101 ifted by N hou	010011). Irs. See Section 6.3	3.7.2.1.			** P _i (t+N): I	for PRN S -code sequence	ignal Assembly No of PRN number i sh	64 are: 1101 ifted by N hou	010011). Irs. See Section 6.3	.6.2.1.	
NOTE: 7	The code phase as	ssignments const	itute inseparable pai P code phase, as sh	irs, each consi 10wn above.	sting of a specific (C/A and a specific		NOTE: Th	e code phase a	ssignments const	itute inseparable pa P code phase, as sl	irs, each consi 10wn above.	sting of a specific C	VA and a specific	

Section Number	IS-GPS-200 Interfaces) RevF IRNO	001 (17 Apr)	2012) Navstar	GPS Space	e Segment/Na	vigation User	Proposed Object Heading	Proposed P	ublic Signals	s-in-Space (SiS	i) Updates Obje	ct Text			Proposed Rationale
6.3.6.2.1		Table 6	5-I Additi	onal C/A-/P-Code I	Phase Assignn	nents (sheet 4 of 5)				Table 6	-I Additi	onal C/A-/P-Code I	Phase Assignn	nents (sheet 4 of 5)		References in
			C/A			Р					C/A		Р			Table have
	PRN Signal No.	G2 Delay (Chips)	Initial G2 Setting (Octal)*	First 10 Chips (Octal)*	X2 Delay (Chips)	P-code Relative Advance (Hours) **	First 12 Chips (Octal)		PRN Signal No.	G2 Delay (Chips)	Initial G2 Setting (Octal)*	First 10 Chips (Octal)*	X2 Delay (Chips)	P-code Relative Advance (Hours) **	First 12 Chips (Octal)	6.3.7.2.1 to Section
	156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 * Inth fire conversion	463 568 904 670 230 911 684 309 644 932 12 314 891 212 185 675 503 150 395 345 846 798 992 357 995 877 112 144 476 193 e octal notation at digit (1/0) re	0107 1153 1542 1223 1702 0436 1735 1662 1570 1573 0201 0635 1737 1670 0134 1224 1460 1362 1654 0510 0242 1142 1017 1070 0501 0455 1566 0215 1003 1454 n for the first 10 operation of the for PRN Second Se	1670 0624 0235 0554 0075 1341 0042 0115 0207 0204 1576 1142 0040 0107 1643 0553 0317 0415 0123 1267 1535 0635 0760 0707 1276 1322 0211 1562 0774 0323 chips of the C/A-coo ''0'', respectively, f he remaining 9 chip Signal Assembly No of PRN number i sh	8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 de or the initia for the first chos. (For example, 64 are: 110) ifted by N horizont	$\begin{array}{c} P_8(t+96) \\ P_9(t+96) \\ P_{10}(t+96) \\ P_{11}(t+96) \\ P_{12}(t+96) \\ P_{12}(t+96) \\ P_{13}(t+96) \\ P_{13}(t+96) \\ P_{15}(t+96) \\ P_{15}(t+96) \\ P_{16}(t+96) \\ P_{17}(t+96) \\ P_{21}(t+96) \\ P_{22}(t+96) \\ P_{22}(t+96) \\ P_{23}(t+96) \\ P_{33}(t+96) \\ P_{33}(t+96) \\ P_{34}(t+96) \\ P_{34}(t+96) \\ P_{35}(t+96) \\ P_{35}(t+96) \\ P_{35}(t+96) \\ P_{35}(t+96) \\ P_{35}(t+96) \\ P_{35}(t+96) \\ P_{36}(t+96) \\ P_{37}(t+96) \\ P_{37$	5470 4416 4025 4230 0336 6375 1354 6744 5140 4642 0103 6263 1313 6767 1151 2646 7101 5662 0513 2067 3211 3726 3571 3456 3405 3420 5432 0437 6035 1234 in this table, the e digits are the s of the C/A code and a sector of the code and a se		156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 * In th firs conversion	463 568 904 670 230 911 684 309 644 932 12 314 891 212 185 675 503 150 395 345 846 798 992 357 995 877 112 144 476 193 e octal notation t digit (1/0) re ntional octal re	0107 1153 1542 1223 1702 0436 1735 1662 1570 1573 0201 0635 1737 1670 0134 1224 1460 1362 1654 0510 0242 1142 1017 1070 0501 0455 1566 0215 1003 1454 0500 0455 1566 0215 1003 1454	1670 0624 0235 0554 0075 1341 0042 0115 0207 0204 1576 1142 0040 0107 1643 0553 0317 0415 0123 1267 1535 0635 0760 0707 1276 1322 0211 1562 0774 0323 chips of the C/A-coo "0", respectively, the remaining 9 chip ignal Assembly No of PRN number i sh	8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37	$\begin{array}{c} P_8(t+96) \\ P_9(t+96) \\ P_{10}(t+96) \\ P_{11}(t+96) \\ P_{12}(t+96) \\ P_{12}(t+96) \\ P_{13}(t+96) \\ P_{13}(t+96) \\ P_{13}(t+96) \\ P_{16}(t+96) \\ P_{16}(t+96) \\ P_{17}(t+96) \\ P_{20}(t+96) \\ P_{20}(t+96) \\ P_{22}(t+96) \\ P_{22}(t+96) \\ P_{23}(t+96) \\ P_{23}(t+96) \\ P_{23}(t+96) \\ P_{23}(t+96) \\ P_{23}(t+96) \\ P_{30}(t+96) \\ P_{31}(t+96) \\ P_{33}(t+96) \\ P_{33}(t+96) \\ P_{34}(t+96) \\ P_{37}(t+96) \\ P_{37$	5470 4416 4025 4230 0336 6375 1354 6744 5140 4642 0103 6263 1313 6767 1151 2646 7101 5662 0513 2067 3211 3726 3571 3456 3405 3420 5432 0437 6035 1234 in this table, the e digits are the s of the C/A code and a code a co	6.3.6.2.1.
	NOTE: T	ne code phase a	nssignments const F	itute inseparable pa ⁹ code phase, as sho	irs, each consi wn above.	isting of a specific (C/A and a specific		NOTE: Th	e code phase a	ssignments const P	itute inseparable pa code phase, as sho	irs, each consi wn above.	sting of a specific C	VA and a specific	

Section Number	IS-GPS-200 Interfaces	0 RevF IRNO	01 (17 Apr 20	012) Navstar G	iPS Space S	Segment/Navig	gation User	Proposed Object Heading	Proposed P	ublic Signals	-in-Space (SiS) Updates Obje	ct Text			Proposed Rationale
6.3.6.2.1		Table 6	-I. Additio	onal C/A-/P-Code H	Phase Assignm	nents (sheet 5 of 5)				Table 6	-I. Additio	onal C/A-/P-Code I	Phase Assignm	nents (sheet 5 of 5)		References in
			C/A			Р					C/A			Р		Lable have
	PRN Signal No.	G2 Delay (Chips)	Initial G2 Setting (Octal)*	First 10 Chips (Octal)*	X2 Delay (Chips)	P-code Relative Advance (Hours) **	First 12 Chips (Octal)		PRN Signal No.	G2 Delay (Chips)	Initial G2 Setting (Octal)*	First 10 Chips (Octal)*	X2 Delay (Chips)	P-code Relative Advance (Hours) **	First 12 Chips (Octal)	6.3.7.2.1 to Section
	186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 * In th fir convert NOTE: TI	109 445 291 87 399 292 901 339 208 711 189 263 537 663 942 173 900 30 500 935 556 373 85 652 310 the octal notation st digit (1/0) rejentional octal ref	1665 0471 1750 0307 0272 0764 1422 1050 1607 1747 1305 0540 1363 0727 0147 1206 1045 0476 0604 1757 1330 0663 1436 0753 0731	0112 1306 0027 1470 1505 1013 0355 0727 0170 0030 0472 1237 0414 1050 1630 0571 0732 1301 1173 0020 0447 1114 0341 1024 1046 hips of the C/A-coc "0", respectively, f re remaining 9 chip ignal Assembly No of PRN number i sh postitute inseparal c P code phase, a	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 ce or the initia for the first ch s. (For examp 6 de are: 1101 iffed by N hou ble pairs, eao as shown abo	$\begin{array}{c} P_{1}(t+120) \\ P_{2}(t+120) \\ P_{3}(t+120) \\ P_{4}(t+120) \\ P_{5}(t+120) \\ P_{6}(t+120) \\ P_{6}(t+120) \\ P_{7}(t+120) \\ P_{1}(t+120) \\ P_{2}(t+120) \\$	1067 6611 5126 4671 0116 6265 1310 6766 1151 2646 3101 7662 5513 4467 4011 4226 4331 0376 6355 5344 0740 6142 1243 6703 1163 in this table, the e digits are the s of the C/A code 5.7.2.1. specific C/A and		186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 * In th firs conve	109 445 291 87 399 292 901 339 208 711 189 263 537 663 942 173 900 30 500 935 556 373 85 652 310 e octal notation t digit (1/0) rej ntional octal re	1665 0471 1750 0307 0272 0764 1422 1050 1607 1747 1305 0540 1363 0727 0147 1206 1045 0476 0604 1757 1330 0663 1436 0753 0731	0112 1306 0027 1470 1505 1013 0355 0727 0170 0030 0472 1237 0414 1050 1630 0571 0732 1301 1173 0020 0447 1114 0341 1024 1024 1046 ************************************	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 de or the initia for the first ch vs. (For examp b. 64 are: 1101 affed by N hore ble pairs, each as shown abo	$\begin{array}{c} P_{1}(t+120) \\ P_{2}(t+120) \\ P_{3}(t+120) \\ P_{4}(t+120) \\ P_{5}(t+120) \\ P_{6}(t+120) \\ P_{7}(t+120) \\ P_{6}(t+120) \\ P_{9}(t+120) \\ P_{10}(t+120) \\ P_{10}(t+120) \\ P_{10}(t+120) \\ P_{12}(t+120) \\ P_{13}(t+120) \\ P_{13}(t+120) \\ P_{15}(t+120) \\ P_{16}(t+120) \\ P_{16}(t+120) \\ P_{16}(t+120) \\ P_{16}(t+120) \\ P_{19}(t+120) \\ P_{20}(t+120) \\ P_{21}(t+120) \\ P_{22}(t+120) \\ P_{23}(t+120) \\ P_{23}(t+120) \\ P_{25}(t+120) \\ $	$ \begin{array}{c} 1067\\ 6611\\ 5126\\ 4671\\ 0116\\ 6265\\ 1310\\ 6766\\ 1151\\ 2646\\ 3101\\ 7662\\ 5513\\ 4467\\ 4011\\ 4226\\ 4331\\ 0376\\ 6355\\ 5344\\ 0740\\ 6142\\ 1243\\ 6703\\ 1163\\ \begin{array}{c} 163\\ 163\\ 163\\ 163\\ 163\\ 163\\ 163\\ 163\\$	6.3.6.2.1.
6.3.6.3								Additiona I L2 CM- /L2 CL-								Due to the renumbering of Sections 6.3.7

