CHANGE NOTICE

Affected Document: IS-GPS-705 Rev H	**IRN/SCN Number** IRN-IS-705H-001	**Date:** 13-JAN-2022
Authority: RFC-00467	**Proposed Change Notice** PCN-IS-705H_RFC467	**Date:** 10-DEC-2021

Document Title: NAVSTAR GPS Space Segment / User Segment L5 Interfaces

RFC Title: 2021 Proposed Changes to the Public Documents

Reason For Change (Driver):

1. Reserved/spare bits in the CNAV/CNAV-2 in IS-GPS-200 are assumed to be a static bit pattern. With the current proposed implementation to fill those bits with a pseudorandom bit pattern, users are at risk of incorrectly using those bits for integrity checks.
2. The GPS IIIF SV Configuration Code '101' confirms that the "alert" in HOW is still applicable. As such, one of the public stakeholder was requesting clarification to confirm if the "alert" in the HOW will also be applicable in the future undefined configuration codes. This is not sufficient for safety-of-life equipment that would need to have the confirmation because the alert is part of the "marginal" conditions leading to the selection/deselection of a satellite in a RAIM or ARAIM integrity context.
3. Current Issue of Data and Clock (IODC) requirement in IS-GPS-200 states that the IODC will be different from any value transmitted by the SV during the preceding 7-days. In certain occasions, current operations have shown not to follow that requirement.
4. The descriptions of how the navigation message changes with time (for example, transitions between data sets, or behavior under extended navigation) do not capture all the implementation differences between earlier SVs and GPS III/IIIF.
5. Documents need clarification and clean-up, as identified in past Public ICWGs and as newly-identified changes of administrative nature.

Description of Change:

1. Clarify language in IS-GPS-200, IS-GPS-705 and IS-GPS-800 to tell users to not utilize the spare/reserved bits.
2. Add clarification to the SV Configuration Code section for the undefined SV codes.
3. Modify or delete the IODC requirement.
4. Update the timing-related information to reflect the current implementation, including aspects specific to GPS III/IIIF. Also added deferred (from RFC-444 RSAM) a Timing Relationships section to ICD-GPS-700 following the Timing Relationships section outline in IS-GPS-200 to ensure the entire subject is covered for MNAV/M-Code.
5. Provide clarity and clean up identified administrative changes in all affected documents.

Authored By: RE: Tony Anthony **Checked By: RE:** Meaghan Leonhardt

AUTHORIZED SIGNATURES	REPRESENTING	DATE
DUNN.MICHAEL.J.1171235045 Digitally signed by DUNN.MICHAEL.J.1171235045 Date: 2022.04.19 06:53:05 -07'00'	PNT Technical Director, MilComm & PNT Directorate, Space Systems Command (SSC)	19 April 2022

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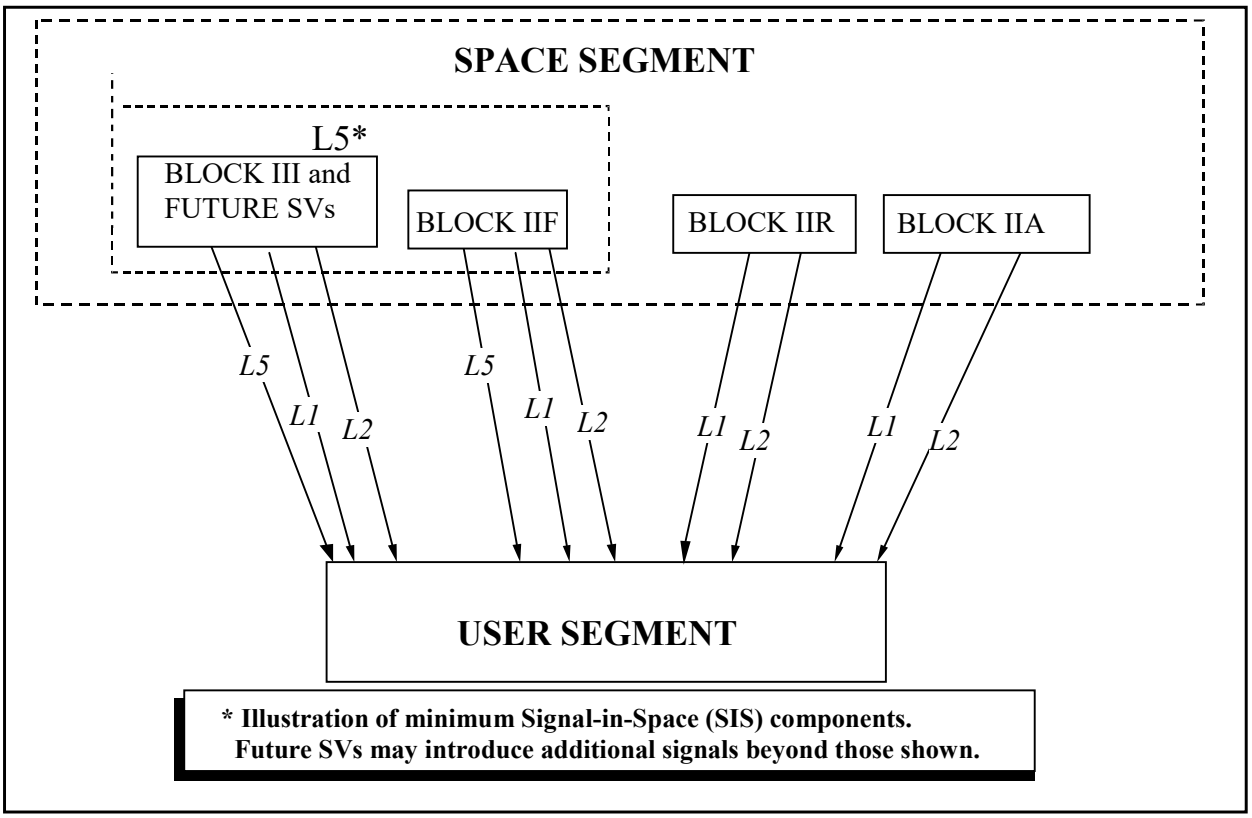
El Segundo, CA 90245

CODE IDENT 66RP1

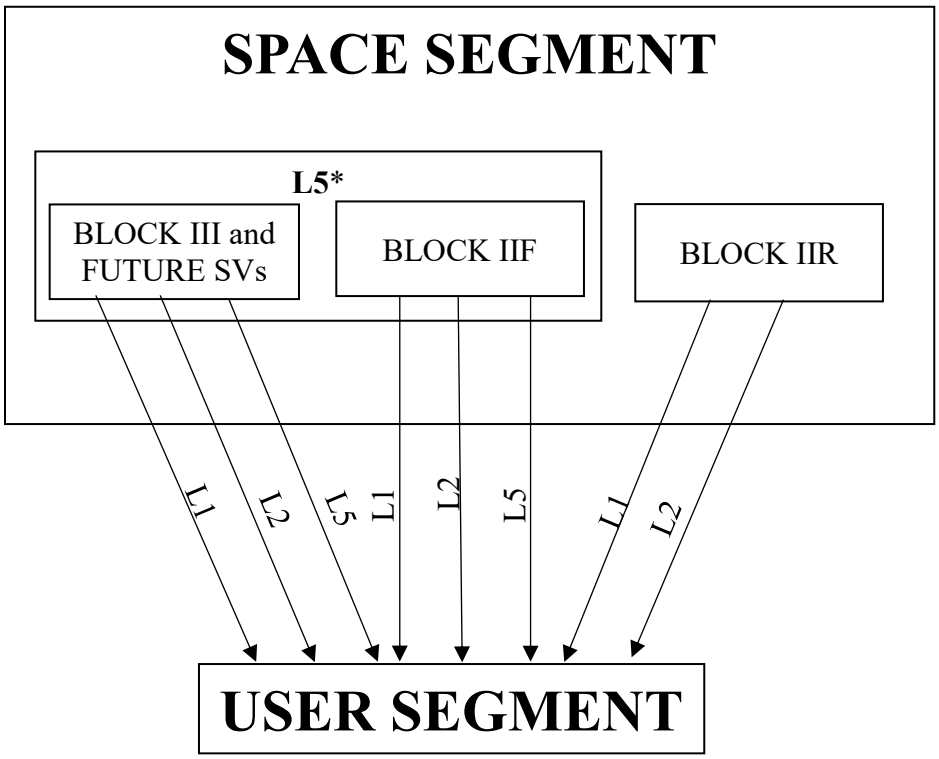
IS705-1534:

