### DISTRIBUTION STATEMENT A

Approved for public release; distribution is unlimited.

### APPROVALS

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### INTERFACE CONTROL DOCUMENT

UNLESS OTHERWISE SPECIFIED: NUMBERS ARE REPRESENTED IN DECIMAL FORM.

THIS DOCUMENT SPECIFIES TECHNICAL REQUIREMENTS AND NOTHING HEREIN CONTAINED SHALL BE DEEMED TO ALTER THE TERMS OF ANY CONTRACT OR PURCHASE ORDER BETWEEN ALL PARTIES AFFECTED.

**Interface Control Contractor:**

SAIC GPS SE&I, 300 N. Sepulveda Blvd., Suite 3000
El Segundo, CA 90245

**ICD TITLE:**

Navstar GPS Control Segment to User Support Community Interfaces

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1 SCOPE

1.1 Scope

This Interface Control Document (ICD) defines the functional data transfer interface between the Global Positioning System (GPS) Control Segment (CS) and the GPS User and User-support communities for the GPS Next Generation Operational Control System (OCX). This ICD describes the data files that are transferred in this interface and the means by which these data files are distributed.

The files that are generated by the GPS CS are: Almanacs (System Effectiveness Model (SEM), YUMA, and Extended Signals Health Status (ESHS)), Operational Advisories (OAs), Anti-Spoofing (A-S) Status, and Notice Advisory to Navstar Users (NANUs). The formats of these files are defined in the Appendices of this document. All data files transferred as described in this ICD are unclassified and are publicly releasable per the current GPS CS mode of operations and the 50th SW Memorandum for Record - 2 SOPS GPS Public Release Policy.

In order to continue to support legacy Users who may not be able to update their code, the .alm (YUMA), .al3 (SEM), and as.txt (A-S Status) file formats are not changing and legacy Users are assured that they will continue to use these file types in the OCX era without changes to their systems. At the same time, the GPS CS does announce that it does not intend to make future updates to these file formats: .alm, .al3 and as.txt. The GPS CS encourages new Users and existing Users migrate to the newer file formats (.blm, .bl3, as2.txt), and in the future may propose to remove these legacy file formats in future updates to GPS CS. The GPS CS shall still be required to coordinate a specific timeframe or process in a public ICWG for the removal of a currently supported file formats.

The new or modified file formats: .nnu (updated NANU), .ale (new ESHS), .blm (new YUMA), .bl3 (new SEM), .oa1 (updated OA), and .as2.txt (new A-S Status) handle a larger number of SVNs and/or PRNs and more clearly specify zero padding and whitespace so automated parsing can be done with less assumptions.

The GPS CS is operated by the 2d Space Operations Squadron (2 SOPS), administratively organized under 50th Space Wing (50 SW). The GPS User and User-support communities are comprised of the Department of Homeland Security (DHS) United States Coast Guard (USCG); Department of Transportation (DOT), Federal Aviation Administration (FAA); other Civil Users; and various Military GPS Users. The interfaces between the GPS CS and the USCG, FAA, other Civil Users, and the Military GPS User community are implemented using electronic mail (e-mail), Internet and SIPRNet. This ICD does not include detailed technical descriptions of the e-mail system, Internet or SIPRNet.

In this document, from here on, the term CS, which stands for Control Segment, will be used instead of OCX where applicable. In the OCX era, the OCX System will be the GPS Control Segment; therefore, the CS will be performing the functions stated in this ICD.
1.2 Key Events
The major milestone for implementation of this interface is the initial operating capability of the GPS OCX system beginning with Effectivity 10 as defined in SS-CS-800.

1.3 Interface Control Document Approval and Changes
The Interface Control Contractor (ICC), designated by the government, is responsible for the basic preparation, approval, distribution, and retention of the ICD in accordance with the Interface Control Working Group (ICWG) charter GP-03-001.

The following signatories must approve this ICD to make it effective.

1. Air Force Space Command (AFSPC), GPS Directorate (GP) Space and Missile Systems Center (SMC)
2. Air Force Space Command (AFSPC), 50th Space Wing (50 SW)
3. Raytheon Company, OCX Contractor
4. Department of Homeland Security (DHS), United States Coast Guard (USCG), Navigation Center (NAVCEN)
5. Department of Transportation (DOT), Federal Aviation Administration (FAA)

Initial signature approval of this ICD can be contingent upon a letter of exception delineating those items by paragraph numbers that are not a part of the approval. Such letter of exception can be prepared by any of the signatories and must be furnished to the ICC for inclusion in the printed distribution of the officially released version of the ICD.

Changes to the approved version of this ICD can be initiated by any of the signatories and must be approved by all above signatories. The ICC is responsible for the preparation of the change pages, change coordination, and the change approval by all signatories. Designated signatories can approve proposed changes to this ICD without any increase in the scope of a specific contract by so specifying in a letter of exception. Such letters of exception must be furnished to the ICC for inclusion in the released version of the approved change and in the printed distribution of the approved ICD.

Whenever all of the issues addressed by a letter of exception are resolved, the respective signatory shall so advise the ICC in writing. When a portion of the exceptions taken by a signatory are resolved (but not all), the signatory shall provide the ICC with an updated letter of exception. Based on such notifications – without processing a proposed interface revision notice (PIRN) for approval – the ICC will omit the obsolete letter of exception from the next revision of the ICD and will substitute the new one (if required).

The typical review cycle for a PIRN is 45 days after receipt by individual addressees unless a written request for a waiver is submitted to the ICC.
2   APPLICABLE DOCUMENTS

2.1  Government Documents

The following documents of the issue specified contribute to the definition of the interfaces in this ICD and form a part of this ICD to the extent specified herein.

Specifications

*Federal*
None

*Military*
None

*Other Government Activity*

SS-CS-800   GPS III Control Segment Specification Global Positioning Systems Wing (GPSW)

Standards

*Federal*


July 2010  DoD IPv6 Standard Profiles For IPv6 Capable Products Version 5.0

*Military*
None

Other Publications

IS-GPS-200   Navstar GPS Space Segment / Navigation User Interface
Current Version

IS-GPS-705   Navstar GPS Space Segment / User Segment L5 Interfaces
Current Version

IS-GPS-800   Navstar GPS Space Segment / User Segment L1C Interfaces
Current Version

GP-03-001A   GPS Interface Control Working Group (ICWG) Charter
20 April 2006

MOA       Memorandum of Agreement Between the United States Coast Guard and the United States Space Command, "Distribution of Navstar Global Positioning System (GPS) Status Information"
February 1992
(Signatories: USCG/G-NRN and USSPACECOM/DO)
2.2 Non-Government Documents

The following documents of the issue specified contribute to the definition of the interfaces in this ICD and form a part of this ICD to the extent specified herein.

Specifications
None

Standards
None

Other Publications
None
3 REQUIREMENTS

3.1 Interface Identification

This ICD defines the interfaces between the Global Positioning System (GPS) Control Segment and the GPS User and User-support communities during the GPS Next Generation Operational Control System (OCX) era. The files provided by the GPS CS to these GPS Users are the Almanacs, Operational Advisories (OAs), Anti-Spoofing (A-S) Status, and the Notice Advisory to Navstar Users (NANUs) corresponding to all legacy signals and the new Civil signals L1C, L2C and L5. The GPS CS provides these data files to a TBD Web Server, residing outside of OCX, for further distribution. The primary means for distribution of the data that is generated by the GPS CS is via electronic mail (e-mail), Internet and SIPRNet.

Figure 1 captures the interfaces defined in this ICD. The point of demarcation separates the end Users from OCX and Department of Defense (DoD) systems that provide the files.

The interfaces defined in this ICD are listed in Table I, in the form of an information exchange matrix.
### Table I Information Exchange Matrix

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<td>OA</td>
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<td>DHS USCG / DOT FAA/ Other Civil Users</td>
<td>GPS Constellation Anti-Spoofing Status</td>
<td>A-S Status</td>
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<td>DHS USCG / DOT FAA/ Other Civil Users</td>
<td>GPS Constellation Orbital and Performance Parameters, and SV Signal Health Status</td>
<td>Almanac</td>
<td>Post to Internet Website</td>
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Note: * Automatic NANUs are also sent to other 2 SOPS approved GPS Users via e-mail

### 3.1.1 GPS Control Segment

The GPS CS is operated by the 2d Space Operations Squadron (2 SOPS), administratively organized under 50th Space Wing (50 SW). The GPS CS operations are performed primarily via the Master Control Station (MCS), Alternate Master Control Station (AMCS), Monitor Stations (MS), and Ground Antennas (GA).

The MCS, located at Schriever Air Force Base (SAFB), is the central control point for
the GPS CS. For this interface, the MCS is responsible for generating the Almanacs, OAs, A-S Status and NANUs and providing these files to the GPS Users and User support community. The AMCS, located at Vandenberg AFB (VAFB), is functionally identical to the MCS; either MCS facility is capable of indefinite control of the GPS constellation. In case the MCS experiences downtime, the AMCS takes over this interface function. The term “MCS”, as now used throughout this document, refers to either the MCS or the AMCS, whichever MCS facility actively controls the GPS constellation.

The MSs and GAs do not play a role in this interface.

3.1.2 GPS User and User-support communities

The GPS User and User-support communities involve the Civil and Military GPS Users which are comprised of the Department of Homeland Security (DHS), United States Coast Guard (USCG); Department of Transportation (DOT), Federal Aviation Administration (FAA); other Civil Users; and various Military GPS Users. These GPS Users are the recipients of the Almanac data, OAs, A-S Status and NANUs.

3.2 Interface Definitions

The following subsections define the functional requirements and physical interface between the GPS CS and the DHS USCG, DOT FAA, other Civil Users, and the Military GPS User Community. For this interface, the GPS CS will communicate using Transmission Control Protocol/Internet Protocol (TCP/IP) communications protocol. This interface will also be IPv6 capable as defined by DoD IPv6 standard profile 5.0.

This ICD describes information exchanges between CS and the user support community at the functional (application) layer only, and does not describe the hardware and software configuration of the Internet or SIPRNet.

