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CLASSIFICATION OF GEOSYNCHRONOUS OBJECTS

Produced with the DISCOS Database

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Reference	GEN-DB-LOG-00126-HSO-GR
Issue	16
Revision	0
Date of Issue	27 February 2014
Status	ISSUED
Document Type	TN

European Space Agency
Agence spatiale européenne

Abstract

This is a status report on geosynchronous objects as of the end of 2013.

Based on orbital data in ESA's DISCOS database and on orbital data provided by KIAM the situation near the geostationary ring (here defined as orbits with mean motion between 0.9 and 1.1 revolutions per day, eccentricity smaller than 0.2 and inclination below 70 deg) is analysed. From 1317 objects for which orbital data are available, 436 are controlled inside their longitude slots, 682 are drifting above, below or through GEO, 178 are in a libration orbit, 9 are in highly-inclined orbits and 12 , whose status could not be determined. Furthermore, there are 79 uncontrolled objects without orbital data (of which 73 have not been catalogued). Thus the total number of known objects in the geostationary region is 1396 .

During 2013 at least twenty spacecraft reached end-of-life. Fifteen of them were reorbited following the IADC recommendations. Three spacecraft were reorbited too low, and two additional spacecraft have the perigee below GEO. We identified no spacecraft that seems to be abandoned or could not make any reorbiting manouevre at all in 2013, but one spacecraft seems to have been abandoned already in 2012.

If you detect any error or if you have any comment or question please contact:

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Table of contents

1 Introduction

All objects near the geostationary ring which are catalogued in ESA's DISCOS Database (Database and Information System Characterising Objects in Space) are listed in this document. The main purpose is to classify all these objects according to different categories. Indeed, seven different types of categories are defined:

- C1: objects under longitude and inclination control (E-W as well as N-S control) - the longitude is nearly constant and the inclination is smaller than 0.3 degrees,
- C2: objects under longitude control (only E-W control) - the longitude is nearly constant but the inclination is higher than 0.3 degrees,
- D: objects in a drift orbit,
- L1: objects in a libration orbit around the Eastern stable point (longitude 75 degrees East),
- L2: objects in a libration orbit around the Western stable point (longitude 105 degrees West),
- L3: objects in a libration orbit around both stable points,
- I: objects in a highly inclined orbit (inclination larger than 25 degrees).

All objects are selected from ESA's DISCOS Database according to the following criteria:

- eccentricity smaller than 0.2
- mean motion between 0.9 and 1.1 revolution per sidereal day, corresponding approximately to a semi-major axis between 42164-2500 and 42164+3150 km.
- inclination lower than 70 degrees

The basic source of information are the USSTRATCOM Two-Line Elements (TLEs). The DISCOS Database is updated at regular intervals by ESOC's Space Debris Office (on average 1 TLE per week and per object is stored). The accuracy of TLE is limited. At the geostationary altitude, only objects larger than about 1 m in size are tracked on a regular basis. The main information given by this catalogue is the classification of the objects according to their type of motion. It should be noted that also some of the derived parameters like libration period and libration amplitude may sometimes have a limited accuracy. For further information about the method of classification please refer to *Classification of geostationary objects*, (Ref. 1).

This document contains three tables:

- Table 1 contains objects with recently updated orbital elements. They are ordered according to their type of motion and some orbital information is given.
- Table 2 contains objects for which there were no TLEs available during the last 6 months. The orbital data is provided by Vladimir Agapov, Keldysh Institute for Applied Mathematics, Moscow (KIAM).
- Table 3 contains all the objects in highly-inclined orbits.

- Table 4 contains all the objects of which the status cannot be determined by our software. The main reason for the difficulty to classify an object is that there are not enough TLEs available or that the status has recently changed (satellite newly launched or recently manoeuvred).

In order to find a specific object in one of the four tables, there is a list of all objects in ascending order of their COSPAR identifier in Chapter 2.

2 List of geosynchronous objects

All the catalogued objects near the geostationary ring are listed here. They are ordered according to their COSPAR designation. The status of these objects (controlled, drifting, libration), the table in which they are classified and a reference number are also given.

Column 1: COSPAR designation.

Column 2: Object's common name.

Column 3: Number of the Table in which the object is classified:

- Table 1: objects with updated TLEs,
- Table 2: objects with orbital data by KIAM or without any orbital data,
- Table 3: objects in highly inclined orbits,
- Table 4: status is indeterminate.

Column 4: The status of the object:

- C1: objects under longitude and inclination control (E-W as well as N-S control),
- C2: objects under longitude control (only E-W control),
- C: objects under control (source: KIAM - no TLEs available),
- D: objects in a drift orbit,
- L1: objects in a libration orbit around the Eastern stable point (longitude 75 degrees East),
- L2: objects in a libration orbit around the Western stable point (longitude 105 degrees West),
- L3: objects in a libration orbit around both stable points,
- I: objects in highly-inclined orbits,
- Ind: the status could not be determined,
- U: uncontrolled objects (source: KIAM - no TLEs available).

Column 5: A reference number to find the object in its table.

Please note, that objects in tables 4.8 (Unidentified objects) and 4.10 (Uncontrolled uncatalogued objects) are not included in this list.

COSPAR	NAME	TABLE	STATUS	No
63031A	Syncom 2	4.	I	1.
64047A	Syncom 3	1.	D	441.
65028A	Intelsat I F-1	1.	L2	25.
66053A	GGTS 1	1.	D	574.
66053B	IDCSP 1	1.	D	572.
66053C	IDCSP 2	1.	D	570.
66053D	IDCSP 3	1.	D	567.
66053E	IDCSP 4	1.	D	564.
66053F	IDCSP 5	1.	D	561.
66053G	IDCSP 6	1.	D	558.
66053H	IDCSP 7	1.	D	556.
66053J	Titan IIIC stage 3 (Transtage)	1.	D	554.
66110A	ATS 1	1.	D	444.
67001A	Intelsat II F-2	1.	D	442.
67003A	IDCSP 8	1.	D	578.
67003B	IDCSP 9	1.	D	577.
67003C	IDCSP 10	1.	D	576.
67003D	IDCSP 11	1.	D	575.
67003E	IDCSP 12	1.	D	573.
67003F	IDCSP 13	1.	D	566.
67003G	IDCSP 14	1.	D	563.
67003H	IDCSP 15	1.	D	559.
67026A	Intelsat II F-3	1.	L1	105.
67066A	IDCSP 16	1.	D	585.
67066B	IDCSP 17	1.	D	584.
67066C	IDCSP 18	1.	D	583.
67066D	IDCSP 19	1.	D	582.
67066E	LES 5	1.	D	581.
67066F	DODGE 1	1.	D	580.
67066G	Titan IIIC stage 3 (Transtage)	1.	D	579.
67094A	Intelsat II F-4	1.	L2	29.
67111A	ATS 3	1.	L2	6.
68050A	OPS 9341 (IDSCS 20)	1.	D	571.
68050B	OPS 9342 (IDSCS 21)	1.	D	569.
68050C	OPS 9343 (IDSCS 22)	1.	D	568.
68050D	OPS 9344 (IDSCS 23)	1.	D	565.
68050E	OPS 9345 (IDSCS 24)	1.	D	562.
68050F	OPS 9346 (IDSCS 25)	1.	D	560.
68050G	OPS 9347 (IDSCS 26)	1.	D	557.
68050H	OPS 9348 (IDSCS 27)	1.	D	555.
68050J	Titan IIIC stage 3 (Transtage)	1.	D	553.
68063A	OPS 2222 (CANYON 1)	2.	D1	70.
68063B	Atlas SLV-3A stage 2 (Agena D)	2.	D1	9.
68081A	OV2 5	1.	D	516.
68081D	LES 6	1.	L2	1.
68081E	Titan IIIC stage 3 (Transtage)	1.	D	514.
68081G	Transtage 5 debris	1.	D	488.

COSPAR	NAME	TABLE	STATUS	No
68081H	Transtage 5 debris	1.	D	519.
68081J	Transtage 5 debris	1.	D	480.
68081K	Transtage 5 debris	1.	D	524.
68081L	Transtage 5 debris	1.	D	520.
68081M	Transtage 5 debris	1.	D	472.
68081N	Transtage 5 debris	1.	D	481.
68081P	Transtage 5 debris	1.	D	509.
68081Q	Transtage 5 debris	1.	D	267.
68081R	Transtage 5 debris	1.	D	469.
68081S	Transtage 5 debris	1.	D	222.
68081T	Transtage 5 debris	1.	D	533.
68081U	Transtage 5 debris	1.	D	542.
68081W	Transtage 5 debris	1.	D	296.
68081X	Transtage 5 debris	1.	D	512.
68081Y	Transtage 5 debris	1.	D	549.
68081Z	Transtage 5 debris	1.	D	478.
68081AA	Transtage 5 debris	1.	D	531.
68081AB	Transtage 5 debris	1.	D	495.
68081AC	Transtage 5 debris	1.	D	526.
68081AD	Transtage 5 debris	1.	D	552.
68081AE	Transtage 5 debris	1.	D	527.
68081AF	Transtage 5 debris	1.	D	523.
68081AG	Transtage 5 debris	1.	D	461.
68081AH	Transtage 5 debris	1.	D	437.
68081AJ	Transtage 5 debris	1.	D	426.
68116A	Intelsat III F-2	1.	D	2.
69013A	TACSAT 1	1.	D	449.
69013B	Titan IIIC stage 3 (Transtage)	1.	D	55.
69036A	OPS 3148 (CANYON 2)	2.	D1	42.
69036B	Atlas SLV-3A stage 2 (Agena D)	2.	D1	3.
69045A	Intelsat III F-4	1.	D	1.
69069A	ATS 5	1.	D	295.
69069C	JPL SR-28-3 (ATS 5 AKM)	1.	D	101.
69101A	Skynet 1A	1.	L2	7.
70003A	Intelsat III F-6	1.	D	220.
70021A	NATO I	1.	L2	10.
70032A	Intelsat III F-7	1.	L1	101.
70046A	OPS 5346 (Rhyolite 1)	2.	L1	4.
70055A	Intelsat III F-8	1.	D	529.
70069A	OPS 7329 (CANYON 3)	2.	L2	4.
70069B	Atlas SLV-3A stage 2 (Agena D)	2.	D1	10.
71006A	Intelsat IV F-2	1.	D	164.
71009A	NATO IIB	1.	L2	5.
71039A	OPS 3811 (DSP F2)	2.	D1	90.
71039B	Titan IIIC stage 3 (Transtage)	2.	D1	41.
71095A	OPS 9431 (DSCS II F-1)	1.	L2	11.
71095B	OPS 9432 (DSCS II F-2)	1.	L3	3.