Section Number:
3.1.0-3
WAS:



Redlines:
Graphics are not available. The **BLOCK IIA** block in the **SPACE SEGMENT** and associated communications lines have been removed.

IS:



* Illustration of minimum Signal-in-Space (SIS) components. Future SVs may introduce additional signals beyond those shown.

IS705-119:

Section Number:
6.2.2.2.0-1
WAS:
The operational satellites are designated Block IIA, Block IIR, Block IIRM, Block IIF, GPS III, and GPS IIIF SVs. Characteristics of these SVs are provided below. These SVs transmit configuration codes as specified in paragraph 20.3.3.5.1.4 of IS-GPS-200. The navigation signal provides no direct indication of the type of the transmitting SV.
Redlines:
The operational satellites are designated Block ~~IIA, Block~~ IIR, Block ~~IIRM~~IIR-M, Block IIF, GPS III, and GPS IIIF SVs. Characteristics of these SVs are provided below. These SVs transmit configuration codes as specified in paragraph 20.3.3.5.1.4 of IS-GPS-200. The navigation signal provides no direct indication of the type of the transmitting SV.
IS:
The operational satellites are designated Block IIR, Block IIR-M, Block IIF, GPS III, and GPS IIIF SVs. Characteristics of these SVs are provided below. These SVs transmit configuration codes as specified in paragraph 20.3.3.5.1.4 of IS-GPS-200. The navigation signal provides no direct indication of the type of the transmitting SV.

IS705-1494:

Section Number:
6.2.2.2.1
WAS:
Object Heading: Block II SVs
Redlines:
Object Heading: Block II SVs (Decommissioned)
IS:
Object Heading: Block II SVs (Decommissioned)

IS705-120:

Section Number:
6.2.2.2.2
WAS:
Object Heading: Block IIA SVs
Redlines:
Object Heading: Block IIA SVs (Decommissioned)
IS:
Object Heading: Block IIA SVs (Decommissioned)

IS705-129:

Section Number:
6.2.2.2.6.0-1
WAS:
See paragraph 6.2.2.2.6 of IS-GPS-200. The GPS III and GPS IIIF operational SVs do broadcast the L5 signal.
Redlines:
See paragraph 6.2.2.2.6 of IS-GPS-200. The GPS III ~~and GPS IIIF~~ operational SVs do broadcast the L5 signal.
IS:
See paragraph 6.2.2.2.6 of IS-GPS-200. The GPS III operational SVs do broadcast the L5 signal.

IS705-1738:
Insertion after object IS705-128
Section Number:
6.2.2.2.7
WAS:
<INSERTED OBJECT>
Redlines:
Object Heading: GPS IIIF SVs
Object Type: Header
IS:
Object Heading: GPS IIIF SVs
Object Type: Header

IS705-1739:
Insertion below object IS705-1738
Section Number:
6.2.2.2.7.0-1
WAS:
<INSERTED OBJECT>
Redlines:
See paragraph 6.2.2.2.7 of IS-GPS-200. The GPS IIIF operational SVs do broadcast the L5 signal.
Object Type: Info-Only
IS:
See paragraph 6.2.2.2.7 of IS-GPS-200. The GPS IIIF operational SVs do broadcast the L5 signal.
Object Type: Info-Only

IS705-131:

Section Number:
6.2.3.0-1
WAS:
See paragraph 6.2.3 of IS-GPS-200. There is no requirement for extended operations on L5.
Redlines:
See paragraph 6.2.3 of IS-GPS-200. ~~There is no requirement for extended operations on L5.~~
IS:
See paragraph 6.2.3 of IS-GPS-200.

IS705-1521:

Section Number:
6.2.8.1-2
WAS:

Symbol	Parameter Name	Message
$\dot{A}$	Change Rate in Semi-major Axis	10
ΔA	Semi-major Axis Difference at Reference Time	10
Δn_0	Mean Motion Difference from Computed Value at Reference Time	10
$\Delta \dot{n_0}$	Rate of Mean Motion Difference from Computed Value	10
ω	Argument of Perigee	10
e	Eccentricity	10
ISF	Integrity Status Flag [NOTE1]	10
(L1/L2/L5)	Signal Health (3 bits)	10
M_0	Mean Anomaly at Reference Time	10
URA_{ED}	Elevation Dependent User Range Accuracy	10
WN	Week Number	10
t_{oe}	Time of Ephemeris	10, 11
t_{op}	CEI Data Sequence Propagation Time of Week	10, 30-37
$\dot{\Omega}$	Rate of Right Ascension	11
Ω_0	Longitude of Ascending Node of Orbit Plane at Weekly Epoch	11
C_{ic}	Amplitude of the Cosine Harmonic Correction Term to the Angle of Inclination	11
C_{is}	Amplitude of the Sine Harmonic Correction Term to the Angle of Inclination	11
C_{rc}	Amplitude of the Cosine Harmonic Correction Term to the Orbit Radius	11
C_{rs}	Amplitude of the Sine Correction Term to the Orbit Radius	11
C_{uc}	Amplitude of Cosine Harmonic Correction Term to the Argument of Latitude	11
C_{us}	Amplitude of Sine Harmonic Correction Term to the Argument of Latitude	11
i_0	Inclination Angle at Reference Time	11
$i_{0\text{-}n}$-DOT	Rate of Inclination Angle	11
$ISC_{L1C/A}$	Inter-signal Correction	30
ISC_{L2C}	Inter-signal Correction	30
ISC_{L5I5}	Inter-signal Correction	30
ISC_{L5Q5}	Inter-signal Correction	30
T_{GD}	Group Delay Differential	30

Symbol	Parameter Name	Message
a_{f0}	SV Clock Bias Correction Coefficient	30-37
a_{f1}	SV Clock Drift Correction Coefficient	30-37
a_{f2}	Drift Rate Correction Coefficient Index	30-37
t_{oc}	Time of Clock	30-37
URA_{NED0}	NED Accuracy Index	30-37
URA_{NED1}	NED Accuracy Change Index	30-37
URA_{NED2}	NED Accuracy Change Rate Index	30-37
Alert	Alert Flag NOTE1	All
NOTE1: Parameters so indicated are for CEI Refinement – not limited to curve fit. Parameters not indicated are needed for/limited to curve fit. Updates to parameters in table shall prompt changes in t_{oe}/t_{oc}. Any parameter marked with NOTE1 may be changed with or without a change in t_{oe}/t_{oc}.		