Section	IS-GPS-200 RevF IRN001 (17 Apr 2012) Navstar GPS Space Segment/Navigation User	Proposed	Proposed Public Signals-in-Space (SiS) Updates Object Text
Number	Interfaces	Heading	
		Code PRN	
		sequence	
		S.	
6.3.7	Additional PRN Code Sequences.	Pre-	
		nal Use	
		nur ose.	
6.3.8	Pro Operational Use	<delete></delete>	

Proposed Rationale
to 6.3.6, all associated sections from 6.3.7.3 have been moved to be part of 6.3.6.3. All associated
text and tables with Section 6.3.7.3 has also moved to Section 6.3.6.3.
Moving Section 6.3.8 "Pre- Operational Use" to 6.3.7, which honors the RevE numbering. All associated
text with Section 6.3.8 has also moved to Section 6.3.7.
has been deleted.
Moving Section 6.3.8 "Pre- Operational Use" to 6.3.7, which honors



	Proposed Rationale
	the RevE numbering.
	All associated text with Section 6.3.8 has also moved to Section 6.3.7.
MSB FIRST	Publication error during Word export.
1 121 A- SPOOF & SV CONFIG SV CONFIG V SV	Figure is now correct in Word/PDF.
	The "A-SPOOF & SV CONFIG" (bits 69 to 121) fields were
	have now been
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	repaired.
SV HEALTH - 6 BITS 4 BITS **	
t 9 of 11)	







Section Number	IS-GPS-200 RevF IRN001 (17 Apr 2012) Navstar GPS Space Segment/Navigation User Interfaces	Proposed Object Heading	Proposed Public Signals-in-Space (SiS) Updates Object Text	Proposed Rationale
	$x' = x \cos(\theta) - y \sin(\theta)$		$x' = x \cos(\theta) - y \sin(\theta)$	
	$y' = x \sin(\theta) + y \cos(\theta)$		$y' = x \sin(\theta) + y \cos(\theta)$	
	z' = z		z' = z	
	where		where	
	Ω _c		$\theta = \hat{\Omega}_{e} (t - t_{0})$	
	$\Theta = (t - t_0)$		* The propagation speed c is constant only in a vacuum. The gravitational potential also has a small effect on the propagation speed, but may be neglected by most users.	
	* The propagation speed c is constant only in a vacuum. The gravitational potential also has a small effect on the propagation speed, but may be neglected by most users.		by most users for small values of $(t - t_0)$.	
	** Neglecting effects due to polar motion, nutation, and precession which may be neglected by most users for small values of $(t - t_0)$.			
20.3.3.5.1	Contents of Subframes 4 and 5	Content		"Content" was
		of		inadvertently
		s 4 and 5.		"Contents" in
				RevF. Changing
				title back to
				"Content".

Section Number	IS-GPS-200 RevF I Interfaces	RN001 (17 Apr	r 2012) Navst	ar GPS Space Segr	nent/Navigation User	Proposed Object Heading	Proposed Public Sig	nals-in-Space (SiS) Updates (Dbject Text		Proposed Rationale
20.3.3.5.1.		Ta	able 20-IX.	UTC Parameters				Ta	able 20-IX.	UTC Parameters		Publication
7	Parameter	No. of Bits**	Scale Factor (LSB)	Effective Range***	Units		Parameter	No. of Bits**	Scale Factor (LSB)	Effective Range***	Units	error during Word export. Table is now
	A ₀	32*	2-30		seconds		A ₀	32*	2-30		seconds	correct in
	A_1	24*	2-50		sec/sec		A ₁	24*	2 ⁻⁵⁰		sec/sec	The deltas for
	t _{LS}	8*	1		seconds		Δ t _{LS}	8*	1		seconds	the terms " t_{LS} " and t_{LSF} " have
	t _{ot}	8	2 ¹²	602,112	seconds		t _{ot}	8	2 ¹²	602,112	seconds	been repaired
	WN _t	8	1		weeks		WNt	8	1		weeks	and remserted
	WN _{LSF}	8	1		weeks		WN _{LSF}	8	1		weeks	
	DN	8****	1	7	days		DN	8****	1	7	days	
	t _{LSF}	8*	1		seconds		Δt_{LSF}	8*	1		seconds	
	* Parame	eters so indicated sh	all be two's comp	lement with the sign bit	(+ or -) occupying the MSB;		* Parame	ters so indicated sh	all be two's com	plement with the sign bit (+	+ or -) occupying the MSB;	
	*** Unless	otherwise indicated	d in this column, indicated bit al	effective range is the ma location and scale factor	ximum range attainable with		*** Unless	otherwise indicated	d in this column, indicated bit a	effective range is the maximum and scale factor;	mum range attainable with	
			**** Ri	ght justified.					**** Ri	ght justified.		
20.3.3.5.1. 8	Page 17 of subfrance the discretion of t eight-bit ASCII chan three, the 24 MSE MSBs of word three ten shall be reserve used for parity (size	me 4 shall be re he Operating C aracters. The re as of words fou ee shall contain ved for system x bits/word) an	eserved for s Command. It equisite 176 r through nin n the data ID use. The ren nd parity com	pecial messages wi shall accommodat bits shall occupy bi e, plus the 16 MSE and SV ID, while bi naining 50 bits of w putation (two bits	ith the specific contents at the transmission of 22 its 9 through 24 of word as of word ten. The eight its 17 through 22 of word words three through ten are in word ten). The eight-bit	2	Page 17 of subframe discretion of the Op characters. The req four through nine, p ID and SV ID, while bits of words three word ten). The eigh	e 4 shall be rese erating Comma uisite 176 bits s olus the 16 MSB bits 17 through through ten are ot-bit ASCII char	rved for speci nd. It shall ac hall occupy bi s of word ten. 22 of word te used for pari acters shall be	al messages with the s commodate the transi ts 9 through 24 of wor The eight MSBs of wo n shall be reserved for ty (six bits/word) and p e limited to the followin	specific contents at the mission of 22 eight-bit ASCII rd three, the 24 MSBs of words ord three shall contain the data system use. The remaining 50 parity computation (two bits in ng set:	Removed borders from table.

Section Number	IS-GPS-200 RevF IRN001 (17 Apr Interfaces	r 2012) Navstar GPS Space	e Segment/Navigation User	Proposed Object Heading	Proposed Public Signals-in-Space (S	SiS) Updates Object Text
	ASCII characters shall be limited Alphanumeric Character A - Z 0 - 9 + (Decimal point) ' (Minute mark) ° (Degree sign)	to the following set: ASCII Character A - Z 0 - 9 + -	Code (Octal) 101 - 132 060 - 071 053 055 056 047 370	Heading	Alphanumeric Character A - Z 0 - 9 + - . (Decimal point) ' (Minute mark) ° (Degree sign) / Blank	ASCII Character A - Z 0 - 9 + -
	/ Blank : " (Second mark)	/ Space : "	057 040 072 042		: " (Second mark)	: "
20.3.5.1	User Frame Parity.			SV/CS Parity Algorith m.		

	Proposed Rationale
Code (Octal) 101 - 132 060 - 071 053 055 056 047 370 057 040 072 042	
	"SV/CS Parity Algorithm" was inadvertently changed to "User Frame Parity" in RevF. Changing title back to "SV/CS Parity Algorithm".

Section Number	IS-GPS-200 RevF IRN001 (17 Apr 2012) Navstar GPS Space Segment/Navigation User Interfaces	Proposed Object Heading	Proposed Public Signals-in-Space (SiS) Updates Object Text
30.3.3	DIFECTION OF DATA FLOW FROM SV MEB FIRST 100 BTS 45ECONDS 45ECO		DIRECTION OF DATA FLOW FROM SV 100 BITS 4 SECONDS 1 1 9 15 21 18 1 9 15 21 19 1 19 15 19 1 9 15 21 19 1 19 15 19 1 19



