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Compass / Global Navigation Satellite System (GNSS)satellite Precision application parameters and definitions described

Definitions and descriptions of BDS / GNSS satellite parameters for high precision application

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Foreword

To meet the needs of China's satellite navigation development standards, the National Standardization Technical Committee of the Beidou satellite navigation Compass organizations to develop a

Standards, recommended the use of reference concerned.

The standard proposed by China Satellite Navigation System Management Office.

This standard by the National Technical Committee of Standardization Beidou satellite navigation (SAC / TC 544) Focal point.

This standard was drafted: Shanghai Astronomical Observatory, Chinese Satellite Navigation Engineering Center, China Academy of Space Technology, China Branch

Small satellite College Innovation Institute, Xi'an Institute of Surveying and Mapping, Wuhan University.

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Compass / Global Navigation Satellite System (GNSS)satellite

Precision application parameters and definitions described

1 range

This standard specifies the Compass / Global Navigation Satellite System (GNSS) And the definition and description of satellite applications such as file format parameters accurately.

This standard applies to the Big Dipper and GPS , GLONASS , Galileo Application of equal precision Orbit satellite navigation system, location, timing, etc.

Generation, distribution and use of satellite closing arguments.

2 Normative References

The following documents for the application of this document is essential. All the reference documents date, only the edition is applicable to this document.

For undated references, the latest edition (including all amendments) applies to this document.

GB / T 19391-2003 Global Positioning System(GPS) Terms and Definitions

BD 110001-2015 The term & COMPASS

iGMAS-T11TAC008-01V3.2 RINEX Data file format

3 Terms and Definitions

GB / T 19391-2003 with BD 110001-2015 Definition The following terms and definitions apply to this document.

3.1

Machine coordinate system mechanical coordinate system

Is a fixed coordinate system attached to the satellite body. The origin of the coordinate system O Four for the geometric center of the satellite and the rocket abutment surfaces, Z An array an

Loading surface normal direction, X Thrust axis is the normal direction of the mounting surface, Y Axis X , Z Constituting the right hand axis, perpendicular to the mounting surface of the solar wings.

3.2

Satellite centroid Mass center of the satellite

The center of mass of the satellite, represented by three-dimensional coordinates in the machine coordinate system.

3.3

Aster coordinate system coordinates of stars

Also known as star-fixed coordinate system and the satellite body coordinate system. origin O_b Satellite center of mass, triaxial X_b , Y_b , Z_b Parallel to the machine coordinate system X , Y ,

Z Axis and in the same direction.

3.4

Orbit System orbital coordinate system

origin O_s Center of mass of the satellite, as the satellite orbit plane coordinate plane, Zs Axis by the satellite geocentric centroid point, Ys Shaft toward the negative side of the track

Normal, Xs Axis in the track plane Zs Axis perpendicular to the satellite direction of movement.

3.5

Satellite Attitude satellite attitude

Describes the relationship between the track star coordinate system and the coordinate parameters generally used astral yaw axis with respect to the track axis, overlooking

Elevation and roll angle representation.

3.6

Antenna phase center antenna phase center

One electrical center of the antenna, the antenna far zone means the radiation field curvature equal phase plane passing through the center of the curve intersects the axis of the antenna.

3.7

The antenna phase center average mean antenna phase center

The actual equiphase plane throughout the center position of the antenna beam Quasi synthetic standard circular curved surface.

3.8

The antenna reference point antenna reference point

The antenna can be specified to a measured point, generally defined as the intersection of the central axis of the mounting surface and the bottom antenna.

3.9

Satellite antenna phase center satellite antenna phase center

The average three-dimensional coordinates satellite antenna phase center in the star coordinates.

3.10

Phase center variation phase center variation

The actual direction of the antenna phase center and a mean phase center (wavefront) goodness of fit, also called dispersion phase center.

3.11

Phase Center phase center offset

The average deviation of the antenna phase center between the antenna reference point.

3.12

Satellite hardware latency hardware delay

Satellite equipment delays device time delay

Satellite signal delay time generated from the end of the antenna phase center.

3.13

Uncorrected phase delay uncalibrated Phase Delay

Fractional circumferential variation delay device fractional-cycle bias

When the non-integer portion of the satellite navigation signal phase of the carrier device delay expression.

3.14

Inter-frequency phase deviation inter-frequency phase bias

Multi-device delay difference frequency carrier signal when transmission of the same apparatus, generally referred to the time varying part of inter-frequency clock offset

(Inter-frequency Clock Bias , IFCB).

3.15

Intersymbol differential code bias deviation

Differences ranging code signal in the same device delays transmission apparatus.

4 Abbreviations

The following abbreviations are applicable to this document.

BDS : Beidou satellite navigation system (BeiDou Navigation Satellite System)

COSPAR-ID : International designator (Committee on Space Research-ID)

GNSS : Global Navigation Satellite System (Global Navigation Satellite System)

ISC : Intra-frequency group delay difference (Timing Group Delay)

ISSB : Deviation signal between systems (Inter-system Signal Bias)

PRN : Pseudorandom noise codes (Pseudo Random Noise Code)

SVN : Space vehicle number (Space Vehicle Number)

TGD : Inter-frequency group delay difference (Timing Group Delay)

5 Satellite Basics

5.1 Satellite logo

Includes satellite identification system identification, SVN number, COSPAR-ID , PRN Four categories:

a) GNSS System Identification: identify the different system identification means of a satellite navigation system, represented by a letter:

- - C : BDS ;
- - G : GPS ;
- - R : GLONASS ;

- - E ; Galileo .

b) SVN Number: unique number for satellite navigation;

c) COSPAR-ID : For naming, satellite identification by a row of two rows of numbers and letters. The first row for the digital satellite

The launch of the second row of numbers for the global launch of its satellite launch in order, with the right number of letters in the second row is in

When a plurality of separated portions of the emission times for identifying each part of the task;

d) PRN Number: identification code using a pseudo random number of navigation satellites.