Redlines:

Symbol	Parameter Name	Message
$\dot{A}$	Change Rate in Semi-major Axis	10
ΔA	Semi-major Axis Difference at Reference Time	10
Δn_0	Mean Motion Difference from Computed Value at Reference Time	10
$\Delta \dot{n}_0$	Rate of Mean Motion Difference from Computed Value	10
ω	Argument of Perigee	10
e	Eccentricity	10
ISF	Integrity Status Flag NOTE1	10
(L1/L2/L5)	Signal Health (3 bits)	10
M_0	Mean Anomaly at Reference Time	10
URA_{ED}	Elevation Dependent User Range Accuracy	10
WN	Week Number	10
t_{oe}	Time of Ephemeris	10, 11
t_{op}	CEI Data Sequence Propagation Time of Week	10, 30-37
$\dot{\Omega}$	Rate of Right Ascension	11
Ω_0	Longitude of Ascending Node of Orbit Plane at Weekly Epoch	11
C_{ic}	Amplitude of the Cosine Harmonic Correction Term to the Angle of Inclination	11
C_{is}	Amplitude of the Sine Harmonic Correction Term to the Angle of Inclination	11
C_{rc}	Amplitude of the Cosine Harmonic Correction Term to the Orbit Radius	11
C_{rs}	Amplitude of the Sine Correction Term to the Orbit Radius	11
C_{uc}	Amplitude of Cosine Harmonic Correction Term to the Argument of Latitude	11
C_{us}	Amplitude of Sine Harmonic Correction Term to the Argument of Latitude	11
i_0	Inclination Angle at Reference Time	11
~~i_{0_n}~~ IDOT	Rate of Inclination Angle	11
$ISC_{L1C/A}$	Inter-signal Correction	30
ISC_{L2C}	Inter-signal Correction	30
ISC_{L5I5}	Inter-signal Correction	30
ISC_{L5Q5}	Inter-signal Correction	30
T_{GD}	Group Delay Differential	30
a_{f0}	SV Clock Bias Correction Coefficient	30-37
a_{f1}	SV Clock Drift Correction Coefficient	30-37
a_{f2}	Drift Rate Correction Coefficient Index	30-37

Symbol	Parameter Name	Message
t_{oc}	Time of Clock	30-37
URA_{NED0}	NED Accuracy Index	30-37
URA_{NED1}	NED Accuracy Change Index	30-37
URA_{NED2}	NED Accuracy Change Rate Index	30-37
Alert	Alert Flag NOTE1	All
NOTE1: Parameters so indicated are for CEI Refinement – not limited to curve fit. Parameters not indicated are needed for/limited to curve fit. Updates to parameters in table shall prompt changes in t_{oe}/t_{oc}. Any parameter marked with NOTE1 may be changed with or without a change in t_{oe}/t_{oc}.		

IS:

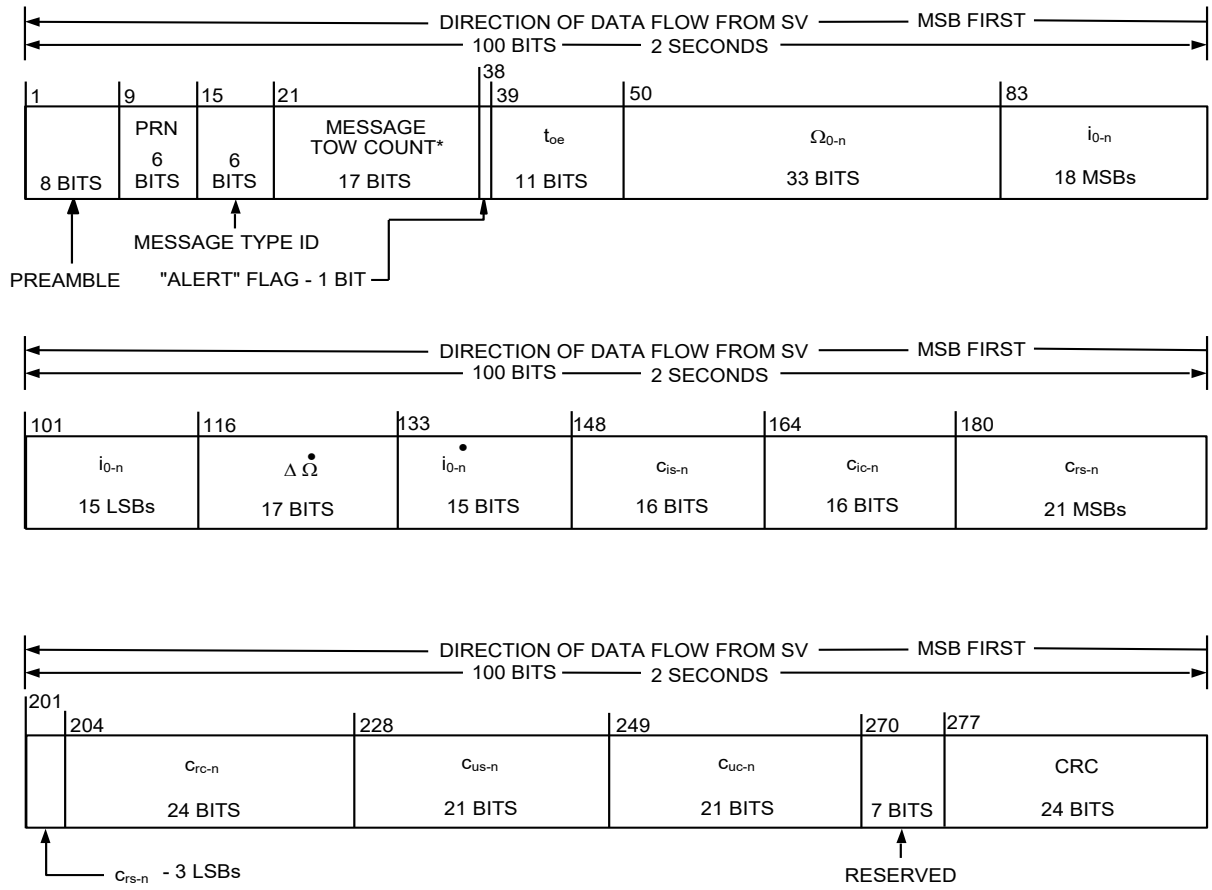
Symbol	Parameter Name	Message
$\dot{A}$	Change Rate in Semi-major Axis	10
ΔA	Semi-major Axis Difference at Reference Time	10
Δn_0	Mean Motion Difference from Computed Value at Reference Time	10
$\Delta \dot{n_0}$	Rate of Mean Motion Difference from Computed Value	10
ω	Argument of Perigee	10
e	Eccentricity	10
ISF	Integrity Status Flag NOTE1	10
(L1/L2/L5)	Signal Health (3 bits)	10
M_0	Mean Anomaly at Reference Time	10
URA_{ED}	Elevation Dependent User Range Accuracy	10
WN	Week Number	10
t_{oe}	Time of Ephemeris	10, 11
t_{op}	CEI Data Sequence Propagation Time of Week	10, 30-37
$\Delta\dot{\Omega}$	Rate of Right Ascension Difference	11
Ω_0	Longitude of Ascending Node of Orbit Plane at Weekly Epoch	11
C_{ic}	Amplitude of the Cosine Harmonic Correction Term to the Angle of Inclination	11
C_{is}	Amplitude of the Sine Harmonic Correction Term to the Angle of Inclination	11
C_{rc}	Amplitude of the Cosine Harmonic Correction Term to the Orbit Radius	11
C_{rs}	Amplitude of the Sine Correction Term to the Orbit Radius	11
C_{uc}	Amplitude of Cosine Harmonic Correction Term to the Argument of Latitude	11
C_{us}	Amplitude of Sine Harmonic Correction Term to the Argument of Latitude	11
i_0	Inclination Angle at Reference Time	11
IDOT	Rate of Inclination Angle	11
$ISC_{L1C/A}$	Inter-signal Correction	30
ISC_{L2C}	Inter-signal Correction	30
ISC_{L5I5}	Inter-signal Correction	30
ISC_{L5Q5}	Inter-signal Correction	30
T_{GD}	Group Delay Differential	30
a_{f0}	SV Clock Bias Correction Coefficient	30-37
a_{f1}	SV Clock Drift Correction Coefficient	30-37
a_{f2}	Drift Rate Correction Coefficient Index	30-37
t_{oc}	Time of Clock	30-37
URA_{NED0}	NED Accuracy Index	30-37