3.2.1 Generation of Almanac Data

The GPS CS generates the Almanac data for the GPS constellation, two current System Effectiveness Model (SEM) format Almanacs (current.ai3 and current.bl3), two current YUMA format Almanacs (current.alm and current.blm), and one current Extended Signals Health Status (ESHS) format Almanac (current.ale). The satellite SEM and YUMA Almanac data contains orbital and performance parameters for operational GPS satellites. Detailed data formats of the SEM and YUMA Almanac data are described in Appendix 3 of this ICD. The satellite ESHS Almanac data contains the health status of each of the modernized civil signals available for each SV – L1C, L2C and L5. Detailed data formats of the ESHS Almanac data are described in Appendix 4 of this ICD.

3.2.2 Generation of Operational Advisory Data

The GPS CS generates the Operational Advisory data (current.oa1) for the GPS constellation. The OA data are descriptive summaries of GPS constellation status.
Detailed data formats of the OA data are described in Appendix 2 of this ICD.

3.2.3 Generation of NANU Data
The GPS CS generates the NANU data file (current.nnu) for the GPS constellation. The NANU data are messages that inform Users of satellite outages and other GPS issues. Detailed data formats of the NANU data are described in Appendix 1 of this ICD.

3.2.4 Generation of Anti-Spoofing Status
The GPS CS generates the Anti-Spoofing Status files (as.txt and as2.txt) for the GPS constellation. The A-S Status informs Users whether the Anti-Spoofing mode of each GPS SV is ON or OFF. Detailed data format of the A-S Status are described in Appendix 5 of this ICD.

3.2.5 Data Distribution
The GPS CS provides the NANU, Operational Advisory, Anti-Spoofing Status, and Satellite Almanac files to a TBD Web Server for further distribution to the Military and Civil User Support Communities via electronic mail (e-mail), and Internet and SIPRNet websites. Sections 3.2.6 and 3.2.7 describe these interfaces.

3.2.6 GPS MCS to Civil GPS Users Interface (USCG/FAA)
The GPS CS provides the NANU data file to a TBD Web Server for further distribution via automatic electronic mail (e-mail) distribution to an e-mail address provided by the USCG and FAA. Other 2 SOPS approved/authorized GPS Users also receive automatic NANUs.

The GPS CS uploads the NANU, Operational Advisory, Anti-Spoofing Status, and Satellite Almanac files to the Constellation Status page of the 2d Space Operations Squadron (2 SOPS) Internet secured website, https://gps.afspc.af.mil/gps, that is hosted on a TBD Web Server. NANU messages are transmitted whenever they are generated including weekends and holidays. The OA, A-S Status, and Almanac files are normally uploaded to the 2 SOPS Internet website once per day, 24/7, 365 days a year, prior to 1700 Zulu time (10 am MST, 11 am MDT). The USCG, FAA and other GPS Users, including Military Users and the general public, with Internet connectivity can access the 2 SOPS website and download these data files using Hypertext Transfer Protocol Secure (HTTPS).

3.2.7 GPS MCS to Military GPS Users Interface
The Military GPS Users with Internet connectivity can access the 2 SOPS secured Internet website and download NANU, Operational Advisory, Anti-Spoofing Status, and Satellite Almanac files as described in Section 3.2.6.

The GPS CS uploads the NANU, Operational Advisory, Anti-Spoofing Status, and Satellite Almanac files to the 2 SOPS SIPRNet website, that is hosted on a TBD Web
Server, with the same frequency and timeline as for the Internet website as described in Section 3.2.6. Only authorized Military GPS Users with SIPRNet connectivity can download a NANU, OA, A-S Status, or Almanac data file using HTTPS.

3.2.8 GPS MCS to the United States Notice to Airman Office Interface

There is a data transfer interface between the CS and the United States NOTAM (Notice to Airmen) Office (USNOF) which is similar in content to the CS interface with the USCG and FAA. However, at this time, the CS to USNOF interface is defined and controlled by operational procedures and is not automated. Therefore, it is not included in this ICD. It is expected that a new automated interface between the CS and the USNOF will be added to this ICD in a future revision.

3.3 GPS MCS to GPS User Support Community Data Integrity

Those consumers not interested in verifying the data integrity of messages (NANUs, OAs, A-S status files, Almanacs, and ESHSs) can simply just use the messages. The requirement is upon the GPS CS to provide data integrity and it is OPTIONAL for the consumer to take the steps needed to verify the integrity of the data. The following paragraphs describe what the GPS CS is required to do and optionally what the consumer would need to do to verify that a message is genuine and originates from the GPS CS.

The GPS CS shall use DoD Public Key Infrastructure (PKI) to digitally sign all messages (NANUs, OAs, A-S status files, Almanacs, and ESHSs) as per Department of Defense Public Key Infrastructure Functional Interface Specification 3.0. Digital signatures shall use the Rivest-Shamir-Adleman (RSA) public key algorithm with 2048 bit keys and Secure Hash Algorithm-256 (SHA-256) for signatures.

The GPS CS shall support modular addition or replacement of DoD PKI algorithms, key lengths, certificate authorities, certificates, and certificate structure with little or no code changes. Coordination in a public ICWG shall occur prior to any changes on the unclassified interface.

The GPS CS unclassified certificate (and corresponding public key) shall be made available to all consumers for data integrity verification and source authentication. DoD PKI root certificates are available on the DoD Class 3 Public Key Infrastructure (PKI) website, http://dodpki.c3pki.chamb.disa.mil/, to verify the certificate chain.

3.3.1 GPS CS to GPS User Support Community data distribution via web site

As all the messages in this interface are unclassified, the GPS CS shall make all the messages and associated digital signatures available to the public without requiring authentication of the consumer. A signature shall be persistent and on the message itself (i.e., not tied to a transport protocol or session). A message shall always have its corresponding signature available to the consumer to verify the message independent of the delivery protocol.
3.3.2 GPS CS to GPS User Support Community data distribution via automated interface

When first applying to receive data via automated interface, individuals may be required to provide some information prior to being added to receive automated distribution. For example, those who do not have an email address ending in .mil, might be referred to NAVCEN to get on their automated data distribution. After approval from the registration process, no further authentication activities are performed.

As all the messages in this interface are unclassified, after registration, the GPS CS shall automatically attempt to deliver messages and associated digital signatures the consumer has registered for without authenticating the consumer when delivery is attempted. If delivery is via email, the signature shall be on the message and not dependent on the email such that the extracted signature can be used to validate the extracted message without the whole email.

4 QUALITY ASSURANCE

Not Applicable

5 PREPARATION FOR DELIVERY

Not Applicable
6 NOTES

6.1 Acronyms and Abbreviations

2 SOPS 2d Space Operations Squadron
50 SW 50th Space Wing
A-S Anti-Spoofing
AFB Air Force Base
AFSPC Air Force Space Command
AMCS Alternate Master Control Station
ANOM Anomaly
ASCII American Standard Code for Information Interchange
CS Control Segment, Cesium
DD Calendar Day (2 digits)
DECOM Decommission
DHS Department of Homeland Security
DO Director of Operations
DOD Department of Defense
DOT Department of Transportation
DSN Defense Switched Network
DTG Day Time Group
e-mail Electronic mail
ESHS Extended Signals Health Status
FAA Federal Aviation Administration
FCSTCANC Forecast Cancellation
FCSTDV Forecast Delta-V
FCSTEXTD Forecast Extension
FCSTMX Forecast Maintenance
FCSTRESCD Forecast rescheduled
FCSTSUMM Forecast Summary
FCSTUUFN Forecast Unusable Until Further Notice
G-NRN Radio Navigation Division
GA Ground Antenna
GP Global Positioning System Directorate
GPS Global Positioning System
GPSOC GPS Operations Center
GPSW GPS Wing
HDBK Handbook
HH Hour (2 digits)
HTTP Hypertext Transfer Protocol
HTTPS Hypertext Transfer Protocol Secure
ICC Interface Control Contractor
ICD Interface Control Document
ICWG Interface Control Working Group
ID Identification
IERS International Earth Rotation and Reference Systems Service
IP Internet Protocol
IS Interface Specification
JDAY Julian Day of the Year
JJJ Julian Date (3 digits)
LEAPSEC Leap Second
LSB Least Significant Bit
M Meters
MCS Master Control Station
MDT Mountain Daylight Time
MIL Military
MM Minutes (2 digits)
MMM Month (3 characters)
MOA Memorandum of Agreement
MS Monitor Station
MST Mountain Standard Time
N/A Not Applicable
NANU Notice Advisory to Navstar Users
NAV Navigation
NAVCEN Navigation Center
NC No Change
NNN NANU Number (3 digits)
NOTAM Notice to Airmen
OA Operational Advisory
OCX Next Generation Operational Control System
PIRN Proposed Interface Revision Notice
PKI Public Key Infrastructure
POC Point Of Contact
PRN Pseudorandom Noise (Signal Number)
RAD Radians
RB Rubidium
RFC Request for Change
s Seconds
SAFB Schriever Air Force Base
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAIC</td>
<td>Science Applications International Corporation</td>
</tr>
<tr>
<td>SE&amp;I</td>
<td>Systems Engineering and Integration</td>
</tr>
<tr>
<td>SEM</td>
<td>System Effectiveness Model</td>
</tr>
<tr>
<td>SIPRNet</td>
<td>Secret Internet Protocol Router Network</td>
</tr>
<tr>
<td>SMC</td>
<td>Space and Missile Systems Center</td>
</tr>
<tr>
<td>SPS</td>
<td>Standard Positioning Service</td>
</tr>
<tr>
<td>SQRT</td>
<td>Square Root</td>
</tr>
<tr>
<td>SUBJ</td>
<td>Subject</td>
</tr>
<tr>
<td>SS</td>
<td>System Specification</td>
</tr>
<tr>
<td>SSS</td>
<td>Seconds (3 digits)</td>
</tr>
<tr>
<td>STD</td>
<td>Standard</td>
</tr>
<tr>
<td>SV</td>
<td>Space Vehicle</td>
</tr>
<tr>
<td>SVID</td>
<td>Space Vehicle Identification</td>
</tr>
<tr>
<td>SVN</td>
<td>Space Vehicle Number</td>
</tr>
<tr>
<td>TBD</td>
<td>To Be Determined</td>
</tr>
<tr>
<td>TCP</td>
<td>Transmission Control Protocol</td>
</tr>
<tr>
<td>UNUNOREF</td>
<td>Unusable with no reference</td>
</tr>
<tr>
<td>UNUSABLE</td>
<td>Unusable with reference NANU</td>
</tr>
<tr>
<td>UNUSUFN</td>
<td>Unusable Until Further Notice</td>
</tr>
<tr>
<td>URA</td>
<td>User Range Accuracy</td>
</tr>
<tr>
<td>USABINIT</td>
<td>Initially usable</td>
</tr>
<tr>
<td>USCG</td>
<td>United States Coast Guard</td>
</tr>
<tr>
<td>USNOF</td>
<td>United States Notice to Airmen Office</td>
</tr>
<tr>
<td>USSPACECOM</td>
<td>United States Space Command</td>
</tr>
<tr>
<td>UTC</td>
<td>Coordinated Universal Time</td>
</tr>
<tr>
<td>VAFB</td>
<td>Vandenberg Air Force Base</td>
</tr>
<tr>
<td>WN</td>
<td>Week Number</td>
</tr>
<tr>
<td>YYYY</td>
<td>Year (4 digits)</td>
</tr>
<tr>
<td>Z</td>
<td>Zulu</td>
</tr>
</tbody>
</table>
7 APPROVAL
The signatories have approved this ICD with or without exception as their signature block implies and a copy of each approval sheet is included in this section.
10 APPENDIX 1: NANU DATA FORMATS