5.2 The basic parameters of the satellite

The basic parameters include the quality of the satellite satellites, satellites and satellite type laser reflector position parameter (see Appendix A Table A.1 And Table A.2):

a) Satellite mass: mass of the satellite in the orbit, the capture phase, there will be a slight change with time;

b) Satellite Type: satellite design or production lot and manufacturer or model type of orbit model, e.g. BEIDOU-2I , BEIDOU-2G , BEIDOU-3M ;

c) Satellite laser reflector setting parameters: coordinates of the laser reflector at the equivalent machine coordinate system or the coordinate system of the reflection point star.

Mass of the satellite, the satellite type and satellite laser reflector position parameter file format described in the Appendix B Fig.

5.3 light pressure parameters

Light pressure parameter includes: solar radiation constant, the satellite configuration of the surface member (planes, cylinders, rings, parabolic, etc.), the reference position described The number and surface area (see Appendix A Table A.3), The absorption coefficient, the specular reflection coefficient and the albedo (see Appendix A Table A.4),motion Law and so on. Light pressure parameter file format described in the Appendix B Fig.

5.4 attitude control mode

5.4.1 Classification

Availability for the navigation satellite health, attitude control mode is divided into three types: dynamic biasing attitude control mode, bias attitude control mode, the motor Yaw control mode.

5.4.2 movable biasing attitude control mode

When the sun - the angle between the earth vector and the satellite orbit plane (i.e. the solar orbit angle) β Not less than its threshold value β_0 (β_0 Generally 3 When °), Wei Star yaw angle using a continuous dynamic control mode, so that the star coordinates + Y Satellite shaft - the sun remains vertical vector, which is called Dynamic bias attitude control mode, the attitude control of the yaw angle in accordance with a predetermined control target yaw, yaw attitude angles at this time is:

$$\bullet_{m} \bullet \cdot (\mathrm{Tan}_{1} /_{oy} S S_{ox}) \text{ - - - - - - - - - - - - - - } (1)$$

Where:

S_{ox} - track the sun vector lines x Direction component;

S_{oy} - track the sun vector lines y Component direction.

When the sun - planet satellite orbital plane vector angle is less than the threshold value β_0 , The zero-bias attitude control mode and a yaw motor control mode.

5.4.3 bias attitude control mode

Under zero bias attitude control mode, the satellite remains zero yaw angle.

5.4.4 Mobile yaw control mode

Maneuver yaw control mode, so that the satellite + X Faces always face the sun, satellite + Y Satellite shaft - vector approximately perpendicular to the sun, in accordance with β = 3.0。

The predetermined yaw control target yaw angle,

If the β> 0。Yaw attitude angle calculating see equation (2):

$$\bullet_{m} \bullet \quad \cdot\, 0(\tan^{-1} \quad 05236 S_{ox}) \text{ - - - - - - - - - - - - - } (2)$$

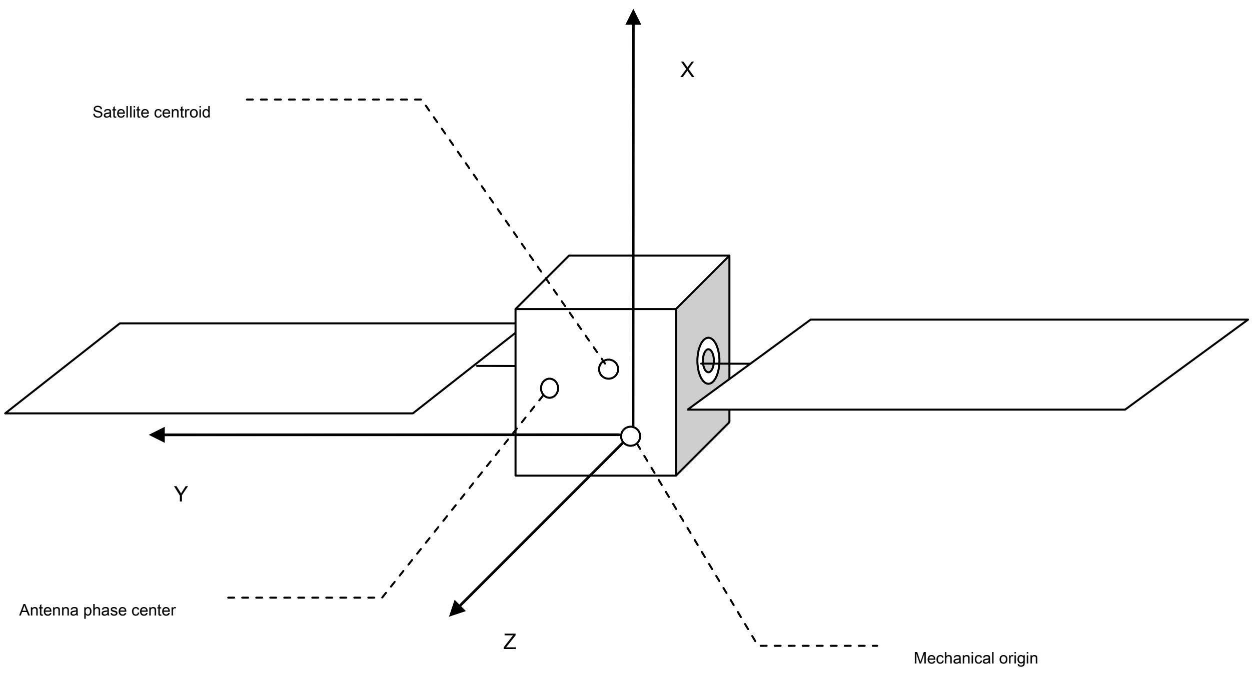
If the β < 0。Yaw attitude angle calculating see equation (3):