Symbol	Parameter Name	Message
URA_{NED1}	NED Accuracy Change Index	30-37
URA_{NED2}	NED Accuracy Change Rate Index	30-37
Alert	Alert Flag[NOTE1]	All
NOTE1: Parameters so indicated are for CEI Refinement – not limited to curve fit. Parameters not indicated are needed for/limited to curve fit. Updates to parameters in table shall prompt changes in t_{oe}/t_{oc}. Any parameter marked with NOTE1 may be changed with or without a change in t_{oe}/t_{oc}.		

IS705-199:

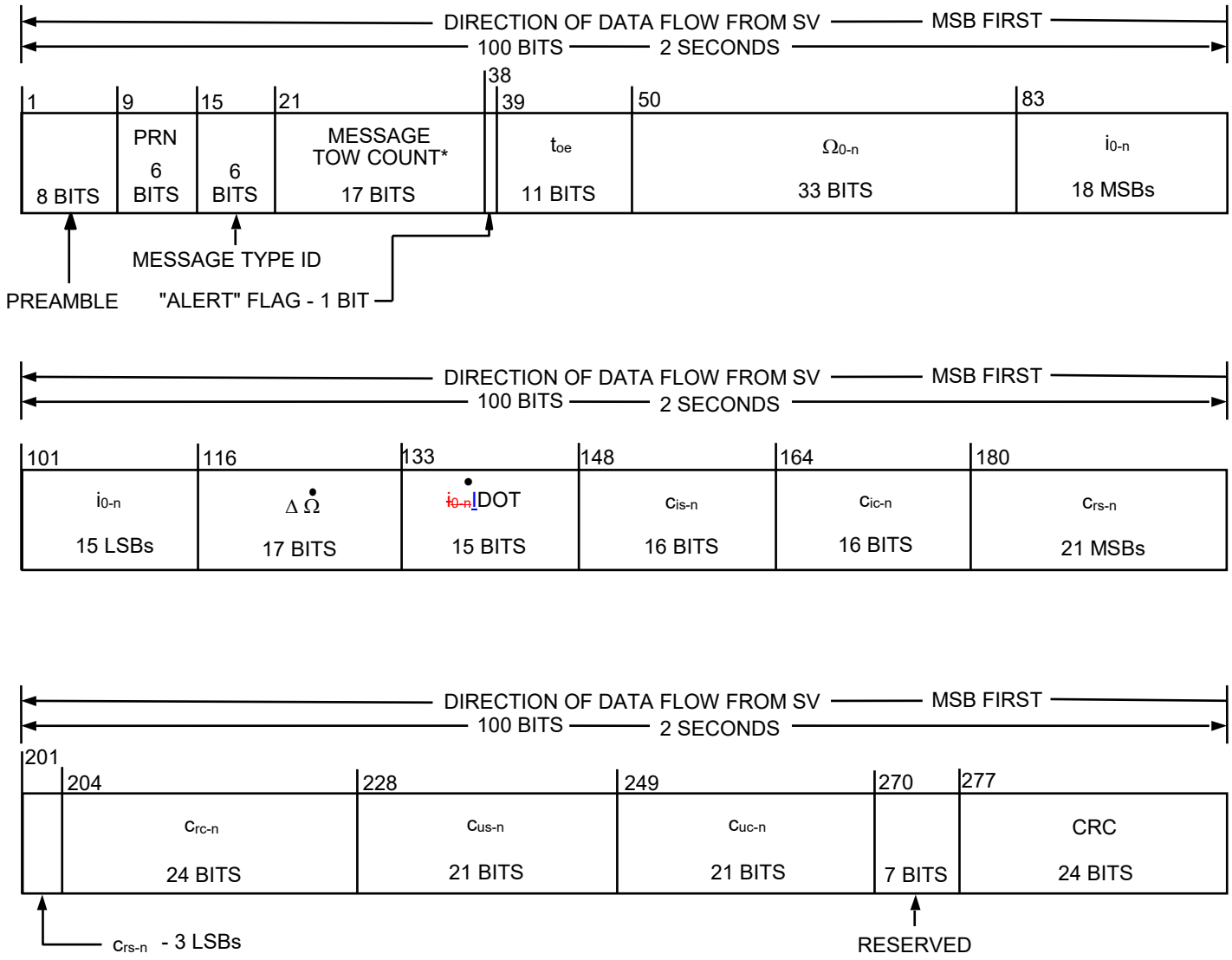
Section Number:
20.3.3.0-4

WAS:



