

INTERFACE REVISION NOTICE (IRN)

Note: This Summary Signature Page is to be used after all signatories have signed separate Signature Pages.

Affected ICD: ICD-GPS-240 Rev A	IRN Number IRN-240A-002	Date: 25-OCT-2016
Authority: RFC-00308	PIRN Number PIRN-240A-002	Date: 20-JUN-2016

CLASSIFIED BY:
DECLASSIFY ON:

Document Title:
Navstar GPS Control Segment to User Support Community Interface

Reason For Change (Driver):
Other ICDs have been updated to describe the new OCX-NGA and OCX-USCG interfaces. ICD-GPS-870 now needs to be updated to describe the data format changes for the public users of the USCG data.

Description of Change: Update the descriptions of the data public users can access on the US Coast Guard server in ICD-GPS-870. Add a definition of "outage" for NANU messages to ICD-GPS-240 and ICD-GPS-870.

Prepared By: _____ **Checked By: George Farmer**

AUTHORIZED SIGNATURES	REPRESENTING	DATE
	GPS Directorate Space & Missile Systems Center (SMC) – LAAFB	
See Section XX <u>OR</u> See Next Page	United States Air Force Space Command (AFSPC) 50 th Space Wing (50 SW)	
See Section XX <u>OR</u> See Next Page	United States Coast Guard (USCG) Navigation Center (NAVCEN)	
See Section XX <u>OR</u> See Next Page	The Boeing Company	

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	CODE IDENT 66RP1

INTERFACE REVISION NOTICE (IRN)

Note: Repeat this Signature Page for each document signatory.

Affected ICD: ICD-GPS-240A	IRN Number IRN-240A-002	Date: 25-OCT-2016
Authority: RFC-00308	PIRN Number PIRN-240-002	Date: 20-JUN-2016

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Description of Change: Update the descriptions of the data public users can access on the US Coast Guard server in ICD-GPS-870. Add a definition of "outage" for NANU messages to ICD-GPS-240 and ICD-GPS-870.

APPROVED:

With Comments: Yes No

With Exceptions: Yes No

Name of Approving Organization

Authorized Signature

Date

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TASC (GPS SE&I)
An Engility Company
200 N. Sepulveda Blvd., Suite 1800
El Segundo, CA 90245

CODE IDENT 66RP1

ICD240-6 :

WAS :

The functional data transfer interfaces between the CS and the United States Coast Guard (USCG) Navigation Center (NAVCEN). These interfaces support the Memorandum of Agreement (MOA) between the United States Space Command and the USCG, “Distribution of Navstar Global Positioning System (GPS) Status Information.”

IS :

The functional data transfer interfaces between the CS and the United States Coast Guard (USCG) Navigation Center (NAVCEN). These interfaces support the Memorandum of Agreement (MOA) between the United Department States of Space Defense (DoD) Joint Functional Component Command for Space (JFCC SPACE); the Department of Homeland Security (DHS) U.S. Coast Guard Navigation Center (NAVCEN); and the USCG Department of Transportation (DOT) Federal Aviation Administration (FAA) National Operations Control Center (NOCC), “Distribution Interagency Memorandum of Agreement with Respect to Support of Users of the Navstar Global Positioning System (GPS)-Status Information.”

ICD240-38 :

WAS :

IS-GPS-200 Current Version	Navstar GPS Space Segment/Navigation User Interface
GP-03-001 14 November 2003	GPS Interface Control Working Group (ICWG) Charter
MOA February 1992	Memorandum of Agreement Between the United States Coast Guard and the United States Space Command, “Distribution of Navstar Global Positioning System (GPS) Status Information” (Signatories: USCG/G-NRN and USSPC/DOO)
MOA February 1996	Support Agreement Between the United States Coast Guard and the United States Air Force Space Command, “Distribution of Navstar Global Positioning System (GPS) Status Information” (Signatories: Commanding Officer NAVCEN and AFSPC/DOO)

IS :

IS-GPS-200 Current Version	Navstar GPS Space Segment/Navigation User Interface
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MOA February 1996	Support Agreement Between the United States Coast Guard and the United States Air Force Space Command, "Distribution of Navstar Global Positioning System (GPS) Status Information" (Signatories: Commanding Officer NAVCEN and AFSPC/DOO)
MOA February 2010	Memorandum of Agreement between the Joint Functional Component Command for Space; the US Coast Guard Navigation Center and the FAA National Operations Control Center with respect to the Support of Users of the Navstar Global Positioning System
MOA June 2014	Interagency Memorandum of Agreement with Respect to Support of Users of the Navstar Global Positioning System (GPS)

ICD240-50 :

WAS :