$$\bullet_{m} \bullet \quad \cdot\, 0\bullet(\tan^{-1} \quad 05236 S_{ox}) \text{ - - - - - - - - - - - - - } (3)$$

Beidou satellite navigation system GEO Satellite adopt zero-bias attitude control mode, Compass II IGSO with MEO Partial use of satellite motion and Two kinds of bias attitude control mode, Compass III IGSO with MEO And biasing the movable motor employed satellite yaw attitude control two kinds of modes.

5.5 Phase Center

Figure 1 Satellite antenna phase center of the satellite as shown with reference points do not coincide, it is necessary to correct the deviation of the phase center, general And gives the machine coordinate system and the deviation coordinates of stars. Satellite phase center deviation information needs Appendix A Table A.5 Fig. Satellite phase center offset file format described in the Appendix C Fig.



1 a schematic diagram Beidou Navigation Satellite

5.6 phase center variation

Since the actual transmission and reception of signals, which phase center varies with time, compared to the average phase center, the presence of

A deviation, it is necessary to correct for variations in phase center precise orbit, high-precision positioning applications. Satellite phase change information center

Appendix demand A Table A.6 Fig. Satellite phase center variation file format described in the Appendix C Fig.

6 Satellite equipment delays

6.1 uncorrected phase delay

Carrier phase signal portion of the peripheral device non-integer delay navigation satellites, usually expressed as a decimal weeks, restored integer ambiguity for

characteristic. Uncorrected phase delay file format described in the Appendix D Fig.

Inter-frequency phase deviation 6.2

Typically a plurality of navigation satellites broadcast navigation signals frequencies, different time delay device of each phase of the signal carrier frequency, and therefore generates a frequency

Between the phase deviation. In the data processing between the ground portion and the intermediate coupling phase difference between the satellite clock bias changes over time together, such mining

Estimated satellite clock of different frequencies with inconsistency, it is also often referred to as inter-frequency clock offset. Inter-frequency phase deviation File Format Description

Appendix D Fig.

Deviation between 6.3 yards

Inter-code bias DCB It is a general term for delay variation between different device types and frequencies ranging code signals, which generally includes a satellite and the receiver

Two machine parts, frequencies between the satellite and the inner portion with the general frequency offset TGD with ISC To represent. DCB Value of the selected reference datum related to

He expressed relative deviation form. Deviation between codes in Appendix describes the file format D Fig.

appendix A

(Informative)

Satellite information needs explanation

Satellite information requirements are listed in Table A.1 ~ A.6 .

Table A.1 satellite quality information table

SVN	PRN	Satellite Quality (date)	Centroid coordinates in the machine coordinate system (date)		
			X	Y	Z
C003	C01	√	√	√	√
C016	C02	√	√	√	√

Table A.2 laser reflector position parameter table

SVN	PRN	Machine coordinate system coordinates			Coordinates of the star coordinates (date)		
		X	Y	Z	X	Y	Z
C003	C01	√	√	√	√	√	√
C016	C02	√	√	√	√	√	√

Table A.3 satellite surface for solar radiation pressure modeling statistical information

Satellite size under mechanical coordinate system	Satellite body surface area
X direction	+ - X surface
Y direction	+ - Y surface
Z direction	+ - Z surface

Table A.4 satellite surface for solar radiation pressure modeling information Statistics (SVN satellite number)

Satellite member		shape Toward the outer area of normal (m 2)			material	Satellite early life		
						Absorption coefficient	Specular reflection coefficient	Albedo
satellite Body	component 1	flat	+ X	√	√	√	√	√
	component 2	flat	- X	√	√	√	√	√
	component 3	flat	- X	√	√	√	√	√
	component 4	flat	+ Y	√	√	√	√	√
	component 5	flat	- Y	√	√	√	√	√
	component 6	flat	+ Z	√	√	√	√	√
	component 7	flat	+ Z	√	√	√	√	√
	component 8	flat	+ Z	√	√	√	√	√
	component 9	flat	- Z	√	√	√	√	√
Solar wing			The sun's rays	√	√	√	√	√
			The sun's rays	√	√	√	√	√

Table A.5 Satellite antenna phase center offset

SVN	PRN	frequency	Machine coordinate system coordinates			The coordinate system of stars		
			X	Y	Z	X	Y	Z
C003	C01	*f*1	√	√	√	√	√	√
		*f*2	√	√	√	√	√	√
		*f*3	√	√	√	√	√	√
C016	C02	*f*1	√	√	√	√	√	√
		*f*2	√	√	√	√	√	√
		*f*3	√	√	√	√	√	√

Table A.6 average phase deviation with respect to the center of the star coordinates in the actual satellite antenna phase center

Value	ZEN1	DZEN	ZEN2
0 °	√	√	√
DAZI	√	√	√
360 °	√	√	√

Note: DZEN Is highly angular interval is set to 0.5 degree; DAZI Azimuth interval set 5 Degree, if the azimuth interval 0 , Only provides high

Angle value related to the deviation. Value It is obtained solving the actual satellite antenna phase center with respect to the average phase deviation of the center, which value can be ground under test or the azimuth and elevation angle corresponding to grid point coordinate stars.

appendix B

(Normative)

Satellite Basic Information File Format Description

Satellite information file naming rules and the content and format of the data part of the Table B.1-B.3 Fig.