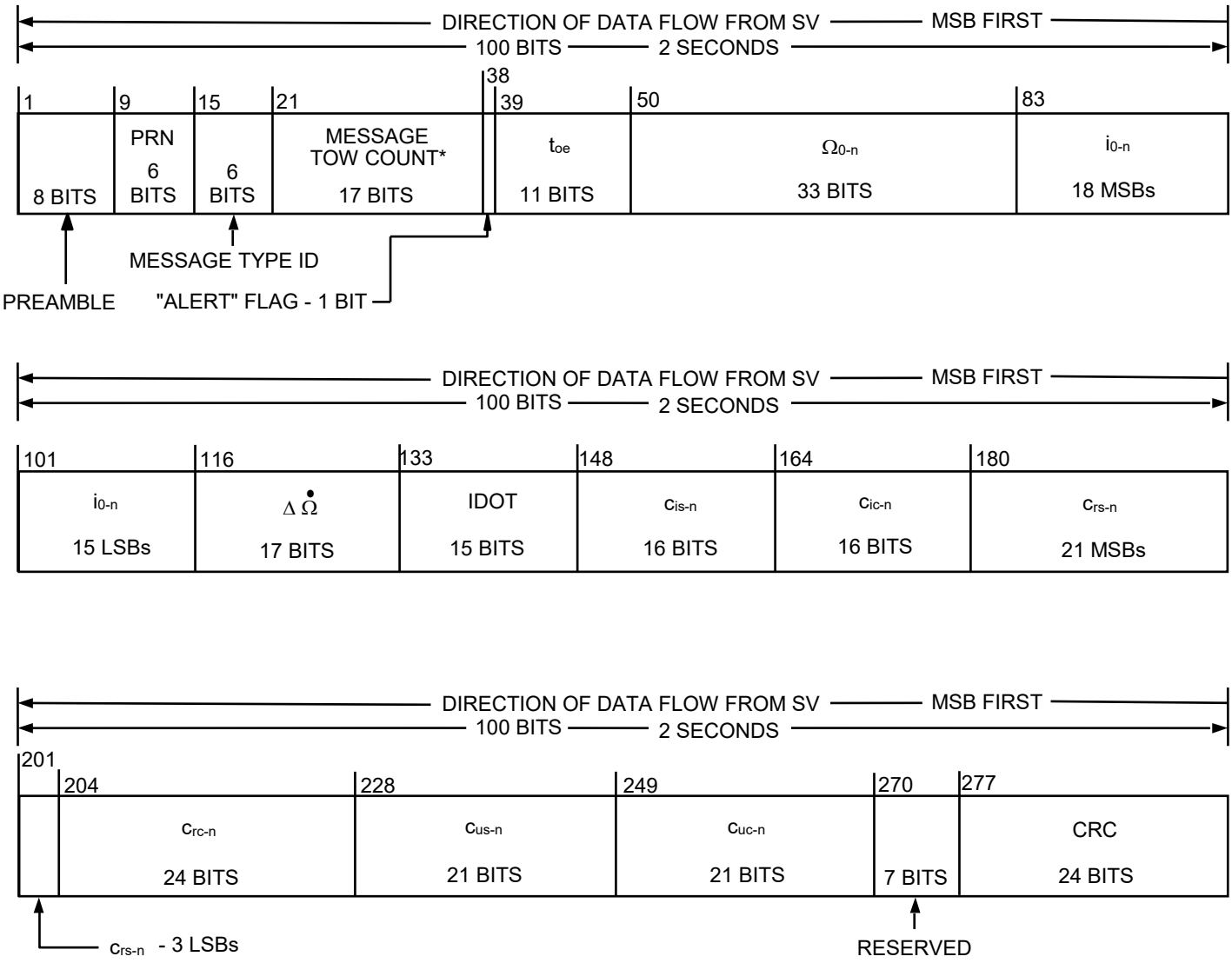
* MESSAGE TOW COUNT = 17 MSB OF ACTUAL TOW COUNT AT START OF NEXT 6-SECOND MESSAGE

Redlines:



* MESSAGE TOW COUNT = 17 MSB OF ACTUAL TOW COUNT AT START OF NEXT 6-SECOND MESSAGE

IS:



* MESSAGE TOW COUNT = 17 MSB OF ACTUAL TOW COUNT AT START OF NEXT 6-SECOND MESSAGE

IS705-242:

Section Number:
20.3.3.1.3.0-8
WAS:

Parameter Symbol	Parameter Description	No. of Bits**	Scale Factor (LSB)	Valid Range***	Units
t_{oe}	Ephemeris data reference time of week	11	300	0 to 604,500	seconds
$\Omega_{0\text{-}n}$	Longitude of Ascending Node of Orbit Plane at Weekly Epoch	33*	2^{-32}		semi-circles
$\Delta\dot{\Omega}$ ****	Rate of right ascension difference	17*	2^{-44}		semi-circles/sec
$i_{0\text{-}n}$	Inclination angle at reference time	33*	2^{-32}		semi-circles
$\dot{i}_{0\text{-}n}$	Rate of inclination angle	15*	2^{-44}		semi-circles/sec
$C_{is\text{-}n}$	Amplitude of the sine harmonic correction term to the angle of inclination	16*	2^{-30}		radians
$C_{ic\text{-}n}$	Amplitude of the cosine harmonic correction term to the angle of inclination	16*	2^{-30}		radians
$C_{rs\text{-}n}$	Amplitude of the sine correction term to the orbit radius	24*	2^{-8}		meters
$C_{rc\text{-}n}$	Amplitude of the cosine correction term to the orbit radius	24*	2^{-8}		meters
$C_{us\text{-}n}$	Amplitude of the sine harmonic correction term to the argument of latitude	21*	2^{-30}		radians
$C_{uc\text{-}n}$	Amplitude of the sine harmonic correction term to the argument of latitude	21*	2^{-30}		radians

* Parameters so indicated are two's complement, with the sign bit (+ or -) occupying the MSB;

** See Figure 20-1 and Figure 20-2 for complete bit allocation in message types 10 and 11;

*** Unless otherwise indicated in this column, valid range is the maximum range attainable with indicated bit allocation and scale factor.

**** Relative to $\dot{\Omega}_{REF} = -2.6 \times 10^{-9}$ semi-circles/second.

Redlines:

Parameter Symbol	Parameter Description	No. of Bits**	Scale Factor (LSB)	Valid Range***	Units
t_{oe}	Ephemeris data reference time of week	11	300	0 to 604,500	seconds
$\Omega_{0\text{-}n}$	Longitude of Ascending Node of Orbit Plane at Weekly Epoch	33*	2^{-32}		semi-circles
$\Delta\dot{\Omega}$ ****	Rate of right ascension difference	17*	2^{-44}		semi-circles/sec
$i_{0\text{-}n}$	Inclination angle at reference time	33*	2^{-32}		semi-circles
~~$\dot{i}_{0\text{-}n}$~~ IDOT	Rate of inclination angle	15*	2^{-44}		semi-circles/sec
$C_{is\text{-}n}$	Amplitude of the sine harmonic correction term to the angle of inclination	16*	2^{-30}		radians
$C_{ic\text{-}n}$	Amplitude of the cosine harmonic correction term to the angle of inclination	16*	2^{-30}		radians
$C_{rs\text{-}n}$	Amplitude of the sine correction term to the orbit radius	24*	2^{-8}		meters
$C_{rc\text{-}n}$	Amplitude of the cosine correction term to the orbit radius	24*	2^{-8}		meters
$C_{us\text{-}n}$	Amplitude of the sine harmonic correction term to the argument of latitude	21*	2^{-30}		radians
$C_{uc\text{-}n}$	Amplitude of the sine harmonic correction term to the argument of latitude	21*	2^{-30}		radians

* Parameters so indicated are two's complement, with the sign bit (+ or -) occupying the MSB;

** See Figure 20-1 and Figure 20-2 for complete bit allocation in message types 10 and 11;

*** Unless otherwise indicated in this column, valid range is the maximum range attainable with indicated bit allocation and scale factor.

**** Relative to $\dot{\Omega}_{REF} = -2.6 \times 10^{-9}$ semi-circles/second.

IS:

Parameter Symbol	Parameter Description	No. of Bits**	Scale Factor (LSB)	Valid Range***	Units
t_{oe}	Ephemeris data reference time of week	11	300	0 to 604,500	seconds
$\Omega_{0\text{-}n}$	Longitude of Ascending Node of Orbit Plane at Weekly Epoch	33*	2^{-32}		semi-circles
$_{\Delta}\dot{\Omega}$ ****	Rate of right ascension difference	17*	2^{-44}		semi-circles/sec
$i_{0\text{-}n}$	Inclination angle at reference time	33*	2^{-32}		semi-circles
IDOT	Rate of inclination angle	15*	2^{-44}		semi-circles/sec
$C_{is\text{-}n}$	Amplitude of the sine harmonic correction term to the angle of inclination	16*	2^{-30}		radians
$C_{ic\text{-}n}$	Amplitude of the cosine harmonic correction term to the angle of inclination	16*	2^{-30}		radians
$C_{rs\text{-}n}$	Amplitude of the sine correction term to the orbit radius	24*	2^{-8}		meters
$C_{rc\text{-}n}$	Amplitude of the cosine correction term to the orbit radius	24*	2^{-8}		meters
$C_{us\text{-}n}$	Amplitude of the sine harmonic correction term to the argument of latitude	21*	2^{-30}		radians
$C_{uc\text{-}n}$	Amplitude of the sine harmonic correction term to the argument of latitude	21*	2^{-30}		radians

* Parameters so indicated are two's complement, with the sign bit (+ or -) occupying the MSB;

** See Figure 20-1 and Figure 20-2 for complete bit allocation in message types 10 and 11;

*** Unless otherwise indicated in this column, valid range is the maximum range attainable with indicated bit allocation and scale factor.