Table I Information Exchange Matrix

Producer	Consumer	Data Exchange Identification	Information Description	Nature of Transaction	Security
GPS CS	GUSS Offline Software Tool	GPS Constellation Orbital and Performance Parameters	Almanac	Transfer via diskette	Unclassified
GPS CS	USCG NAVCEN	GPS Status Information	NANU	Transmit via E-Mail	Unclassified
GPS CS	USCG NAVCEN	GPS Constellation Status Summary	OA	Post to Internet Website	Unclassified
GPS CS	USCG NAVCEN	GPS Constellation Orbital and Performance Parameters	Almanac	Post to Internet Website	Unclassified
GPS CS	Military User Community	GPS Status Information	NANU	Post to Internet and SIPRNET Websites	Unclassified
GPS CS	Military User Community	GPS Constellation Status Summary	OA	Post to Internet and SIPRNET Websites	Unclassified
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GPS CS	USCG NAVCEN	GPS Constellation Orbital and Performance Parameters	Almanac	Post to Internet Website	Unclassified
GPS CS	USCG NAVCEN	GPS Status Information	Satellite Outage File	Post to Internet Website	Unclassified
GPS CS	Military User Community	GPS Status Information	NANU	Post to Internet and SIPRNET Websites	Unclassified
GPS CS	Military User Community	GPS Constellation Status Summary	OA	Post to Internet and SIPRNET Websites	Unclassified
GPS CS	Military User Community	GPS Constellation Orbital and Performance Parameters	Almanac	Post to Internet and SIPRNET Websites	Unclassified
GPS CS	Military User Community	GPS Status Information	Satellite Outage File	Post to Internet and SIPRNET Websites	Unclassified

ICD240-51 :

WAS :

The information distributed by the CS includes Notice Advisory to Navstar Users (NANU), Operational Advisory (OA), and satellite almanac. The NANU is a message that informs users of satellite outages and other GPS issues. The OA is a descriptive summary of GPS constellation status. The satellite almanac contains orbital and performance parameters for operational GPS satellites. The primary means of data distribution include electronic mail (e-mail) and Internet and SIPRNET websites. All data transfer described in this ICD is unclassified.

IS :

The information distributed by the CS includes Notice Advisory to Navstar Users (NANU), Operational Advisory (OA), [Satellite Outage File \(SOF\)](#) and satellite almanac. The NANU is a message that informs users of satellite outages and other GPS issues. The OA is a descriptive summary of GPS constellation status. [The SOF is a machine readable format of GPS satellite outage information.](#) The satellite almanac contains orbital and performance parameters for operational GPS satellites. The primary means of data distribution include electronic mail (e-mail) and Internet and SIPRNET websites. All data transfer described in this ICD is unclassified.

ICD240-56 :**WAS :**

Detailed data formats of the NANU, OA, and almanac data that are referenced in the paragraphs below are described in Appendices 1, 2, and 3 of this ICD, respectively.

IS :

Detailed data formats of the NANU, OA, [SOF](#) and almanac data that are referenced in the paragraphs below are described in Appendices 1, 2, [3](#) and [34](#) of this ICD, respectively.

ICD240-67 :**WAS :**

NANU messages are transmitted to the USCG NAVCEN via e-mail from the CS to an e-mail address provided by the NAVCEN. The NANUs are transmitted in a tabular format described in Appendix 1. NANU messages are transmitted whenever they are generated (intermittently) including weekends and holidays. Circumstances that may initiate the generation and transmission of specific NANUs are described in Appendix 1. The NANU file is named current.nnu, which is a running list of NANUs.

IS :

NANU messages are transmitted to the USCG NAVCEN via e-mail from the CS to an e-mail address provided by the NAVCEN. [NANU products from 2SOPS are also received via automated processes that link back to the 2SOPS internet website \(\(https://gps.afspc.af.mil/gps/archive/\)\).](#) The NANUs are transmitted in a tabular format described in Appendix 1. NANU messages are transmitted whenever they are generated (intermittently) including weekends and holidays. Circumstances that may initiate the generation and transmission of specific NANUs are described in Appendix 1. The NANU file is named

current.nnu, which is a running list of NANUs.