Section Number	IS-GPS-200 Revi Interfaces	IRN001 (1	17 Apr 2012	?) Navstar G	iPS Space S	egment/Na	avigation U	ser	Proposed Object	Proposed I	Public Si	gnals-in	n-Space	(SiS) Up	dates O	bject Te	xt
									Heading								
30.3.3	1 9 1 9 PRN 6 8 BITS BITS MESSA PREAMBLE "ALE 101 attan 101 attan 17 LSBs 201 201 209 α1 α2 8 BITS 8 BITS	15 21 6 TOV BITS 1 6 TOV GE TYPE ID 1 RT" FLAG - 1 B 1118 10 BITS 10 BITS 217 2217 2217 2217 2217 2217 2217 8 BITS 8 BITS	DIREC 100 100 28 ESSAGE N COUNT* 17 BITS DIREC 128 128 T _{GD} 13 BITS 0 13 BITS 0 100 128 100 100 100 100 100 100 100 10	2TION OF DATA I 0 BITS 33 50 top 11 BITS BITS URANE CTION OF DATA I 0 BITS 141 ISCL1C/A 13 BITS CTION OF DATA I 0 BITS 241 241 241 8 BITS 8 BITS 8 BITS	FLOW FROM SV 4 SECONDS 5 TS 58 61 5 TS 1 1 1 5 TS 1 1 1 5 TS 1 1 1 5 TS 1 1 1 5 TS 1 1 1 1 5 TS 1 1 1 1 5 TS 1 1 1 1 5 TS 1 1 1 1 1 5 TS 1 1 1 1 1 5 TS 1 1 1 1 1 1 1 5 TS 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	/ MSE 1 BITS / / ANED2 INDEX - / INDEX - 3 BI / MSE 167 167 15CL515 13 BITS / MSE 265 2 RESERVED 12 BITS	a FIRST ato-n 26 BITS 3 BITS ITS att-n - 3 MS 3 FIRST 180 ISCL505 13 BITS 35 FIRST 26 BITS 277 CRC 24 BITS	98 98 5Bs 5Bs 193 α ₀ 8 BITS		1 8 BITS PREAMBLE	9 11 PRN 6 BITS 6 MESSAG "ALEF 	5 21 6 BITS E TYPE IC RT" FLAG - 1118 10 Bl 10 Bl	MESSAG TOW COU 17 BITS 0 1 BIT	- DIREC - DIREC - DIREC - DIREC - DIREC - 100 - 100	ГІОN OF D BITS — 9 t _{op} 11 BITS U 11 BITS U ГІОN OF D BITS — 141 ISCL10 13 BIT ГІОN OF D BITS — 241 60	ATA FLOV 	/ FROM CONDS - 5 58 6 5 58 6 4 4 UR DEX / FROM CONDS - 13 BITS / FROM CONDS - 13 BITS / FROM CONDS - 1257
	* MESSAGE TOW CC	DUNT = 17 MSB Figure 30-3	OF ACTUAL TO	W COUNT AT S • Type 30 - C	TART OF NEXT Clock, IONC	12-SECOND ME 9 & Group D	SSAGE Velay			α ₁ 8 BITs * MESSAGE	α ₂ 8 BITS	α ₃ 8 BITS JNT = 17 M Figur	βο 8 BITS //SB OF AC re 30-3.	β1 8 BITS CTUAL TOV Messag	β2 8 BITS W COUNT A e Type 3	β3 8 BITS AT START 60 - Cloc	WNor 8 BITS OF NEX k, ION

					Proposed Rationale
sv ·	N	MSB F	IRST —		The 5 bit field
				►	starting with
61	7:	2		98	Bit 50 should
	t _{oc}		a _{f0-n}		URA _{NEDO} , not
11	BITS		26 BITS		URA _{NED} .
UR	A _{NED2} INDE	X - 3	BITS	1	
ANED	1 INDEX - 3	3 BITS	6 au - 3 MS	Bs	
				20	
sv ·	N	MSB F	IRST ——		
				►	
	167		180	193	
	ISC _{L5I}	15	ISC_{L5Q5}	α	
i	13 BIT	S	13 BITS	8 BITS	
				I	
SV ·	N	NSB F			
þ	65	277	7	•	
, I	RESERVED)	CRC		
	12 BITS		24 BITS		
T 12	-SECOND	MESS	SAGE		
ባ እ	Group	حام	W		
00	Gibupi		7		



Section Number	IS-GPS-200 RevF IRN001 (17 Apr 2012) Navstar GPS Space Segment/Navigation User Interfaces	Proposed Object Heading	Proposed Public Signals-in-Space (SiS) Updates Object Text	Proposed Rationale
30.3.3	DIRECTION OF DATA FLOW FROM SVMSB FIRST 100 BITS4 SECONDSMSB FIRST 100 BITS4 SECONDSMSB FIRST 100 BITS4 SECONDSMSB FIRST 11 BITS BITS BITS 17 BITS 111 BITS 26 BITS MESSAGE TYPE ID PREAMBLE "ALERT" FLAG - 1 BITURA_NED INDEX - 3 BITS DIRECTION OF DATA FLOW FROM SVMSB FIRST 100 BITS4 SECONDS		DIRECTION OF DATA FLOW FROM SV	The 5 bit field starting with Bit 50 should be designated URA _{NED0} , not URA _{NED} .
	101 118 128 144 165 180 att-n atg-n teop PM-X PM-X PM-Y 17 LSBs 10 BITS 16 BITS 21 BITS 15 BITS 21 BITS		101 118 128 144 165 180 ar1-n ar2-n teop PM-X PM-X PM-Y 17 LSBs 10 BITS 16 BITS 21 BITS 15 BITS 21 BITS	
	DIRECTION OF DATA FLOW FROM SV MSB FIRST 100 BITS 4 SECONDS		DIRECTION OF DATA FLOW FROM SV — MSB FIRST — 100 BITS — 4 SECONDS — 100 BITS — 100 BITS — 1017	
	201 216 247 266 277 PM-Y ΔUT1 ΔUT1 RESERVED CRC 15 BITS 31 BITS 19 BITS 11 BITS 24 BITS		Image: PM-Y Image: PM-Y	
	* MESSAGE TOW COUNT = 17 MSB OF ACTUAL TOW COUNT AT START OF NEXT 12-SECOND MESSAGE		* MESSAGE TOW COUNT = 17 MSB OF ACTUAL TOW COUNT AT START OF NEXT 12-SECOND MESSAGE	
	Figure 30-5. Message Type 32 - Clock & EOP		Figure 30-5. Message Type 32 - Clock & EOP	

Section Number	IS-GPS-200 RevF IRN001 (17 Apr 2012) Navstar GPS Space Segment/Navigation User Interfaces	Proposed Object Heading	Proposed Public Signals-in-Space (SiS) Updates Object Text	Proposed Rationale	
30.3.3	DIRECTION OF DATA FLOW FROM SV MSB FIRST 100 BITS 4 SECONDS 1 9 15 21 38 38 39 50 55 58 61 72 98 PRN MESSAGE TOW COUNT* top 5 11 BITS 26 BITS 8 BITS BITS 11 BITS 26 BITS 11 BITS 26 BITS MESSAGE TYPE ID URANED INDEX 3 BITS 0 URANEDI INDEX - 3 BITS MESSAGE TYPE ID URANED INDEX attan - 3 MSBs DIRECTION OF DATA FLOW FROM SV MSB FIRST DIRECTION OF DATA FLOW FROM SV MSB FIRST 100 BITS 14 SECONDS <th col<="" td=""><td></td><td>DIPECTION OF DATA FLOW FROM SV MSB FIRST 1 9 15 21 38 50 55 58 61 72 98 1 9 15 21 38 50 55 58 61 72 98 1 9 15 21 38 50 55 58 61 72 98 1 9 15 17 BTS 11 BTS 26 BTS 4 5 11 BTS 26 BTS 4 5 11 BTS 26 BTS 4 10 DEX - 3 38 5 4 10 DEX - 3 38 5 4 10 26 BTS 4 10 DEX - 3 BTS 38 34 10 DEX - 3 38 5 4 10 10 10 15 10 10 10 10 10 10 10 10 10 10 10<</td><td>The 5 bit field starting with Bit 50 should be designated URA_{NED0}, not URA_{NED}.</td></th>	<td></td> <td>DIPECTION OF DATA FLOW FROM SV MSB FIRST 1 9 15 21 38 50 55 58 61 72 98 1 9 15 21 38 50 55 58 61 72 98 1 9 15 21 38 50 55 58 61 72 98 1 9 15 17 BTS 11 BTS 26 BTS 4 5 11 BTS 26 BTS 4 5 11 BTS 26 BTS 4 10 DEX - 3 38 5 4 10 DEX - 3 38 5 4 10 26 BTS 4 10 DEX - 3 BTS 38 34 10 DEX - 3 38 5 4 10 10 10 15 10 10 10 10 10 10 10 10 10 10 10<</td> <td>The 5 bit field starting with Bit 50 should be designated URA_{NED0}, not URA_{NED}.</td>		DIPECTION OF DATA FLOW FROM SV MSB FIRST 1 9 15 21 38 50 55 58 61 72 98 1 9 15 21 38 50 55 58 61 72 98 1 9 15 21 38 50 55 58 61 72 98 1 9 15 17 BTS 11 BTS 26 BTS 4 5 11 BTS 26 BTS 4 5 11 BTS 26 BTS 4 10 DEX - 3 38 5 4 10 DEX - 3 38 5 4 10 26 BTS 4 10 DEX - 3 BTS 38 34 10 DEX - 3 38 5 4 10 10 10 15 10 10 10 10 10 10 10 10 10 10 10<	The 5 bit field starting with Bit 50 should be designated URA _{NED0} , not URA _{NED} .
	ΔIRECTION OF DATA FLOW FROM SV MSB FIRST 100 BITS 4 SECONDS 201 214 218 226 201 214 218 226 WNLSF DN ΔtLSF RESERVED CRC 13 BITS BITS 8 BITS 51 BITS 24 BITS		DIRECTION OF DATA FLOW FROM SV MSB FIRST 100 BITS 4 SECONDS 201 214 218 226 201 214 218 226 WNUSF DN ΔILSF RESERVED CRC 13 BITS BITS 8 BITS 51 BITS 24 BITS		
	Figure 30-6. Message Type 33 - Clock & UTC		Figure 30-6. Message Type 33 - Clock & UTC		



			Proposed Rationale
SV ———	MSB FIRST		The 5 bit field
		►	starting with
I	72	98	Bit 50 should
t _{oc}	а	lf0-n	be designated
11 BITS	26	BITS	URA _{NED} .
URA _{NED2} IND A _{NED1} INDEX	DEX - 3 BITS - 3 BITS a _{f1}	-n - 3 MSBs	
SV ———	MSB FIRST		
		185	
CDC		EDC	
4 BITS		16 MSBs	
SV	MSB FIRST		
	277	-	
		CRC	
		24 BITS	
XT 12-SECO	ND MESSAG	E	
ferential	Correctior	ı	