**** Relative to $\dot{\Omega}_{REF} = -2.6 \times 10^{-9}$ semi-circles/second.

IS705-244:

Section Number:
20.3.3.1.3.0-12
WAS:

Element/Equation *	Description
$\Phi_k = \nu_k + \omega_n$	Argument of Latitude
$\delta u_k = C_{us\text{-}n}\sin 2\Phi_k + C_{uc\text{-}n}\cos 2\Phi_k$	Argument of Latitude Correction (Second Harmonic Perturbations)
$\delta r_k = C_{rs\text{-}n}\sin 2\Phi_k + C_{rc\text{-}n}\cos 2\Phi_k$	Radial Correction (Second Harmonic Perturbations)
$\delta i_k = C_{is\text{-}n}\sin 2\Phi_k + C_{ic\text{-}n}\cos 2\Phi_k$	Inclination Correction (Second Harmonic Perturbations)
$u_k = \Phi_k + \delta u_k$	Corrected Argument of Latitude
$r_k = A_k(1 - e_n \cos E_k) + \delta r_k$	Corrected Radius
$i_k = i_{o\text{-}n} + (\dot{i}_{o\text{-}n})t_k + \delta i_k$	Corrected Inclination
$x_k' = r_k \cos u_k$ $y_k' = r_k \sin u_k$	Positions in orbital plane
$\dot{\Omega} = \dot{\Omega}_{REF} + \Delta\dot{\Omega}$ ***	Rate of Right Ascension
$\Omega_k = \Omega_{0\text{-}n} + (\dot{\Omega} - \dot{\Omega}_e)\, t_k - \dot{\Omega}_e\, t_{oe}$	Corrected Longitude of Ascending Node
$x_k = x_k' \cos\Omega_k - y_k' \cos i_k \sin\Omega_k$ $y_k = x_k' \sin\Omega_k + y_k' \cos i_k \cos\Omega_k$ $z_k = y_k' \sin i_k$	Earth-fixed coordinates of SV antenna phase center

*** $\dot{\Omega}_{REF} = -2.6 \times 10^{-9}$ semi-circles/second.

Redlines:

Element/Equation *	Description
$\Phi_k = \nu_k + \omega_n$	Argument of Latitude
$\delta u_k = C_{us\text{-}n}\sin 2\Phi_k + C_{uc\text{-}n}\cos 2\Phi_k$	Argument of Latitude Correction } Second Harmonic Perturbations
$\delta r_k = C_{rs\text{-}n}\sin 2\Phi_k + C_{rc\text{-}n}\cos 2\Phi_k$	Radial Correction } Second Harmonic Perturbations
$\delta i_k = C_{is\text{-}n}\sin 2\Phi_k + C_{ic\text{-}n}\cos 2\Phi_k$	Inclination Correction } Second Harmonic Perturbations
$u_k = \Phi_k + \delta u_k$	Corrected Argument of Latitude
$r_k = A_k(1 - e_n \cos E_k) + \delta r_k$	Corrected Radius
$i_k = i_{o\text{-}n} + (\dot{i}_{o\text{-}n}\ \text{IDOT})t_k + \delta i_k$	Corrected Inclination
$x_k' = r_k \cos u_k$ $y_k' = r_k \sin u_k$ }	Positions in orbital plane
$\dot{\Omega} = \dot{\Omega}_{REF} + \Delta\dot{\Omega}$ ***	Rate of Right Ascension
$\Omega_k = \Omega_{0\text{-}n} + (\dot{\Omega} - \dot{\Omega}_e)\, t_k - \dot{\Omega}_e\, t_{oe}$	Corrected Longitude of Ascending Node
$x_k = x_k' \cos\Omega_k - y_k' \cos i_k \sin\Omega_k$ $y_k = x_k' \sin\Omega_k + y_k' \cos i_k \cos\Omega_k$ $z_k = y_k' \sin i_k$ }	Earth-fixed coordinates of SV antenna phase center

*** $\dot{\Omega}_{REF} = -2.6 \times 10^{-9}$ semi-circles/second.

IS:

Element/Equation *	Description
$\Phi_k = \nu_k + \omega_n$	Argument of Latitude
$\delta u_k = C_{us\text{-}n}\sin 2\Phi_k + C_{uc\text{-}n}\cos 2\Phi_k$	Argument of Latitude Correction } Second Harmonic Perturbations
$\delta r_k = C_{rs\text{-}n}\sin 2\Phi_k + C_{rc\text{-}n}\cos 2\Phi_k$	Radial Correction } Second Harmonic Perturbations
$\delta i_k = C_{is\text{-}n}\sin 2\Phi_k + C_{ic\text{-}n}\cos 2\Phi_k$	Inclination Correction } Second Harmonic Perturbations
$u_k = \Phi_k + \delta u_k$	Corrected Argument of Latitude
$r_k = A_k(1 - e_n \cos E_k) + \delta r_k$	Corrected Radius
$i_k = i_{o\text{-}n} + (IDOT)t_k + \delta i_k$	Corrected Inclination
$x_k' = r_k \cos u_k$ $y_k' = r_k \sin u_k$	Positions in orbital plane
$\dot{\Omega} = \dot{\Omega}_{REF} + \Delta\dot{\Omega}$ ***	Rate of Right Ascension
$\Omega_k = \Omega_{0\text{-}n} + (\dot{\Omega} - \dot{\Omega}_e)\, t_k - \dot{\Omega}_e t_{oe}$	Corrected Longitude of Ascending Node
$x_k = x_k' \cos\Omega_k - y_k' \cos i_k \sin\Omega_k$ $y_k = x_k' \sin\Omega_k + y_k' \cos i_k \cos\Omega_k$ $z_k = y_k' \sin i_k$	Earth-fixed coordinates of SV antenna phase center

*** $\dot{\Omega}_{REF} = -2.6 \times 10^{-9}$ semi-circles/second.

IS705-1540:

Section Number:
20.3.3.3.1.2.0-2
WAS:
Table 20-IV. Group Delay Differential Parameters ****
Object Type: <blank>
Redlines:
Table 20-IV. Group Delay Differential Parameters ****
Object Type: ~~<blank>~~Table Caption
IS:
Table 20-IV. Group Delay Differential Parameters
Object Type: Table Caption

IS705-275:

Section Number:
20.3.3.3.1.2.0-3
WAS:

Parameter	No. of Bits**	Scale Factor (LSB)	Valid Range***	Units
T_{GD}	13*	2^{-35}		seconds
$ISC_{L1C/A}$	13*	2^{-35}		seconds
ISC_{L2C}	13*	2^{-35}		seconds
ISC_{L5I5}	13*	2^{-35}		seconds
ISC_{L5Q5}	13*	2^{-35}		seconds
* Parameters so indicated are two's complement with the sign bit (+ or -) occupying the MSB; ** See Figure 20-3 for complete bit allocation in message type 30; *** Valid range is the maximum range attainable with indicated bit allocation and scale factor; **** The bit string of "1000000000000" will indicate that the group delay value is not available.				