ICD240-290 :

Insertion after object ICD240-68

WAS :

N/A

IS :

[Satellite Outage File \(SOF\)](#)

ICD240-292 :

Insertion below object ICD240-290

WAS :

N/A

IS :

[The Satellite Outage File \(SOF\) is built by the GPSOC GPSIS \(GPS Information Service\) to provide a complete and up-to-date statement of past, current, and forecasted satellite outages in the GPS constellation. The information contained in the SOF is based solely on NANUs supplied by the 2 SOPS. It only applies to the GPS satellites managed by the US Air Force, and thus does not reflect status of augmentation satellites, such as those in the WAAS and EGNOS constellations. SOF data is updated and posted to GPSOC GPSIS web sites whenever the GPSOC issues a Notice: Advisory to Navstar Users \(NANU\).](#)

ICD240-76 :

WAS :

Military User Community Internet NANU, OA, and Almanac Interfaces

IS :

Military User Community Internet NANU, OA, [SOF](#) and Almanac Interfaces

ICD240-77 :

WAS :

NANUs, OAs, and almanacs are distributed to the Military user community over the internet by uploading NANU, OA, and almanac files to the 2 SOPS internet website. Military users with internet connectivity can access the 2 SOPS internet website directly or via a direct page-to-page hyperlink from the GPS Operations Center (GPSOC) internet website to the 2 SOPS internet website. Files are downloaded from the 2 SOPS internet website using FTP by selecting a hyperlink to the desired NANU, OA, or almanac file.

IS :

NANUs, OAs, [SOFs](#) and almanacs are distributed to the Military user community over the internet by uploading NANU, OA, [SOF](#) and almanac files to the 2 SOPS internet website. Military users with internet connectivity can access the 2 SOPS internet website directly or via a direct page-to-page hyperlink from the GPS Operations Center (GPSOC) internet website to the 2 SOPS internet website. Files are downloaded from the 2 SOPS internet website using FTP by selecting a hyperlink to the desired NANU, OA, [SOF](#) or almanac file.

ICD240-78 :

WAS :

Military User Community SIPRNET NANU, OA, and Almanac Interfaces

IS :

Military User Community SIPRNET NANU, OA, [SOF](#) and Almanac Interfaces

ICD240-79 :

WAS :

NANUs, OAs, and almanacs are distributed to the Military user community over the SIPRNET by uploading NANU, OA, and almanac files to the GPSOC SIPRNET website. Military users with SIPRNET connectivity can download a NANU, OA, or almanac file using FTP by selecting the corresponding hyperlink.

IS :

NANUs, OAs, [SOF](#) and almanacs are distributed to the Military user community over the SIPRNET by uploading NANU, OA, [SOF](#) and almanac files to the GPSOC SIPRNET website. Military users with SIPRNET connectivity can download a NANU, OA, [SOF](#) or almanac file using FTP by selecting the corresponding hyperlink.

ICD240-99 :**WAS :**

NANU ACRONYM	NAME	DESCRIPTION
FCSTDV	Forecast Delta-V	Scheduled outage times for Delta-V maneuvers.
FCSTMX	Forecast Maintenance	Scheduled outage times for non-Delta-V maintenance.
FCSTEXTD	Forecast Extension	Extends the scheduled outage time "Until Further Notice"; references the original forecast NANU.
FCSTSUMM	Forecast Summary	Exact outage times for the scheduled outage. This is sent after the maintenance is complete and the satellite is set healthy. It references the original forecast NANU. If a FCSTEXTD or a FCSTRESCD were required the FCSTSUMM will reference these.
FCSTCANC	Forecast Cancellation	Cancels a scheduled outage when a new maintenance time is not yet determined; it references the original forecast NANU message.
FCSTRESCD	Forecast rescheduled	Reschedules a scheduled outage referencing the original-FCST NANU message.
FCSTUUFN	Forecast Unusable Until Further Notice	Scheduled outage of indefinite duration not necessarily related to Delta-V or maintenance activities.

IS :

NANU ACRONYM	NAME	DESCRIPTION
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FCSTCANC	Forecast Cancellation	Cancels a scheduled outage when a new maintenance time is not yet determined. It references the original forecast NANU message. May be issued after the start time of the referenced NANU.
FCSTRESCD	Forecast rescheduled	Reschedules a scheduled outage referencing the original-FCST NANU message.
FCSTUUFN	Forecast Unusable Until Further Notice	Scheduled outage of indefinite duration not necessarily related to Delta-V or maintenance activities.

ICD240-293 :

Insertion after object ICD240-295

WAS :

N/A

IS :

[APPENDIX 3: SATELLITE OUTAGE FILE \(SOF\)](#)

ICD240-294 :

Insertion below object ICD240-293

WAS :

N/A

IS :

Following is a list of the rules or protocols for the SOF data.

Usage Rules

1. The SOF always contains fields identifying creation date/time and reference date/time.
2. A new SOF is built each time a NANU is issued.
3. The latency of the SOF initially may be 15-20 minutes, and is driven by operational procedures and workload.