COSPAR	NAME	TABLE	STATUS	No
71095C	Titan IIIC stage 3 (Transtage)	1.	D	41.
71116A	Intelsat IV F-3	1.	D	317.
72003A	Intelsat IV F-4	1.	D	353.
72010A	OPS 1570 (DSP F3)	2.	D1	52.
72010B	Titan IIIC stage 3 (Transtage)	2.	D1	30.
72041A	Intelsat IV F-5	1.	D	412.
72090A	Anik A1	1.	D	162.
72101A	OPS 9390 (CANYON 5)	2.	L1	5.
72101B	Atlas SLV-3A stage 2 (Agena D)	2.	D1	6.
73013A	OPS 6063 (Rhyolite 2)	2.	L1	3.
73023A	Anik A2	1.	D	347.
73040A	OPS 6157 (DSP F4)	2.	D1	50.
73040B	Titan IIIC stage 3 (Transtage)	2.	D1	60.
73058A	Intelsat IV F-7	1.	D	214.
73100A	OPS 9433 (DSCS II F-3)	1.	D	58.
73100B	OPS 9434 (DSCS II F-4)	1.	D	48.
73100D	Titan IIIC stage 3 (Transtage)	1.	D	9.
74017A	Cosmos 637	1.	D	473.
74017F	Proton-K/DM fourth stage (Blok-DM)	1.	D	485.
74022A	Westar I	1.	D	370.
74033A	SMS 1	1.	D	135.
74039A	ATS 6	1.	D	522.
74039C	Titan IIIC stage 3 (Transtage)	1.	D	467.
74060A	Molniya 1-S	1.	L1	61.
74060F	Proton-K/DM fourth stage (Blok-DM)	1.	L1	79.
74075A	Westar II	1.	D	361.
74093A	Intelsat IV F-8	1.	D	344.
74094A	Skynet 2B	1.	L1	99.
74101A	Symphonie A	1.	D	381.
75011A	SMS 2	1.	D	297.
75011F	Aerojet SVM-5 (SMS 2 AKM)	1.	D	132.
75038A	Anik A3	1.	D	403.
75042A	Intelsat IV F-1	1.	D	255.
75055A	OPS 4966 (CANYON 6)	2.	L1	7.
75055B	Atlas SLV-3A stage 2 (Agena D)	2.	D1	8.
75077A	Symphonie B	1.	D	384.
75091A	Intelsat IVA F-1	1.	D	375.
75097A	Cosmos 775	1.	L1	67.
75097F	Proton-K/DM fourth stage (Blok-DM)	1.	D	411.
75100A	GOES 1	1.	L2	17.
75100F	Aerojet SVM-5 (GOES 1 AKM)	1.	D	521.
75117A	RCA Satcom I	1.	D	315.
75118A	OPS 3165 (DSP F5)	2.	D1	40.
75118C	Titan IIIC stage 3 (Transtage)	2.	D1	36.
75118D	OPS 3165 operational debris (Telescope aperture suncover)	2.	U	1.
75123A	Raduga 1	1.	L1	21.
75123F	Proton-K/DM fourth stage (Blok-DM)	1.	D	455.

COSPAR	NAME	TABLE	STATUS	No
76004A	Hermes	1.	L2	22.
76010A	Intelsat IVA F-2	1.	D	328.
76017A	Marisat 1	1.	D	238.
76023A	LES 8 (RTGPP)	1.	L2	12.
76023B	LES 9 (RTGPP)	1.	L2	14.
76023F	Titan IIIC stage 3 (Transtage)	1.	D	106.
76023J	LES 8, LES 9 operational debris	1.	D	105.
76023K	LES 8, LES 9 operational debris	1.	D	505.
76029A	RCA Satcom II	1.	D	137.
76035A	NATO IIIA	1.	D	357.
76042A	Comstar 1A	1.	D	351.
76053A	Marisat 2	1.	D	22.
76059A	OPS 2112 (DSP F6)	2.	D1	64.
76059C	Titan IIIC stage 3 (Transtage)	2.	D1	37.
76059D	OPS 2112 operational debris (Telescope aperture suncover)	2.	U	2.
76066A	Palapa 1	1.	D	408.
76073A	Comstar 2	1.	D	387.
76092A	Raduga 2	1.	L1	23.
76092F	Proton-K/DM fourth stage (Blok-DM)	1.	L1	38.
76101A	Marisat 3	1.	D	51.
76107A	Ekran 1	1.	L1	39.
76107F	Proton-K/DM fourth stage (Blok-DM)	1.	D	511.
77005A	NATO IIIB	1.	D	15.
77007A	OPS 3151 (DSP F7)	2.	D1	92.
77007C	Titan IIIC stage 3 (Transtage)	2.	L2	3.
77007D	OPS 3151 operational debris (Telescope aperture suncover)	2.	D1	33.
77014A	Kiku-2	1.	D	393.
77018A	Palapa 2	1.	D	399.
77034A	OPS 9437 (DSCS II F-7)	1.	D	32.
77034B	OPS 9438 (DSCS II F-8)	1.	D	17.
77034C	Titan IIIC stage 3 (Transtage)	1.	D	19.
77038A	OPS 9751 (CANYON 7)	2.	L1	2.
77038C	Atlas SLV-3A stage 2 (Agena D)	2.	D1	5.
77041A	Intelsat IVA F-4	1.	D	289.
77048A	GOES 2	1.	D	278.
77048G	Aerojet SVM-5 (GOES 2 AKM)	1.	D	460.
77065A	Himawari	1.	D	252.
77071A	Raduga 3	1.	L1	71.
77071F	Proton-K/DM fourth stage (Blok-DM)	1.	D	67.
77080A	SIRIO 1	1.	L1	24.
77092A	Ekran 2	1.	L1	45.
77092G	Proton-K/DM fourth stage (Blok-DM)	1.	D	501.
77092H	Ekran 2 fragmentation debris	1.	L1	88.
77092J	Ekran 2 fragmentation debris	1.	D	397.
77092K	Ekran 2 fragmentation debris	1.	D	420.
77108A	Meteosat 1	1.	L1	94.
77108D	Mage 1 (Meteosat 1 AKM)	1.	D	72.
77114A	OPS 4258 (AQUACADE 3)	2.	L2	2.

COSPAR	NAME	TABLE	STATUS	No
77118A	Sakura	1.	D	175.
78002A	Intelsat IVA F-3	1.	D	373.
78012A	IUE	4.	I	2.
78016A	OPS 6391 (FLTSATCOM F1)	2.	D1	74.
78035A	Intelsat IVA F-6	1.	L1	100.
78038A	OPS 8790 (AQUACADE 4)	2.	D1	38.
78039A	Yuri	1.	L1	62.
78044A	OTS 2	1.	D	212.
78058A	OPS 9454 (VORTEX 1) (CHALET 1)	2.	D1	46.
78058B	Titan IIIC stage 3 (Transtage)	2.	D1	56.
78062A	GOES 3	1.	L2	8.
78062D	Aerojet SVM-5 (GOES 3 AKM)	1.	D	294.
78068A	Comstar 3	1.	D	234.
78071A	ESA GEOS 2	1.	D	272.
78073A	Raduga 4	1.	L1	65.
78073F	Proton-K/DM fourth stage (Blok-DM)	1.	D	49.
78106A	NATO IIIC	1.	D	124.
78113A	OPS 9441 (DSCS II F-11)	1.	D	6.
78113B	OPS 9442 (DSCS II F-12)	1.	D	116.
78113D	Titan IIIC stage 3 (Transtage)	1.	D	5.
78116A	Anik B1	1.	D	349.
79007A	Scatha	1.	D	515.
79007C	Scatha AKM	1.	D	517.
79015A	Ekran 3	1.	L1	46.
79015D	Proton-K/DM fourth stage (Blok-DM)	1.	D	502.
79035A	Raduga 5	1.	L1	20.
79035E	Proton-K/DM fourth stage (Blok-DM)	1.	D	430.
79038A	OPS 6392 (FLTSATCOM F2)	1.	D	128.
79053A	OPS 7484 (DSP F8)	2.	D1	83.
79053C	Titan IIIC stage 3 (Transtage)	2.	D1	66.
79053D	OPS 7484 operational debris (Telescope aperture suncover)	2.	U	3.
79062A	Gorizont 2	1.	L1	27.
79062D	Proton-K/DM fourth stage (Blok-DM)	1.	D	61.
79072A	Westar III	1.	D	380.
79086A	OPS 1948 (VORTEX 2) (CHALET 2)	2.	D1	44.
79086C	Titan IIIC stage 3 (Transtage)	2.	D1	55.
79087A	Ekran 4	1.	L1	37.
79087C	Proton-K/DM fourth stage (Blok-DM)	1.	D	453.
79098A	OPS 9443 (DSCS II F-13)	1.	D	20.
79098B	OPS 9444 (DSCS II F-14)	1.	D	112.
79098C	Titan IIIC stage 3 (Transtage)	1.	D	16.
79105A	Gorizont 3	1.	L1	64.
79105E	Proton-K/DM fourth stage (Blok-DM)	1.	D	143.
80004A	OPS 6393 (FLTSATCOM F3)	1.	L2	37.
80016A	Raduga 6	1.	L1	59.
80016D	Proton-K/DM fourth stage (Blok-DM)	1.	D	56.
80049A	Gorizont 4	1.	D	139.

COSPAR	NAME	TABLE	STATUS	No
80049F	Proton-K/DM fourth stage (Blok-DM)	1.	D	81.
80060A	Ekran 5	2.	L3	1.
80060F	Proton-K/DM fourth stage (Blok-DM)	1.	D	518.
80060G	Ekran 5 debris	2.	D1	43.
80074A	GOES 4	1.	D	246.
80081A	Raduga 7	1.	L2	32.
80081F	Proton-K/DM fourth stage (Blok-DM)	1.	D	383.
80087A	OPS 6394 (FLTSATCOM F4)	2.	D1	76.
80091A	SBS I	1.	D	350.
80098A	Intelsat V F-2	1.	D	169.
80104A	Ekran 6	1.	L1	41.
80104E	Proton-K/DM fourth stage (Blok-DM)	1.	D	503.
81018A	Comstar 4	1.	L1	11.
81025A	OPS 7350 (DSP F9)	2.	D1	80.
81025C	Titan IIIC stage 3 (Transtage)	2.	D1	12.
81027A	Raduga 8	1.	D	446.
81027F	Proton-K/DM fourth stage (Blok-DM)	1.	D	60.
81049A	GOES 5	1.	L2	21.
81050A	Intelsat V F-1	1.	D	165.
81057A	Meteosat 2	1.	D	147.
81057B	APPLE	1.	D	396.
81057F	Mage 1 (Meteosat 2 AKM)	1.	D	271.
81061A	Ekran 7	1.	L1	47.
81061F	Proton-K/DM fourth stage (Blok-DM)	1.	D	487.
81069A	Raduga 9	1.	L1	70.
81069F	Proton-K/DM fourth stage (Blok-DM)	1.	D	65.
81073A	FLTSATCOM F5	1.	D	133.
81076A	Himawari-2	1.	D	305.
81096A	SBS II	1.	D	424.
81102A	Raduga 10	1.	L1	19.
81102F	Proton-K/DM fourth stage (Blok-DM)	1.	D	440.
81107A	OPS 4029 (VORTEX 3)	2.	L2	5.
81107C	Titan IIIC stage 3 (Transtage)	2.	D1	57.
81114A	RCA Satcom IIIR	1.	D	413.
81119A	Intelsat V F-3	1.	D	293.
81122A	Marecs A	1.	D	11.
82004A	RCA Satcom IV	1.	D	311.
82009A	Ekran 8	1.	D	378.
82009F	Proton-K/DM fourth stage (Blok-DM)	1.	D	484.
82014A	Westar IV	1.	D	340.
82017A	Intelsat V F-4	1.	D	244.
82019A	OPS 8701 (DSP F10)	2.	D1	88.
82019B	Titan IIIC stage 3 (Transtage)	2.	D1	16.
82020A	Gorizont 5	1.	D	126.
82020F	Proton-K/DM fourth stage (Blok-DM)	1.	D	141.
82031A	Insat-IA	1.	L1	78.
82044A	Cosmos 1366	1.	L1	16.
82044F	Proton-K/DM fourth stage (Blok-DM)	1.	L3	1.