Redlines:

Parameter	No. of Bits**	Scale Factor (LSB)	Valid Range***	Units
T_{GD}	13*	2^{-35}		seconds
$ISC_{L1C/A}$	13*	2^{-35}		seconds
ISC_{L2C}	13*	2^{-35}		seconds
ISC_{L5I5}	13*	2^{-35}		seconds
ISC_{L5Q5}	13*	2^{-35}		seconds
* Parameters so indicated are two's complement with the sign bit (+ or -) occupying the MSB; ** See Figure 20-3 for complete bit allocation in message type 30; *** Valid range is the maximum range attainable with indicated bit allocation and scale factor; ~~**** The bit string of "1000000000000" will indicate that the group delay value is not available.~~				

IS:

Parameter	No. of Bits**	Scale Factor (LSB)	Valid Range***	Units
T_{GD}	13*	2^{-35}		seconds
$ISC_{L1C/A}$	13*	2^{-35}		seconds
ISC_{L2C}	13*	2^{-35}		seconds
ISC_{L5I5}	13*	2^{-35}		seconds
ISC_{L5Q5}	13*	2^{-35}		seconds

* Parameters so indicated are two's complement with the sign bit (+ or -) occupying the MSB;
** See Figure 20-3 for complete bit allocation in message type 30;
*** Valid range is the maximum range attainable with indicated bit allocation and scale factor;

IS705-287:

Section Number:
20.3.3.3.1.3.0-2
WAS:
The ionospheric data shall be updated by the CS at least once every six days while the CS is able to upload the SVs. If the CS is unable to upload the SVs, the ionospheric data transmitted by the SVs may not be accurate. During extended operations, if the CS is unable to upload the SVs, the use of this model will yield unpredictable results.
Redlines:
The ionospheric data shall be updated by the CS at least once every six days while the CS is able to upload the SVs. If the CS is unable to upload the SVs, the ionospheric data transmitted by the SVs may not be accurate~~.~~ ~~During extended operations, if the CS is unable to upload the~~ ~~SVs,~~and the use of this model will yield unpredictable results.
IS:
The ionospheric data shall be updated by the CS at least once every six days while the CS is able to upload the SVs. If the CS is unable to upload the SVs, the ionospheric data transmitted by the SVs may not be accurate and the use of this model will yield unpredictable results.

IS705-299:

Section Number:
20.3.3.4.4.0-1
WAS:
The three, one-bit, health indication in bits 155, 156 and 157 of message type 37 and bits 29, 30 and 31 of each packet of reduced almanac refers to the L1, L2, and L5 carrier of the SV whose PRN number is specified in the message or in the packet. These health indication bits only apply to codes and data as defined in IS-GPS-200, IS-GPS-705, and IS-GPS-800.
The health of each carrier is indicated by:

0 = Some or all codes and data on this carrier are OK,

1 = All codes and data on this carrier are bad or unavailable.

The health bit indication shall be given relative to the capabilities of each SV as designated by the configuration code in the LNAV message (see paragraph 20.3.3.5.1.4 of IS-GPS-200). Accordingly, the health bit for any SV which does not have a certain capability will be indicated as "healthy" if the lack of this capability is inherent in its design or if it has been configured into a mode which is normal from a user standpoint and does not require that capability; however, the Operating Command may choose to set the health bit "unhealthy" for an SV without a certain capability. Single-frequency L5 users or users who have not recieved or choose not to use configuration code should assume that every signal is available on every SV. The predicted health data will be updated at the time of upload when a new midi almanac or reduced almanac has been built by the CS. Therefore, the transmitted health data may not correspond to the actual health of the transmitting SV. For more information about user protocol for interpreting health indications see paragraph 6.4.5.
Redlines:
The three, one-bit, health indication in bits 155, 156 and 157 of message type 37 and bits 29, 30 and 31 of each packet of reduced almanac refers to the L1, L2, and L5 carrier of the SV whose PRN number is specified in the message or in the packet. These health indication bits only apply to codes and data as defined in IS-GPS-200, IS-GPS-705, and IS-GPS-800.
The health of each carrier is indicated by:

0 = Some or all codes and data on this carrier are OK,

1 = All codes and data on this carrier are bad or unavailable.

The health bit indication shall be given relative to the capabilities of each SV as designated by the configuration code in the LNAV message (see paragraph 20.3.3.5.1.4 of IS-GPS-200). Accordingly, the health bit for any SV which does not have a certain capability will be indicated as "healthy" if the lack of this capability is inherent in its design or if it has been configured into a mode which is normal from a user standpoint and does not require that capability; however, the Operating Command may choose to set the health bit "unhealthy" for an SV without a certain capability. Single-frequency L5 users or users who have not ~~recieved~~received or choose not to use configuration code should assume that every signal is available on every SV. The predicted health data will be updated at the time of upload when a new midi almanac or reduced almanac has been built by the CS. Therefore, the transmitted health data may not correspond to the actual health of the ~~transmitting~~relevant SV. For more information about user protocol for interpreting health indications see paragraph 6.4.5.

IS:
The three, one-bit, health indication in bits 155, 156 and 157 of message type 37 and bits 29, 30 and 31 of each packet of reduced almanac refers to the L1, L2, and L5 carrier of the SV whose PRN number is specified in the message or in the packet. These health indication bits only apply to codes and data as defined in IS-GPS-200, IS-GPS-705, and IS-GPS-800.
The health of each carrier is indicated by:

0 = Some or all codes and data on this carrier are OK,

1 = All codes and data on this carrier are bad or unavailable.

The health bit indication shall be given relative to the capabilities of each SV as designated by the configuration code in the LNAV message (see paragraph 20.3.3.5.1.4 of IS-GPS-200). Accordingly, the health bit for any SV which does not have a certain capability will be indicated as "healthy" if the lack of this capability is inherent in its design or if it has been configured into a mode which is normal from a user standpoint and does not require that capability; however, the Operating Command may choose to set the health bit "unhealthy" for an SV without a certain capability. Single-frequency L5 users or users who have not received or choose not to use configuration code should assume that every signal is available on every SV. The predicted health data will be updated at the time of upload when a new midi almanac or reduced almanac has been built by the CS. Therefore, the transmitted health data may not correspond to the actual health of the relevant SV. For more information about user protocol for interpreting health indications see paragraph 6.4.5.