Appendix 1 describes the NANU types and the NANU message format.

10.1 Notice Advisory to Navstar Users

NANUs are used to notify Users of scheduled and unscheduled satellite outages and general GPS information. The paragraphs that follow describe the different types of NANUs. The NANU descriptions are arranged into four groups, as follows:

- Scheduled outages
- Unscheduled outages
- General text message
- Others

10.1.1 Scheduled Outages

NANUs in the scheduled outage group forecast outages that are planned to begin in the near future. Table 10-I identifies NANU types in the scheduled outage group. The table describes the NANU acronym used in the message format, the name of the file and a description of the outages. NANU acronyms in this group all begin with “FCST” for “forecast.”

Table 10-I  Scheduled Outages

<table>
<thead>
<tr>
<th>NANU ACRONYM</th>
<th>NAME</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>FCSTDV</td>
<td>Forecast Delta-V</td>
<td>Scheduled outage times for Delta-V maneuvers.</td>
</tr>
<tr>
<td>FCSTMX</td>
<td>Forecast Maintenance</td>
<td>Scheduled outage times for non-Delta-V maintenance.</td>
</tr>
<tr>
<td>FCSTEXTD</td>
<td>Forecast Extension</td>
<td>Extends the scheduled outage time “Until Further Notice”; references the original forecast NANU.</td>
</tr>
<tr>
<td>FCSTSUMM</td>
<td>Forecast Summary</td>
<td>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.</td>
</tr>
<tr>
<td>FCSTCANC</td>
<td>Forecast Cancellation</td>
<td>Cancels a scheduled outage when a new maintenance time is not yet determined; it references the original forecast NANU message.</td>
</tr>
<tr>
<td>FCSTRESCD</td>
<td>Forecast rescheduled</td>
<td>Reschedules a scheduled outage referencing the original-FCST NANU message.</td>
</tr>
<tr>
<td>FCSTUUFN</td>
<td>Forecast Unusable Until Further Notice</td>
<td>Scheduled outage of indefinite duration not necessarily related to Delta-V or maintenance activities.</td>
</tr>
</tbody>
</table>
The message templates for the NANU types listed in Table 10-I are shown in Figures 10-1 through 10-7, respectively.

---

**Figure 10-1** FCSTDV NANU Message Template

---

**Figure 10-2** FCSTMX NANU Message Template

---
NOTICE ADVISORY TO NAVSTAR USERS (NANU) YYYYSSS
SUBJ: SVNXXX (PRNXX) FORECAST OUTAGE EXTENDED UNTIL FURTHER NOTICE

1. NANU TYPE: FCSTEXTD
   NANU NUMBER: YYYYSSS
   NANU DTG: DDHHMMZ MMM YYYY
   REFERENCE NANU: YYYYNNN
   REF NANU DTG: DDHHMMZ MMM YYYY
   SVN: XXX
   PRN: XX
   START JDAY: JJJ
   START TIME ZULU: HHMM
   START DATE: DD MMM YYYY
   STOP JDAY: UFN
   STOP TIME ZULU: N/A
   STOP DATE: N/A

2. CONDITION: THE FORECAST OUTAGE FOR GPS SATELLITE SVNXXX (PRNXX) IS EXTENDED UNTIL FURTHER NOTICE.

3. POC: CIVILIAN - NAVCEN AT 703-313-5900, HTTP://WWW.NAVCEN.USCG.GOV
   CIVIL AVIATION - FAA National Operations Control Center
   MILITARY - GPS Support Center at HTTPS://GPS.AFSPC.AF.MIL/GPSOC, DSN 560-2541,
   COMM 719-567-2493, GPS_SUPPORT@SCHRIEVER.AF.MIL, HTTP://WWW.SCHRIEVER.AF.MIL/GPS
   MILITARY ALTERNATE - JOINT SPACE OPERATIONS CENTER, DSN 276-9994,
   COMM 805-606-9994, JSPCOCOMBATOPS@VANDENBERG.AF.MIL

Figure 10-3 FCSTEXTD NANU Message Template

NOTICE ADVISORY TO NAVSTAR USERS (NANU) YYYYSSS
SUBJ: SVNXXX (PRNXX) FORECAST OUTAGE SUMMARY JDAY JJJ/HHMM - JDAY JJJ/HHMM

1. NANU TYPE: FCSTSUMM
   NANU NUMBER: YYYYSSS
   NANU DTG: DDHHMMZ MMM YYYY
   REFERENCE NANU: YYYYNNN
   REF NANU DTG: DDHHMMZ MMM YYYY
   SVN: XXX
   PRN: XX
   START JDAY: JJJ
   START TIME ZULU: HHMM
   START DATE: DD MMM YYYY
   STOP JDAY: JJJ
   STOP TIME ZULU: HHMM
   STOP DATE: DD MMM YYYY

2. CONDITION: GPS SATELLITE SVNXXX (PRNXX) WAS UNUSABLE ON JDAY JJJ (DD MMM YYYY) BEGINNING HHMM ZULU UNTIL JDAY JJJ (DD MMM YYYY) ENDING HHMM ZULU.

3. POC: CIVILIAN - NAVCEN AT 703-313-5900, HTTP://WWW.NAVCEN.USCG.GOV
   CIVIL AVIATION - FAA National Operations Control Center
   MILITARY - GPS Support Center at HTTPS://GPS.AFSPC.AF.MIL/GPSOC, DSN 560-2541,
   COMM 719-567-2493, GPS_SUPPORT@SCHRIEVER.AF.MIL, HTTP://WWW.SCHRIEVER.AF.MIL/GPS
   MILITARY ALTERNATE - JOINT SPACE OPERATIONS CENTER, DSN 276-9994,
   COMM 805-606-9994, JSPCOCOMBATOPS@VANDENBERG.AF.MIL

Figure 10-4 FCSTSUMM NANU Message Template
NOTICE ADVISORY TO NAVSTAR USERS (NANU) YYYYSSS
SUBJ: SVNXXX (PRNXX) FORECAST OUTAGE CANCELLED
1. NANU TYPE: FCSTCANC
   NANU NUMBER: YYYYSSS
   NANU DTG: DDHHMMZ MMM YYYY
   REFERENCE NANU: YYYYNNN
   REF NANU DTG: DDHHMMZ MMM YYYY
   SVN: XXX
   PRN: XX
   START JDAY: JJJJ
   START TIME ZULU: HHMM
   START CALENDAR DATE: DD MMM YYYY
   STOP JDAY: CANCELLED
   STOP TIME ZULU: N/A
   STOP CALENDAR DATE: N/A
2. CONDITION: THE FORECAST OUTAGE FOR GPS SATELLITE SVNXXX (PRNXX) SCHEDULED FOR JDAY JJJJ (DD MMM YYYY) BEGINNING HHMM ZULU HAS BEEN CANCELLED.
3. POC: CIVILIAN - NAVCEN AT 703-313-5900, HTTP://WWW.NAVCEN.USCG.GOV
   MILITARY - GPS Support Center at HTTPS://GPS.AFSPC.AF.MIL/GPSOC, DSN 560-2541,
   COMM 719-567-2493, GPS_SUPPORT@SCHRIEVER.AF.MIL, HTTP://WWW.SCHRIEVER.AF.MIL/GPS
   MILITARY ALTERNATE - JOINT SPACE OPERATIONS CENTER, DSN 276-9994.
   COMM 805-606-9994, JSPOCCOMBATOPS@VANDENBERG.AF.MIL

Figure 10-5 FCSTCANC NANU Message Template

NOTICE ADVISORY TO NAVSTAR USERS (NANU) YYYYSSS
SUBJ: SVNXXX (PRNXX) FORECAST OUTAGE RESCHEDULED
1. NANU TYPE: FCSTRESCD
   NANU NUMBER: YYYYSSS
   NANU DTG: DDHHMMZ MMM YYYY
   REFERENCE NANU: YYYYNNN
   REF NANU DTG: DDHHMMZ MMM YYYY
   SVN: XXX
   PRN: XX
   START JDAY: JJJJ
   START TIME ZULU: HHMM
   START CALENDAR DATE: DD MMM YYYY
   STOP JDAY: JJJJ
   STOP TIME ZULU: HHMM
   STOP CALENDAR DATE: DD MMM YYYY
2. CONDITION: GPS SATELLITE SVNXXX (PRNXX) WILL BE UNUSABLE ON JDAY JJJJ (DD MMM YYYY) BEGINNING HHMMZULU UNTIL JDAY JJJJ (DD MMM YYYY) ENDING HHMMZULU. PLEASE REFERENCE NANU NUMBER YYYYNNN DTG DDHHMMZ MMM YYYY FOR THE ORIGINAL OUTAGE TIME.
3. POC: CIVILIAN - NAVCEN AT 703-313-5900, HTTP://WWW.NAVCEN.USCG.GOV
   MILITARY - GPS Support Center at HTTPS://GPS.AFSPC.AF.MIL/GPSOC, DSN 560-2541,
   COMM 719-567-2493, GPS_SUPPORT@SCHRIEVER.AF.MIL, HTTP://WWW.SCHRIEVER.AF.MIL/GPS
   MILITARY ALTERNATE - JOINT SPACE OPERATIONS CENTER, DSN 276-9994.
   COMM 805-606-9994, JSPOCCOMBATOPS@VANDENBERG.AF.MIL

Figure 10-6 FCSTRESC NANU Message Template
10.1.2 Unscheduled Outages

NANU types in the unscheduled outage group describe unplanned outages that are ongoing or have occurred in the recent past. Table 10-II identifies NANU types in the unscheduled outage group. The table describes the NANU acronym used in the message format, the name of the file and a description of the outages. NANU acronyms in this group all begin with “UNU” or “UNUS” for “unusable.”