File Naming Convention

The most recently built SOF is given a standard name that contains the creation date/time and the file format version number, 'yyyy_ddd_hhmmss_vnn.sof', where yyyy is the year, ddd is the Jday (day of year starting with 1), hhmmss is the hour/minute/second UTC, and nn is the file format version number. The file format version number will increment sequentially whenever the file format changes.

Dissemination Methods

Unclassified Web Site. The GPSOC maintains a Web site accessible to unclassified users worldwide. The current SOF is posted at a conspicuous spot on this Web site for download.

Classification

The SOF is Unclassified and approved for public release. [Reference GPS Security Classification Guide, 30 Sep 2008, Topic Number 700.7.10]

Format

The SOF is formatted in XML according to the format below. The data type definition (DTD), the data format, and the data field definitions are provided.

A sample SOF with an internal DTD is as follows:

SOF DTD

<?xml version="1.0"?>

<!DOCTYPE GPSISFILE [

 <!ELEMENT GPSISFILE
(CREATION,REFERENCE,(PREDICTED|CURRENT|HISTORICAL)+)>

 <!ELEMENT CREATION EMPTY>

 <!ELEMENT REFERENCE EMPTY>

 <!ELEMENT PREDICTED EMPTY>

 <!ELEMENT CURRENT EMPTY>

 <!ELEMENT HISTORICAL EMPTY>

<!ATTLIST GPSISFILE FILEID CDATA #FIXED "SOF">

<!ATTLIST GPSISFILE SYSID CDATA #FIXED "GPS">

<!ATTLIST GPSISFILE VERSION CDATA #REQUIRED>

<!ATTLIST CREATION YEAR CDATA #REQUIRED>

<!ATTLIST CREATION DOY CDATA #REQUIRED>

<!ATTLIST CREATION HR CDATA #REQUIRED>

<!ATTLIST CREATION MIN CDATA #REQUIRED>

<!ATTLIST CREATION SEC CDATA #REQUIRED>

<!ATTLIST REFERENCE YEAR CDATA #REQUIRED>

<!ATTLIST REFERENCE DOY CDATA #REQUIRED>

<!ATTLIST REFERENCE HR CDATA #REQUIRED>

<!ATTLIST REFERENCE MIN CDATA #REQUIRED>

<!ATTLIST REFERENCE SEC CDATA #REQUIRED>

<!ATTLIST PREDICTED SVID CDATA #REQUIRED>

<!ATTLIST PREDICTED SVN CDATA #REQUIRED>

<!ATTLIST PREDICTED NAME (NANU|GOCGIS|USER_DEFINED) #REQUIRED>

<!ATTLIST PREDICTED TYPE (FCSTDV|FCSTMX) #REQUIRED>

<!ATTLIST PREDICTED REFERENCE CDATA #REQUIRED>

<!ATTLIST PREDICTED START_YEAR CDATA #REQUIRED>

<!ATTLIST PREDICTED START_DOY CDATA #REQUIRED>

<!ATTLIST PREDICTED START_HR CDATA #REQUIRED>

<!ATTLIST PREDICTED START_MIN CDATA #REQUIRED>

<!ATTLIST PREDICTED START_SEC CDATA #REQUIRED>

<!ATTLIST PREDICTED END_YEAR CDATA #REQUIRED>

<!ATTLIST PREDICTED END_DOY CDATA #REQUIRED>

<!ATTLIST PREDICTED END_HR CDATA #REQUIRED>

<!ATTLIST PREDICTED END_MIN CDATA #REQUIRED>

<!ATTLIST PREDICTED END_SEC CDATA #REQUIRED>

<!ATTLIST CURRENT SVID CDATA #REQUIRED>

<!ATTLIST CURRENT SVN CDATA #REQUIRED>

<!ATTLIST CURRENT NAME (NANU|GOCGIS|USER_DEFINED) #REQUIRED>
<!ATTLIST CURRENT TYPE CDATA #FIXED "UNUSUFN">
<!ATTLIST CURRENT REFERENCE CDATA #REQUIRED>
<!ATTLIST CURRENT START_YEAR CDATA #REQUIRED>
<!ATTLIST CURRENT START_DOY CDATA #REQUIRED>
<!ATTLIST CURRENT START_HR CDATA #REQUIRED>
<!ATTLIST CURRENT START_MIN CDATA #REQUIRED>
<!ATTLIST CURRENT START_SEC CDATA #REQUIRED>