IS705-1737:
Insertion after object IS705-301
Section Number:
20.3.3.4.5.0-2
WAS:
<INSERTED OBJECT>
Redlines:
The Midi almanac parameters shall be updated by the CS at least once every 3 days while the CS is able to upload the SVs. If the CS is unable to upload the SVs, the accuracy of the Midi almanac parameters transmitted by the SVs will degrade over time.
Object Type: Requirement
IS:
The Midi almanac parameters shall be updated by the CS at least once every 3 days while the CS is able to upload the SVs. If the CS is unable to upload the SVs, the accuracy of the Midi almanac parameters transmitted by the SVs will degrade over time.
Object Type: Requirement

IS705-1643:

Section Number:
20.3.3.10.1.7
WAS:
Object Heading: Satellite Fault Probability
Redlines:
Object Heading: Satellite Fault ~~Probability~~Rate
IS:
Object Heading: Satellite Fault Rate

IS705-1644:

Section Number:
20.3.3.10.1.7.0-1
WAS:
Bits 74 through 77 of Message Type 40 shall provide the assumed Satellite Fault Probability (R_{sat}) value for ARAIM at the current time for the associated GNSS constellation.
Redlines:
Bits 74 through 77 of Message Type 40 shall provide the assumed Satellite Fault ~~Probability~~Rate (R_{sat}) value for ARAIM at the current time for the associated GNSS constellation.
IS:
Bits 74 through 77 of Message Type 40 shall provide the assumed Satellite Fault Rate (R_{sat}) value for ARAIM at the current time for the associated GNSS constellation.

IS705-1476:

Section Number:
20.3.4.4
WAS:
Object Heading: CEI Data Sets
Redlines:
Object Heading: ~~CEI~~ Data Sets
IS:
Object Heading: Data Sets

IS705-1672:

Section Number:
20.3.4.4.0-2
WAS:
t_{op} does not have to match t_{oe}/ t_{oc}. As a redundant check, t_{op} in message type 10 will match with the t_{op} term in message type 30-37 for a valid CEI data set.
Redlines:
t_{op} does not have to match ~~-~~toe/~~-~~toc~~. As a~~, ~~redundant~~but ~~check,~~the t_{op} in ~~message~~Message ~~type~~Type 10 will match~~ with~~ the t_{op}~~ term~~ in ~~message~~Message ~~type~~Type 30-37 ~~for~~from ~~a~~the ~~valid~~same CEI data set.
IS:
t_{op} does not have to match t_{oe}/t_{oc}, but the t_{op} in Message Type 10 will match the t_{op} in Message Type 30-37 from the same CEI data set.

IS705-1674:

Section Number:
20.3.4.4.0-4
WAS:
Cutovers to new CEI data sets will occur only on hour boundaries except for the first CEI data set of a new CEI data sequence propagation. The first CEI data set may be cut-in (reference paragraph 20.3.4.1) at any time during the hour and therefore may be transmitted by the SV for less than one hour.
Redlines:
Cutovers to new CEI data sets will occur only on two-hour boundaries except for the first CEI data set of a new CEI data sequence propagation.~~-~~ The first CEI data set may be cut-in (reference paragraph 20.3.4.1) at any time during the ~~hour~~two hours and therefore may be transmitted by the SV for less than ~~one~~two ~~hour~~hours.
IS:
Cutovers to new CEI data sets will occur only on two-hour boundaries except for the first CEI data set of a new CEI data sequence propagation. The first CEI data set may be cut-in (reference paragraph 20.3.4.1) at any time during the two hours and therefore may be transmitted by the SV for less than two hours.

IS705-1675:

Section Number:
20.3.4.4.0-5
WAS:
The start of the transmission interval for each CEI data set corresponds to the beginning of the curve fit interval for the CEI data set. Each CEI data set remains valid for the duration of its transmission interval, and nominally also remains valid for the duration of its curve fit interval. A CEI data set is rendered obsolete before the end of its curve fit interval when it is superseded by the SV cutting over to the first CEI data set of a new CEI data sequence propagation.
Redlines:
~~The~~Except for the first CEI data set of a new CEI data sequence propagation, the start of the transmission interval for each CEI data set corresponds to the beginning of the curve fit interval for the CEI data set.~~-~~ Each CEI data set remains valid for the duration of its transmission interval, and nominally also remains valid for the duration of its curve fit interval.~~-~~ A CEI data set is rendered obsolete before the end of its curve fit interval when it is superseded by the SV cutting over to the first CEI data set of a new CEI data sequence propagation.
IS:
Except for the first CEI data set of a new CEI data sequence propagation, the start of the transmission interval for each CEI data set corresponds to the beginning of the curve fit interval for the CEI data set. Each CEI data set remains valid for the duration of its transmission interval, and nominally also remains valid for the duration of its curve fit interval. A CEI data set is rendered obsolete before the end of its curve fit interval when it is superseded by the SV cutting over to the first CEI data set of a new CEI data sequence propagation.

IS705-1736:
Insertion after object IS705-1675
Section Number:
20.3.4.4.0-6
WAS:
<INSERTED OBJECT>
Redlines:
The start time of the curve fit interval of the first CEI data set of a new CEI data sequence propagation may be later than the start time of the curve fit interval of the preceding CEI data set that was transmitted prior to the cutover. The beginning of the curve fit interval of the first CEI data set of a new CEI data sequence propagation will be a multiple of 300 seconds (5 minutes) relative to the start of week.
Object Type: Info-Only
IS:
The start time of the curve fit interval of the first CEI data set of a new CEI data sequence propagation may be later than the start time of the curve fit interval of the preceding CEI data set that was transmitted prior to the cutover. The beginning of the curve fit interval of the first CEI data set of a new CEI data sequence propagation will be a multiple of 300 seconds (5 minutes) relative to the start of week.
Object Type: Info-Only

IS705-2, IS705-4, IS705-9, IS705-14, IS705-19, IS705-22, IS705-24, IS705-26, IS705-29, IS705-31, IS705-36, IS705-38, IS705-40, IS705-42, IS705-44, IS705-46, IS705-48, IS705-50, IS705-52, IS705-57, IS705-60, IS705-62, IS705-64, IS705-66, IS705-68, IS705-70, IS705-72, IS705-74, IS705-78, IS705-87, IS705-89, IS705-91, IS705-93, IS705-99, IS705-101, IS705-111, IS705-112, IS705-114, IS705-116, IS705-118, IS705-120, IS705-122, IS705-124, IS705-126, IS705-130, IS705-132, IS705-1514, IS705-1523, IS705-1516, IS705-134, IS705-135, IS705-137, IS705-140, IS705-143, IS705-155, IS705-157, IS705-159, IS705-177, IS705-179, IS705-180, IS705-185, IS705-189, IS705-190, IS705-192, IS705-196, IS705-212, IS705-213, IS705-221, IS705-223, IS705-227, IS705-236, IS705-238, IS705-245, IS705-246, IS705-249, IS705-251, IS705-253, IS705-255, IS705-266, IS705-267, IS705-269, IS705-276, IS705-279, IS705-285, IS705-288, IS705-1500, IS705-291, IS705-293, IS705-295, IS705-296, IS705-298, IS705-300, IS705-303, IS705-305, IS705-308, IS705-310, IS705-314, IS705-316, IS705-325, IS705-327, IS705-330, IS705-333, IS705-335, IS705-338, IS705-340, IS705-342, IS705-344, IS705-348, IS705-350, IS705-353, IS705-358, IS705-360, IS705-362, IS705-365, IS705-367, IS705-369, IS705-372, IS705-374, IS705-376, IS705-378:

This change removes the trailing period from all of the above headings.

Section Number:
<many>

WAS:
<many>

Redlines:
<many>~~.~~

IS:
<many>

 # CP Status = 'In Review': 24
CP Status = 'Applied': 120

of inserted requirements: 1
# of modified requirements: 4
# of deleted requirements: 0
# of TBDs: 0
# of TBRs: 0
of (added/modified) effectivities: 0
of VCRM additions: 0
# of VCRM modifications: 0
# of VCRM deletions: 0
# of descriptive texts: 9
of (added/modified) tables: 4
of (added/modified) figures: 1