Table 10-II Unscheduled Outages

<table>
<thead>
<tr>
<th>NANU ACRONYM</th>
<th>NAME</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNUSUFN</td>
<td>Unusable Until Further Notice</td>
<td>Notifies Users that a satellite will be unusable to all Users until further notice.</td>
</tr>
<tr>
<td>UNUSABLE</td>
<td>Unusable with reference NANU</td>
<td>Closes out an UNUSUFN NANU and gives the exact outage times; references the UNUSUFN NANU</td>
</tr>
<tr>
<td>UNUNOREF</td>
<td>Unusable with no reference</td>
<td>Gives times for outages that were resolved before an UNUSUFN NANU could be sent.</td>
</tr>
</tbody>
</table>

The message templates for the NANU types listed in Table 10-II are shown in Figures 10-8 through 10-10, respectively.
**Figure 10-8 UNUSUFN NANO Message Template**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NANU TYPE</td>
<td>UNUSUFN</td>
</tr>
<tr>
<td>NANU NUMBER</td>
<td>YYYYSSS</td>
</tr>
<tr>
<td>NANU DTG</td>
<td>DDHHMMZ MM YYYY</td>
</tr>
<tr>
<td>REFERENCE NANU</td>
<td>N/A</td>
</tr>
<tr>
<td>SVN</td>
<td>XXX</td>
</tr>
<tr>
<td>PRN</td>
<td>XX</td>
</tr>
<tr>
<td>START JDAY</td>
<td>JJJ</td>
</tr>
<tr>
<td>START TIME ZULU</td>
<td>HHMM</td>
</tr>
<tr>
<td>START CALENDAR DATE</td>
<td>DD MMM YYYY</td>
</tr>
<tr>
<td>STOP JDAY</td>
<td>UFN</td>
</tr>
<tr>
<td>STOP TIME ZULU</td>
<td>N/A</td>
</tr>
<tr>
<td>STOP CALENDAR DATE</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**Figure 10-9 UNUSABLE NANO Message Template**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NANU TYPE</td>
<td>UNUSABLE</td>
</tr>
<tr>
<td>NANU NUMBER</td>
<td>YYYYSSS</td>
</tr>
<tr>
<td>NANU DTG</td>
<td>DDHHMMZ MM YYYY</td>
</tr>
<tr>
<td>REFERENCE NANU</td>
<td>N/A</td>
</tr>
<tr>
<td>SVN</td>
<td>XXX</td>
</tr>
<tr>
<td>PRN</td>
<td>XX</td>
</tr>
<tr>
<td>START JDAY</td>
<td>JJJ</td>
</tr>
<tr>
<td>START TIME ZULU</td>
<td>HHMM</td>
</tr>
<tr>
<td>START CALENDAR DATE</td>
<td>DD MMM YYYY</td>
</tr>
<tr>
<td>STOP JDAY</td>
<td>JJJ</td>
</tr>
<tr>
<td>STOP TIME ZULU</td>
<td>HHMM</td>
</tr>
<tr>
<td>STOP CALENDAR DATE</td>
<td>DD MMM YYYY</td>
</tr>
</tbody>
</table>

2. CONDITION: GPS SATELLITE SVNXXX (PRNXX) WAS UNUSABLE ON J DAY JJJ (DD MMM YYYY) BEGINNING HHMM ZULU UNTIL J DAY JJJ (DD MMM YYYY) ENDING HHMM ZULU.

3. POC: CIVILIAN - NAVCEN AT 703-313-5900, HTTP://WWW.NAVCEN.USCG.GOV
   CIVIL AVIATION - FAA National Operations Control Center
   MILITARY - GPS Support Center at HTTPS://GPS.AFSPC.AF.MIL/GPSOC, DSN 560-2541,
   COMM 719-567-2493, GPS_SUPPORT@SCHRIEVER.AF.MIL, HTTP://WWW.SCHRIEVER.AF.MIL/GPS
   MILITARY ALTERNATE - JOINT SPACE OPERATIONS CENTER, DSN 276-9994,
   COMM 805-606-9994, JSPOCCOMBATOPS@VANDENBERG.AF.MIL
10.1.3 General NANU Messages

General NANU messages describe a GPS issue, problem, or event deemed noteworthy to the GPS user community. General NANU topics may include but are not limited to failures in meeting SPS Performance Standard requirements, space segment problems that cannot be conveyed through other NANU formats, and space vehicle (SV) disposal announcements. NANU messages of this type are all identified with the “GENERAL” NANU acronym.

General NANU messages may be generically worded and may direct further detailed questions to the appropriate authorities. Recommendations or notes may be included, depending on the circumstances.

The GENERAL message structure is a text paragraph format, such as, the generic example shown in Figure 10-11. The format consists of two sections. Section one contains a header indicating the type of message. Section two is the body of the message.
1. NANU TYPE: GENERAL
*** GENERAL MESSAGE TO ALL GPS USERS ***

MESSAGE WRITTEN IN PARAGRAPH FORM

*** GENERAL MESSAGE TO ALL GPS USERS ***

Figure 10-11 General Message Format

10.1.4 Other Messages

NANU types in the “other” group describe events that occur infrequently. Table 10-III identifies NANU types in the “other” outage group. The table describes the NANU acronym used in the message format, the name of the file and a description of the message.

<table>
<thead>
<tr>
<th>NANU ACRONYM</th>
<th>NAME</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>USABINIT</td>
<td>Initially usable</td>
<td>Notifies Users that an SV is set healthy for the first time.</td>
</tr>
<tr>
<td>LEAPSEC</td>
<td>Leap second</td>
<td>Notifies Users of an impending leap second.</td>
</tr>
<tr>
<td>LAUNCH</td>
<td>Launch</td>
<td>Notifies Users after the launch of a satellite.</td>
</tr>
<tr>
<td>DECOM</td>
<td>Decommission</td>
<td>Notifies Users that an SV has been removed from the current constellation identified within the broadcast Almanac, but does not necessarily signify permanent disposal.</td>
</tr>
</tbody>
</table>

The message templates for the NANU types listed in Table 10-III are shown in Figures 10-12 through 10-15, respectively.
NOTICE ADVISORY TO NAVSTAR USERS (NANU) YYYYSSS 
SUBJ: SVNXXX (PRNXX) USABLE J DAY JJJJ HHMM 
1. NANU TYPE: USABINIT 
   NANU NUMBER: YYYYSSS 
   NANU DTG: DDMMHHMM YYYY 
   REFERENCE NANU: N/A 
   REF NANU DTG: N/A 
   SVN: XXX 
   PRN: XX 
   START J DAY: JJJJ 
   START TIME ZULU: HHMM 
   START CALENDAR DATE: DD MMM YYYY 
   STOP J DAY: N/A 
   STOP TIME ZULU: N/A 
   STOP CALENDAR DATE: N/A 
2. CONDITION: GPS SATELLITE SVNXXX (PRNXX) WAS USABLE AS OF J DAY JJJJ (DD MMM YYYY) BEGINNING HHMM ZULU. 
3. POC: CIVILIAN - NAVCEN AT 703-313-5900, HTTP://WWW.NAVCEN.USCG.GOV 
   MILITARY - GPS Support Center at HTTPS://GPS.AFSPC.AF.MIL/GPSOC, DSN 560-2541, 
   COMM 719-567-2493, GPS_SUPPORT@SCHRIEVER.AF.MIL, HTTP://WWW.SCHRIEVER.AF.MIL/GPS 
   MILITARY ALTERNATE - JOINT SPACE OPERATIONS CENTER, DSN 276-9994, JSPOCCOMBATOPS@VANDENBERG.AF.MIL 

NOTICE ADVISORY TO NAVSTAR USERS (NANU) YYYYSSS 
SUBJ: LEAP SECOND 
1. CONDITION: THE INTERNATIONAL EARTH ROTATION SERVICE (IERS) HAS ANNOUNCED THE INTRODUCTION OF A LEAP SECOND TO OCCUR AT THE END OF MMM YYYY 
2. COORDINATED UNIVERSAL TIME (UTC) WILL SEQUENCE AS FOLLOWS: 
   DD MMM YYYY HH HOURS MM M NUTES SS SECONDS 
   DD MMM YYYY HH HOURS MM M NUTES SS SECONDS 
   DD MMM YYYY HH HOURS MM M NUTES SS SECONDS 
   FOR GPS, IF/AS AVAILABLE, THE UTC DATA IN SUBFRAME 3, PAGE 1 OF THE CNAV-2 DATA FOR L1C WILL CHANGE IN ACCORDANCE WITH IS-GPS-800. 
   FOR GPS, IF/AS AVAILABLE, THE UTC DATA IN MESSAGE TYPE 33 OF THE CNAV DATA FOR L5 WILL CHANGE IN ACCORDANCE WITH IS-GPS-705. 
   BEFORE THE LEAP SECOND 
   GPS-UTC IS XX (GPS IS AHEAD OF UTC BY XX SECONDS) 
   AFTER THE LEAP SECOND 
   GPS-UTC WILL BE XX (GPS WILL BE AHEAD OF UTC BY XX SECONDS) 
4. POC: CIVILIAN - NAVCEN AT 703-313-5900, HTTP://WWW.NAVCEN.USCG.GOV 
   MILITARY - GPS Support Center at HTTPS://GPS.AFSPC.AF.MIL/GPSOC, DSN 560-2541, 
   COMM 719-567-2493, GPS_SUPPORT@SCHRIEVER.AF.MIL, HTTP://WWW.SCHRIEVER.AF.MIL/GPS 
   MILITARY ALTERNATE - JOINT SPACE OPERATIONS CENTER, DSN 276-9994, JSPOCCOMBATOPS@VANDENBERG.AF.MIL 