<!ATTLIST HISTORICAL SVID CDATA #REQUIRED>
<!ATTLIST HISTORICAL SVN CDATA #REQUIRED>
<!ATTLIST HISTORICAL NAME (NANU|GOCGIS|USER_DEFINED) #REQUIRED>
<!ATTLIST HISTORICAL_TYPE (FCSTSUMM|UNUSABLE|UNUNOREF) #REQUIRED>
<!ATTLIST HISTORICAL REFERENCE CDATA #REQUIRED>
<!ATTLIST HISTORICAL START_YEAR CDATA #REQUIRED>
<!ATTLIST HISTORICAL START_DOY CDATA #REQUIRED>
<!ATTLIST HISTORICAL START_HR CDATA #REQUIRED>
<!ATTLIST HISTORICAL START_MIN CDATA #REQUIRED>
<!ATTLIST HISTORICAL START_SEC CDATA #REQUIRED>
<!ATTLIST HISTORICAL END_YEAR CDATA #REQUIRED>
<!ATTLIST HISTORICAL END_DOY CDATA #REQUIRED>
<!ATTLIST HISTORICAL END_HR CDATA #REQUIRED>
<!ATTLIST HISTORICAL END_MIN CDATA #REQUIRED>
<!ATTLIST HISTORICAL END_SEC CDATA #REQUIRED>

>

SOF Structure

<?xml version="1.0"?>
<GPSISFILE FILEID="SOF" SYSID="GPS" VERSION="2">
<CREATION YEAR="2004" DOY="257" HR="11" MIN="2" SEC="11" />
<REFERENCE YEAR="2004" DOY="257" HR="11" MIN="2" SEC="11" />

<PREDICTED

SVID="9" SVN="39"

NAME="NANU" TYPE="FCSTMX" REFERENCE="2004094"

START_YEAR="2004" START_DOY="229" START_HR="12" START_MIN="0"
START_SEC="0"

END_YEAR="2004" END_DOY="230" END_HR="0" END_MIN="0" END_SEC="0"

_____/>

<CURRENT

SVID="31" SVN="31"

NAME="NANU" TYPE="UNUSUFN" REFERENCE="2004101"

START_YEAR="2004" START_DOY="257" START_HR="5" START_MIN="50"
START_SEC="0"

_____/>

-

<HISTORICAL

SVID="27" SVN="27"

NAME="NANU" TYPE="UNUSABLE" REFERENCE="2004100"

START_YEAR="2004" START_DOY="242" START_HR="1" START_MIN="32"
START_SEC="0"

END_YEAR="2004" END_DOY="243" END_HR="19" END_MIN="12" END_SEC="0"

_____/>

</GPSISFILE>

All times are UTC TIME (ZULU) unless otherwise specified. DOY is day of year (same as JDAY); 1=1 January, 366 is valid for leap year

'GPSISFILE' FILE INFORMATION

Occurs once per file

FILEID is always 'SOF'

SYSID is always 'GPS'

VERSION is the version number of the file. The version text should be an integer version number. Example: 2

CREATION indicates date/time of file creation. Time is computer time (UTC time zone).

REFERENCE indicates date/time to which SOF data applies. For example, if January 10, 2003 1550Z is the REFERENCE time then Satellite Outage information will be collected up to and including that time, including past, current, and predicted information. The REFERENCE time is set to be the date/time of the most recent NANU incorporated into the SOF.

'SOF_RECORD' INFORMATION

Occurs multiple times per file, once for each predicted, current or historical satellite outage issued by the REFERENCE data/time.

There are three types of SOF records.

PREDICTED identifies predicted outages as of the REFERENCE time.

CURRENT identifies any active outages as of the REFERENCE time, along with the time the outage began.

HISTORICAL identifies actual outages that have taken place prior to the REFERENCE time.

SVID - reusable identifier for each satellite in identified system. For GPS the SVID shall be the PRN.

SVN (Satellite Vehicle Number) – unique sequential number associated with satellite-specific program is an integer. For GPS this is assigned by the US Air Force.

PREDICTED record fields

NAME – Alphanumeric indicator of outage source (currently 'NANU'). GOCGIS used when no NANU has been issued, yet outage is predicted or a GENERAL NANU has been issued that affects this outage.

TYPE – If NAME=NANU, then the choices are FCSTDV, FCSTMX. If a FCSTEXTD, then implemented as original type (FCSTDV or FCSTMX) with start date/time the same as in the FCSTEXTD and end date/time fixed twenty years out. If FCSTRESCD, then implemented as original type with dates/times as in the FCSTRESCD NANU. If a FCSTCANC type NANU is issued, the original type will be deleted from the SOF.

REFERENCE – reference info. If NAME=NANU this will be the NANU number of the last valid NANU associated with this outage. For example, if there is a FCSTDV issued with number 2003010, then REFERENCE=2003010. As another example, if there is a FCSTMX issued with number 2003047, followed by a FCSTEXTD with number 2003050, then REFERENCE=2003050.

CURRENT record fields

NAME – Alphanumeric indicator of outage source (currently 'NANU').