COSPAR	NAME	TABLE	STATUS	No
82058A	Westar V	1.	D	241.
82082A	Anik D1	1.	D	415.
82093A	Ekran 9	1.	L1	56.
82093F	Proton-K/DM fourth stage (Blok-DM)	1.	D	498.
82097A	Intelsat V F-5	1.	D	114.
82103A	Gorizont 6	1.	L2	30.
82103E	Proton-K/DM fourth stage (Blok-DM)	1.	D	445.
82105A	Aurora I	1.	L2	18.
82106A	DSCS II F-16	1.	D	12.
82106B	DSCS III A-01	2.	D1	91.
82106D	IUS second stage	1.	D	273.
82110B	SBS III	1.	D	376.
82110C	Anik C3	1.	D	372.
82113A	Raduga 11	1.	D	66.
82113F	Proton-K/DM fourth stage (Blok-DM)	1.	D	50.
83006A	Sakura 2A	1.	D	283.
83016A	Ekran 10	1.	D	10.
83016F	Proton-K/DM fourth stage (Blok-DM)	1.	D	492.
83026B	TDRS-1	1.	D	149.
83028A	Raduga 12	1.	L1	18.
83028F	Proton-K/DM fourth stage (Blok-DM)	1.	D	401.
83030A	RCA Satcom IR	1.	D	362.
83041A	GOES 6	1.	L2	19.
83047A	Intelsat V F-6	1.	D	221.
83058A	Eutelsat I F-1 (ECS 1)	1.	D	167.
83059B	Anik C2	1.	D	207.
83059C	Palapa Pacific System	1.	D	432.
83065A	Galaxy I	1.	D	419.
83066A	Gorizont 7	1.	D	111.
83066F	Proton-K/DM fourth stage (Blok-DM)	1.	D	54.
83077A	Arabsat 1D-R	1.	D	298.
83081A	Sakura 2B	1.	D	160.
83088A	Raduga 13	1.	D	100.
83088F	Proton-K/DM fourth stage (Blok-DM)	1.	D	53.
83089B	Insat-IB	1.	L1	90.
83094A	RCA Satcom IIR	1.	D	285.
83098A	Galaxy II	1.	D	438.
83100A	Ekran 11	1.	L1	50.
83100F	Proton-K/DM fourth stage (Blok-DM)	1.	D	489.
83105A	Intelsat V F-7	1.	D	329.
83118A	Gorizont 8	1.	D	107.
83118F	Proton-K/DM fourth stage (Blok-DM)	1.	L1	29.
84005A	Yuri 2A	1.	D	194.
84009A	OPS 0441 (VORTEX 4)	2.	L3	2.
84009C	Titan 34D stage 3 (Transtage)	2.	D1	65.
84016A	Raduga 14	1.	L1	22.
84016F	Proton-K/DM fourth stage (Blok-DM)	1.	L1	44.
84022A	Cosmos 1540	1.	L1	9.

COSPAR	NAME	TABLE	STATUS	No
84022F	Proton-K/DM fourth stage (Blok-DM)	1.	D	364.
84023A	Intelsat V F-8	1.	D	42.
84028A	Ekran 12	1.	D	27.
84028F	Proton-K/DM fourth stage (Blok-DM)	1.	D	510.
84031A	Cosmos 1546	1.	L1	13.
84031F	Proton-K/DM fourth stage (Blok-DM)	1.	D	286.
84035A	STW F-2	1.	L1	96.
84037A	OPS 7641 (DSP F11)	2.	D1	84.
84037B	Titan 34D stage 3 (Transtage)	2.	D1	21.
84041A	Gorizont 9	1.	L1	35.
84041D	Proton-K/DM fourth stage (Blok-DM)	1.	D	138.
84049A	Chinasat 5 (Spacenet 1)	1.	D	388.
84063A	Raduga 15	1.	L1	86.
84063F	Proton-K/DM fourth stage (Blok-DM)	1.	D	539.
84078A	Gorizont 10	1.	L2	27.
84078F	Proton-K/DM fourth stage (Blok-DM)	1.	L1	74.
84080A	Himawari-3	1.	D	354.
84080E	Star 27 (Himawari-3 AKM)	1.	D	336.
84081A	Eutelsat I F-2 (ECS 2)	1.	D	157.
84081B	Telecom 1A	1.	D	113.
84090A	Ekran 13	1.	D	25.
84090F	Proton-K/DM fourth stage (Blok-DM)	1.	D	500.
84093B	SBS IV	1.	D	153.
84093C	Leasat 2	1.	D	46.
84093D	Telstar 3C	1.	D	342.
84101A	Galaxy III	1.	D	356.
84113B	Arabsat 1D	1.	D	172.
84113C	Leasat 1	1.	D	129.
84114A	Spacenet 2	1.	D	337.
84114B	Marecs B2	1.	D	23.
84115A	NATO IIID	1.	D	8.
84129A	USA 7 (DSP F12)	2.	D1	78.
84129B	Titan 34D stage 3 (Transtage)	2.	D1	23.
85007A	Gorizont 11	1.	L3	12.
85007D	Proton-K/DM fourth stage (Blok-DM)	1.	D	536.
85010B	USA 8 (MAGNUM 1)	2.	D1	51.
85010D	IUS second stage	2.	D1	27.
85015A	Arabsat 1A	1.	D	448.
85015B	Brazilsat 1	1.	D	304.
85016A	Cosmos 1629	1.	L2	35.
85016F	Proton-K/DM fourth stage (Blok-DM)	1.	D	280.
85024A	Ekran 14	1.	D	7.
85024D	Proton-K/DM fourth stage (Blok-DM)	1.	D	497.
85025A	Intelsat VA F-10	1.	D	109.
85028B	Anik C1	1.	D	325.
85028C	Leasat 3	1.	D	35.
85035A	Gstar 1	1.	L2	4.
85035B	Telecom 1B	1.	L1	103.

COSPAR	NAME	TABLE	STATUS	No
85048B	Morelos 1	1.	D	291.
85048C	Arabsat 1B	1.	D	447.
85048D	Telstar 3D	1.	D	366.
85055A	Intelsat VA F-11	1.	D	409.
85070A	Raduga 16	1.	L2	31.
85070F	Proton-K/DM fourth stage (Blok-DM)	1.	D	73.
85076B	Optus A1	1.	D	339.
85076C	ASC 1	1.	L2	16.
85076D	Leasat 4	1.	D	70.
85087A	Intelsat VA F-12	1.	D	203.
85092B	USA 11 (DSCS III B-04)	2.	D1	75.
85092C	USA 12 (DSCS III B-05)	2.	D1	68.
85092E	IUS second stage	2.	D1	25.
85102A	Cosmos 1700	1.	L1	32.
85102D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	464.
85107A	Raduga 17	1.	D	428.
85107F	Proton-K/DM fourth stage (Blok-DM)	1.	D	47.
85109B	Morelos 2	1.	D	308.
85109C	Optus A2	1.	D	379.
85109D	Satcom Ku-2	1.	D	316.
86003B	Satcom Ku-1	1.	D	306.
86007A	Raduga 18	1.	D	161.
86007F	Proton-K/DM fourth stage (Blok-DM)	1.	D	71.
86010A	STTW-1	1.	L1	51.
86016A	Yuri 2B	1.	D	261.
86026A	Gstar 2	1.	D	346.
86026B	Brazilsat 2	1.	D	319.
86027A	Cosmos 1738	1.	L3	6.
86027F	Proton-K/DM fourth stage (Blok-DM)	1.	D	64.
86038A	Ekran 15	1.	D	30.
86038D	Proton-K/DM fourth stage (Blok-DM)	1.	D	507.
86044A	Gorizont 12	1.	L1	63.
86044F	Proton-K/DM fourth stage (Blok-DM)	1.	D	62.
86082A	Raduga 19	1.	D	121.
86082F	Proton-K/DM fourth stage (Blok-DM)	1.	D	52.
86090A	Gorizont 13	1.	D	33.
86090D	Proton-K/DM fourth stage (Blok-DM)	1.	L1	83.
86096A	USA 20 (FLTSATCOM F7)	2.	C2	21.
87022A	GOES 7	1.	D	371.
87022F	Star 27 (GOES 7 AKM)	2.	U	4.
87028A	Raduga 20	1.	D	24.
87028D	Proton-K/DM fourth stage (Blok-DM)	1.	D	365.
87029A	Agila 1	1.	D	374.
87040A	Gorizont 14	1.	D	59.
87040D	Proton-K/DM fourth stage (Blok-DM)	1.	D	535.
87070A	Kiku-5	1.	D	268.
87073A	Ekran 16	1.	D	29.
87073D	Proton-K/DM fourth stage (Blok-DM)	1.	D	508.

COSPAR	NAME	TABLE	STATUS	No
87078A	Optus A3	1.	D	171.
87078B	Eutelsat I F-4 (ECS 4)	1.	D	145.
87084A	Cosmos 1888	1.	L3	14.
87084D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	400.
87091A	Cosmos 1894	1.	L2	36.
87091D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	436.
87095A	TV-Sat 1	1.	D	176.
87096A	Cosmos 1897	1.	L1	36.
87096D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	459.
87097A	USA 28 (DSP F13)	2.	D1	87.
87097B	Titan 34D stage 3 (Transtage)	2.	D1	18.
87100A	Raduga 21	1.	L2	24.
87100D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	540.
87109A	Ekran 17	1.	D	21.
87109D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	477.
88012A	Sakura 3A	1.	D	98.
88014A	STTW-2	1.	L1	26.
88018A	Spacenet 3R	1.	D	324.
88018B	Telecom 1C	1.	D	87.
88028A	Gorizont 15	1.	D	74.
88028D	Proton-K/DM fourth stage (Blok-DM)	1.	D	69.
88034A	Cosmos 1940	1.	D	468.
88034D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	410.
88036A	Ekran 18	1.	D	14.
88036E	Proton-K/DM fourth stage (Blok-DM)	1.	D	493.
88040A	Intelsat VA F-13 (NSS 513)	1.	D	130.
88051A	Meteosat 3	1.	D	34.
88051C	PAS 1	1.	D	275.
88063A	Insat-IC	1.	L1	31.
88063B	Eutelsat I F-5 (ECS 5)	1.	D	99.
88066A	Cosmos 1961	1.	L1	7.
88066D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	142.
88071A	Gorizont 16	1.	D	386.
88071D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	458.
88081A	Gstar 3	1.	L2	3.
88081B	SBS V	1.	D	345.
88086A	Sakura 3B	1.	D	243.
88091B	TDRS-West	1.	C2	71.
88091D	IUS second stage	1.	D	452.
88095A	Raduga 22	1.	L1	95.
88095F	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	82.
88098A	TDF 1	1.	D	233.
88108A	Ekran 19	1.	D	31.
88108D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	513.
88109A	Skynet 4B	1.	D	327.
88109B	Astra 1A	1.	D	110.
88111A	STTW-3	1.	L1	66.
89004A	Gorizont 17	1.	D	197.