Section Number	IS-GPS-200 RevF IRN001 (17 Apr 2012) Navstar GPS Space Segment/Navigation User Interfaces	Proposed Object Heading	Proposed Public Signals-in-Space (SiS) Updates Object Text
30.3.3	DIRECTION OF DATA FLOW FROM SV MSB FIRST 1 9 15 21 33 50 55 58 61 72 98 1 9 15 21 133 50 55 58 61 72 98 1 9 15 21 133 50 55 58 61 72 98 9 100 BITS BITS 11 BITS 26 BITS 11 BITS 26 BITS 4 98 <th></th> <th>DIRECTION OF DATA FLOW FROM SV 100 BITS 4 SECONDS - 11 9 15 21 39 50 55 58 61 PRN MESSAGE 17 BITS 17 BITS 11 BITS BITS 11 MESSAGE TYPE ID PREAMBLE "ALERT" FLAG-1 BIT URAVED INDEX URAVED INDEX DIRECTION OF DATA FLOW FROM SV 100 BITS 4 SECONDS - 101 118 128 144 157 160 100 BITS 4 SECONDS - 101 118 128 144 157 160 CNSS ID - 3 BITS 16 CNSS ID - 3 BITS 100 BITS 4 SECONDS - 201 RESERVED 201 RESERVED 201 RESERVED 76 BITS</th>		DIRECTION OF DATA FLOW FROM SV 100 BITS 4 SECONDS - 11 9 15 21 39 50 55 58 61 PRN MESSAGE 17 BITS 17 BITS 11 BITS BITS 11 MESSAGE TYPE ID PREAMBLE "ALERT" FLAG-1 BIT URAVED INDEX URAVED INDEX DIRECTION OF DATA FLOW FROM SV 100 BITS 4 SECONDS - 101 118 128 144 157 160 100 BITS 4 SECONDS - 101 118 128 144 157 160 CNSS ID - 3 BITS 16 CNSS ID - 3 BITS 100 BITS 4 SECONDS - 201 RESERVED 201 RESERVED 201 RESERVED 76 BITS
	* MESSAGE TOW COUNT = 17 MSB OF ACTUAL TOW COUNT AT START OF NEXT 12-SECOND MESSAGE Figure 30-8. Message Type 35 - Clock & GGTO		* MESSAGE TOW COUNT = 17 MSB OF ACTUAL TOW COUNT AT START OF NEXT 1 Figure 30-8. Message Type 35 - Clor





	Proposed Rationale
- MSB FIRST	The 5 bit field
▶	starting with
72 98	Bit 50 should
a _{t0-n}	be designated
26 BITS	URA _{NEDO} , not
20 0113	URA _{NED} .
DEX-3 BITS	
a _{f1-n} -3MSBs —	
- MSB FIRST	
IAR)	
- MSB FIRST ───	
276 72 277	
CRC	
4 24 BITS	
RESERVED-1 BIT	
ND MESSAGE	
:	
	$MSB FIRST \longrightarrow 98$ $a_{0 \text{m}}$ 26 BITS 26 BITS $DEX - 3 \text{ BITS}$ $- 3 \text{ BITS}$ $a_{1 \text{m}} - 3 \text{ MSBs}$ $MSB FIRST \longrightarrow 9$ $MSB FIRST \longrightarrow 9$ 276 277 CRC 4 SERVED - 1 BIT $MSSAGE$

ection umber	IS-GPS-200 RevF IRN001 (17 Apr 2012) Navstar GPS Space Segment/Navigation User Interfaces	Proposed Object Heading	Proposed Public Signals-in-Space (SiS) Updates Object Text	Proposed Rationale
0.3.3	DIRECTION OF DATA FLOW FROM SVMSB FIRST 100 BITS4 SECONDS 100 BITS5 SECONDS 100 BITS 100 BITS 100 BITS 100 BITS 100 BITS 100 BITS 100 BITS 100 BITS 100 BITS 100 BITS		DIRECTION OF DATA FLOW FROM SV MSB FIRST 100 BITS 4 SECONDS 1 9 15 21 39 50 55 58 61 72 98 1 9 15 21 39 50 55 58 61 72 98 1 PRN MESSAGE top toc atom 6 6 6 170W COUNT* top 5 11 BITS 26 BITS 10 A A A A A A A A A A A A A A A A A A	The 5 bit field starting with Bit 50 should be designated URA _{NED0} , not URA _{NED} .
	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$		DIRECTION OF DATA FLOW FROM SV MSB FIRST 100 BITS 4 SECONDS 101 118 128 141 149 155 158 169 180 191 arı-n arı-n arı-n toa PRNa e δ Ω √A 17 LSBs 10 BITS 13 BITS 8 BITS 6 BITS 11 BITS 11 BITS 11 BITS 10 MSBs L1 HEALTH – 1 BIT L2 HEALTH – 1 BIT L3 HEALTH – 1 BIT L5 HEALTH – 1 BIT L5 HEALTH – 1 BIT MSB FIRST DIRECTION OF DATA FLOW FROM SV MSB FIRST MSB FIRST MSB FIRST	
	* MESSAGE TOW COUNT = 17 MSB OF ACTUAL TOW COUNT AT START OF NEXT 12-SECOND MESSAGE Eigure 30-10 Message Type 37 - Clock & Midi Almanac		201 208 224 240 256 267 277 \sqrt{A} Ω_0 ω M_0 a_{i0} a_{i1} CRC 7 LSBs 16 BITS 16 BITS 16 BITS 11 BITS 10 BITS 24 BITS	
	Figure 30-10. Message Type 37 - Clock & Midi Almanac		Figure 30-10. Message Type 37 - Clock & Midi Almanac	

Section Number	IS-GPS-200 Interfaces	RevF IRN001 (17 Apr 2012) Navstar	r GPS Sp	ace Segn	nent/Navig	ation User	Proposed Object Heading	Proposed Pu	ıblic Signals-in-Space (SiS) Updates Ob		Proposed Rationale		
30.3.3.1.3		Table 30-I. Message Type	es 10 and 1	1 Parameter	rs (2 of 2)				Table 30-I. Message Types	10 and 11 1	Parameters	(2 of 2)	The orbit
		Daramatar	No. of Bits**	Scale Factor	Effective Bange***	Unite				No. of	Scale Factor	Effective	parameter "Reference
	ta	Ephemeris data reference time of week	11	(L3D) 300	604 500	seconds			Parameter	Bits**	(LSB)	Range*** Units	
	^v oe	Epiciteris data reference und of week	11	500	001,000	seconds		t _{oe}	Ephemeris data reference time of week	11	300	604,500 seconds	
	Ω _{0-n} ****	Reference right ascension angle	33*	2-32		semi-circles		Ω_{0-n}	Longitude of Ascending Node of Orbit Plane at Weekly Epoch	33*	2 ⁻³²	semi-circles	Table 30-I, is defined as
	$\Delta \Omega$ *****	Rate of right ascension difference	17*	2-44		semi-circles/sec		•		17*	2-44		$\Omega_{ m O-N}$ is the
	i _{0-n}	Inclination angle at reference time	33*	2-32		semi-circles		ΔΩ	Rate of right ascension difference	1/*	2	semi-circles/sec	right ascension
		Rate of inclination angle	15*	2-44		semi-circles/sec		i _{0-n}	Inclination angle at reference time	33*	2-32	semi-circles	weekly epoch
	IU-n DOI		10					i _{0-n} -DOT	Rate of inclination angle	15*	2-44	semi-circles/sec	(Ω _{O-w})
	C _{is-n}	Amplitude of the sine harmonic correction term to the angle of inclination	16*	2.30		radians		C _{is-n}	Amplitude of the sine harmonic correction term to the angle of inclination	16*	2-30	radians	propagated to the reference
	C _{ic-n}	Amplitude of the cosine harmonic correction term to the angle of inclination	16*	2-30		radians		C _{ic-n}	Amplitude of the cosine harmonic	16*	2-30	radians	time at the rate of right
	C _{rs-n}	Amplitude of the sine correction term to the orbit radius	24*	2 ⁻⁸		meters		C _{rs-n}	Amplitude of the sine correction term to	24*	2-8	meters	ascension." This definition
	C _{rc-n}	Amplitude of the cosine correction term to the orbit radius	24*	2-8		meters		C _{rc-n}	Amplitude of the cosine correction term to	24*	2 ⁻⁸	meters	is consistent with the term
	C _{us-n}	Amplitude of the sine harmonic correction term to the argument of latitude	21*	2 ⁻³⁰		radians		C _{us-n}	Amplitude of the sine harmonic correction	21*	2-30	radians	20-II, but the
	C _{uc-n}	Amplitude of the cosine harmonic correction term to the argument of latitude	21*	2-30		radians		C _{uc-n}	Amplitude of the cosine harmonic	21*	2-30	radians	term is inconsistent-
	* Parameters so indicated are two's complement, with the sign bit (+ or -) occupying the MSB; ** See Figure 30-1 and Figure 30-2 for complete bit allocation in Message Types 10 and 11; *** Unless otherwise indicated in this column, effective range is the maximum range attainable with indicated bit allocation and scale factor. **** Ω_{0-n} is the right ascension angle at the weekly epoch (Ω_{0-w}) propagated to the reference time at the rate of right ascension { $\hat{\Omega}_{REF}$ Table 30-II }. ***** Relative to $\hat{\Omega}_{REF} = -2.6 \times 10^{-9}$ semi-circles/second.					* ** ***	Parameters so indicated are two's compleme See Figure 30-1 and Figure 30-2 for comp Unless otherwise indicated in this column, eff indicated bit alloc **** Relative to $\Omega_{\text{REF}} = -2.6$	ent, with th lete bit allo fective rang cation and s 5×10^{-9} sen	e sign bit (- ocation in N ge is the ma scale factor ni-circles/se	+ or -) occupying the MSB; Message Types 10 and 11; eximum range attainable with econd.	"Reference right ascension angle" in Table 30-I and "Longitude of Ascending Node of Orbit		
													Plane at Weekly Epoch" in Table 20-II. Recommend that the

Section	IS-GPS-200 RevF IRN001 (17 Apr 2012) Navstar GPS Space Segment/Navigation User	Proposed	Proposed Public Signals-in-Space (SiS) Updates Object Text
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		Heading	

Proposed Rationale
identical terms be used since they are have identical definitions. Also recommending deleting the 4- star note, and thus renumbering the old 5-star note to a 4-star note.