Table B.1 satellite information file naming rules

Satellite information file naming rules
Satellite information file named BDSsatellite_yyyymmdd.info . yyyy For the year of release files (four digits), mm For the month of release files (two digits), dd For the publication number (two digits) days files, info It represents the satellite information file.

Table B.2 satellite information file header file formats

Satellite information header file formats		
Field Name	**description**	**format(FORTRAN) (Default: right-aligned)**
VERSION / TYPE / AGENCY	**-version** **-Types of** C: BDS Satellite Information G: GPS Satellite Information R: GLONASS Satellite Information E: Galileo Satellite Information M: Multi-satellite information system **-Operating agencies**	F8.1,12X A1,19X A3,17X
PGM / TIME SYSTEM / TIME	**-Run the program** **-Time System** **-calculating time** year month day	- A6,14X - A4,16X - I4, A1, I2, A1, I2,10X
END OF HEADER	The last part of the recording head	60X

Table B.3 satellite information file data section format

Satellite information data file format section		
Field Name	**description**	**format(FORTRAN) (Default: right-aligned)**
+SATEINFO	**-Satellite information data recording start portion**	9X
SYSTEM	**-System identification**	A1,1X
SVN	**- SVN number**	I4,1X
COSPAR-ID	**- COSPAR-ID**	I4, A1, I3, A1,1X
PRN	**- PRN number**	A1, I2,1X
LAUNCHED	**- PRN No. Enable Time**	I7, A1, I5,1X
DECOMMISSIONED	**- PRN No end time**	I7, A1, I5,1X
SAT MASS	**-Satellite Quality**	F6.2,1X
SAT TYPE	**-Satellite type**	A15,1X
SAT RETROREFLECTOR	**-Satellite corner reflector position parameter (star coordinates)** X	 F11.6,1X

Table B.3 (cont.)

Satellite information data file format section		
Field Name	**description**	**format(FORTRAN) (Default: right-aligned)**
	Y	F11.6,1X
	Z	F11.6,1X
-SATEINFO	-End of the satellite information data recording portion	9X
SOLAR PRESSURE Satellite Box	**-Light pressure parameter**	
Satellite Box part 1	**satellite body satellite body member 1 size:**	
+SOLARPRE	Solar pressure parameter data recording section to	9X
PRN:	start the same kind of satellite structure of stars PRN Satellite	A4,1X, mA1, I2, IX
Shape of satellite Box part 1	body member 1 Toward the normal shape of the	A10,1X
Oriented	outer material in the effective area of the heat	A2,1X
Sate effective Area	radiation absorption coefficient of the specular	F11.6,1X
Sate Material	reflection coefficient power irradiation albedo	A10,1X
Sate Absorption coefficient		F11.6,1X
Sate Reflection coefficient		F11.6,1X
Sate Diffuse coefficient		F11.6,1X
Heat radiation		F11.6,1X
Power radiation		F11.6,1X
Solar Wing	**Sun sun wing flap**	
	Dimensions:	
Oriented	Normal outer material	A2,1X
Solar wing effective Area	facing the effective	F11.6,1X
Solar wing Material	area of the heat	A10,1X
Solar wing Absorption coefficient	radiation absorption	F11.6,1X
Solar wing Reflection coefficient Solar wing	coefficient of the name	F11.6,1X
Diffuse coefficient	of specular reflectance	F11.6,1X
Heat radiation	power irradiation	F11.6,1X
Power radiation	albedo	F11.6,1X
-SOLARPRE	Solar pressure parameter data recording portion of the end	9X

NOTE: Data Format Type Description

F: represents a single precision floating point numbers, representing the character as floating point F9.2, representing 9, two decimal places, right justified; A: represents a character or character string, such as A60 represents a string of length 60 ; X: represents a space occupying, as accounted for 60 denotes 60X space; I: integer representing the number, such as accounting I4 represents an integer of 4 bits, right-aligned.