COSPAR	NAME	TABLE	STATUS	No
89004F	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	90.
89006A	Intelsat VA F-15	1.	D	201.
89020A	JC-Sat 1	1.	D	301.
89020B	Meteosat 4	1.	D	37.
89020E	Mage 1 (Meteosat 4 AKM)	1.	D	450.
89021B	TDRS 4	1.	D	123.
89021D	IUS second stage	1.	D	463.
89027A	Tele-X	1.	D	229.
89030A	Raduga 23	1.	L1	77.
89030D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	80.
89035A	USA 37 (VORTEX 6)	2.	C2	22.
89035C	Titan 34D stage 3 (Transtage)	2.	D1	67.
89041A	Superbird A	1.	D	335.
89041B	DFS-Kopernikus 1	1.	D	466.
89046A	USA 39 (DSP F14)	2.	D1	81.
89046D	IUS second stage	2.	D1	13.
89046E	USA 39 operational debris (Telescope aperture suncover)	2.	U	5.
89048A	Raduga 1-1	1.	D	146.
89048D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	79.
89052A	Gorizont 18	1.	D	279.
89052D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	537.
89053A	Olympus 1	1.	D	506.
89062A	TV-Sat 2	1.	D	358.
89067A	Sirius 1	1.	D	231.
89069A	USA 43 (DSCS II F-15)	2.	D1	85.
89069B	USA 44 (DSCS III A-02)	2.	D1	71.
89069D	Titan 34D stage 3 (Transtage)	2.	D1	17.
89070A	Himawari-4	1.	D	45.
89070C	Star 27 (Himawari-4 AKM)	1.	D	154.
89077A	USA 46 (FLTSATCOM F8)	2.	C2	48.
89081A	Gorizont 19	1.	L1	68.
89081D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	462.
89087A	Intelsat VI F-2	1.	D	188.
89090B	USA 48 (MAGNUM 2)	2.	D1	28.
89090D	IUS second stage	2.	D1	62.
89098A	Raduga 24	1.	L1	57.
89098D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	77.
89101A	Cosmos 2054	1.	L2	38.
89101D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	104.
89101G	Cosmos 2054 debris	1.	D	76.
90001A	Skynet 4A	1.	D	186.
90001B	JC-Sat 2	1.	D	127.
90002B	Leasat 5	1.	C2	30.
90011A	DFH-2A	1.	L1	40.
90016A	Raduga 25	1.	L2	28.
90016D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	394.
90021A	Intelsat VI F-3	1.	C2	67.
90030A	AsiaSat 1	1.	D	250.

COSPAR	NAME	TABLE	STATUS	No
90034A	Palapa B-2R	1.	D	299.
90051A	Insat-ID	1.	L1	14.
90054A	Gorizont 20	1.	L1	34.
90054D	Proton-K/DM fourth stage (Blok-DM)	1.	D	457.
90056A	Intelsat VI F-4	1.	D	115.
90061A	Cosmos 2085	1.	L1	5.
90061D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	L1	80.
90063A	TDF 2	1.	D	134.
90063B	DFS-Kopernikus 2	1.	D	303.
90074A	Thor I	1.	D	240.
90077A	Yuri 3A	1.	D	159.
90079A	Skynet 4C	1.	C2	82.
90079B	Eutelsat II F-1	1.	D	269.
90091A	SBS VI	1.	D	185.
90091B	Galaxy VI	1.	D	338.
90093A	Inmarsat 2-F1	1.	D	168.
90094A	Gorizont 21	1.	L3	9.
90094D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	479.
90095A	USA 65 (DSP F15)	2.	D1	86.
90095D	IUS second stage	2.	D1	47.
90097B	USA 67 (SDS 2 F2)(QUASAR 2)	2.	C2	14.
90100A	Satcom C-1	1.	D	230.
90100B	Gstar 4	1.	D	213.
90102A	Gorizont 22	1.	L1	98.
90102D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	78.
90112A	Raduga 26	1.	L1	33.
90112D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	395.
90116A	Raduga 1-2	1.	L1	49.
90116D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	85.
91001A	NATO IVA	1.	D	108.
91003A	Italsat 1	1.	D	382.
91003B	Eutelsat II F-2	1.	D	177.
91010A	Cosmos 2133	1.	L1	10.
91010F	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	418.
91014A	Raduga 27	1.	L1	84.
91014D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	541.
91015A	Astra 1B	1.	D	125.
91015B	Meteosat 5	1.	D	119.
91015E	Mage 1 (Meteosat 5 AKM)	1.	D	423.
91018A	Inmarsat 2-F2	1.	C2	57.
91026A	Anik E2	1.	D	210.
91028A	Spacenet 4	1.	D	309.
91037A	Aurora II	1.	D	189.
91046A	Gorizont 23	1.	D	173.
91046D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	482.
91054B	TDRS 5	1.	C2	56.
91054D	IUS second stage	1.	L3	4.
91055A	Intelsat VI F-5	1.	D	266.

COSPAR	NAME	TABLE	STATUS	No
91060A	Yuri 3B	1.	D	156.
91064A	Cosmos 2155	1.	L3	5.
91064B	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	369.
91067A	Anik E1	1.	D	223.
91074A	Gorizont 24	1.	D	117.
91074D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	332.
91075A	Intelsat VI F-1	1.	D	312.
91079A	Cosmos 2172	1.	L3	13.
91079D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	136.
91080B	USA 75 (DSP F16)	2.	Ind	2.
91080D	IUS second stage	2.	D1	14.
91083A	Eutelsat II F-3	1.	D	262.
91084A	Telecom 2A	1.	D	178.
91084B	Inmarsat 2-F3	1.	D	28.
91087A	Raduga 28	1.	L1	1.
91087D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	92.
92006A	USA 78 (DSCS III B-14)	2.	D1	73.
92006C	IABS	2.	D1	1.
92010A	Superbird B1	1.	D	195.
92010B	Insat-IIDT (Arabsat 1C)	1.	D	144.
92013A	Galaxy V	1.	D	260.
92017A	Gorizont 25	1.	D	360.
92017D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	491.
92021A	Telecom 2B	1.	D	300.
92021B	Inmarsat 2-F4	1.	D	84.
92027A	Palapa B4	1.	D	377.
92032A	Intelsat K (NSS K)	1.	D	40.
92037A	USA 82 (DSCS III B-12)(DSCS III F6)	2.	C2	41.
92037C	IABS	2.	D1	11.
92041A	Insat-IIA	1.	D	439.
92041B	Eutelsat II F-4	1.	D	199.
92043A	Gorizont 26	1.	D	249.
92043D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	75.
92054A	Optus B1	1.	D	237.
92057A	Satcom C-4	1.	D	190.
92059A	Cosmos 2209	1.	L2	34.
92059D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	348.
92060A	Hispasat 1A	1.	D	265.
92060B	Satcom C-3	1.	D	36.
92066A	DFS-Kopernikus 3	1.	D	334.
92072A	Galaxy VII	1.	D	330.
92074A	Ekran 20	1.	L1	43.
92074D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	494.
92082A	Gorizont 27	1.	D	435.
92082D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	93.
92084A	Superbird A1	1.	D	204.
92088A	Cosmos 2224	1.	L1	104.

COSPAR	NAME	TABLE	STATUS	No
92088D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	404.
93003B	TDRS 6	1.	C2	73.
93003D	IUS second stage	1.	D	416.
93013A	Raduga 29	1.	L1	93.
93013D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	91.
93015A	USA 98 (UFO F1)	1.	D	253.
93031A	Astra 1C	1.	C2	1.
93039A	Galaxy IV	1.	L1	3.
93046A	USA 93 (DSCS III B-09)(DSCS III F7)	2.	D1	72.
93046C	IABS	2.	D1	7.
93048A	Hispasat 1B	1.	D	333.
93048B	Insat-IIB	1.	D	385.
93056A	USA 95 (UFO F2)	2.	C2	3.
93058B	ACTS	1.	L2	2.
93062A	Raduga 30	1.	L1	17.
93062D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	L1	102.
93066A	Intelsat VII F-1	1.	C2	77.
93069A	Gorizont 28	1.	D	321.
93069D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	454.
93072A	Gorizont 29	1.	D	425.
93072D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	538.
93073A	Solidaridad 1	1.	L2	9.
93073B	Meteosat 6	1.	D	182.
93073E	Mage 1 (Meteosat 6 AKM)	1.	D	389.
93074A	USA 97 (DSCS III B-10)(DSCS III F8)	2.	C2	36.
93074B	IABS	2.	D1	69.
93076A	NATO IVB	1.	C2	14.
93077A	Telstar 4A	1.	L2	13.
93078A	DirecTV-1	1.	D	183.
93078B	Thaicom 1	1.	D	228.
94002A	Gals 1	1.	L1	73.
94002D	Proton-K/DM-2M fourth stage (Blok DM-2M)	1.	D	292.
94008A	Raduga 1-3	1.	L1	48.
94008D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	89.
94009A	USA 99 (Milstar DFS-1)	2.	C2	44.
94009B	Titan IVA stage 3 (Centaur)	2.	D1	32.
94012A	Raduga 31	1.	L1	58.
94012D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	97.
94013A	Galaxy IR-A	1.	D	242.
94022A	GOES 8	1.	D	170.
94030A	Gorizont 30	1.	L3	16.
94030D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	544.
94034A	Intelsat VII F-2	1.	C2	13.
94035A	USA 104 (UFO F3)	2.	L2	1.
94038A	Cosmos 2282	1.	L2	33.
94038D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	287.
94040A	PAS 2	1.	D	232.
94040B	BS-3N	1.	D	216.