TYPE – If NAME=NANU, then the choices are UNUSUFN and GENERAL. If NANU is initially issued as a GENERAL launch message, then it will be implemented in the SOF as a UNUSUFN with the start date/time as 0000Z on the first day the satellite appears in the almanac.

REFERENCE – reference info. If NAME=NANU this will be the NANU number of the last valid NANU associated with this outage. For example, if there is a UNUSUFN issued with number 2003049, then REFERENCE=2003049.

HISTORICAL record fields

NAME –Alphanumeric indicator of outage source (currently NANU).

TYPE – If NAME=NANU, then the choices are FCSTSUMM, UNUSABLE, UNUNOREF, USABINIT, and GENERAL. If NANU is initially issued as a GENERAL launch message, then it will be implemented in the SOF as an UNUSABLE with stop dates/times as in the USABINIT and the start date/time as 0000Z on the first day the satellite appears in the almanac. This closes out the UNUSUFN that was implemented earlier for the GENERAL launch message. If the NANU is initially issued as a GENERAL decommission it will be implemented in the SOF as an UNUSABLE with the decommission date/time as the end date/time. If a GENERAL NANU is issued which cancels a previous NANU, the previous NANU will not appear in the SOF.

REFERENCE – reference info. If NAME=NANU this will be the NANU number of the last valid NANU associated with this outage. For example, if there is a FCSTSUMM issued with number 2003051, then REFERENCE=2003051.

Format Changes

Changes to file formats are implemented as follows:

1. Files implementing a new format have the VERSION attribute of the GPSISFILE element incremented. Version 1 files encoded the file version in the filename. For example, a file with a previous format may have a name like 2004_202_145503_v01.sof. Later file versions encode the version both in the filename, and the XML VERSION attribute. The filenames of the new file versions look like 2004_202_145503_v02.sof.
2. If a new file format is implemented, both the old and the new file formats will be posted to the web site location for a transition period.
3. The old file format will be posted for six months, and then be removed. This provides time for users to adapt to the new file format.
4. Notifications of file format changes, with samples of the new format, will be published to www.GPS.gov when they are final.

ICD240-184 :

WAS :

While the orbital description data is generally usable for months, the satellite health may change at any time. The SEM and YUMA almanac data formats also include an SV health word. The

SV health word is defined in paragraph 20.3.3.5.1.3 and Table 20-VIII of IS-GPS-200. Table 30-I specifies the binary health words used in SV navigation (NAV) messages and the equivalent decimal representations used by both the SEM and YUMA almanacs. The SV health word is found in cell R-7 of each record in the SEM almanac. It is found on the third line of each record in the YUMA almanac.

IS :

While the orbital description data is generally usable for months, the satellite health may change at any time. The SEM and YUMA almanac data formats also include an SV health word. The SV health word is defined in paragraph 20.3.3.5.1.3 and Table 20-VIII of IS-GPS-200. Table 3040-I specifies the binary health words used in SV navigation (NAV) messages and the equivalent decimal representations used by both the SEM and YUMA almanacs. The SV health word is found in cell R-7 of each record in the SEM almanac. It is found on the third line of each record in the YUMA almanac.

ICD240-185 :

WAS :

Table 30-I Almanac Health

IS :

Table 3040-I Almanac Health

ICD240-188 :

WAS :

The SEM format, as shown in Figure 30-1, is arranged with a header that identifies the number of records (number of satellites) and file name (extension .alm). The SEM almanac sample illustrated below is a data sample of one record out of 28 in this sample file.

IS :

The SEM format, as shown in Figure 3040-1, is arranged with a header that identifies the number of records (number of satellites) and file name (extension .alm). The SEM almanac sample illustrated below is a data sample of one record out of 28 in this sample file.

ICD240-189 :

WAS :

LINE						
1	28	CURRENT.ALM				
2	175	589824				
3						
R-1	1					
R-2	32					
R-3	1					
R-4	0.54044723510742E-0002	b	0.95157623291016E-0002	c	-0.25247572921216E-0008	
R-5	0.51537275390625E+0004	d	-0.12954437732697E+0000	e	-0.54729294776917E+0000	
R-6	0.21287477016449E+0000	f	0.26512145996094E-0003	g	0.00000000000000E+0000	
R-7	0					
R-8	9					
R-9						
1						
2						
.						
.						

Figure 30-1 SEM Data Sample

IS :

LINE						
1	28	CURRENT.ALM				
2	175	589824				
3						
R-1	1					
R-2	32					
R-3	1					
R-4	0.54044723510742E-0002	b	0.95157623291016E-0002	c	-0.25247572921216E-0008	
R-5	0.51537275390625E+0004	d	-0.12954437732697E+0000	e	-0.54729294776917E+0000	
R-6	0.21287477016449E+0000	f	0.26512145996094E-0003	g	0.00000000000000E+0000	
R-7	0					
R-8	9					
R-9						
1						
2						
.						
.						