Section Number	IS-GPS-200 RevF IRN001 (17 Apr 20) Interfaces	12) Navstar GPS Space Segment/Navigation User	Proposed Object Heading	Proposed Public Signals-in-Space (SiS) Upda		Proposed Rationale		
30.3.3.1.3	Table 30-II. Ele	ments of Coordinate System (part 2 of 2)		Table 30-II. Elemen	ts of Coordinate System (part 2 of 2)		Publication	
	Element/Equation *	Description		Element/Equation *	Description		error during	
	$\Phi_{k} = v_{k} + \omega_{h}$	Argument of Latitude		$\Phi_k = v_k + \omega_n$	Argument of Latitude	Argument of Latitude		
	$\delta u_{k} = C_{us-n} \sin 2\Phi_{k} + C_{uc-n} \cos 2\Phi_{k}$	Argument of Latitude Correction		$\delta u_{k} = C_{us-n} \sin 2\Phi_{k} + C_{uc-n} \cos 2\Phi_{k}$	Argument of Latitude Correction	Second Harmonic	Table is now	
	$\delta \mathbf{r}_{k} = \mathbf{C}_{\text{rs-n}} \sin 2\Phi_{k} + \mathbf{C}_{\text{rc-n}} \cos 2\Phi_{k}$	Radial Correction		$\delta \mathbf{r}_{k} = \mathbf{C}_{\text{rs-n}} \sin 2\Phi_{k} + \mathbf{C}_{\text{rc-n}} \cos 2\Phi_{k}$	Radial Correction	Perturbations	correct in	
	$\delta i_k = C_{is-n} \sin 2\Phi_k + C_{ic-n} \cos 2\Phi_k$	Inclination Correction		$\delta i_k = C_{is-n} \sin 2\Phi_k + C_{ic-n} \cos 2\Phi_k$	Inclination Correction		Word/PDF.	
	$\begin{split} u_{k} &= \Phi_{k} + \delta u_{k} \\ r_{k} &= A_{k}(1 - e_{n} \cos E_{k}) + \delta r_{k} \\ i_{k} &= i_{on} + (i_{on} \text{-} DOT) t_{k} + \delta i_{k} \\ x_{k}' &= r_{k} \cos u_{k} \\ y_{k}' &= r_{k} \sin u_{k} \\ & \hat{\Omega} &= \hat{\Omega}_{RHF} + ? \hat{\Omega} \text{sees} \\ & \hat{\Omega}_{k} &= \Omega_{0:n} + (\hat{\Omega} - \hat{\Omega}_{e}) t_{k} - \hat{\Omega}_{e} t_{ce} \end{split}$	Corrected Argument of Latitude Corrected Radius Corrected Inclination Positions in orbital plane Rate of Right Ascension Corrected Longitude of Ascending Node		$\begin{aligned} u_{k} &= \Phi_{k} + \delta u_{k} \\ r_{k} &= A_{k}(1 - e_{n} \cos E_{k}) + \delta r_{k} \\ i_{k} &= i_{o-n} + (i_{o-n} \text{-DOT})t_{k} + \delta i_{k} \\ x_{k}' &= r_{k} \cos u_{k} \\ y_{k}' &= r_{k} \sin u_{k} \\ \end{aligned}$	Corrected Argument of Latitude Corrected Radius Corrected Inclination Positions in orbital plane Rate of Right Ascension Corrected Longitude of Ascending Noo	de	The brackets from the "Second Harmonic Perturbations," "Positions in Orbital Plane," and Earth Fixed coordinates of SV antenna phase center,"	
	$x_{k} = x_{k}' \cos \Omega_{k} - y_{k}' \cos i_{k} \sin \Omega_{k}$ $y_{k} = x_{k}' \sin \Omega_{k} + y_{k}' \cos i_{k} \cos \Omega_{k}$ $z_{k} = y_{k}' \sin i_{k}$ **** $\mathring{\Omega}_{REF} = -2.6 \times 10^{-9} \text{ semi-circles/second}$	Earth-fixed coordinates of SV antenna phase center		$\left.\begin{array}{l} x_{k} = x_{k}'\cos\Omega_{k} - y_{k}'\cos i_{k}\sin\Omega_{k} \\ y_{k} = x_{k}'\sin\Omega_{k} + y_{k}'\cos i_{k}\cos\Omega_{k} \\ z_{k} = y_{k}'\sin i_{k} \end{array}\right\}$ $\ast \ast \ast \hat{\Omega}_{REF} = -2.6 \times 10^{-9} \text{ semi-circles/second.}$	Earth-fixed coordinates of SV antenna	phase center	have been repaired and reinserted.	

Section Number	IS-GPS-200 Re Interfaces	evF IRN001 (17 Apr 2012) Navsta	ar GPS Space	e Segmen	t/Navigatio	n User	Proposed Object Heading	Proposed Public	c Signals-in-Space (SiS) Updates Obje	ct Text				Proposed Rationale
30.3.3.2.3		Table 30-III. Clock Correc	tion and Accur	racy Paramet	ters				Table 30-III. Clock Correc	ction and Accu	racy Paramet	ers		Replaced
		Parameter	No. of Bits**	Scale Factor (LSB)	Effective Range***	Units			Parameter	No. of Bits**	Scale Factor (LSB)	Effective Range***	Units	URA _{NED} with URA _{NED0} .
	t _{cc}	Clock Data Reference Time of Week	11	300	604,500	secon ds		t _{oc}	Clock Data Reference Time of Week	11	300	604,500	secon ds	the correct
	URA _{NED} Index	NED Accuracy Index	5*			(see		URA _{NED0} Index	NED Accuracy Index	5*			(see text)	term.
	URA _{NEDI} Index	NED Accuracy Change Index	3			(see		URA _{NED1} Index	NED Accuracy Change Index	3			(see	
	URA _{NED2} Index	NED Accuracy Change Rate Index	10*	2^{-60}		(see		URA _{NED2} Index	NED Accuracy Change Rate Index	10*	2^{-60}		(see	
	a _{f2-n}	SV Clock Drift Rate Correction Coefficient	20* 26*	2 ⁻³⁵		text) sec/se		a _{f2-n}	SV Clock Drift Rate Correction Coefficient	20* 26*	2 ⁻³⁵		sec/se	
	a _{f1-n}	SV Clock Drift Correction Coefficient				c ⁻ sec/se		a_{fl-n}	SV Clock Drift Correction Coefficient				c sec/se	
	$a_{\rm f0-n}$	SV Clock Bias Correction Coefficient				c secon		$a_{\rm f0-n}$	SV Clock Bias Correction Coefficient				c secon	
	* Pai ** *** Unle	rameters so indicated are two's compleme See Figure 30-3 through 30-10 for comp ss otherwise indicated in this column, effo indicated bit alloc	nt, with the sig lete bit allocati ective range is ation and scale	n bit (+ or -) on in Messag the maximum factor.	occupying the ge types 30 to 3 m range attainal	MSB; 7; ble with		* Par ** *** Unle	rameters so indicated are two's compleme See Figure 30-3 through 30-10 for comp ess otherwise indicated in this column, effe indicated bit alloc	nt, with the sig lete bit allocat ective range is ation and scale	gn bit (+ or -) ion in Messaş the maximur e factor.	occupying the ge types 30 to 3 n range attainal	MSB; 7; ble with	
30.3.3.2.4	For each URA _f	_{NEDO} index (N), users may comput ne value of N is 6 or less, but mor	e a nominal e than -16, 2	$I URA_{NEDO} N$ $X = 2^{(1 + N/2)}$	value (X) as ; ?,	given by:		For each URA _{NEC}	₂₀ index (N), users may compute a non value of N is 6 or less, but more than •	ninal URA _{NEDC} -16, X = 2 ^{(1 + N}	[,] value (X) as	s given by:		The variable URA _{NED} has in the sentence
	• If th	e value of N is 6 or more, but les	s than 15, X	$X = 2^{(N-2)},$				• If the	value of N is 6 or more, but less than a	15, X = 2 ^(N - 2) ,				"URA _{NED} does not account for
	• N = advise th	-16 or N = 15 shall indicate the a e standard positioning service us	bsence of a ser to use th	n accurac [.] nat SV at h	y prediction his own risk.	and shall		• N = -1 standard pe	6 or N = 15 shall indicate the absence ositioning service user to use that SV a	of an accura at his own ris	cy predictio k.	n and shall ad	vise the	user range contributions
	For N = 1, 3, a	nd 5, X should be rounded to 2.8	8, 5.7, and 1	1.3 meter	s, respective	ely.		For N = 1, 3, and	1 5, X should be rounded to 2.8, 5.7, a	nd 11.3 mete	ers, respectiv	vely.		" has been corrected to
	The nominal L RMS NED rang	JRA _{NEDO} value (X) shall be suitable ge errors for accuracy-related pu	e for use as rposes in th	a conserv ie pseudo	ative predic range doma	tion of the in (e.g.,		The nominal URA _{NEDO} value (X) shall be suitable for use as a conservative prediction of the RMS NED range errors for accuracy-related purposes in the pseudorange domain (e.g., measurement de-						