COSPAR	NAME	TABLE	STATUS	No
94043A	Apstar 1	1.	C2	52.
94047A	DirecTV-2	1.	D	140.
94049A	Brazilsat B1	1.	D	251.
94049B	Turksat 1B	1.	D	193.
94054A	USA 105 (MERCURY 1)	2.	C2	8.
94054B	Titan IVA stage 3 (Centaur)	2.	D1	58.
94055A	Optus B3	1.	C2	53.
94060A	Cosmos 2291	1.	L2	40.
94060D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	405.
94064A	Intelsat VII F-3 (NSS 703)	1.	C2	72.
94065A	Solidaridad 2	1.	D	166.
94065B	Thaicom 2	1.	D	313.
94067A	Ekspress 1	1.	D	352.
94067D	Proton-K/DM-2M fourth stage (Blok DM-2M)	1.	L3	11.
94069A	Elektro 1	1.	L1	15.
94069D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	417.
94070A	Astra 1D	1.	C2	22.
94079A	Orion 1	1.	D	131.
94080A	Zongxing 6 (A)	1.	D	483.
94082A	Luch 1	1.	L2	39.
94082D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	475.
94084A	USA 107 (DSP F17)	2.	C2	43.
94084D	IUS second stage	2.	D1	19.
94087A	Raduga 32	1.	L1	6.
94087D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	406.
95001A	Intelsat VII F-4	1.	D	227.
95003A	USA 108 (UFO F4)	2.	C2	39.
95011B	Himawari-5	1.	D	282.
95011D	Star 27 (Himawari-5 AKM)	1.	D	499.
95013A	Intelsat VII F-5	1.	D	181.
95016A	Brazilsat B2	1.	C2	69.
95016B	Hot Bird 1	1.	D	264.
95019A	AMSC-1	1.	C2	61.
95022A	USA 110 (Advanced ORION 1)	2.	C2	25.
95022B	Titan IVA stage 3 (Centaur)	2.	D1	35.
95023A	Intelsat VIIA F-1	1.	C2	51.
95025A	GOES 9	1.	D	158.
95027A	USA 111 (UFO F5)	2.	D1	82.
95029A	DirecTV-3	1.	D	187.
95035B	TDRS 7	1.	C2	33.
95035D	IUS second stage	1.	D	456.
95038A	USA 113 (DSCS III B-07)(DSCS III F9)	2.	C2	29.
95038C	IABS	2.	D1	15.
95040A	PAS 4	1.	D	39.
95041A	Mugunghwa 1 (Koreasat 1)	1.	D	326.
95043A	JC-Sat 3	1.	D	215.
95044A	N-Star 1	1.	D	209.
95045A	Cosmos 2319	1.	L3	15.

COSPAR	NAME	TABLE	STATUS	No
95045D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	429.
95049A	Telstar 402R	1.	L2	15.
95054A	Luch 1-1	1.	L1	2.
95054D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	L1	92.
95055A	Astra 1E	1.	C2	11.
95057A	USA 114 (UFO F6)	2.	C2	38.
95060A	USA 115 (Milstar DFS-2)	2.	C2	32.
95060B	Titan IVA stage 3 (Centaur)	2.	D1	34.
95063A	Gals 2	1.	D	367.
95063D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	L1	97.
95064A	AsiaSat 2	1.	D	263.
95067A	Telecom 2C	1.	D	83.
95067B	Insat-IIC	1.	D	343.
95069A	Galaxy IIIR	1.	L2	20.
95073A	EchoStar 1	1.	C1	239.
96002A	PAS 3R	1.	D	200.
96002B	MEASAT 1	1.	D	196.
96003A	Mugunghwa 2 (Koreasat 2)	1.	C2	32.
96005A	Gorizont 31	1.	D	368.
96005D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	63.
96006A	Palapa C1	1.	D	314.
96007A	N-Star 2	1.	D	256.
96015A	Intelsat VIIA F-2	1.	D	122.
96020A	Inmarsat 3-F1	1.	C2	26.
96021A	Astra 1F	1.	C1	67.
96022A	MSAT	1.	C2	60.
96026A	USA 118 (MERCURY 2)	2.	C2	7.
96026B	Titan IVA stage 3 (Centaur)	2.	D1	59.
96030A	Palapa C2	1.	C2	50.
96030B	AMOS 1	1.	D	38.
96033A	Galaxy IX	1.	D	302.
96034A	Gorizont 32	1.	D	433.
96034D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	86.
96035A	Intelsat VII F-6	1.	D	226.
96039A	Apstar 1A	1.	C2	21.
96040A	Arabsat 2A	1.	D	245.
96040B	Turksat 1C	1.	L1	87.
96042A	USA 127 (UFO F7)	2.	C2	46.
96044A	Italsat 2	1.	D	474.
96044B	Telecom 2D	1.	D	118.
96053A	Inmarsat 3-F2	1.	C1	281.
96053D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	95.
96054A	GE 1	1.	C1	209.
96055A	EchoStar 2	1.	L2	23.
96058A	Ekspress 2	1.	L1	52.
96058D	Proton-K/DM-2M fourth stage (Blok DM-2M)	1.	L1	72.
96063A	Arabsat 2B	1.	D	284.
96063B	MEASAT 2	1.	C2	48.

COSPAR	NAME	TABLE	STATUS	No
96067A	Hot Bird 2	1.	C2	17.
96070A	Inmarsat 3-F3	1.	C2	54.
97002A	GE 2	1.	C2	66.
97002B	Nahuel 1A	1.	D	274.
97007A	JC-Sat 4	1.	C2	27.
97008A	USA 130 (DSP F18)	2.	C2	1.
97008D	IUS second stage	2.	D1	63.
97008E	USA 130 operational debris (Telescope aperture suncover)	2.	D1	61.
97009A	Intelsat VIII F-1	1.	D	148.
97011A	Tempo 2	1.	D	191.
97016A	Thaicom 3	1.	D	152.
97016B	BSAT-1a	1.	D	206.
97019A	GOES 10	1.	D	208.
97021A	Zhongxing 6 (B)	1.	L1	81.
97025A	Thor II	1.	D	180.
97026A	Telstar 5	1.	C1	225.
97027A	Inmarsat 3-F4	1.	C2	70.
97027B	Insat-IID	1.	D	551.
97029A	Fengyun 2A (Fengyun 2-1R)	1.	D	26.
97029C	Fengyun 2A AKM	1.	D	534.
97031A	Intelsat VIII F-2	1.	D	96.
97036A	Superbird C	1.	C2	37.
97040A	PAS 6	1.	D	4.
97041A	Cosmos 2345	1.	L3	7.
97041D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	391.
97042A	Agila 2	1.	C2	81.
97046A	PAS 5	1.	C2	18.
97049A	Hot Bird 3	1.	D	530.
97049B	Meteosat 7	1.	C2	25.
97049E	Mage 1 (Meteosat 7 AKM)	1.	D	465.
97050A	GE 3	1.	C1	248.
97053A	Intelsat VIII F-3 (NSS 803)	1.	C2	19.
97059A	EchoStar 3	1.	C1	252.
97062A	Apstar 2R	1.	D	239.
97065A	USA 134 (DSCS III B-13)(DSCS III F10)	2.	C2	35.
97065C	IABS	1.	D	490.
97070A	Kupon 1	1.	L1	30.
97070D	Proton-K/DM-2M fourth stage (Blok DM-2M)	1.	D	318.
97071A	Sirius 2	1.	D	281.
97071B	Cakrawatra 1	1.	L1	76.
97075A	JC-Sat 5	1.	C2	49.
97076A	Astra 1G	1.	C1	42.
97078A	Galaxy VIII-i	1.	D	331.
97083A	Intelsat 804	1.	L3	2.
97086A	HGS-1	1.	L2	26.
98002A	Skynet 4D	1.	D	219.
98006A	Brazilsat B-3A	1.	C2	65.
98006B	Inmarsat-3 F5	1.	C1	29.

COSPAR	NAME	TABLE	STATUS	No
98013A	Hot Bird 4	1.	C2	5.
98014A	Intelsat 806 (NSS 806)	1.	C1	261.
98016A	USA 138 (UFO F8)	2.	C2	28.
98024A	Nilesat 101	1.	D	44.
98024B	BSAT-1b	1.	D	205.
98025A	Cosmos 2350	1.	L1	12.
98025D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	402.
98028A	EchoStar 4	1.	D	179.
98029A	USA 139 (Advanced ORION 2)	2.	C2	45.
98029B	Titan IVB stage 3 (Centaur)	2.	L1	1.
98033A	Zhongwei 1	1.	C1	152.
98035A	Thor III	1.	C2	80.
98037A	Intelsat 805	1.	C1	258.
98044A	ZX 5B (ChinaSat 5B)	1.	D	225.
98049A	ST-1	1.	D	151.
98050A	Astra 2A	1.	C1	34.
98052A	PAS 7	1.	C2	29.
98056A	Eutelsat W2	1.	D	257.
98056B	Sirius 3	1.	C2	20.
98057A	Hot Bird 5	1.	D	120.
98058A	USA 140 (UFO F9)	2.	D1	89.
98063A	AfriStar 1	1.	C2	6.
98063B	GE 5	1.	C2	68.
98065A	PAS 8	1.	C1	165.
98068A	Bonum 1	1.	C2	24.
98070A	Satmex 5	1.	C2	58.
98075A	PAS 6B	1.	D	218.
99005A	Telstar 6	1.	C1	62.
99006A	JC-Sat 6	1.	C1	94.
99009A	Arabsat 3A	1.	D	427.
99009B	Skynet 4E	1.	C2	12.
99010A	Raduga 1-4	1.	L1	69.
99010D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	94.
99013A	Asiasat 3S	1.	C1	117.
99016A	Insat 2E	1.	D	322.
99018A	Eutelsat W3	1.	C2	16.
99027A	Nimiq	1.	C1	230.
99033A	Astra 1H	3.	Ind	1.
99042A	Telkom 1	1.	C1	119.
99046A	Mugunghwa 3 (Koreasat 3)	1.	C1	132.
99047A	Yamal-100 No. 1	1.	D	363.
99047B	Yamal-100 No. 2	1.	D	390.
99047E	Proton-K/DM-2M fourth stage (Blok DM-2M)	1.	D	422.
99050A	EchoStar 5	1.	D	150.
99052A	Telstar 7	1.	C2	28.
99053A	LMI 1	1.	C1	85.
99056A	DirecTV-1R	1.	C2	23.
99059A	Orion 2	1.	C1	282.

COSPAR	NAME	TABLE	STATUS	No
99060A	GE 4	1.	C1	247.
99063A	USA 146 (UFO F10)	2.	C2	13.
99071A	Galaxy 11	1.	C1	257.
00001A	USA 148 (DSCS III B-08)(DSCS III F11)	2.	C2	26.
00001C	IABS	2.	D1	20.
00002A	Galaxy 10R	1.	D	320.
00003A	Zhongxing-22 (FengHuo 1, FH-1)	1.	D	43.
00007A	Hispasat 1C	3.	Ind	2.
00011A	Garuda 1	1.	C2	43.
00012A	Superbird 4	1.	C1	162.
00013A	Ekspress 2A	1.	C2	39.
00013D	Proton-K/DM-2M fourth stage (Blok DM-2M)	1.	D	471.
00016A	Asiastar	1.	C1	116.
00016B	Insat 3B	1.	D	323.
00019A	Sesat	1.	C2	4.
00019D	Proton-K/DM-2M fourth stage (Blok DM-2M)	1.	D	307.
00020A	Galaxy IVR	1.	D	355.
00022A	GOES 11	1.	D	192.
00024A	USA 149 (DSP F20)	2.	C2	31.
00024D	IUS second stage	2.	D1	54.
00024E	DSP F20 Aperture Cover	2.	D1	53.
00028A	Eutelsat W4	1.	C1	47.
00029A	Gorizont 33	1.	L3	10.
00029B	Proton-K/Briz-M fourth stage (Briz-M)	1.	D	443.
00031A	Ekspress 3A	1.	D	155.
00031D	Proton-K/DM-2M fourth stage (Blok DM-2M)	1.	D	288.
00032A	Fengyun 2B	1.	D	407.
00032C	Fengyun 2B AKM	1.	D	431.
00034A	TDRS 8	1.	C2	35.
00036A	Cosmos-2371	1.	L1	4.
00036D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	434.
00038A	EchoStar 6	1.	C2	63.
00043A	PAS 9	1.	C2	74.
00046A	Brasilsat B4	1.	C1	234.
00046B	Nilesat 102	1.	C1	289.
00049A	Raduga 1-5	1.	L1	55.
00049D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	103.
00052A	Eutelsat W1	1.	D	102.
00054A	Astra 2B	1.	C1	23.
00054B	GE 7	1.	C1	173.
00059A	GE-1A	1.	C1	120.
00060A	N-SAT-110	1.	C1	124.
00065A	USA 153 (DSCS III B-11)(DSCS III F12)	2.	C2	10.
00065C	IABS	2.	D1	22.
00066A	Thuraya 1	1.	D	184.
00067A	GE 6	1.	C1	245.
00068A	Europe*Star F1	1.	C1	55.
00069A	Beidou	1.	D	174.