Figure 40-1 SEM Data Sample

ICD240-191 :

WAS :

Note: The **bold** letters and numbers in the rectangles are not part of the SEM format; they are

used for identification purposes in Table 30-II. Table 30-II identifies the characteristics of each parameter in the SEM almanac.

IS :

Note: The bold letters and numbers in the rectangles are not part of the SEM format; they are used for identification purposes in Table ~~30~~40-II. Table ~~30~~40-II identifies the characteristics of each parameter in the SEM almanac.

ICD240-207 :

WAS :

Table 30-II Almanac Description

(Sheet 1 of 2)

Line No.	Almanac Name	Description	Units	Range	Accuracy	Precision
1	Number of records	The number of satellite almanac records contained in the file	Records	0 to 32	1	2 significant digits
	Name of Almanac	Descriptive name for the Almanac in the file	N/A	Any combination of valid ASCII characters	N/A	24 significant characters
2	GPS Week Number	The almanac reference week number (WNa) for all almanac data in the file	Weeks	0 to 1024 *	1	4 significant digits
	GPS Time of Applicability	The number of seconds since the beginning of the almanac reference week. The almanac reference time (t_{oa}) for all almanac data in the file	Second	0 to 602,112	1	6 significant digits
3	Blank line for format spacing					
Record Format						
R-1	PRN Number	The satellite PRN number. This is a required data item as it is the GPS user's primary means of identifying GPS satellites	None	1 to 32	None	2 significant digits
R-2	SVN	The SV reference number. It is equivalent to the space vehicle identification (SVID) number of the SV	None	0 to 255 (zero denotes that this field is empty)	None	3 significant digits
R-3	Average URA Number	The satellite "average" URA** number. This is not an item in the raw almanac file but is based on the average URA value transmitted by this satellite in subframe 1. The URA is taken in the range of 730 hours	None	0 to 15	1	2 significant digits
R-4	Eccentricity	This defines the amount of the orbit deviation from a circular orbit (e)**	Unitless	0 to 3.125 E-2	4.77 E-7	7 significant digits

IS :

**Table 40-II Almanac Description
(Sheet 1 of 2)**

Line No.	Almanac Name	Description	Units	Range	Accuracy	Precision
1	Number of records	The number of satellite almanac records contained in the file	Records	0 to 32	1	2 significant digits
	Name of Almanac	Descriptive name for the Almanac in the file	N/A	Any combination of valid ASCII characters	N/A	24 significant characters
2	GPS Week Number	The almanac reference week number (WNa) for all almanac data in the file	Weeks	0 to 1024 *	1	4 significant digits
	GPS Time of Applicability	The number of seconds since the beginning of the almanac reference week. The almanac reference time (t_{oa}) for all almanac data in the file	Second	0 to 602,112	1	6 significant digits
3	Blank line for format spacing					
Record Format						
R-1	PRN Number	The satellite PRN number. This is a required data item as it is the GPS user's primary means of identifying GPS satellites	None	1 to 32	None	2 significant digits
R-2	SVN	The SV reference number. It is equivalent to the space vehicle identification (SVID) number of the SV	None	0 to 255 (zero denotes that this field is empty)	None	3 significant digits
R-3	Average URA Number	The satellite "average" URA** number. This is not an item in the raw almanac file but is based on the average URA value transmitted by this satellite in subframe 1. The URA is taken in the range of 730 hours	None	0 to 15	1	2 significant digits
R-4	Eccentricity	This defines the amount of the orbit deviation from a circular orbit (e)**	Unitless	0 to 3.125 E-2	4.77 E-7	7 significant digits

ICD240-194 :**WAS :**

Parameters used in the YUMA format are not the same as used in the SEM format. The SEM parameters are the same as defined in IS-GPS-200 and broadcast from an SV. The YUMA angular units are in radians whereas the SEM angular units are in semicircles. In addition, the YUMA Orbital Inclination is a direct measure of inclination angle (approximately 55 degrees), whereas the SEM Inclination Offset is relative to 0.30 semicircles (54 degrees). The parameters of the YUMA almanac are identified within the message structure. Figure 30-2 illustrates one record of 28 in a sample YUMA almanac file. Line one of each record identifies the week in which the file was generated as well as the PRN number of the subject SV.