Figure 10-12 USABINIT NANU Message Template 

Figure 10-13 LEAPSEC NANU Message Template
NOTICE ADVISORY TO NAVSTAR USERS (NANU) YYYYSSS
SUBJ: SVNXXX (PRNXX) LAUNCH JDAY JJJ
1. NANU TYPE: LAUNCH
   NANU NUMBER: YYYYSSS
   NANU DTG: HHHHDDZ MMM 2007
   SVN: XXX
   PRN: XX
   LAUNCH JDAY: JJJ
   LAUNCH TIME ZULU: HHHH
2. GPS SATELLITE SVN XXX (PRN XX) WAS LAUNCHED ON JDAY JJJ A USABLE INIT NANU WILL BE SENT
   WHEN THE SATELLITE IS SET ACTIVE TO SERVICE.
3. POC: CIVILIAN - NAVCEN AT 703-313-5900, HTTP://WWW.NAVCEN.USCG.GOV
   CIVIL AVIATION - FAA National Operations Control Center
   MILITARY - GPS Support Center at HTTPS://GPS.AFSPC.AF.MIL/GPSOC, DSN 560-2541,
   COMM 719-567-2493, GPS_SUPPORT@SCHRIEVER.AF.MIL, HTTP://WWW.SCHRIEVER.AF.MIL/GPS
   MILITARY ALTERNATE - JOINT SPACE OPERATIONS CENTER, DSN 276-9994.
   COMM 805-606-9994, JSPOCCOMBATOPS@VANDENBERG.AF.MIL

NOTICE ADVISORY TO NAVSTAR USERS (NANU) YYYYSSS
SUBJ: SVNXXX (PRNXX) DECOMMISSIONING JDAY JJJ/HHHH
1. NANU TYPE: DECOMM
   NANU NUMBER: YYYYSSS
   NANU DTG: HHHHDDZ MMM YYYY
   REFERENCE NANU: YYYYSSS
   REF DTG: HHHHDDZ MMM YYYY
   SVN: XXX
   PRN: XX
   UNUSABLE START JDAY: JJJ
   UNUSABLE START TIME ZULU: HHHH
   UNUSABLE START CALENDAR DATE: DD MMM YYYY
   DECOMMISSIONING START JDAY: JJJ
   DECOMMISSIONING START TIME ZULU: HHHH
   DECOMMISSIONING START CALENDAR DATE: DD MMM YYYY
2. CONDITION: GPS SATELLITE SVN XXX (PRNXX) WAS UNUSABLE AS OF JDAY JJJ (DD MMM YYYY) AND
   REMOVED FROM THE GPS CONSTELLATION ON JDAY JJJ (DD MMM YYYY) AT HHHH ZULU.
3. POC: CIVILIAN - NAVCEN AT 703-313-5900, HTTP://WWW.NAVCEN.USCG.GOV
   CIVIL AVIATION - FAA National Operations Control Center
   MILITARY - GPS Support Center at HTTPS://GPS.AFSPC.AF.MIL/GPSOC, DSN 560-2541,
   COMM 719-567-2493, GPS_SUPPORT@SCHRIEVER.AF.MIL, HTTP://WWW.SCHRIEVER.AF.MIL/GPS
   MILITARY ALTERNATE - JOINT SPACE OPERATIONS CENTER, DSN 276-9994,
   COMM 805-606-9994, JSPOCCOMBATOPS@VANDENBERG.AF.MIL
10.2 NANU Notification Times

NANU messages announcing scheduled events are normally distributed to the user community prior to the event. NANU messages announcing unscheduled events are normally distributed to the user community as soon as practical after the event. However, mission critical problems have priority over user notification and therefore may delay normal NANU distribution. NANU notification times typically vary by NANU group. Nominal and objective NANU notification times for the four NANU groups are summarized in Table 10-IV.

<table>
<thead>
<tr>
<th>NANU Group</th>
<th>Nominal Notification Times</th>
<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scheduled</td>
<td>48 hrs prior to outage start</td>
<td>96 hrs prior to outage start</td>
</tr>
<tr>
<td>Unscheduled</td>
<td>Less than 1 hr after outage start</td>
<td>15 minutes after outage start</td>
</tr>
<tr>
<td>General</td>
<td>No Nominal – Timing determined on a case-by-case basis</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>No Nominal – Timing determined on a case-by-case basis</td>
<td></td>
</tr>
</tbody>
</table>

The length of the outage time specified in scheduled NANU messages is typically longer than the expected maintenance time to allow for minor variations in the time required to accomplish a particular maintenance activity.

10.3 NANU Message Format
The NANU message structure for all messages, except the General, LAUNCH, DECOM, and LEAPSEC messages, is based on a tabular format that simplifies the readability of data. A template for these messages is illustrated in Figure 10-16. These messages are arranged into a header and three sections. The following paragraphs explain this message format in more detail.

**Figure 10-16  NANU Message Template**

**10.3.1 NANU Header**

The first line of the header includes the title "NOTICE ADVISORY TO NAVSTAR USERS (NANU) YYYYNNN" and the assigned identification (ID) number for that NANU message. The ID number consists of the four-digit year followed by a sequentially assigned three-digit number which begins at 001 for the first NANU on the first day of a new year. The ID number is incremented for each new NANU up to a maximum of 999 in any given calendar year, after which the ID number rolls over and begins numbering subsequent NANUs beginning with 001. The second line identifies the subject of the message including the Space Vehicle Number (SVN), SV Pseudo Random Noise (PRN) number, type of message, and effective dates for the event. The three digit SVN field and two digit PRN number are zero padded. The date is in Julian day-of-year format (JDAY), numbered from 001 to 366, and the time is Zulu referenced in a 24-hour, two digit hour (HH) and two digit minute (MM) format. The NANU header is illustrated in Figure 10-17.
10.3.2 NANU Section 1

Section 1 provides the message description, reference information, satellite identification and outage time in a tabular format.
10.3.2.1  NANU Message Description

The message description includes the NANU type acronym, NANU number, and Day Time Group (DTG). The NANU type acronym is as previously described in paragraphs 10.1.1, 10.1.2, and 10.1.4. The NANU number is as previously described in paragraph 10.3.1. The DTG provides the date the NANU was created. The DTG format is represented as DDHHMM “Z” MMM YYYY. The first two digits identify the calendar day (DD) followed by the hour (HH) and minutes (MM). The letter Z indicates that the time is given in Zulu reference. This is followed by the first three letters of the month (MMM) and the four-digit year (YYYY). This portion of the message is illustrated in Figure 10-

![Figure 10-18 Message Description](image)

18.  

**Figure 10-18 Message Description**

10.3.2.2  NANU Reference Information

As shown in Figure 10-19, the reference information serves to close, extend, cancel, or reschedule previously broadcast messages. The data conveyed in this section includes the message ID number (YYYYNNN) and DTG (REF NANU DTG) of a previously broadcast message. Both of these items will be noted as N/A if the current message is not a follow up message.

![Figure 10-19 Reference Information](image)

**Figure 10-19 Reference Information**
10.3.2.3 Satellite Identification

As shown in Figure 10-20, the satellite identification information specifies the satellite that is the subject of the NANU. The identification information includes the satellite three-digit SVN and two-digit PRN number. The SVN field and PRN number are zero padded.

Figure 10-20 Satellite Identification Information

10.3.2.4 Outage Time

As shown in Figure 10-21, the outage time variables include start and stop dates and times. The start day is provided in three-digit Julian Day-of-Year format (JJJ = 001 to 366) as well as calendar day-month-year format. The calendar day is represented as two digits (DD), followed by the first three letters of the month (MMM) followed by the four-digit year (YYYY). The start time is given in Zulu time in a 24-hour, two-digit hour (HH), and two-digit minute (MM) format. The stop dates and time follow the same formats as the start dates and time.

Figure 10-21 Outage Time
10.3.3 NANU Section 2

As shown in Figure 10-22, Section 2 is a summary of the NANU in paragraph format including the satellite three-digit SVN and two-digit PRN number, text description of the event, start and stop date(s) in Julian and calendar date formats, and start and stop time(s) in Zulu hours and minutes. The SVN field and PRN number are zero padded.

```
2.  CONDITION: GPS SATELLITE SVNXXX (PRNXX) WILL BE UNUSABLE ON J DAY JJJ
    (DD MMM YYYY) BEGINNING HHMM ZULU UNTIL J DAY JJJ (DD MMM YYYY) ENDING HHMM ZULU.
```

Figure 10-22  NANU Section 2

10.3.4 NANU Section 3

Section 3 of the NANU identifies points of contact for additional technical and support information. An example of this section is illustrated in Figure 10-23.

```
3.  POC: CIVILIAN - NAVCEN AT (703) 313-5900, HTTP://WWW.NAVCEN.USCG.GOV
    CIVIL AVIATION - FAA National Operations Center
    MILITARY - GPS Operations Center at HTTPS://GPS.AFSPC.AF.MIL/GPSOC, DSN 560-2541,
    COMM 719-567-2541, GPS_SUPPORT@SCHRIEVER.AF.MIL, HTTPS://GPS.AFSPC.AF.MIL
    MILITARY ALTERNATE - JOINT SPACE OPERATIONS CENTER, DSN 276-9994,
    COMM 805-606-9994, JSPOCCOMBATOPS@VANDENBERG.AF.MIL
```

Figure 10-23  Contact Information
20 APPENDIX 2: OPERATIONAL ADVISORY DATA FILE

Appendix 2 describes the Operational Advisory message format.