COSPAR	NAME	TABLE	STATUS	No
00072A	PAS 1R	1.	C1	260.
00076A	Anik F1	1.	C1	202.
00080A	USA 155 (SDS 3 F2)	2.	C2	23.
00081A	Astra 2D	1.	C2	9.
00081B	GE 8 (Aurora 3)	1.	C1	172.
00082A	Beidou 1B	1.	D	254.
01002A	Turksat 2A (Eurasiasat 1)	1.	C1	52.
01005A	Sicral	2.	C2	5.
01005B	Skynet 4F	1.	C2	76.
01009A	USA 157 (Milstar-2 F2)	2.	C2	27.
01009B	Titan IVB stage 3 (Centaur)	2.	D1	39.
01011A	Eurobird 1	1.	C1	38.
01011B	BSAT-2a	1.	D	224.
01012A	XM Radio 2 (Rock)	1.	C1	192.
01014A	Ekran 21 (Ekran-M)	1.	D	310.
01014C	Proton-M/Briz-M fourth stage (Briz-M)	1.	D	88.
01015A	GSAT-1	1.	D	543.
01018A	XM Radio 1 (Roll)	1.	C1	191.
01019A	PAS 10	1.	C1	58.
01020A	USA 158 (GeoLITE)	2.	D1	79.
01024A	Intelsat 901	1.	C1	279.
01025A	Astra 2C	1.	C1	20.
01029A	Artemis	1.	C2	7.
01031A	GOES 12	1.	D	211.
01033A	USA 159 (DSP F21)	2.	C2	24.
01033D	IUS second stage	2.	D1	48.
01033E	USA 159 operational debris (Telescope aperture suncover)	2.	U	6.
01037A	Cosmos-2379	1.	L1	91.
01037D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	L1	75.
01039A	Intelsat 902	1.	C1	73.
01042A	Atlantic Bird 2	1.	C1	285.
01045A	Raduga 1-6	1.	D	68.
01045D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	L1	53.
01046A	USA 162 (SDS 3 F3)	2.	C2	33.
01052A	DirecTV-4S	1.	C1	214.
02001A	USA 164 (Milstar-2 F3)	2.	C2	4.
02001B	Titan IVB stage 3 (Centaur)	2.	D1	45.
02002A	Insat 3C	1.	C1	81.
02006A	EchoStar 7	1.	C1	187.
02007A	Intelsat 904	1.	C1	72.
02011A	TDRS 9	1.	C2	75.
02015A	JC-Sat 8	1.	C1	157.
02015B	Astra 3A	3.	Ind	3.
02016A	Intelsat 903	1.	C1	269.
02019A	NSS-7	1.	C1	278.
02023A	DirecTV-5	1.	C1	199.
02027A	Intelsat 905	1.	C1	276.
02029A	Ekspress A1R (Express 4A)	1.	C2	79.

COSPAR	NAME	TABLE	STATUS	No
02029D	Proton-K/DM-2M fourth stage (Blok DM-2M)	1.	D	259.
02030A	Galaxy 3C	1.	C1	223.
02035A	Atlantic Bird 3	1.	C1	291.
02035B	N-Star 3 (N-Star c)	1.	C2	45.
02038A	Hot Bird 6	1.	C1	286.
02039A	EchoStar 8	1.	C1	241.
02040A	Atlantic Bird 1	1.	C1	283.
02040B	MSG 1	1.	C2	2.
02041A	Intelsat 906	1.	C1	75.
02042B	Kodama (DRTS)	1.	C2	36.
02043A	KALPANA-1 (METSAT-1)	1.	C2	31.
02044A	Hispasat 1D	1.	C1	273.
02051A	Eutelsat W5	1.	C1	44.
02055A	TDRS 10	1.	C2	55.
02057A	NSS 6	1.	C1	112.
02062A	Nimiq 2	1.	C1	50.
03007A	Intelsat 907	1.	C1	275.
03008A	USA 167 (DSCS III A-3)(DSCS III F13)	2.	C2	34.
03008C	IABS (Apogee Boost Subsystem)	2.	D1	24.
03012A	USA 169 (Milstar-2 F4)	2.	C2	40.
03012B	Titan IVB stage 3 (Centaur)	2.	D1	31.
03013A	Insat 3A	1.	C1	110.
03013B	Galaxy XII	1.	C1	178.
03014A	Asiasat 4	1.	C1	136.
03015A	Cosmos-2397	1.	D	451.
03015F	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	L1	89.
03018A	GSAT-2	1.	D	359.
03020A	Hellas Sat 2	1.	C1	49.
03021A	Beidou 3	1.	D	341.
03024A	AMC-9 (GE-12)	1.	C1	235.
03026A	Thuraya 2	1.	C2	15.
03028A	BSAT-2c	1.	D	236.
03028B	Optus C1 (Defense C1)	1.	C1	158.
03033A	Rainbow 1	1.	C1	251.
03034A	EchoStar 9 (Telstar 13)	1.	C1	184.
03040A	USA 170 (DSCS III B-6)(DSCS III F14)	2.	Ind	3.
03040C	IABS (Apogee Boost Subsystem)	2.	D1	29.
03041A	USA 171 (Advanced ORION 3)	2.	C2	12.
03041B	Titan IVB stage 3 (Centaur)	2.	D1	26.
03043A	Eurobird 3	1.	C1	45.
03043E	Insat 3E	1.	C1	68.
03044A	Galaxy 13/Horizons-1	1.	C1	180.
03052A	Zhongxing-20 (ShenTong 1, ST-1)	1.	C2	41.
03053A	Yamal 200 N2 (Yamal 202)	1.	C1	60.
03053B	Yamal 200 N1 (Yamal 201)	1.	C1	105.
03053E	Proton-K/DM-2M fourth stage (Blok DM-2M)	1.	D	398.
03057A	USA 174 (UFO F11)	2.	C2	15.
03059A	AMOS 2	1.	C1	292.

COSPAR	NAME	TABLE	STATUS	No
03060A	Ekspress AM-22	1.	C1	65.
03060D	Proton-K/DM-2M fourth stage (Blok DM-2M)	1.	L1	42.
04001A	Estrela do Sul 1 (Telstar 14)	1.	D	163.
04003A	AMC-10 (GE 10)	1.	C1	175.
04004A	USA 176 (DSP F22)	2.	C2	11.
04004D	IUS second stage	2.	D1	49.
04007A	MBSAT	1.	C1	84.
04008A	Eutelsat W3A	1.	C1	8.
04010A	Raduga-1	1.	L1	85.
04010F	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	414.
04011A	Superbird A2 (Superbird 6)	1.	D	290.
04015A	Ekspress AM-11	1.	D	248.
04015D	Proton-K/DM-2M fourth stage (Blok DM-2M)	1.	D	470.
04016A	DirecTV-7S	1.	C1	186.
04017A	AMC-11 (GE-11)	1.	C1	177.
04022A	Intelsat 10-02	1.	C1	294.
04024A	Telstar 18 (APstar 5)	1.	C1	148.
04027A	Anik F2	1.	C1	196.
04031A	Amazonas	1.	C1	268.
04036A	GSAT 3 (EDUSAT)	1.	D	258.
04041A	AMC-15	1.	C1	206.
04042A	Fengyun 2C	1.	C2	44.
04042C	Fengyun 2C AKM	1.	D	504.
04043A	Ekspress AM-1	1.	D	235.
04043D	Proton-K/DM-2M fourth stage (Blok DM-2M)	1.	D	421.
04048A	AMC 16	1.	C1	233.
05003A	AMC 12	1.	C1	267.
05005A	XTAR-EUR	1.	C1	39.
05006A	Himawari-6	1.	C1	151.
05008A	XM Radio 3 (Rhythm)	1.	C1	232.
05009A	Inmarsat 4 F1	1.	C2	46.
05010A	Ekspress AM-2	1.	C1	91.
05010F	Proton-K/DM-2M fourth stage (Blok DM-2M)	1.	L1	54.
05012A	Apstar 6	1.	C1	147.
05015A	Spaceway 1	1.	C1	210.
05019A	DirectTV-8	1.	C1	217.
05022A	Intelsat Americas 8 (Telstar 8)	1.	C1	228.
05023A	Ekspress AM-3	1.	C1	150.
05023H	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	476.
05028A	Thaicom 4 (IPStar 1)	1.	C1	135.
05030A	Galaxy 14	1.	C1	181.
05036A	Anik F1R	1.	C1	203.
05041A	Galaxy 15	1.	C1	176.
05041B	Syracuse 3A	1.	C1	57.
05044A	Inmarsat 4 F2	1.	C2	8.
05046A	Telkom 2	1.	C1	134.
05046B	Spaceway 2	1.	C1	219.
05049A	Insat 4A	1.	C1	96.