IS :

Parameters used in the YUMA format are not the same as used in the SEM format. The SEM parameters are the same as defined in IS-GPS-200 and broadcast from an SV. The YUMA angular units are in radians whereas the SEM angular units are in semicircles. In addition, the YUMA Orbital Inclination is a direct measure of inclination angle (approximately 55 degrees), whereas the SEM Inclination Offset is relative to 0.30 semicircles (54 degrees). The parameters of the YUMA almanac are identified within the message structure. Figure ~~30~~[40](#)-2 illustrates one record of 28 in a sample YUMA almanac file. Line one of each record identifies the week in which the file was generated as well as the PRN number of the subject SV.

ICD240-196 :**WAS :**

Figure 30-2 YUMA Almanac Data Sample

IS :

Figure ~~30~~[40](#)-2 YUMA Almanac Data Sample

ICD240-197 :

WAS :
APPENDIX 4: LETTERS OF EXCEPTION

IS :
APPENDIX [45](#): LETTERS OF EXCEPTION

ICD240-203 :

WAS :

If signature approval of this document -- as affixed to the cover page -- is marked by an asterisk, it indicates that the approval is contingent upon the exceptions taken by that signatory in a letter of exception. Any letter of exception, which is in force for the revision of the ICD is depicted in Figure 40-1. Signatories for whom no letter of exception is shown have approved this version of the document without exception.

IS :

If signature approval of this document -- as affixed to the cover page -- is marked by an asterisk, it indicates that the approval is contingent upon the exceptions taken by that signatory in a letter of exception. Any letter of exception, which is in force for the revision of the ICD is depicted in Figure [4050](#)-1. Signatories for whom no letter of exception is shown have approved this version of the document without exception.

ICD240-204 :

WAS :

The Boeing Company
5301 Bolsa Avenue
Huntington Beach, CA 92647

10 September 2004
Letter 03-0426-K211-LFB

Subject: Global Positioning System, (GPS) Block IIF
Contract F04701-96-C-0025; Subject: Approval of ICD-
GPS-240

To: ARINC Engineering Services, LLC
4055 Hancock Street, Suite 100
San Diego, CA 92110-5152



Attention: Mr. John Dobyne

To: Department of the Air Force
GPHD
2420 Vela Way, Suite 1467
El Segundo, CA 90245-4659

Attention: Mr. Al Mak, PCO

Reference: ARINC Request for review and approval of ICD-GPS-240
(E-mail dated 08/12/2004)

Pursuant to the ARINC Engineering Services request referenced above, Boeing is submitting the attached Signatory approval cover sheet for ICD-GPS-240, dated 10 August 2004. Boeing approves the subject ICD-GPS-240 with comments and with exception.

The reason for Boeing taking exception to the document is as follows:

The only content within ICD-GPS-240 that applies to the IIF contract relates to the Almanac Data Files (YUMA and SEM) located in section 3.2.1 (definition of the transfer of almanac data by floppy disk from OCS to GUSS offline tool and Appendix 3 (definition of the two almanac data formats). All other content of the ICD falls outside the scope of the IIF contract.

Should you require additional technical information, please contact Ms. Rebecca Gaede at 714-372-5178, or the undersigned at 562-797-2630 for contractual matters.

Please contact me if you have any questions.

Sincerely,

/Signed/
Bruce D. Jensen
Contract Management
GPS Programs

Table 40-I Letter of Exception

IS :

The Boeing Company
5301 Bolsa Avenue
Huntington Beach, CA 92647

10 September 2004
Letter 03-0426-K211-LFB

Subject: Global Positioning System, (GPS) Block IIF
Contract F04701-96-C-0025; Subject: Approval of ICD-
GPS-240

To: ARINC Engineering Services, LLC
4055 Hancock Street, Suite 100
San Diego, CA 92110-5152



Attention: Mr. John Dobyne

To: Department of the Air Force
GPHD
2420 Vela Way, Suite 1467
El Segundo, CA 90245-4659

Attention: Mr. Al Mak, PCO

Reference: ARINC Request for review and approval of ICD-GPS-240
(E-mail dated 08/12/2004)

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The reason for Boeing taking exception to the document is as follows:

The only content within ICD-GPS-240 that applies to the IIF contract relates to the Almanac Data Files (YUMA and SEM) located in section 3.2.1 (definition of the transfer of almanac data by floppy disk from OCS to GUSS offline tool and Appendix 3 (definition of the two almanac data formats). All other content of the ICD falls outside the scope of the IIF contract.

Should you require additional technical information, please contact Ms. Rebecca Gaede at 714-372-5178, or the undersigned at 562-797-2630 for contractual matters.

Please contact me if you have any questions.

Sincerely,

/Signed/
Bruce D. Jensen
Contract Management
GPS Programs

Table 50-I Letter of Exception