20.1 Operational Advisory

The Operational Advisory (OA) message provides a summary of the satellite constellation status. An example is shown in Figure 20-1. The OA is arranged in three sections. The following paragraphs describe each section and subsection of the OA.

*Note: Section 1.C of the example OA message shown above contains example data for the GPS III SVs to show the type of data that will go in this section in the OCX era. This example is not meant to represent the actual GPS constellation configuration.

Figure 20-1 Sample Operational Advisory
20.2 OA Header.

The header includes the title “GPS OPERATIONAL ADVISORY,” the subject “SUBJ: GPS STATUS” and the date. The date is represented in a format that includes two-digit day (DD), the first three characters of the month (MMM), and four-digit year (YYYY). The OA header is illustrated in Figure 20-2.

![Figure 20-2 OA Header](image)

20.3 OA Section 1

Section 1 lists operational satellites by PRN number, assigned plane, and clock in current use. The PRN number is a two digit number that is zero padded. Subsection 1.A previously identified operational satellites in Block I. However, these satellites are no longer operational, so this subsection includes the word “NONE”. Subsection 1.B identifies satellites within Block II that are currently in use. Subsection 1.C identifies satellites within Block III that are currently in use. The example data shown for Section 1 is not meant to represent the actual GPS constellation configuration. The abbreviations CS and RB are used to indicate Cesium and Rubidium clocks, respectively. An example of section 1 of the OA is illustrated in Figure 20-3.

![Figure 20-3 OA Section 1](image)
20.4 OA Section 2
Section 2 contains a summary of current and recent advisories, forecasts, and general text messages. It is organized into three subsections. Subsection 2A summarizes scheduled NANU messages. Subsection 2B summarizes advisory messages (messages with prefix UNU). Section 2C summarizes general text messages. The PRN number is zero-padded. An example of section 2 of the OA is illustrated in Figure 20-4.

<table>
<thead>
<tr>
<th>PRN</th>
<th>Type</th>
<th>SUMMARY (J DAY/ZULU TIME START - STOP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>FCSTDV</td>
<td>092/1600-093/0630</td>
</tr>
</tbody>
</table>

Figure 20-4 OA Section 2

20.5 OA Section 3
Section 3 identifies points of contact for additional technical and support information. It is organized into three subsections, each in text format. An example of section 3 of the OA is illustrated in Figure 20-5.

3. REMARKS:
A. THE POINT OF CONTACT FOR GPS MILITARY OPERATIONAL SUPPORT IS THE GPS OPERATIONS CENTER AT (719) 567-2541 OR DSN 560-2541.
B. CIVILIAN: FOR INFORMATION, CONTACT US COAST GUARD NAVCEN AT COMMERCIAL (703) 313-5900 24 HOURS DAILY AND INTERNET HTTP://WWW.NAVCEN.USCG.GOV
C. MILITARY SUPPORT WEBPAGES CAN BE FOUND AT THE FOLLOWING HTTPS://GPS.AFSPC.AF.MIL/GPS OR HTTPS://GPS.AFSPC.AF.MIL/GPSOC

Figure 20-5 OA Section 3
30 APPENDIX 3: ALMANAC DATA FILES

Appendix 3 describes the SEM and YUMA Almanac message formats.

30.1 Almanac Description

The Almanac is a subset of GPS satellite clock and ephemeris data, with reduced precision. The CS provides the GPS Almanac in two formats, YUMA and System Effectiveness Model (SEM). Each Almanac format is broken into two files. YUMA files are named current.alm (PRNs 1-32) and current.blm (PRNs 1-63). SEM files are named current.al3 (PRNs 1-32) and current.bl3 (PRNs 1-63). The YUMA Almanac is an easy-to-read format of the Almanac data, while the SEM format is intended as input for software tools.

30.2 SEM Almanac Parameters Definition

The SEM Almanac parameters are defined in paragraph 20.3.3.5.1.2 of IS-GPS-200. The number of bits, scale factor for the least significant bit (LSB), range, and units of the Almanac parameters are specified in Table 20-VI of IS-GPS-200.

30.3 SV Health Word

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 shows the 3 MCS health categories for satellites commonly used by 2 SOPS (ACTIVE, BAD & DEAD). The “OTHER” MCS health category is a generalized term for the remaining states/conditions defined by IS-GPS-200 which may be used by 2 SOPS in the future. Table 30-I also 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. Users of the SEM and YUMA Almanacs should be prepared for any potential future 2 SOPS use of other MCS health categories, as defined by codes in IS-GPS-200, Table 20-VIII.

Table 30-I Six-Bit SV Health Word in Almanac

<table>
<thead>
<tr>
<th>SV Health Category</th>
<th>Six Bit SV Health Word in NAV message</th>
<th>Numerical Representation of Six-Bit Health Word in SEM &amp; YUMA Almanac</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTIVE</td>
<td>0000000</td>
<td>0</td>
</tr>
<tr>
<td>OTHER</td>
<td>000001</td>
<td>1</td>
</tr>
<tr>
<td>OTHER</td>
<td>000010</td>
<td>2</td>
</tr>
<tr>
<td>OTHER</td>
<td>000011</td>
<td>3</td>
</tr>
<tr>
<td>OTHER</td>
<td>000100</td>
<td>4</td>
</tr>
<tr>
<td>OTHER</td>
<td>000101</td>
<td>5</td>
</tr>
<tr>
<td>OTHER</td>
<td>000110</td>
<td>6</td>
</tr>
<tr>
<td>OTHER</td>
<td>000111</td>
<td>7</td>
</tr>
<tr>
<td>SV Health Category</td>
<td>Six Bit SV Health Word in NAV message</td>
<td>Numerical Representation of Six-Bit Health Word in SEM &amp; YUMA Almanac</td>
</tr>
<tr>
<td>--------------------</td>
<td>---------------------------------------</td>
<td>---------------------------------------------------------------------</td>
</tr>
<tr>
<td>OTHER</td>
<td>001000</td>
<td>8</td>
</tr>
<tr>
<td>OTHER</td>
<td>001001</td>
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<td>001101</td>
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<td>001111</td>
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<td>OTHER</td>
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<td>OTHER</td>
<td>101110</td>
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</tr>
<tr>
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<td>101111</td>
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</tr>
<tr>
<td>OTHER</td>
<td>110000</td>
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</tr>
<tr>
<td>OTHER</td>
<td>110011</td>
<td>51</td>
</tr>
</tbody>
</table>
### SV Health Category

<table>
<thead>
<tr>
<th>SV Health Category</th>
<th>Six Bit SV Health Word in NAV message</th>
<th>Numerical Representation of Six-Bit Health Word in SEM &amp; YUMA Almanac</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTHER</td>
<td>110100</td>
<td>52</td>
</tr>
<tr>
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<td>110101</td>
<td>53</td>
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<td>OTHER</td>
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</tr>
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<td>OTHER</td>
<td>111011</td>
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<tr>
<td>BAD</td>
<td>111100</td>
<td>60</td>
</tr>
<tr>
<td>OTHER</td>
<td>111101</td>
<td>61</td>
</tr>
<tr>
<td>OTHER</td>
<td>111110</td>
<td>62</td>
</tr>
<tr>
<td>DEAD</td>
<td>111111</td>
<td>63</td>
</tr>
</tbody>
</table>

#### 30.4 SEM Almanac Format

The SEM format file example in Figure 30-1 is arranged with a header that identifies the number of records (number of satellites) and file name (current.al3). The SEM Almanac sample illustrated below is a data sample of one record out of 28 in this sample file and its parameter definition, as stated in the note of Figure 30-1, is in Table 30-II. There is an additional SEM file with a file name extension of .bl3 that is identical to .al3, except for the number of records range, PRN number range and SVN number field. All parameters are listed in Table 30-III.

![Figure 30-1 SEM Data Sample for Current.al3](image)