COSPAR	NAME	TABLE	STATUS	No
05049B	MSG 2 (Meteosat 9)	1.	C1	1.
05049E	MSG-2 operational debris (SEVIRI cooler cover)	1.	D	496.
05049F	MSG-2 operational debris (entry baffle cover)	1.	D	528.
05052A	AMC 23	1.	C1	168.
06003A	Echostar 10	1.	C1	198.
06004A	MTSAT-2	1.	C1	155.
06007A	Spainsat	1.	C1	272.
06007B	Hot Bird 7A	1.	C1	10.
06010A	JCSAT 9	1.	C1	146.
06012A	Astra 1KR	1.	C1	21.
06018A	GOES N	1.	C1	243.
06020A	Satmex 6	1.	C1	195.
06020B	Thaicom 5	1.	C1	88.
06022A	KAZSAT	1.	D	247.
06022D	Proton-K/DM-2M fourth stage (Blok DM-2M)	1.	D	486.
06023A	Galaxy 16	1.	C1	220.
06024A	USA 187 (MITEx OSC satellite)	2.	C4	17.
06024B	USA 188 (MITEx Lockheed satellite)	2.	D1	77.
06024C	USA 189 (NRL Upper Stage/Satellite)	2.	C4	16.
06032A	Hot Bird 8	1.	C1	13.
06033A	JCSAT 3A	1.	C1	139.
06033B	Syracuse 3B	1.	C1	290.
06034A	Mugunghwa 5	1.	C1	129.
06038A	Zhongxing-22A (FengHuo 1, FH-1)	1.	C2	40.
06043A	DirecTV 9S	1.	C1	215.
06043B	Optus D1	1.	C1	161.
06048A	Xinnuo 2	1.	D	3.
06049A	XM Radio 4 (Blues)	1.	C1	193.
06051A	Badr 4	1.	C1	32.
06053A	Fengyun 2D	1.	C2	34.
06053C	Fengyun 2D AKM (FG-36 AKM)	1.	D	270.
06053D	Fengyun 2D debris	1.	L1	25.
06054A	WildBlue 1	1.	C1	197.
06054B	AMC 18	1.	C1	207.
06056A	Measat 3	1.	C1	107.
06059A	Kiku-8 (ETS VIII)	1.	C2	47.
07003A	Beidou 4	1.	D	217.
07007A	Insat 4B	1.	C1	111.
07007B	Skynet 5A	1.	C1	7.
07009A	Anik F3	1.	C1	189.
07016A	Astra 1L	1.	C1	22.
07016B	Galaxy 17	1.	C1	227.
07018A	Nigcomsat 1	1.	L1	60.
07021A	Xinnuo 3	1.	C1	4.
07031A	Zhongxing 6B	1.	C1	131.
07032A	DirecTV 10	1.	C1	211.
07036A	Spaceway 3	1.	C1	224.
07036B	BSAT-3A	1.	C1	122.

COSPAR	NAME	TABLE	STATUS	No
07037A	INSAT 4CR	1.	C1	82.
07044A	Optus D2	1.	C1	156.
07044B	Intelsat IS-11	1.	C1	264.
07046A	USA 195 (WGS F1)	2.	C1	5.
07054A	USA 197 (DSP F23)	2.	L1	6.
07054B	Delta 4 second stage	2.	D1	94.
07056A	Star One C1	1.	C1	249.
07056B	Skynet 5B	1.	C1	27.
07057A	Sirius 4	1.	C1	5.
07058A	Cosmos-2434 (Raduga-1M1)	1.	D	277.
07058C	Proton-M/Briz-M fourth stage (Briz-M)	1.	D	550.
07063A	Rascom-QAF 1	1.	D	198.
07063B	Horizons 2	1.	C1	99.
08001A	Thuraya 3	1.	C2	38.
08003A	Ekspress AM-33	1.	C1	113.
08003B	Proton-M/Briz-M fourth stage (Briz-M)	1.	D	545.
08006A	Thor 2R	1.	C1	296.
08006C	Proton-M/Briz-M fourth stage (Briz-M)	1.	D	13.
08007A	Kizuna	1.	C1	153.
08011A	AMC 14	1.	C2	10.
08013A	DirecTV 11	1.	C1	218.
08016A	ICO G1	1.	C2	64.
08018A	Vinasat	1.	C1	145.
08018B	Star One C2	1.	C1	246.
08019A	Tian Lian 1A	1.	C1	92.
08022A	Amos 3	1.	C1	293.
08022B	Zenit-3SLB third stage (Blok-DM-SL-B)	1.	D	18.
08024A	Galaxy 18	1.	C1	183.
08028A	Zhongxing 9	1.	C1	109.
08030A	Skynet 5C	1.	C1	280.
08030B	Turksat 3A	1.	C1	51.
08033A	Cosmos-2440	1.	L1	8.
08033D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	L1	28.
08034A	Protostar 1	1.	C1	271.
08034B	Badr 6	1.	C1	33.
08035A	Echostar 11	1.	C1	200.
08038A	Superbird C2	1.	C1	154.
08038B	AMC 21	1.	C1	182.
08039A	Inmarsat 4 F3	1.	C2	62.
08044A	Nimiq 4	1.	C1	236.
08045A	Galaxy 19	1.	C1	221.
08055A	Simon Bolivar	1.	C1	238.
08057A	Astra 1M	1.	C1	19.
08063A	Ciel 2	1.	C1	179.
08065A	Hot Bird 9	1.	C1	12.
08065B	Eutelsat W2M	1.	C1	37.
08066A	Fengyun 2E	1.	C2	42.

COSPAR	NAME	TABLE	STATUS	No
08066C	Fengyun 2E AKM (FG-36 AKM)	1.	D	525.
09001A	USA 202 (NROL-26)	2.	C2	6.
09001B	Delta 4 second stage	2.	D1	93.
09007A	Ekspress AM-44	1.	C1	284.
09007B	Ekspress MD-1	1.	D	202.
09007D	Proton-M/Briz-M fourth stage (Briz-M)	1.	D	57.
09008A	NSS 9	1.	C1	170.
09008B	Atlantic Bird 4A	1.	C1	14.
09009A	Telstar 11N	1.	C1	266.
09010A	Raduga-1	1.	C2	3.
09010B	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	D	392.
09016A	Eutelsat W2A	1.	C1	11.
09017A	USA 204 (WGS F2)	2.	C1	3.
09018A	Beidou DW 2 (Compass G2)	1.	L1	82.
09020A	SICRAL 1B	2.	C1	1.
09027A	Indostar II/Protostar II	1.	C1	118.
09032A	Measat 3A	1.	C1	108.
09033A	GOES 14	1.	C1	205.
09034A	Sirius FM5	1.	C1	222.
09035A	Terrestar 1	1.	C2	59.
09042A	Asiasat 5	1.	C1	115.
09044A	JCSAT 12 (JCSAT-RA)	1.	C1	140.
09044B	Optus D3	1.	C1	159.
09046A	Palapa D	1.	C1	128.
09047A	USA 207 (PAN)	2.	C1	2.
09050A	Nimiq 5	1.	C1	244.
09054A	Amazonas 2	1.	C1	254.
09054B	COMSATBw-1	1.	C1	74.
09058A	NSS 12	1.	C1	70.
09058B	Thor 6	1.	C1	295.
09064A	Intelsat IS-14	1.	C1	263.
09065A	Eutelsat W7	1.	C1	46.
09067A	Intelsat IS-15	1.	C1	101.
09068A	USA 211 (WGS F3)	2.	C1	8.
09075A	DirecTV 12	1.	C1	212.
10001A	Beidou DW 3	1.	C1	149.
10002A	Raduga-1M	1.	C1	100.
10002B	Proton-M/Briz-M fourth stage (Briz-M)	1.	D	546.
10005A	Solar Dynamics Observatory	4.	I	3.
10006A	Intelsat IS-16	1.	C1	237.
10008A	GOES 15	1.	C1	174.
10010A	Echostar XIV	1.	C1	188.
10016A	SES-1	1.	C1	216.
10021A	Astra 3B	1.	C1	26.
10021B	COMSATBw-2	1.	C1	15.
10024A	Beidou DW 4	1.	C1	125.
10025A	Badr 5	1.	C1	31.
10032A	Chollian	1.	C1	141.

COSPAR	NAME	TABLE	STATUS	No
10032B	Arabsat 5A	1.	C1	40.
10034A	Echostar XV	1.	C1	262.
10036A	Beidou DW 5	4.	I	4.
10037A	Nilesat 201	1.	C1	288.
10037B	RASCOM-QAF 1R	1.	C1	2.
10039A	USA 214 (AEHF SV-1)	2.	C2	42.
10042A	Zhongxing 6A	1.	C1	138.
10045A	Michibiki	4.	I	5.
10053A	Sirius XM-5	1.	C1	231.
10056B	BSAT-3B	1.	C1	121.
10057A	Beidou DW 6	1.	C1	160.
10061A	SkyTerra 1	1.	C1	213.
10063A	USA 223 (NROL-32)	2.	C2	20.
10063B	Delta-4 second stage	2.	D1	2.
10064A	Zhongxing 20A	1.	C1	143.
10065A	Hylas	1.	C1	270.
10065B	Intelsat IS-17	1.	C1	76.
10068A	Beidou DW 7	4.	I	6.
10069A	KA-Sat	1.	C1	9.
10070A	Hispasat 1E	1.	C1	274.
10070B	Koreasat 6	1.	C1	133.
11001A	Elektro-L No. 1	1.	C1	86.
11001B	Zenit-3SLBF third stage (Fregat-SB)	1.	D	532.
11011A	USA 227 (NROL-27)	2.	C2	18.
11013A	Beidou DW 8	4.	I	7.
11016A	Intelsat New Dawn	1.	C1	43.
11016B	Yahsat 1A	1.	C1	63.
11019A	USA 230 (SBIRS-GEO 1)	2.	C2	19.
11021A	Estrela do Sul 2	1.	C1	250.
11022A	GSAT-8	1.	C1	69.
11022B	ST-2	1.	C1	104.
11026A	Zhongxing 10	1.	C1	126.
11032A	Tian Lian 1B	1.	C1	167.
11034A	GSAT-12	1.	C1	98.
11035A	SES-3	1.	C1	208.
11035B	Kazsat-2	1.	C1	102.
11038A	Beidou DW 9	4.	I	8.
11041A	Astra 1N	1.	C1	35.
11041B	BSAT 3c	1.	C1	123.
11042A	Paksat 1R	1.	C1	48.
11047A	Zhongxing 1A	1.	C1	142.
11048A	Cosmos-2473	1.	C1	90.
11048B	Proton-M/Briz-M fourth stage (Briz-M)	1.	D	548.
11049A	SES-2	1.	C1	229.
11049B	Arabsat 5C	1.	C1	24.
11051A	Atlantic Bird 7	1.	C1	287.
11054A	QuetzSat-1	1.	C1	240.
11056A	Intelsat IS-18	1.	C1	169.

COSPAR	NAME	TABLE	STATUS	No
11057A	Eutelsat W3C	1.	C1	16.
11059A	ViaSat-1	1.	C1	194.
11069A	Asiasat 7	1.	C1	89.
11073A	Beidou DW 10	4.	I	9.
11074A	Amos 5	1.	C1	18.
11074B	Luch-5A	1.	C1	166.
11077A	Nigcomsat 1R	1.	C1	53.
12002A	Fengyun 2F	1.	C1	127.
12002C	Fengyun 2F AKM (FG-36 AKM)	1.	D	276.
12003A	WGS SV-4	2.	C1	4.
12007A	SES-4	1.	C1	277.
12008A	Beidou DW 11	1.	C1	71.
12009A	MUOS 1	2.	C2	30.
12011A	Intelsat IS-22	1.	C1	80.
12012A	Cosmos-2479	1.	C1	163.
12012D	Proton-K/DM-2 fourth stage (Blok DM-2)	1.	L3	8.
12013A	Apstar 7	1.	C1	87.
12016A	Yahsat 1B	1.	C1	59.
12019A	USA 235 (AEHF 2)	2.	C2	47.
12023A	JCSAT 13	1.	C1	137.
12023B	Vinasat-2	1.	C1	144.
12026A	Nimiq 6	1.	C1	226.
12028A	Zhongxing 2A	1.	C1	114.
12030A	Intelsat IS-19	1.	C1	164.
12033A	USA 236 (SDS 3 F7)	2.	C2	49.
12034A	USA 237 (NROL-15)	2.	C2	9.
12034B	DELTA 4 R/B	2.	D1	4.
12035A	Echostar 17	1.	C1	204.
12035B	Meteosat 10	1.	C1	297.
12036A	SES-5	1.	C1	6.
12040A	Tian Lian 1-03	1.	C1	17.
12043A	Intelsat IS-20	1.	C1	77.
12043B	Hylas 2	1.	C1	41.
12045A	Intelsat IS-21	1.	C1	256.
12051A	Astra 2F	1.	C1	36.
12051B	GSAT-10	1.	C1	97.
12057A	Intelsat IS-23	1.	C1	259.
12059A	Beidou DW 16	1.	C1	93.
12061A	Luch-5B	1.	C2	78.
12061B	Yamal-300K	1.	C1	106.
12062A	Star One C3	1.	C1	242.
12062B	Eutelsat 21B	1.	C1	25.
12065A	Echostar XVI	1.	C1	253.
12067A	Zhongxing 12	1.	C1	103.
12069A	Eutelsat 70B	1.	C1	79.
12070A	Yamal-402	1.	C1	66.
12075A	Skynet 5D	1.	C1	64.