File examples are as follows:

```
     1.0              C                                    SHA VERSION / TYPE / AGENCY
SHA SateInfo        BDST                2019-01-29          PGM / TIME SYSTEM / DATE
The satellite infomation contain satellite mass, satellite  COMMENT
type, the position of retroreflector, satellite effective   COMMENT
area, satellite material, absorption coefficient, reflectionCOMMENT
coefficient, diffuse coefficient, heat radiation and power  COMMENT
radiation.                                                  COMMENT
The satellite information file provided by satellite        COMMENT
manufacturers.                                              COMMENT
                                                            END OF HEADER
+SATEINFO
C C201 0000-000A C19 2010016:00000 0000000:00000 0943.00  BEIDOU-3M-CAST    0.593300   -0.086960    1.260040
C C202 0000-000A C20 2010016:00000 0000000:00000 0942.00  BEIDOU-3M-CAST    0.594700   -0.084560    1.264440
C C206 0000-000A C21 2010016:00000 0000000:00000 0941.00  BEIDOU-3M-CAST    0.596700   -0.087560    1.267340
C C205 0000-000A C22 2010016:00000 0000000:00000 0942.00  BEIDOU-3M-CAST    0.598600   -0.086560    1.265040
C C209 0000-000A C23 2010016:00000 0000000:00000 0945.00  BEIDOU-3M-CAST    0.604500   -0.080860    1.271840
C C210 0000-000A C24 2010016:00000 0000000:00000 0946.00  BEIDOU-3M-CAST    0.605400   -0.082460    1.262840
C C212 0000-000A C25 2010016:00000 0000000:00000 1043.30  BEIDOU-3M-SECM    0.656600    0.428700    0.610000
C C211 0000-000A C26 2010016:00000 0000000:00000 1041.80  BEIDOU-3M-SECM    0.655900    0.427900    0.609200
C C203 0000-000A C27 2010016:00000 0000000:00000 1018.00  BEIDOU-3M-SECM    0.609600    0.431570    0.620390
C C204 0000-000A C28 2010016:00000 0000000:00000 1014.40  BEIDOU-3M-SECM    0.608000    0.431120    0.608010
C C207 0000-000A C29 2010016:00000 0000000:00000 1010.40  BEIDOU-3M-SECM    0.609500    0.426000    0.614200
C C208 0000-000A C30 2010016:00000 0000000:00000 1008.60  BEIDOU-3M-SECM    0.609700    0.427300    0.615300
C C213 0000-000A C32 2010016:00000 0000000:00000 1007.00  BEIDOU-3M-CAST    0.628300   -0.086760    1.236740
C C214 0000-000A C33 2010016:00000 0000000:00000 1007.00  BEIDOU-3M-CAST    0.627600   -0.088160    1.229340
C C216 0000-000A C34 2010016:00000 0000000:00000 1046.60  BEIDOU-3M-SECM    0.672800    0.428200    0.611400
C C215 0000-000A C35 2010016:00000 0000000:00000 1045.00  BEIDOU-3M-SECM    0.672400    0.429100    0.609500
C C218 0000-000A C36 2010016:00000 0000000:00000 1061.00  BEIDOU-3M-CAST    0.613300   -0.089160    1.097740
C C219 0000-000A C37 2010016:00000 0000000:00000 1061.00  BEIDOU-3M-CAST    0.608200   -0.089860    1.093540
C C220 0000-000A C38 2010016:00000 0000000:00000 2952.00  BEIDOU-3I-CAST   -0.989260   -0.711820    1.972390
C C221 0000-000A C39 2010016:00000 0000000:00000 2949.00  BEIDOU-3I-CAST   -0.982410   -0.712660    1.927750
C C222 0000-000A C45 2010016:00000 0000000:00000 1059.00  BEIDOU-3M-CAST    0.529300   -0.086660    1.170740
C C223 0000-000A C46 2010016:00000 0000000:00000 1058.00  BEIDOU-3M-CAST    0.529500   -0.088160    1.163440
C C217 0000-000A C59 2010016:00000 0000000:00000 2968.00  BEIDOU-3G-CAST    0.589600   -0.084460    0.763740
-SATEINFO
+SOLARPRE
PRN: C19 C20 C21 C22 C23 C24 C36 C37 C45 C46
SATEBOX_01 +X 0002.780000 ********** 0000.350000 0001.000000 0000.000000 0000.000000 0000.000000
SATEBOX_02 -X 0001.750000 ********** 0000.920000 0000.000000 0001.000000 0000.000000 0000.000000
SATEBOX_03 +Y 0001.030000 ********** 0000.135000 0000.000000 0001.000000 0000.000000 0000.000000
SATEBOX_04 -Y 0002.600000 ********** 0000.135000 0000.000000 0001.000000 0000.000000 0000.000000
SATEBOX_05 +Z 0002.600000 ********** 0000.135000 0000.000000 0001.000000 0000.000000 0000.000000
SATEBOX_06 -Z 0000.820000 ********** 0000.920000 0000.000000 0001.000000 0000.000000 0000.000000
SATEWING   +Y 0010.220000 ********** 0000.920000 0000.000000 0001.000000 0000.000000 0000.000000
SATEWING   -Y 0010.220000 ********** 0000.920000 0000.000000 0001.000000 0000.000000 0000.000000
-SOLARPRE
```

appendix C

(Normative)

Satellite antenna phase center File Format Description

Satellite information file naming rules and the content and format of the data part of the Table C.1-C.3 Fig.

Table C.1 antenna phase center file naming

Antenna phase center file naming rules
Antenna phase center file is named BDSsatellite_yyyymmdd.atx . yyyy For the year of release files (four digits), mm For the month of release files (two digits), dd For the publication number (two digits) days files, atx An antenna phase center file.