**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.
<table>
<thead>
<tr>
<th>Line No.</th>
<th>Almanac Name</th>
<th>Description</th>
<th>Units</th>
<th>Range</th>
<th>Accuracy</th>
<th>Precision</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Number of records</td>
<td>The number of satellite Almanac records contained in the file</td>
<td>Records</td>
<td>0 to 32</td>
<td>1</td>
<td>2 significant digits</td>
</tr>
<tr>
<td></td>
<td>Name of Almanac</td>
<td>Descriptive name for the Almanac in the file</td>
<td>N/A</td>
<td>Any combination of valid ASCII characters</td>
<td>N/A</td>
<td>24 significant characters</td>
</tr>
<tr>
<td>2</td>
<td>GPS Week Number</td>
<td>The Almanac reference week number (WNa) for all Almanac data in the file</td>
<td>Weeks</td>
<td>0 to 1023 *</td>
<td>1</td>
<td>4 significant digits</td>
</tr>
<tr>
<td></td>
<td>GPS Time of Applicability</td>
<td>The number of seconds since the beginning of the Almanac reference week. The Almanac reference time (toa) for all Almanac data in the file</td>
<td>Second</td>
<td>0 to 602,112</td>
<td>1</td>
<td>6 significant digits</td>
</tr>
<tr>
<td>3</td>
<td>Blank line for format spacing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Record Format</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R-1</td>
<td>PRN Number</td>
<td>The satellite PRN number. This is a required data item as it is the GPS user's primary means of identifying GPS satellites. It is equivalent to the space vehicle identification (SVID) number of the SV</td>
<td>None</td>
<td>1 to 32</td>
<td>None</td>
<td>2 significant digits</td>
</tr>
<tr>
<td>R-2</td>
<td>SVN</td>
<td>The SV reference number. Unique sequential number associated with each satellite.</td>
<td>None</td>
<td>0 to 255 (zero denotes that this field is empty)</td>
<td>None</td>
<td>3 significant digits</td>
</tr>
<tr>
<td>R-3</td>
<td>Average URA Number</td>
<td>The satellite &quot;average&quot; 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</td>
<td>None</td>
<td>0 to 15</td>
<td>1</td>
<td>2 significant digits</td>
</tr>
<tr>
<td>R-4</td>
<td>Eccentricity</td>
<td>This defines the amount of the orbit deviation from a circular orbit (e)**</td>
<td>Unitless</td>
<td>0 to 3.125 E-2</td>
<td>4.77 E-7</td>
<td>7 significant digits</td>
</tr>
<tr>
<td>Line No</td>
<td>Almanac Name</td>
<td>Description</td>
<td>Units</td>
<td>Range</td>
<td>Accuracy</td>
<td>Precision</td>
</tr>
<tr>
<td>--------</td>
<td>----------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>-------------</td>
<td>------------------------</td>
<td>-----------</td>
<td>-----------------</td>
</tr>
<tr>
<td>b</td>
<td>Inclination Offset</td>
<td>Satellite Almanac orbital <em>inclination angle offset</em> (δ) This does not include the 0.30 semicircle reference value (i0)**</td>
<td>Semi circles</td>
<td>-6.25 E-2 to +6.25 E-2</td>
<td>1.91 E-6</td>
<td>7 significant digits</td>
</tr>
<tr>
<td>c</td>
<td>Rate of Right Ascension</td>
<td>Rate of change in the measurement of the angle of right ascension (Ω-DOT)**</td>
<td>Semi circles/second</td>
<td>-1.1921 E-7*** to +1.1921 E-7***</td>
<td>3.64 E-12</td>
<td>7 significant digits</td>
</tr>
<tr>
<td>R-5</td>
<td>Square Root of Semi-Major Axis</td>
<td>Measurement from the center of the orbit to either the point of apogee or the point of perigee ((A^{1/2}))**</td>
<td>Meters(^{1/2})</td>
<td>0 to 8,192</td>
<td>4.88 E-04</td>
<td>9 significant digits</td>
</tr>
<tr>
<td>d</td>
<td>Geographic Longitude of Orbital Plane</td>
<td>Geographic longitude of the orbital plane at the weekly epoch* (Ω₀)**</td>
<td>Semi circles</td>
<td>-1.0 to +1.0</td>
<td>1.19 E-07</td>
<td>9 significant digits</td>
</tr>
<tr>
<td>e</td>
<td>Argument of Perigee</td>
<td>The angle from the equator to perigee (ω)**</td>
<td>Semi circles</td>
<td>-1.0 to +1.0</td>
<td>1.19 E-07</td>
<td>9 significant digits</td>
</tr>
<tr>
<td>R-6</td>
<td>Mean Anomaly</td>
<td>The angle which describes the position of the satellite in its orbit, relative to perigee. (M₀)**</td>
<td>Semi circle</td>
<td>-1.0 to +1.0</td>
<td>1.19 E-07</td>
<td>9 significant digits</td>
</tr>
<tr>
<td>f</td>
<td>Zeroth Order Clock Correction</td>
<td>The satellite Almanac zeroth order clock correction term (a₀)**</td>
<td>Seconds</td>
<td>-9.7657 E-4*** to +9.7657 E-4***</td>
<td>9.54 E-07</td>
<td>5 significant digits</td>
</tr>
<tr>
<td>g</td>
<td>First Order Clock Correction</td>
<td>The satellite Almanac first order clock correction term (a₁)**</td>
<td>Seconds/second</td>
<td>-3.7253 E-9*** to +3.7253 E-9***</td>
<td>3.64 E-12</td>
<td>5 significant digits</td>
</tr>
<tr>
<td>R-7</td>
<td>Satellite Health</td>
<td>The satellite subframe 4 and 5, page 25 six-bit health code **</td>
<td>None</td>
<td>0 to 63</td>
<td>None</td>
<td>2 significant digits</td>
</tr>
<tr>
<td>R-8</td>
<td>Satellite Configuration</td>
<td>The satellite subframe 4, page 25 four-bit configuration code **</td>
<td>None</td>
<td>0 to 15</td>
<td>None</td>
<td>2 significant digits</td>
</tr>
<tr>
<td>R-9</td>
<td>Blank line for format spacing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*GPS Week Number as distributed by the CS is a modulo 1024 (0-1023) decimal number representing the modulo 1024 binary week number broadcast from an SV (see IS-GPS-200). Some user applications (such as the SEM program) may require the user to replace the modulo 1024 week number in this format with the full decimal week number (e.g., 0-65,535) in order to determine the correct calendar date of the Almanac.

**As defined in IS-GPS-200.

***Rounded up from max range of IS-GPS-200 binary format.
Table 30-III  SEM Almanac Description for Current.bl3

(Sheet 1 of 2)

<table>
<thead>
<tr>
<th>Line No.</th>
<th>Almanac Name</th>
<th>Description</th>
<th>Units</th>
<th>Range</th>
<th>Accuracy</th>
<th>Precision</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Number of records</td>
<td>The number of satellite Almanac records contained in the file</td>
<td>Records</td>
<td>00 to 63</td>
<td>1</td>
<td>2 significant digits</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blank space for format spacing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>GPS Week Number</td>
<td>The Almanac reference week number (WNa) for all Almanac data in the file</td>
<td>Weeks</td>
<td>0 to 1023 *</td>
<td>1</td>
<td>4 significant digits</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blank space for format spacing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>GPS Time of Applicability</td>
<td>The number of seconds since the beginning of the Almanac reference week. The Almanac reference</td>
<td>Second</td>
<td>0 to 602,112</td>
<td>1</td>
<td>6 significant digits</td>
</tr>
<tr>
<td></td>
<td></td>
<td>time (toa) for all Almanac data in the file</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Blank line for format spacing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Record Format

<table>
<thead>
<tr>
<th>R-1</th>
<th>PRN Number</th>
<th>The satellite PRN number. This is a required data item as it is the GPS user's primary means of identifying GPS satellites. It is equivalent to the space vehicle identification (SVID) number of the SV</th>
<th>None</th>
<th>01 to 63</th>
<th>None</th>
<th>2 significant digits</th>
</tr>
</thead>
<tbody>
<tr>
<td>R-2</td>
<td>SVN</td>
<td>The SV reference number. Unique sequential number associated with each satellite**</td>
<td>None</td>
<td>000 to 255</td>
<td>None</td>
<td>3 significant digits</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(000 denotes that this field is empty)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R-3</td>
<td>Average URA Number</td>
<td>The satellite &quot;average&quot; 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</td>
<td>None</td>
<td>0 to 15</td>
<td>1</td>
<td>2 significant digits</td>
</tr>
<tr>
<td>R-4</td>
<td>Eccentricity</td>
<td>This defines the amount of the orbit deviation from a circular orbit (e)***</td>
<td>Unitless</td>
<td>0 to 3.125 E-2</td>
<td>4.77 E-7</td>
<td>7 significant digits</td>
</tr>
</tbody>
</table>
Table 30-II SEM Almanac Description for Current.bl3  
(Sheet 2 of 2)

<table>
<thead>
<tr>
<th>Line No</th>
<th>Almanac Name</th>
<th>Description</th>
<th>Units</th>
<th>Range</th>
<th>Accuracy</th>
<th>Precision</th>
</tr>
</thead>
<tbody>
<tr>
<td>b</td>
<td>Inclination Offset</td>
<td>Satellite Almanac orbital <em>inclination angle offset</em> (δ_i)*** This does not include the 0.30 semicircle reference value (i_0)***</td>
<td>Semi circles</td>
<td>-6.25 E-2 to +6.25 E-2</td>
<td>1.91 E-6</td>
<td>7 significant digits</td>
</tr>
<tr>
<td>c</td>
<td>Rate of Right Ascension</td>
<td>Rate of change in the measurement of the angle of right ascension (Ω-DOT)***</td>
<td>Semi circles/second</td>
<td>-1.1921 E-7 to +1.1921 E-7***</td>
<td>3.64 E-12</td>
<td>7 significant digits</td>
</tr>
<tr>
<td>R-5</td>
<td>Square Root of Semi-Major Axis</td>
<td>Measurement from the center of the orbit to either the point of apogee or the point of perigee (A_1/2)***</td>
<td>Meters(^{1/2})</td>
<td>0 to 8,192</td>
<td>4.88 E-04</td>
<td>9 significant digits</td>
</tr>
<tr>
<td>d</td>
<td>Geographic Longitude of Orbital Plane</td>
<td>Geographic longitude of the orbital plane at the weekly epoch* (Ω_0)***</td>
<td>Semi circles</td>
<td>-1.0 to +1.0</td>
<td>1.19 E-07</td>
<td>9 significant digits</td>
</tr>
<tr>
<td>e</td>
<td>Argument of Perigee</td>
<td>The angle from the equator to perigee (ω)***</td>
<td>Semi circles</td>
<td>-1.0 to +1.0</td>
<td>1.19 E-07</td>
<td>9 significant digits</td>
</tr>
<tr>
<td>R-6</td>
<td>Mean Anomaly</td>
<td>The angle which describes the position of the satellite in its orbit, relative to perigee. (M_0)***</td>
<td>Semi circle</td>
<td>-1.0 to +1.0</td>
<td>1.19 E-07</td>
<td>9 significant digits</td>
</tr>
<tr>
<td>f</td>
<td>Zeroth Order Clock Correction</td>
<td>The satellite Almanac zeroth order clock correction term (a_0)***</td>
<td>Seconds</td>
<td>-9.7657 E-4 to +9.7657 E-4***</td>
<td>9.54 E-07</td>
<td>5 significant digits</td>
</tr>
<tr>
<td>g</td>
<td>First Order Clock Correction</td>
<td>The satellite Almanac first order clock correction term (a_1)***</td>
<td>Seconds/second</td>
<td>-3.7253 E-9 to +3.7253 E-9***</td>
<td>3.64 E-12</td>
<td>5 significant digits</td>
</tr>
<tr>
<td>R-7</td>
<td>Satellite Health</td>
<td>The satellite subframe 4 and 5, page 25 six-bit health code ***</td>
<td>None</td>
<td>0 to 63</td>
<td>None</td>
<td>2 significant digits</td>
</tr>
<tr>
<td>R-8</td>
<td>Satellite Configuration</td>
<td>The satellite subframe 4, page 25 four-bit configuration code ***</td>
<td>None</td>
<td>0 to 15</td>
<td>None</td>
<td>2 significant digits</td>
</tr>
<tr>
<td>R-9</td>
<td></td>
<td>Blank line for format spacing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*GPS Week Number as distributed by the CS is a modulo 1024 (0-1023) decimal number representing the modulo 1024 binary week number broadcast from an SV (see IS-GPS-200). Some user applications (such as the SEM program) may require the user to replace the modulo 1024 week number in this format with the full decimal week number (e.g., 0-65,535) in order to determine the correct calendar date of the Almanac.