Section Number	IS-GPS-200 RevF IRN001 (17 Apr 2012) Navstar GPS Space Segment/Navigation User Interfaces	Proposed Object Heading	Proposed Public Signals-in-Space (SiS) Updates Object Text	Proposed Rationale
	measurement de-weighting RAIM, FOM computations). Integrity properties of the IAURA_NED are specified with respect to the scaled (multiplied by either 4.42 or 5.73 as appropriate) upper bound values of the URA_NED0 index, URA_NED1 index, and URA_NED2 index (see 30.3.3.1.1).URA_NED0 accounts for zeroth order SIS-contributions to user range error which include, but are not limited to, the following: LSB representation/truncation error; the net effect of clock correction polynomial error and code phase error in the transmitted signal for single- frequency L1C/A or single-frequency L2C users who correct the code phase as described in Section 30.3.3.3.1.1.1; the net effect of clock parameter, code phase, and inter-signal correction error for dual-frequency L1/L2 and L1/L5 users who correct for group delay and ionospheric effects as described in Section 30.3.3.3.1.1.2; radial ephemeris error; anisotropic antenna errors; and signal deformation error. URA_NED does not account for user range contributions due to the inaccuracy of the broadcast ionospheric data parameters used in the single-frequency ionospheric model or for other atmospheric effects.The transmitted URA_NED1 index is an integer value in the range 0 to 7. The URA_NED1 index has the following relationship to the URA_NED1 value:URA_NED1 = $\frac{1}{2^N}$ (meters/second)		weighting RAIM, FOM computations). Integrity properties of the IAURA _{NED} are specified with respect to the scaled (multiplied by either 4.42 or 5.73 as appropriate) upper bound values of the URA _{NED0} index, URA _{NED1} index, and URA _{NED2} index (see 30.3.3.1.1). URA _{NED0} accounts for zeroth order SIS-contributions to user range error which include, but are not limited to, the following: LSB representation/truncation error; the net effect of clock correction polynomial error and code phase error in the transmitted signal for single-frequency L1C/A or single- frequency L2C users who correct the code phase as described in Section 30.3.3.1.1.; the net effect of clock parameter, code phase, and inter-signal correction error for dual-frequency L1/L2 and L1/L5 users who correct for group delay and ionospheric effects as described in Section 30.3.3.3.1.1.2; radial ephemeris error; anisotropic antenna errors; and signal deformation error. URA _{NED0} does not account for user range contributions due to the inaccuracy of the broadcast ionospheric data parameters used in the single-frequency ionospheric model or for other atmospheric effects. The transmitted URA _{NED1} index is an integer value in the range 0 to 7. The URA _{NED1} index has the following relationship to the URA _{NED1} value: $URANED1 = \frac{1}{2^{N}}$ (meters/second)	does not account for user range contributions " In the equation URA _{NED2} = 1/2 ^N (meters/secon d2), the second2 should be second ² (seconds squared)
			where	
	where $N = 14 + URA_{NED1}$ Index The transmitted URA_{NED2} index is an integer value in the range 0 to 7. URA_{NED2} index has the following relationship to the URA_{NED2} : $URA_{NED2} = \frac{1}{2^{N}}$ (meters/second2)		N = 14 + URA _{NED1} Index The transmitted URA _{NED2} index is an integer value in the range 0 to 7. URA _{NED2} index has the following relationship to the URA _{NED2} : $URA_{NED2} = \frac{1}{2^{N}} \text{ (meters/second^{2})}$	
	where		where $N = 28 + URA_{NED2}$ Index.	
	N = 28 + URA _{NED2} Index.			

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30.3.3.4	Message Types 31, 12, and 37 Almanac Types.	Message Types 31, 12, and 37 Almanac Paramete rs.		Section title has been changed back to "Almanac Parameters".
50.5.3.4.4	29,30 and 31 of each packet of reduced almanac refers to the L1, L2, and L5 signals of the SV whose PRN number is specified in the message or in the packet. For each health indicator, a "0" signifies that all navigation data are okay and "1" signifies that some or all navigation data are bad. The predicted health data will be updated at the time of upload when a new reduced almanac has been built by the CS. The transmitted health data may not correspond to the actual health of the transmitting SV or other SVs in the constellation.		The entree, one-oil, nearth indication in bits 153, 156, and 157 of message types 7 and bits 29,50 and 31 of each packet of reduced almanac refers to the L1, L2, and L5 signals of the SV whose PRN number is specified in the message or in the packet. For each health indicator, a "O" signifies that all signals on the associated frequency are okay and "1" signifies that some or all signals on the associated frequency are bad. The predicted health data will be updated at the time of upload when a new reduced almanac has been built by the CS. The transmitted health data may not correspond to the actual health of the transmitting SV or other SVs in the constellation.	Inecurrent language states that "For each health indicator, a "O" signifies that all navigation data are okay and "1" signifies that some or all navigation data are bad." This language is misleading in that it implies that one bit designated with a "1" means that all navigation data (L1, L2, and L5) are bad, which may not be true. Recommended text clarifies that a "1" signifies that

Section	IS-GPS-200 RevF IRN001 (17 Apr 2012) Navstar GPS Space Segment/Navigation User	Proposed	Proposed Public Signals-in-Space (SiS) Updates Object Text	Proposed
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		Heading		
				some or all
				signals on the
				associated
				frequency are
				bad.
30.3.3.4.6			A 6-bit value of "000000" in the PRN, field shall indicate that no further Status Words are contained in	This language is
1			the remainder of the data block. In this event, all subsequent bits in the data block field shall be filler	being supplied
			bits, i.e., alternating ones and zeros beginning with one.	so that users
				now know how
				to interpret
				dummy SVs for
				the CNAV
				signal.
30.3.3.4.6.		Reduced		Publication
2.1		Almanac.		error during
				Word export.
				•
				Section
				heading is now
				correct in
				Word/PDF.

Section Number	IS-GPS-200 RevF II Interfaces	RN001 (17 Apr 20	12) Navstar GPS S	pace Segment/Nav	igation User	Proposed Object Heading	Proposed Public Sig	Proposed Rationale				
30.3.3.4.6.		Table 30-VI.	. Reduced Almanac Par	ameters ****]		Table 30-VI	. Reduced Almanac Par	ameters ****		Publication
2.1	$\begin{tabular}{ c c c c } \hline Parameter \\ \hline & & & & \\ \hline & & & & \\ \hline & & & & \\ \hline & & & &$	No. of Bits No. of Bits 8 * 7 * 7 * 1000000000000000000000000000000000000	Scale Factor (LSB) 2^{+9} 2^{-6} 2^{-	Effective Range ** ** sign bit (+ or -) occupyin ted bit allocation and scal	Units meters semi-circles semi-circles g the MSB; e factor;		$\begin{tabular}{ c c c c } \hline Parameter \\ \hline & & & & \\ \hline & & & & \\ \hline & & & & \\ \hline & & & &$	No. of Bits 8 * 7 * 7 * 0 indicated shall be two ge is the maximum ran $A_{ref} = 26,559,710$ meter ent of Latitude at Refer llowing reference value +0.0056 semi-circles -2.6 x 10 ⁻⁹ semi-circles	Scale Factor (LSB) 2^{+9} 2^{-6} 2^{-6} 2^{-6} b's complement with the ge attainable with indical s; ence Time = M ₀ + ω ; es: (i = 55 degrees) s/second.	Effective Range ** ** ** sign bit (+ or -) occupyin ted bit allocation and sca	Units meters semi-circles semi-circles ng the MSB; lle factor;	error during Word export. Table is now correct in Word/PDF. The DOT term over the OMEGA term has been replaced.

Section Number	IS-GPS-20 Interface	00 RevF IRN001 (17 Apr 2012) Na s	vstar GPS	Space Segme	ent/Navigati	on User	Proposed Object Heading	Proposed Pu	blic Signals-in-Space (SiS) Update	s Object Te	xt			Proposed Rationale
30.3.3.6.2		Table 30-IX.	UTC	Parameters					Table 30-IX.	UTC	Parameters			Fixed
		Parameter	ScaleNo. ofFactorBits**(LSB)Range***Units				Parameter	No. of Bits**	Scale Factor (LSB)	Effective Range***	Units	alignment of table rows. The deltas have		
	A _{0-n}	Bias coefficient of GPS time scale relative to UTC time scale	16*	2 ⁻³⁵		Seconds		A _{0-n}	Bias coefficient of GPS time scale relative to UTC time scale	16*	2 ⁻³⁵		Seconds	also been replaced in the
	A _{1-n}	Drift coefficient of GPS time scale relative to UTC time scale	13*	2 ⁻⁵¹		sec/sec		A _{1-n}	Drift coefficient of GPS time scale relative to UTC time scale	13*	2 ⁻⁵¹		sec/sec	terms "t _{LS} " and "t _{LSF} ."
	A _{2-n}	Drift rate correction coefficient of GPS time scale relative to UTC time scale	7*	2 ⁻⁶⁸		sec/sec ²		A _{2-n}	Drift rate correction coefficient of GPS time scale relative to UTC time scale	7*	2 ⁻⁶⁸		sec/sec ²	
	t _{LS}	Current or past leap second count Time data reference Time of Week	8*	1	(04.704	seconds		Δt_{LS}	Current or past leap second count	8*	1	604 704	seconds	
	t _{ot} WN _{ot}	Time data reference Week Number	16 13	2* 1	604,784	seconds weeks		t _{ot} WN _{ot}	Time data reference Time of Week	16 13	2* 1	604,784	seconds weeks	
	WN _{LSF}	Leap second reference Week Number Leap second reference Day Number	8	1		weeks		WN _{LSF}	Leap second reference Week Number	8	1		weeks	
	DN	Current or future leap second count	4*** °*	1		days		DN	Leap second reference Day Number	4*** °*	1		days	
	LSF		ð*	1		seconds		Δt_{LSF}	Current or future leap second count	8	1		seconds	
	*** [Parameters so indicated shall be two's c ** See Figure 3 Jnless otherwise indicated in this column, e bit all ****	omplement v 0-6 for comp ffective rang ocation and s Right justif	vith the sign bit (- lete bit allocation e is the maximum cale factor; ied.	+ or -) occupying ; h range attainable	the MSB;		* *** Unl	Parameters so indicated shall be two's c ** See Figure 3 ess otherwise indicated in this column, e bit all ****	complement w 0-6 for compl effective range ocation and se Right justifi	with the sign bit (lete bit allocation e is the maximum cale factor; led.	+ or -) occupying ; n range attainable	the MSB; with indicated	
30.3.3.7.2	Each DC c	lata packet contains: corrections	to SV clo	ck polynomia	l coefficients	provided in		Each DC data	packet contains: corrections to S	V clock poly	ynomial coeffi	cients provide	d in any one of	Incorporated
	any one c Keplerian	f the message types 30 to 37 of t	he corres	ponding SV; o	corrections t	o quasi- rential Range		the message	types 30 to 37 of the correspondi	ng SV; corr	ections to qua	si-Keplerian el	ements •	DOT over
	Accuracy (UDRA) and UDRA indices that enable users to estimate the accuracy obtained							referenced to indices that e	o t _{op} of the corresponding SV; and enable users to estimate the accur	l User Diffei acy obtaine	rential Range A	Accuracy (UDR tions are appli	A) and <i>UDRA</i> ed. Each DC	term.
	first soom	ections are applied. Each DC Pac lent contains 34 bits for the CDC	naramete	rs and the sec	cond segmen	t containe 07		packet is ma	de up of two different segments.	, The first sea	gment contain	s 34 bits for th	e CDC	
	hits of FD	C narameters totaling 126 hits 1	he CDC a	nd FDC param	heters form a	n indivisible		parameters a	and the second segment contains s	92 bits of E	- DC parameters	totaling 126 k	oits. The CDC	
	nair and u	isers must utilize CDC and FDC as	a nair II	sers must uti	lize CDC and	FDC data nair	r	and EDC para	ameters form an indivisible pair ar	nd users mu	st utilize CDC	and EDC as a p	air. Users must	:
	of same t	$_{\text{op-D}}$ and of same t_{OD} .	, a pan. O	sers must uth				utilize CDC a	nd EDC data pair of same t_{op-D} and	of same t_{OD}).			