Table C.2 file header described antenna phase center

Description Header antenna phase center		
Field Name	description	format(FORTRAN) (Default: right-aligned)
ANTEX VERSION / SYST	-version -Satellite System C: BDS G: GPS R: GLONASS E: Galileo M: Multi-system hybrid antenna file	F8.1,12X, A1,39X
PCV TYPE / REFANT	-Type phase center A : Absolute value of the phase center R : Relative phase center value -Reference antenna relative value type (blank: AOAD / M_T) -Reference antenna serial number (optional)	A1,19X, A20, A20
* COMMENT	Comment lines	A60
END OF HEADER	The last part of the recording head	60X

Table C.3 antenna phase center data block descriptors

Antenna phase center data block descriptors		
Field Name	description	format(FORTRAN) (Default: right-aligned)
START OF ANTENNA	Data recording start identification antenna portion	60X

Table C.3 (cont.)

Antenna phase center data block descriptors		
Field Name	**description**	**format(FORTRAN) (Default: right-aligned)**
TYPE / SERIAL NO	**Satellite Antenna:** -Antenna type, for example: ' BEIDOU-3M ' -satellite PRN number -sNN‖ -Satellite code -sNNN‖ (Optional) s - Satellite system flag (' C ' , G ' ' R ' ' E ') NN- Two digital satellite PRN No. NNN- Three-digit satellite SVN No. - International designator -YYYY-XXXA‖ (Optional) YYYY - Rocket into the orbit of the Year | XXX - Rocket car number order	A20, A20, A10, A10
METH / BY / # / DATE	- **The calibration method:** 'CHAMBER' ' FIELD ' ' ROBOT ' Wait - institution name - The number of antenna calibration - date, DD-MMM-YY, E.g:' 07-NOV-19 ' DD- Date, with two-digit MMM- month, Abbreviations used the first three characters of English YY- years, It is represented by two digits	A20, A20, I6,4X, A10
DAZI	**Azimuth increment** : 0 to 360 Incremental ' DAZI ' (In degrees). 360 Degree must be ' DAZI ' Divisible. 'DAZI' Constants: 5.0 For non-position-related phase center variation, with ' 0.0 ' Specified.	2X, F6.1, 52X
ZEN1 / ZEN2 / DZEN	**Satellite antenna nadir angle range and increment:** Grid nadir angle defined by the angle: nadir angle range ' ZEN1 ' To ' ZEN2 ' Incremental ' DZEN ' (degree). 'DZEN' Must be> 0.0 . 'ZEN1' with' ZEN2 ' must be' DZEN ' Multiples. ' ZEN2 ' Always must be greater than ' ZEN1 ' . 'DZEN' Common values: 1.0 E.g:' 0.0 14.0 1.0 '	2X, 3F6.1, 40X
# OF FREQUENCIES	Antenna type comprises a number of frequency current.	I6,54X

Table C.3 (cont.)

Antenna phase center data block descriptors		
Field Name	**description**	**format(FORTRAN) (Default: right-aligned)**
* VALID FROM	time(4 Bit year, month, day, hour, minute, second) valid start time	5I6, F13.7, 17X
* VALID UNTI	time(4 Bit year, month, day, hour, minute, second) end time of validity	5I6, F13.7, 17X
* SINEX CODE	To from SINEX Documents PCO Indicating their corresponding SINEX File Number	A10,50X
* COMMENT	Comment lines	A60
START OF FREQUENCY	A frequency of the identification data block begins. You must specify a satellite system flag (' C ' ' G ' ' R ' ' E ') And is consistent with the observation file format standard frequency number. **BDS:** 'C02' - B1 'C07' - B2 'C06' - B3 'C01' - B1c 'C05' - B2a **GPS:** 'G01' - L1 'G02' - L2 'G05' - L5 **GLONASS:** 'R01' - G1 'R02' - G2 **Galileo:** 'E01' - E1 'E05' - E5a 'E07' - E5b 'E08' - E5 (E5a + E5b) 'E06' - E6 The center portion comprises a frequency deviation from an average phase of the antenna phase center. This section does not allow other types of records or comment lines.	3X, A1, I2,54X
NORTH / EAST / UP	**Satellite Antenna:** The average antenna phase center with respect to the satellite center of mass X , Y with Z Direction deviation (in millimeters).	3F10.2,30X

Table C.3 (cont.)

Antenna phase center data block descriptors		
Field Name	description	format(FORTRAN) (Default: right-aligned)
Values of a non azimuth-dependent pattern	Mark ' NOAZI ' Represents a non-azimuth mode (if ' DAZI '> 0.0). From 'ZEN1' To ' ZEN2 ' (Incremental ' DZEN ') The phase variation values, in millimeters. All values on one line.	3X, A5, mF8.2
* Values of an azimuth-dependent pattern	in case' DAZI '> 0.0 , It indicates that the relevant azimuth mode. The first value in each row indicates the azimuth angle, from the back -ZEN1‖ To -ZEN2‖ (In increments' DZEN ') A phase change value in millimeter unit. Line represent all the values of the azimuth angle.	F8.1, mF8.2
END OF FREQUENCY	A frequency block end identification (format _END OF FREQUENCY_ Consistent).	3X, A1, I2,54X
* START OF FREQ RMS	Phase center variation value block start identification accuracy. The center portion comprises the rms phase error and the phase variation value. This section records or other type of comment lines can appear.	3X, A1, I2,54X
* NORTH / EAST / UP	Deviation RMS (In millimeters)	3F10.2,30X
* (Rms values of the non-azimuth-dependent pattern)	From' ZEN1 ' To ' ZEN2 ' (Incremental ' DZEN ') Rms value of the phase variation value of the non-azimuth mode, in millimeters. All values on one line.	3X, A5, mF8.2
* (Rms values of the azimuth-dependent pattern	From' ZEN1 ' To ' ZEN2 ' (Incremental ' DZEN ') Rms value of the phase change value associated azimuthal mode, in millimeters. All values on one line.	F8.1, mF8.2
* END OF FREQ RMS	Phase center variation value identification module begins precision (see also ' START OF FREQ RMS ')	3X, A1, I2,54X
END OF ANTENNA	The antenna identification data recording start portion.	60X