** SVN Number as distributed by the CS is a modulo 256 (000-255) filled with leading zeros.

***As defined in IS-GPS-200.

****Rounded up from max range of IS-GPS-200 binary format.
30.5 YUMA Almanac Format

Parameters used in the YUMA format are not the same as used in the SEM format. 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. Entries for ID, Health, and Week are represented in decimal format.

Figure 30-2 illustrates one record in a current.alm YUMA Almanac file sample. The maximum number of records in a current.alm file is 32 and this file addresses PRNs 1-32. Line one of each record identifies the week in which the file was generated as well as the PRN number of the subject SV. There is an additional YUMA file with a file name extension of .blm that is identical to .alm, except that it addresses PRNs 01-63 and the range of number of records or ID number in a current.blm file is 00-63.
| **ID:** | 01 |
| **Health:** | 000 |
| **Eccentricity:** | 0.5404472351E-002 |
| **Time of Applicability(s):** | 589824.0000 |
| **Orbital Inclination(rad):** | 0.9723724451 |
| **Rate of Right Ascen(r/s):** | -0.7931758961E-008 |
| **SQRT(A) (m 1/2):** | 5153.727539 |
| **Right Ascen at Week(rad):** | -0.4069756641E+000 |
| **Argument of Perigee(rad):** | -1.719371504 |
| **Mean Anom(rad):** | 0.6687658141E+000 |
| **Af0(s):** | 0.2651214600E-003 |
| **Af1(s/s):** | 0.0000000000E+000 |
| **Week:** | 175 |

*Figure 30-2* YUMA Almanac Data Sample For Current.alm
APPENDIX 4: EXTENDED SIGNALS HEALTH STATUS FILES

Appendix 4 describes the Extended Signals Health Status (ESHS) message format.

40.1 Extended Signals Health Status

The Extended Signals Health Status (ESHS) data message provides the health status of each of the modernized civil signals (L1C, L2C, and L5) for each SV, as defined in Table 40-I.

Table 40-I Modernized Civil Signals

<table>
<thead>
<tr>
<th>Modernized Civil Signal</th>
<th>L1C</th>
<th>L2C</th>
<th>L5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference Document</td>
<td>IS-GPS-800</td>
<td>IS-GPS-200</td>
<td>IS-GPS-705</td>
</tr>
<tr>
<td>Applicable SV Block/Iteration</td>
<td>III</td>
<td>IIR-M, IIF, III</td>
<td>IIF, III</td>
</tr>
</tbody>
</table>

IS-GPS-200, Section 30.3.3.1.1.2, defines the signal health of L1, L2 and L5 as follows: “the three, one-bit, health indication in bits 52 through 54 of message type 10 refers to the L1, L2, and L5 signals of the transmitting SV. The health of each signal is indicated by:

- 0 = Signal OK,
- 1 = Signal bad or unavailable

The ESHS format, as shown in Figure 40-1, contains a header that identifies the number of records (number of satellites), filename (extension .ale), and the health of each signal as described above. The ESHS sample shown in Figure 40-1 depicts one data record out of 28 in this sample file.

<table>
<thead>
<tr>
<th>LINE</th>
<th>Parameter Name</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td># of Records/FileName</td>
<td>28 CURRENT.ALE</td>
</tr>
<tr>
<td>2</td>
<td>GPS Week #/GPS TOA</td>
<td>175 589824</td>
</tr>
<tr>
<td>3</td>
<td>Blank Line</td>
<td></td>
</tr>
<tr>
<td>R-1</td>
<td>PRN</td>
<td>18</td>
</tr>
<tr>
<td>R-2</td>
<td>SVN</td>
<td>054</td>
</tr>
<tr>
<td>R-3</td>
<td>L1/L2/L5 Health Status</td>
<td>0-7 in binary format (000, 001, 010, 011, 100, 101, 110, 111)</td>
</tr>
<tr>
<td>R-4</td>
<td>Blank Line</td>
<td></td>
</tr>
</tbody>
</table>

Note: The left columns are for information only and not part of the CURRENT.ALE file. The extended health Almanac sample (CURRENT.ALE) illustrated above is a data sample of one record out of 28 in this sample file.

After line R-4 of this example, lines R-1 through R-4 are repeated for each record in the CURRENT.ALE file.

Figure 40-1 Extended Signals Health Status Data Sample

Table 40-II identifies the characteristics of each parameter in the ESHS message.
### Table 40-II  ESHS Description

<table>
<thead>
<tr>
<th>Line No.</th>
<th>Parameter Name</th>
<th>Description</th>
<th>Units</th>
<th>Range</th>
<th>Accuracy</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Number of records</td>
<td>The number of satellite ESHS records contained in the file</td>
<td>Records</td>
<td>00 to 63</td>
<td>1</td>
<td>2 significant digits</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blank space for format spacing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Name of ESHS file</td>
<td>Descriptive name for the ESHS file</td>
<td>N/A</td>
<td>Any combination of valid ASCII characters</td>
<td>N/A</td>
<td>24 significant characters</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blank space for format spacing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>GPS Week Number</td>
<td>The Almanac reference week number (WNa) for all data in the file</td>
<td>Weeks</td>
<td>0 to 1023*</td>
<td>1</td>
<td>4 significant characters</td>
</tr>
<tr>
<td>3</td>
<td>GPS Time of Applicability</td>
<td>The number of seconds since the beginning of the Almanac reference week for all data in the file.</td>
<td>Seconds</td>
<td>0 to 602,112</td>
<td>1</td>
<td>6 significant characters</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blank Line for Format Spacing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Record Format</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R-1</td>
<td>PRN Number</td>
<td>The satellite PRN number. This is a required data item as it is the GPS user’s primary means of identifying GPS satellites. It is equivalent to the Space Vehicle identification (SVID) number of the SV.</td>
<td>None</td>
<td>01-63</td>
<td>N/A</td>
<td>2 significant digits</td>
</tr>
<tr>
<td>R-2</td>
<td>SVN</td>
<td>The SV reference number. Unique sequential number associated with each satellite.</td>
<td>None</td>
<td>000-255 (000 denotes this field is empty)</td>
<td>N/A</td>
<td>3 significant digits</td>
</tr>
<tr>
<td>R-3</td>
<td>L1C/L2C/L5 Health Status</td>
<td>The health status of the L1C/L2C/L5 signals, defined as follows: 0 = Signal OK 1 = Signal bad or unavailable</td>
<td>None</td>
<td>0-7 in binary format (000, 001, 010, 011, 100, 101, 110, 111)</td>
<td>N/A</td>
<td>3 significant characters</td>
</tr>
</tbody>
</table>

*GPS Week Number as distributed by the CS is a modulo 1024 (0-1023) decimal number representing the modulo 1024 binary week number broadcast from an SV (see IS-GPS-200). Some user applications (such as the SEM program) may require the user to replace the modulo 1024 week number in this format with the full decimal week number (e.g., 0-65,535) in order to determine the correct calendar date of the Almanac.
50 APPENDIX 5: ANTI-SPOOFING STATUS FILE

Appendix 5 describes the Anti-Spoofing Status message format.

50.1 Anti-Spoofing Status

The Anti-Spoofing (A-S) Status informs Users whether the Anti-Spoofing mode of each GPS SV is ON or OFF. There are two A-S Status files named as.txt and as2.txt. The message files are simple text files that identify each satellite in the GPS constellation by a two digit PRN number and a three digit SVN number and it shows the SV’s A-S Status (ON/OFF). The difference between the two A-S Status files is the PRN Numbers. As.txt addresses PRNs 1-32 and as2.txt addresses PRNs 01-63. For the as2.txt file, the two digit PRN number and the three digit SVN field are zero padded. An example of the A-S Status (as.txt) is shown in Figure 50-1.

<table>
<thead>
<tr>
<th>PRN</th>
<th>SVN</th>
<th>A-S</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>049</td>
<td>ON</td>
</tr>
<tr>
<td>2</td>
<td>061</td>
<td>ON</td>
</tr>
<tr>
<td>3</td>
<td>033</td>
<td>ON</td>
</tr>
<tr>
<td>4</td>
<td>034</td>
<td>ON</td>
</tr>
<tr>
<td>5</td>
<td>050</td>
<td>ON</td>
</tr>
<tr>
<td>6</td>
<td>036</td>
<td>ON</td>
</tr>
<tr>
<td>7</td>
<td>048</td>
<td>ON</td>
</tr>
<tr>
<td>8</td>
<td>038</td>
<td>ON</td>
</tr>
<tr>
<td>9</td>
<td>039</td>
<td>ON</td>
</tr>
<tr>
<td>10</td>
<td>040</td>
<td>ON</td>
</tr>
<tr>
<td>11</td>
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Figure 50-1 Sample of the Anti-Spoofing Status file (as.txt)


60  APPENDIX 6: LETTERS OF EXCEPTION

60.1 Scope

As indicated in paragraph 1.3, initial signature approval of this document, as well as approval of subsequent changes to the document, can be contingent upon a "letter of exception". This appendix depicts such "letters of exception" when utilized by any signatory of this document in the initial approval cycle and/or in the change approval process. The ICC will omit such letters of exception from subsequent revisions of this document based on written authorization by the respective signatory (without processing a proposed interface revision notice (PIRN) for approval). When some (but not all) of the exceptions taken by a signatory are resolved, the signatory shall provide the ICC with an updated letter of exception for inclusion in the next ICD revision (without processing a PIRN for approval).

60.2 Applicable Documents

The documents listed in Section 2.1 shall be applicable to this appendix.

60.3 Letters of Exception

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 60-1. Signatories for whom no letter of exception is shown have approved this version of the document without exception.

Figure 60-1 Letter of Exception