Section Number	IS-GPS-200 RevF IRN001 (17 Apr 2012) Navstar GPS Space Segment/Navigation User Interfaces	Proposed Object Heading	Proposed Public Signals-in-Space (SiS) Updates Object Text	Proposed Rationale
30.3.3.7.2. 1	Differential Correction Data Predict Time of the Week.	Differenti al Correctio n Data Predict Time of Week.		Publication error during Word export. Section heading is now correct in Word/PDF.
30.3.3.7.3	Application of Clock Related DC Data.	Applicatio n of Clock- Related DC Data.		Publication error during Word export. Section heading is now correct in Word/PDF.
30.3.3.7.4	The user will construct a set of initial (uncorrected) elements by: $\begin{array}{rcl} A_{i} & = & A_{0} \\ e_{i} & = & e_{n} \\ i_{i} & = & i_{0-n} \\ \Omega_{i} & = & \Omega_{0-n} \\ \alpha_{i} & = & e_{n} \cos(\omega_{n}) \\ \beta_{i} & = & e_{n} \sin(\omega_{n}) \\ \gamma_{i} & = & M_{0-n} + \omega_{n} \\ \end{array}$ where A ₀ , e _n , i _{0-n} , Ω_{0-n} , ω_{n} and M _{0-n} are obtained from the applicable SV's message types 10 and 11 data. The terms α_{i} , β_{i} , and γ_{i} form a subset of stabilized ephemeris elements which are subsequently corrected by $\Delta \alpha$, $\Delta \beta$ and $\Delta \gamma$ —the values of which are supplied in the		The user will construct a set of initial (uncorrected) elements by: $\begin{array}{rcl} A_{i} & = & A_{0} \\ e_{i} & = & e_{n} \\ i_{i} & = & i_{0 \cdot n} \\ \Omega_{i} & = & \Omega_{0 \cdot n} \\ \Omega_{i} & = & \alpha_{0} \\ \Omega_{i} & = & \alpha_{0} \\ \Omega_{i} & = & e_{n} \cos(\omega_{n}) \\ \beta_{i} & = & e_{n} \sin(\omega_{n}) \\ \gamma_{i} & = & M_{0 \cdot n} + \omega_{n} \\ \end{array}$ where A ₀ , e _n , i _{0-n} , Ω_{0-n} , ω_{n} and M _{0-n} are obtained from the applicable SV's message types 10 and 11 data. The terms α_{i} , β_{i} , and γ_{i} form a subset of stabilized ephemeris elements which are subsequently corrected by $\Delta \alpha$, $\Delta \beta$ and $\Delta \gamma$ —the values of which are supplied in the message types 34 or 14 - as	The current mean anomaly equation, ΔM ₀ , yields a velocity component and is incorrect. The mean anomaly equation should yield 'radians.'
	message types 34 or 14 - as follows: $\begin{array}{rcl} \alpha_{c} &=& \alpha_{i} + \Delta \alpha \\ \beta_{c} &=& \beta_{i} + \Delta \beta \\ \gamma_{c} &=& \gamma_{i} + \Delta \gamma \end{array}$		follows: $\begin{array}{rcl} \alpha_{c} & = & \alpha_{i} + \Delta \alpha \\ \beta_{c} & = & \beta_{i} + \Delta \beta \\ \gamma_{c} & = & \gamma_{i} + \Delta \gamma \end{array}$	

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	The quasi-Keplerian elements are then corrected by		The quasi-Keplerian elements are then corrected by	
	$\begin{array}{rcl} A_c & = & A_i + \Delta A \\ e_c & = & (\alpha_c^2 + \beta_c^2)^{1/2} \\ i_c & = & i_i + \Delta i \\ \Omega_c & = & \Omega_i + \Delta \Omega \\ \omega_c & = & \tan^{-1} \left(\beta_c / \alpha_c\right) \\ M_{0-c} & = & \gamma_c - \omega_c + \Delta M_0 \end{array}$ where ΔA , Δi and $\Delta \Omega$ are provided in the EDC data packet of the message type 34 or 14 and ΔM_0 is obtained from $\Delta M_0 & = & -3 \frac{\sqrt{\mu}}{A_c^2} \left[(t_{oe}) - (t_{OD}) \right].$		$A_{c} = A_{i} + \Delta A$ $e_{c} = (\alpha_{c}^{2} + \beta_{c}^{2})^{1/2}$ $i_{c} = i_{i} + \Delta i$ $\Omega_{c} = \Omega_{i} + \Delta \Omega$ $\omega_{c} = \tan^{-1}(\beta_{c}/\alpha_{c})$ $M_{0-c} = \gamma_{c} - \omega_{c} + \Delta M_{0}$ where ΔA , Δi and $\Delta \Omega$ are provided in the EDC data packet of the message type 34 or 14 and ΔM_{0} is obtained from $\Delta M_{0} = \frac{-3}{2} \left(\frac{\mu}{A_{0}^{3}}\right)^{\frac{1}{2}} \left(\frac{\Delta A_{0}}{A_{0}}\right) \left[(t_{oe} + WN_{oe} * 604,800) - (t_{OD} + WN * 604,800) \right]$	
	The corrected quasi-Keplerian elements above are applied to the user algorithm for determination of antenna phase center position in Section 30.3.3.1.3, Table 30-II.		The corrected quasi-Keplerian elements above are applied to the user algorithm for determination of antenna phase center position in Section 30.3.3.1.3, Table 30-II.	
30.3.3.7.5	The UDRA _{op-D} and UDRA shall give the differential user range accuracy for the SV. It must be noted that the two parameters provide estimated accuracy after both clock and ephemeris DC are applied. The UDRA _{op-D} and UDRA indices are signed, two's complement integers in the range of +15 to -16 and has the following relationship:		The UDRA _{op-D} and $UDRA$ shall give the differential user range accuracy for the SV. It must be noted that the two parameters provide estimated accuracy after both clock and ephemeris DC are applied. The UDRA _{op-D} and $UDRA$ indices are signed, two's complement integers in the range of +15 to -16 and has the following relationship:	Incorporated DOT over proper UDRA term.

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	Index Value	<u>UDRA_{op-D} (meters)</u>	<u>UDRA (10⁻⁶ m/sec)</u>		Index Value		UDRA _{op-D} (meters)	$UDRA (10^{-6} \text{ m/sec})$	
	15	$6144.00 < UDRA_{op-D} $ $6144.$	00		15	6144.00	< UDRA _{op-D} 6144.00		
	14	$3072.00 < UDRA_{op-D} \le 6144.$	00 3072.00		14	3072.00	$<$ UDRA _{op-D} \leq 6144.00	3072.00	
	13	$1536.00 < UDRA_{op-D} \le 3072.$	00 1536.00		13	1536.00	$<$ UDRA _{op-D} \leq 3072.00	1536.00	
	12	$768.00 < UDRA_{op-D} \le 1536.$	00 768.00		12	768.00	$<$ UDRA _{op-D} \leq 1536.00	768.00	
	11	$384.00 < UDRA_{op-D} \le 768.$	00 384.00		11	384.00	$<$ UDRA _{op-D} \leq 768.00	384.00	
	10	$192.00 < UDRA_{op-D} \le 384.$	00 192.00		10	192.00	$<$ UDRA _{op-D} \leq 384.00	192.00	
	9	$96.00 < UDRA_{op-D} \leq 192.$	00 96.00		9	96.00	$<$ UDRA _{op-D} \leq 192.00	96.00	
	8	$48.00 < UDRA_{op-D} \leq 96.$	00 48.00		8	48.00	$<$ UDRA _{op-D} \leq 96.00	48.00	
	7	$24.00 < UDRA_{op-D} \leq 48.$	00 24.00		7	24.00	$<$ UDRA _{op-D} \leq 48.00	24.00	
	6	$13.65 < UDRA_{op-D} \leq 24.$	00 13.65		6	13.65	$<$ UDRA _{op-D} \leq 24.00	13.65	
	5	$9.65 < UDRA_{op-D} \leq 13.$	65 9.65		5	9.65	$<$ UDRA _{op-D} \leq 13.65	9.65	
	4	$6.85 < UDRA_{op-D} \leq 9$	65 6.85		4	6.85	$<$ UDRA _{op-D} \leq 9.65	6.85	
	3	$4.85 < UDRA_{op-D} \leq 6.$	85 4.85 85 2.40		3	4.85	$<$ UDRA _{op-D} \leq 6.85	4.85	
	2	$3.40 < UDRA_{op-D} \leq 4$	85 3.40 40 2.40		2	3.40	$<$ UDRA _{op-D} \leq 4.85	3.40	
	1	$2.40 < UDRA_{op-D} \leq 3.$	40 2.40			2.40	$<$ UDRA _{op-D} \leq 3.40	2.40	
	0	$1.70 < UDRA_{op-D} \leq 2.1$	40 1.70		0	1.70	$<$ UDRA _{op-D} \leq 2.40	1.70	
	-1	$1.20 < UDRA_{op-D} \geq 1.$	20 0.85		-1	1.20	$<$ UDRA _{op-D} \leq 1.70	1.20	
	-2	$0.85 < UDRA_{op-D} \leq 1$	20 0.85		-2	0.83	$<$ UDRA \leq 0.85	0.83	
	-3	$0.00 < UDRA_{op-D} \leq 0.00$	60 0.42		-5	0.00	$<$ UDRA \leq 0.60	0.00	
	-4	$0.43 < 0DRA_{op-D} \leq 0.000$	42 0.20		-4	0.43	$<$ UDRA _{op-D} \leq 0.00	0.45	
	-5	$0.30 < UDRA_{op-D} \leq 0.000$	45 0.50 20 0.21		-5	0.30	$<$ UDRA \leq 0.45	0.30	
	-0	$0.15 < UDRA_{op-D} \leq 0.0$	21 0.15		-0	0.21	$<$ UDRA $_{op-D} \leq 0.30$	0.15	
	-7	$0.11 < UDRA_{op-D} \leq 0.0$	15 0.11		-7	0.15	$< UDRA_{op-D} \leq 0.21$	0.11	
	-0	$0.08 < \text{UDRA}_{\text{op-D}} \leq 0.000$	11 0.08		_9	0.08	$<$ UDRA $_{\rm p}$ $<$ 0.11	0.08	
	-10	$0.06 < UDRA_{p-D} \leq 0.000$	08 0.06		-10	0.06	$<$ UDRA $_{\rm D}$ $<$ 0.08	0.06	
	-11	$0.04 < UDRA_{} > 0.04$	06 0.04		-11	0.00	$<$ UDRA $_{\rm p}$ $<$ 0.06	0.04	
	-12	$0.03 < UDRA_{op} > 0$	04 0.03		-12	0.03	$<$ UDRA _{op} $_{Op}$ \leq 0.04	0.03	
	-13	$0.02 < UDRA_{} > 0$	03 0.02		-13	0.02	< UDRA _{op} $>$ 0.03	0.02	
	-14	$0.01 < UDRA_{cp} > 0.01$	02 0.01		-14	0.01	$<$ UDRA _{op D} \leq 0.02	0.01	
	-15	$UDRA_{op,D} \leq 0$	01 0.005		-15		$UDRA_{op-D} \leq 0.01$	0.005	
	-16	No accuracy predictio	n available—use at own risk		-16		No accuracy prediction av	ailable—use at own risk	
	For any time, t_k , other than t_{op-D} , UDRA is found by, UDRA = UDRA _{op-D} + UDRA ($t_k - t_{op-D}$)				For any time, t _k , other t UDRA = UDRA _{ol}	than t _{op-D} , UD _{p-D} + <i>UDRA</i> (PRA is found by, t _k - t _{op-D})		
202201				GDS/GNIS					Corroct the
30.3.3.8.1	GPS/GNSS Tiem Offset	Parameter Content.		S Time					spelling of the