NOTE: Data Format Type Description Appendix B Footnote

File examples are as follows:

```
     1.4            C                                           ANTEX VERSION / SYST
A                                                           PCV TYPE / REFANT
The satellite antenna phase center file contain the PCO     COMMENT
and PCV of BDS, GPS, GLONASS and Galileo.                   COMMENT
The satellite antenna phase center file provided by         COMMENT
satellite manufacturers.                                    COMMENT
                                                            END OF HEADER
                                                            START OF ANTENNA
BEIDOU-2G           C01                 C003      2010-001A TYPE / SERIAL NO
                                             0     20-JUL-15 METH / BY / # / DATE
     0.0                                                    DAZI
     0.0   9.0   1.0                                        ZEN1 / ZEN2 / DZEN
     3                                                      # OF FREQUENCIES
  2010     1    16     0     0    0.0000000                 VALID FROM
VALUES FROM BEIDOU PROVIDER                                 COMMENT
FREQUENCY CODES C01 AND C02 BOTH REFER TO BEIDOU SIGNAL B1  COMMENT
   C02                                                      START OF FREQUENCY
    600.00      0.00   1100.00                              NORTH / EAST / UP
   NOAZI    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
   C02                                                      END OF FREQUENCY
   C06                                                      START OF FREQUENCY
    600.00      0.00   1100.00                              NORTH / EAST / UP
   NOAZI    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
   C06                                                      END OF FREQUENCY
   C07                                                      START OF FREQUENCY
    600.00      0.00   1100.00                              NORTH / EAST / UP
   NOAZI    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
   C07                                                      END OF FREQUENCY
                                                            END OF ANTENNA
```

appendix D

(Normative)

Device delay File Format Description

Fractional deviation of the delay devices, naming rules and inter-frequency phase deviation between the variation code and a file content and format of the data part of the Table D.1-D.3 Fig.

Table D.1 delay device file naming rules

Delay device file naming rules
Device delay skew file named ACCYYYYDDD.bias , ACC The issuing authority for the product, YYYY For the year, DDD For the day of the year.

Table D.2 delay device description file header

Delay device description file header		
Field Name	**description**	**format(FORTRAN)**
VERSION / TYPE / AGENCY	**-version** **-Types of** C: BDS G: GPS R: GLONASS E: Galileo M: Mixed multi-system deviation file **-Operating agencies**	F8.1,12X, A1,19X A3,17X
PGM / TIME SYSTEM / TIME	**-Run the program** **-Time System** **-calculating time** year month day	- A6,14X - A4,16X - I4, A1, I2, A1, I2,10X

Table D.3 apparatus described delay block

Device delay data block descriptors		
Field Name	**description**	**format(FORTRAN)**
* COMMENT	Comment lines	A60
WLUPD_SAT / WLUPD_REC	Epoch start time (hour, minute, second) end of the epoch time (hours, minutes, seconds) system identification, PRN Number / name of the station C: BDS G: GPS R: GLONASS E: Galileo Frequency combination type widelane UPD Value, in the circumferential widelane UPD Precision value, the unit is the estimated circumferential widelane UPD When used in the initial number of the station / satellite epoch time (hour, minute, second) end epoch time (hours, minutes, seconds) system identification, PRN Number / name of the station	I2,1X, I2,1X, I2,2X I2,1X, I2,1X, I2,2X 1X, A1, I2, 1X / A4, 1X A3, 1X, A3, 1X F8.4, 1X F8.4, 1X I6, 1X I2,1X, I2,1X, I2,2X I2,1X, I2,1X, I2,2X A1, 2X, A1, I2, 1X / A1, 1X,

Table D.3 (continued)

Device delay data block descriptors		
Field Name	**description**	**format(FORTRAN)**
NLUPD_SAT / NLUPD_REC	C: BDS G: GPS R: GLONASS E: Galileo Type frequency combination alleys UPD Value, in alleys week UPD Value accuracy, the unit is estimated alleys week UPD When the number of the station used	A4, 1X A3, 1X, A3, 2X F8.4, 1X F8.4, 1X I5, 2X
NCUPD_SAT / NCUPD_REC	Epoch start time (hour, minute, second) end of the epoch time (hours, minutes, seconds) system identification, PRN Number / name of the station C: BDS G: GPS R: GLONASS E: Galileo Frequency Type UPD Value, in week UPD Value accuracy, the unit is estimated Week UPD When the number of the station used	I2,1X, I2,1X, I2,2X I2,1X, I2,1X, I2,2X A1, 2X, A1, I2, 1X / A1, 1X, A4, 1X A8, 1X F8.3, 1X F8.3, 1X I5, 1X
IFPB_SAT / IFPB_REC	Epoch start time (hour, minute, second) end of the epoch time (hours, minutes, seconds) system identification, PRN Number / name of the station C: BDS G: GPS R: GLONASS E: Galileo The type of carrier phase IFPB Value, in ns estimate IFPB When the weight of the whole network and estimates IFPB When the number of the station used	I2,1X, I2,1X, I2,2X I2,1X, I2,1X, I2,2X A1, 2X, A1, I2, 1X / A1, 1X, A4, 1X A3, 1X, A3, 3X F8.3, 1X F8.3, 1X I5, 1X