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		Offset		word "Time" in
		Paramete		the header.
		Content.		
30.3.5.1	Twenty-four bits of CRC parity will provide protection against burst as well as random		Twenty-four bits of CRC parity will provide protection against burst as well as random errors with a	Fixed
	errors with a probability of undetected error $\leq 2^{-24} = 5.96 \times 10^{-8}$ for all channel bit error		probability of undetected error $\leq 2^{-24} = 5.96 \times 10^{-8}$ for all channel bit error probabilities ≤ 0.5 . The CRC	lowercase "x"s
	probabilities \leq 0.5. The CRC word is calculated in the forward direction on a given message		word is calculated in the forward direction on a given message using a seed of 0. The sequence of 24	to uppercase
	using a seed of 0. The sequence of 24 bits $(p_1, p_2,, p_{24})$ is generated from the sequence of		bits $(p_1, p_2,, p_{24})$ is generated from the sequence of information bits $(m_1, m_2,, m_{276})$ in a given	"X"s in g(X) and
	information bits $(m_1, m_2,, m_{276})$ in a given message. This is done by means of a code that is		message. This is done by means of a code that is generated by the polynomial	m(X) terms.
	$g(X) = \sum_{i=0}^{24} g_i X^i$		$g(X) = \sum_{i=0}^{24} g_i X^i$	
			where	
	where			
	$g_i = 1$ for $i = 0,1,3,4,5,6,7,10,11,14,17,18,23,24$ = 0 otherwise		$g_i = 1$ for $i = 0,1,3,4,5,6,7,10,11,14,17,18,23,24$ = 0 otherwise	
	This code is called CRC-24Q. The generator polynomial of this code is in the following form (using binary polynomial algebra):	This code is called CRC-24Q. The generator polynomial of this code is in the following form (using binary polynomial algebra):		
			g(X) = (1 + X)p(X)	
	g(X) = (1 + X)p(X)			
			where p(X) is the primitive and irreducible polynomial	
	where p(X) is the primitive and irreducible polynomial			
			$p(X) = X^{23} + X^{17} + X^{13} + X^{12} + X^{11} + X^9 + X^8 + X^7 + X^5 + X^3 + 1$	
	$p(X) = X^{23} + X^{17} + X^{13} + X^{12} + X^{11} + X^9 + X^8 + X^7 + X^5 + X^3 + 1$			
			When, by the application of binary polynomial algebra, the above $g(X)$ is divided into $m(X)X^{24}$, where	
	When, by the application of binary polynomial algebra, the above $g(x)$ is divided into $m(x)x^{24}$, where the information sequence $m(x)$ is expressed as		the information sequence m(X) is expressed as	

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			$m(X) = m_{k} + m_{k-1}X + m_{k-2}X^{2} + \cdots + m_{1}X^{k-1}$	
	$m (X) = m_{k} + m_{k-1}X + m_{k-2}X^{2} + \cdots + m_{1}X^{k-1}$			
30.3.5.1	The result is a quotient and a remainder $R(x)$ of degree < 24. The bit sequence formed by this remainder represents the parity check sequence. Parity bit p_i , for any i from 1 to 24, is the coefficient of x^{24-i} in $R(x)$.		The result is a quotient and a remainder $R(X)$ of degree < 24. The bit sequence formed by this remainder represents the parity check sequence. Parity bit p_i , for any i from 1 to 24, is the coefficient of X^{24-i} in $R(X)$.	Corrected the term "R(x)" to "R(X)".
	This code has the following characteristics:		This code has the following characteristics:	
	1) It detects all single bit errors per code word.		1) It detects all single bit errors per code word.	
	2) It detects all double bit error combinations in a codeword because the generator polynomial g(X) has a factor of at least three terms.		2) It detects all double bit error combinations in a codeword because the generator polynomial g(X) has a factor of at least three terms.	
	3) It detects any odd number of errors because g(X) contains a factor 1+X.		3) It detects any odd number of errors because g(X) contains a factor 1+X.	
	4) It detects any burst error for which the length of the burst is \leq 24 bits.		4) It detects any burst error for which the length of the burst is \leq 24 bits.	
	5) It detects most large error bursts with length greater than the parity length $r = 24$ bits. The fraction of error bursts of length b > 24 that are undetected is:		5) It detects most large error bursts with length greater than the parity length $r = 24$ bits. The fraction of error bursts of length b > 24 that are undetected is:	
	a) $2^{-24} = 5.96 \times 10^{-8}$, if b > 25 bits.		a) $2^{-24} = 5.96 \times 10^{-8}$, if b > 25 bits.	
	b) $2^{-23} = 1.19 \times 10^{-7}$, if b = 25 bits.		b) $2^{-23} = 1.19 \times 10^{-7}$, if b = 25 bits.	

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		Heading				
40.3.2	A 10	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	The dual asterisked (**) section reference 20.3.3.5.1.10 is an incorrect section reference for Special Messages. The section reference should be 20.3.3.5.1.8.			
	Figure 40-1. Data Format (sheet 11 of 11)	Figure 40-1. Data Format (sheet 11 of 11)				
40.3.3.5.1	 Words three through ten of each page contain six parity bits as their LSBs; in addition, two non-information bearing bits are provided as bits 23 and 24 of word ten in each page for parity computation purposes. The data contained in the remaining bits of words three through ten of the various pages in subframes 4 and 5 are described in the following subparagraphs. A brief summary of the various data contained in each page of subframes 4 and 5 is as follows: a. Subframe 4: Pages 1, 6, 11, 16 and 21: (reserved); 	Words three through ten of each page contain six parity bits as their LSBs; in addition, two non- information bearing bits are provided as bits 23 and 24 of word ten in each page for parity computation purposes. The data contained in the remaining bits of words three through ten of the various pages in subframes 4 and 5 are described in the following subparagraphs.A brief summary of the various data contained in each page of subframes 4 and 5 is as follows:	Reformatting table to make it consistent with similar table in Section 20.3.3.5.1			

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	through 63) respectively;		Subframe	Page(s)	Data	
	· Page 10: (reserved);		4	1, 6, 11, 16 and 21	Reserved	
	 Pages 12, 19, 20, 22, 23 and 24: (reserved); 			2, 3, 4, 5, 7, 8, and 9	Almanac data for SV ID 89 through 95 (PRN 57 through 63) respectively	
	· Page 13: NMCT;			10	Reserved	
	 Pages 14 and 15: reserved for system use; 			12, 19, 20, 22, 23 and 24	Reserved	
				13	NMCT	
	· Page 17: special messages;			14 and 15	Reserved for system use	
	 Page 18: ionospheric and UTC data; 			17	Special messages	
	 Page 25: A-S flags/SV configurations for 31 SVs, plus SV health for SV ID 89 			18	Ionospheric and UTC data	
	through 95 (PRN 57 through 63).			25	A-S flags/SV configurations for 31 SVs, plus SV health for SV ID 89	
	b. Subframe 5:				through 95 (PRN 57 through 63)	
			5	1 through 24	Almanac data for SV ID 65 through 88 (PRN 33 through 56)	
	 Pages 1 through 24: almanac data for SV ID 65 through 88 (PRN 33 through 56); 			25	SV health data for SV ID 65 through 88 (PRN 33 through 56), the	
	• Page 25: SV health data for SV ID 65 through 88 (PRN 33 through 56), the almanac reference time, the almanac reference week number.				almanac reference time, the almanac reference week number	

End of WAS/IS for IS-GPS-200F, IRN-001 Changes