Table D.3 (continued)

Device delay data block descriptors		
Field Name	**description**	**format(FORTRAN)**
DCB_SAT / DCB_REC	Epoch start time (hour, minute, second) end of the epoch	I2,1X, I2,1X, I2,2X
	time (hours, minutes, seconds) system identification, PRN	I2,1X, I2,1X, I2,2X
	Number / name of the station	A1, 2X, A1, I2, 1X / A1, 1X, A4, 1X
	C: BDS G: GPS R: GLONASS E: Galileo	
	The ranging code type	A3, 1X, A3, 8X
	DCB Value, in ns	F8.3, 1X
	RMS Value, in ns	F8.3, 1X
	estimate DCB When the number of the station used	I5, 1X

NOTE: Data Format Type Description Appendix B Footnote

File examples are as follows:

```
     1.0           M                   SHA                VERSION / TYPE / AGENCY
BIAS               BDST                2019-01-29         PGM / TIME SYSTEM / DATE
************************************************************COMMENT
00 00 00  00 00 30  G  G01 L1W L2W  0000.004 0000.001    32 WLUPD_SAT
00 00 00  00 00 30  G  G02 L1W L2W  0000.004 0000.001    32 WLUPD_SAT
00 00 00  00 00 30  G  G03 L1W L2W  0000.004 0000.001    32 WLUPD_SAT
00 00 00  00 00 30  G  G04 L1W L2W  0000.004 0000.001    32 WLUPD_SAT
00 00 00  00 00 30  G  G05 L1W L2W  0000.004 0000.001    32 WLUPD_SAT
00 00 00  00 00 30  G  G06 L1W L2W  0000.004 0000.001    32 WLUPD_SAT
00 00 00  00 00 30  C  C01 L2I L6I  0000.004 0000.001    35 WLUPD_SAT
00 00 00  00 00 30  C  C02 L2I L6I  0000.004 0000.001    35 WLUPD_SAT
00 00 00  00 00 30  C  C03 L2I L6I  0000.004 0000.001    35 WLUPD_SAT
00 00 00  00 00 30  C  C04 L2I L6I  0000.004 0000.001    35 WLUPD_SAT
00 00 00  00 00 30  G SHA1 L1W L2W  0000.004 0000.001    35 WLUPD_REC
00 00 00  00 00 30  G KUN1 L1W L2W  0000.004 0000.001    35 WLUPD_REC
00 00 00  00 00 30  C SHA1 L2I L6I  0000.004 0000.001    35 WLUPD_REC
00 00 00  00 00 30  C KUN1 L2I L6I  0000.004 0000.001    35 WLUPD_REC
00 00 00  00 00 30  G  G01 L1W L2W  0000.004 0000.001    32 NLUPD_SAT
00 00 00  00 00 30  G  G02 L1W L2W  0000.004 0000.001    32 NLUPD_SAT
00 00 00  00 00 30  G  G03 L1W L2W  0000.004 0000.001    32 NLUPD_SAT
00 00 00  00 00 30  G  G04 L1W L2W  0000.004 0000.001    32 NLUPD_SAT
00 00 00  00 00 30  G  G05 L1W L2W  0000.004 0000.001    32 NLUPD_SAT
00 00 00  00 00 30  G  G06 L1W L2W  0000.004 0000.001    32 NLUPD_SAT
00 00 00  00 00 30  C  C01 L2I L6I  0000.004 0000.001    35 NLUPD_SAT
00 00 00  00 00 30  C  C02 L2I L6I  0000.004 0000.001    35 NLUPD_SAT
00 00 00  00 00 30  C  C03 L2I L6I  0000.004 0000.001    35 NLUPD_SAT
00 00 00  00 00 30  C  C04 L2I L6I  0000.004 0000.001    35 NLUPD_SAT
00 00 00  00 00 30  G SHA1 L1W L2W  0000.004 0000.001    35 NLUPD_REC
00 00 00  00 00 30  G KUN1 L1W L2W  0000.004 0000.001    35 NLUPD_REC
00 00 00  00 00 30  C SHA1 L2I L6I  0000.004 0000.001    35 NLUPD_REC
00 00 00  00 00 30  C KUN1 L2I L6I  0000.004 0000.001    35 NLUPD_REC
00 00 00  00 00 30  G  G01 Non-comb 0000.004 0000.001    32 NCUPD_SAT
00 00 00  00 00 30  G  G02 Non-comb 0000.004 0000.001    32 NCUPD_SAT
00 00 00  00 00 30  G  G03 Non-comb 0000.004 0000.001    32 NCUPD_SAT
00 00 00  00 00 30  G  G04 Non-comb 0000.004 0000.001    32 NCUPD_SAT
00 00 00  00 00 30  G SHA1 Non-comb 0000.004 0000.001    35 NCUPD_REC
00 00 00  00 00 30  G KUN1 Non-comb 0000.004 0000.001    35 NCUPD_REC
00 00 00  00 00 30  G  G01 L1W L2W  0000.004 0000.001   100 IFPB_SAT
00 00 00  00 00 30  G  G02 L1W L2W  0000.004 0000.001   100 IFPB_SAT
```

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