COSPAR	NAME	TABLE	STATUS	No
12075B	Mexsat Bicentenario	3.	Ind	4.
13004A	TDRS 11	1.	C1	171.
13006A	Amazonas 3	1.	C1	255.
13006B	Azerspace	1.	C1	56.
13011A	USA 241 (SBIRS GEO-2)	2.	C2	2.
13012A	Satmex 8	1.	C1	190.
13014A	Anik G-1	1.	C1	201.
13020A	Zhongxing 11	1.	C1	130.
13022A	Eutelsat 3D	1.	C1	3.
13024A	USA 243 (WGS SV-5)	2.	C1	7.
13026A	SES-6	1.	C1	265.
13034A	IRNSS-R1A	1.	C1	61.
13036A	MUOS 2	2.	Ind	1.
13038A	Alphasat	1.	C1	28.
13038B	Insat 3D	1.	C1	95.
13041A	USA 244 (WGS SV-6)	2.	C1	6.
13044A	Es'hail 1 / Eutelsat 25B	1.	C1	30.
13044B	GSAT-7	1.	C1	83.
13045A	Amos 4	3.	Ind	5.
13050A	USA 246 (AEHF SV-3)	2.	C4	37.
13056A	Astra 2E	1.	C1	54.
13058A	Sirius FM6	1.	C1	185.
13062A	Raduga-1M	1.	C1	78.
13062B	Proton-M/Briz-M fourth stage (Briz-M)	1.	D	547.
13071A	SES-8	3.	Ind	6.
13073A	Inmarsat 5F1	3.	Ind	7.
13075A	Tupac Katari (TKSat 1)	3.	Ind	8.
13077A	Ekspress AM-5	3.	Ind	9.

3 Table 1: Objects with Two-Line-Element data

This table contains all objects with recently updated Two-Line-Elements.

The objects are ordered according to the following criteria:

1. Status C1, then according to the ascending order of longitude of station keeping.
2. Status C2, then according to the ascending order of longitude of station keeping.
3. Status D , then according to the ascending order of the mean drift rate (which is equivalent to the decreasing order of the mean semi-major axis).
4. Status L1, then according to the ascending order of the libration period (which is equivalent to the ascending order of the libration magnitude).
5. Status L2, then according to the ascending order of the libration period (which is equivalent to the ascending order of the libration magnitude).
6. Status L3, then according to the ascending order of the libration period (which is equivalent to the ascending order of the libration magnitude).

The following symbols are used:

- nn: is the reference number.
- COSPAR: is the COSPAR identifier.
- Name: is the object's common name.
- Date: is the epoch of the last available TLE.
- $\overline{\lambda}$: is the mean longitude of the satellite (in degrees).
- $\overline{\dot{\lambda}}$: is the mean drift of the satellite (in deg/days).
- $\overline{\Delta a}$: is the difference between the satellite's mean semi-major axis and the geostationary semi-major axis (in km).
- $\overline{\Delta r_p}$: is the perigee mean deviation from the geostationary altitude (in km).
- $\overline{\Delta r_a}$: is the apogee mean deviation from the geostationary altitude (in km).
- P_{lib}: is the libration period (in days).
- $\Delta\lambda$: is the libration magnitude (in degrees): $\Delta\lambda = \lambda_{max} - \lambda_{min}$
- λ_{min}: is the minimum longitude of the libration (in degrees).
- λ_{max}: is the maximum longitude of the libration (in degrees).
- N_{ly}: is the number of Two-Line Elements stored during the last 52 weeks.
- N_{tot}: is the total number of Two-Line Elements available for this object.
- MJD1950: is the Modified Julian Date (number of days since 01-Jan-1950) corresponding to "Date"

- a, e, i, Ω, ω and λ are the latest values of the satellite's semi-major axis (in km), eccentricity, inclination (in degrees), right-ascension of the ascending node (in degrees), perigee argument (in degrees) and longitude (in degrees).

3.1 Satellites under longitude and inclination control (E-W and N-S control)

In the case where the satellite is under longitude and inclination control, there are 297 objects identified.

For explanation of symbols, see the definitions at the beginning of Chapter 3 on page 34.

C1 .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$				N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
C1 . 1	**05049B**	**MSG 2 (Meteosat 9)**					
	27-DEC-13	0.10				53	401
	23371.202766	42163.22958	0.0001064	0.3242	16.5271	359.0639	9.3825
C1 . 2	**10037B**	**RASCOM-QAF 1R**					
	27-DEC-13	2.90				53	181
	23371.202616	42164.54878	0.0004203	0.0134	47.0949	228.8520	2.9090
C1 . 3	**13022A**	**Eutelsat 3D**					
	27-DEC-13	2.93				35	35
	23371.202616	42164.34161	0.0003099	0.0559	348.4015	294.8937	3.1300
C1 . 4	**07021A**	**Xinnuo 3**					
	27-DEC-13	3.11				53	339
	23371.669109	42163.88468	0.0004403	0.0676	100.9835	218.1617	3.3220
C1 . 5	**07057A**	**Sirius 4**					
	25-DEC-13	4.82				51	312
	23369.135880	42164.08455	0.0002898	0.0133	354.2499	269.0595	4.8394
C1 . 6	**12036A**	**SES-5**					
	27-DEC-13	5.00				51	77
	23371.301933	42164.45094	0.0001917	0.0651	269.7215	5.4027	4.9888
C1 . 7	**07007B**	**Skynet 5A**					
	27-DEC-13	6.01				53	349
	23371.301933	42164.81145	0.0003533	0.0696	357.1831	279.5669	5.9611
C1 . 8	**04008A**	**Eutelsat W3A**					
	23-DEC-13	7.00				53	492
	23367.235405	42163.95644	0.0004541	0.0622	352.6753	274.9603	7.0325
C1 . 9	**10069A**	**KA-Sat**					
	27-DEC-13	9.00				53	159
	23371.202755	42164.44645	0.0000394	0.0436	295.4846	272.9994	8.9977
C1 . 10	**06007B**	**Hot Bird 7A**					
	26-DEC-13	9.00				53	387
	23370.931782	42164.43048	0.0006094	0.0505	71.3767	203.6975	9.0001
C1 . 11	**09016A**	**Eutelsat W2A**					
	27-DEC-13	10.00				53	246
	23371.202766	42164.37105	0.0004980	0.0619	351.1267	282.1076	10.0060

C1 .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$				N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
C1 . 12	**08065A**	**Hot Bird 9**					
	27-DEC-13	13.00				51	264
	23371.299248	42164.51598	0.0003321	0.0767	32.4873	282.9274	13.0250
C1 . 13	**06032A**	**Hot Bird 8**					
	27-DEC-13	13.01				53	371
	23371.298275	42164.87004	0.0005581	0.0528	357.5565	297.6782	13.0154
C1 . 14	**09008B**	**Atlantic Bird 4A**					
	27-DEC-13	13.03				51	257
	23371.299317	42164.67268	0.0005671	0.0500	307.5868	320.0172	13.0063
C1 . 15	**10021B**	**COMSATBw-2**					
	27-DEC-13	13.21				53	191
	23371.299317	42165.19608	0.0001796	0.0197	80.0889	202.7915	13.1763
C1 . 16	**11057A**	**Eutelsat W3C**					
	26-DEC-13	15.86				51	119
	23370.290104	42163.75013	0.0005003	0.0623	346.0413	281.3557	16.0421
C1 . 17	**12040A**	**Tian Lian 1-03**					
	27-DEC-13	16.80				53	76
	23371.232593	42163.65117	0.0004213	0.9745	270.6609	347.6831	16.8235
C1 . 18	**11074A**	**Amos 5**					
	26-DEC-13	17.00				52	108
	23370.737581	42163.77760	0.0001667	0.0386	156.0524	333.8868	17.0161
C1 . 19	**08057A**	**Astra 1M**					
	11-DEC-13	19.19				23	191
	23355.654931	42164.81509	0.0002536	0.0036	5.7437	227.4176	19.2144
C1 . 20	**01025A**	**Astra 2C**					
	26-NOV-13	19.20				25	499
	23340.705069	42164.62867	0.0004103	0.0688	348.3362	313.2404	19.2374
C1 . 21	**06012A**	**Astra 1KR**					
	12-DEC-13	19.20				23	296
	23356.556042	42165.74332	0.0004459	0.0656	290.7191	309.1580	19.1933
C1 . 22	**07016A**	**Astra 1L**					
	12-DEC-13	19.21				26	260
	23356.582141	42164.73071	0.0003592	0.0565	301.9080	317.2867	19.2272
C1 . 23	**00054A**	**Astra 2B**					
	27-DEC-13	19.41				29	538
	23371.227708	42163.89253	0.0003189	0.0812	37.0928	274.3184	19.4232
C1 . 24	**11049B**	**Arabsat 5C**					
	27-DEC-13	19.99				51	120
	23371.202998	42165.49885	0.0003479	0.0647	350.2907	235.1930	20.0330
C1 . 25	**12062B**	**Eutelsat 21B**					
	26-DEC-13	21.60				52	60
	23370.281563	42163.75657	0.0002290	0.0630	345.2031	299.3092	21.6346

C1 .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$				N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
C1 . 26	**10021A**	**Astra 3B**					
	26-DEC-13	23.50				42	164
	23370.280370	42164.84509	0.0002033	0.0426	358.7665	240.6173	23.5037
C1 . 27	**07056B**	**Skynet 5B**					
	25-DEC-13	24.60				53	321
	23369.730394	42164.67409	0.0003930	0.0595	349.3501	281.5805	24.3282
C1 . 28	**13038A**	**Alphasat**					
	27-DEC-13	24.89				23	23
	23371.228380	42163.94607	0.0001997	0.1985	64.9755	203.7958	24.9210
C1 . 29	**98006B**	**Inmarsat-3 F5**					
	26-DEC-13	24.92				53	815
	23370.038438	42164.36684	0.0005494	0.2336	36.5678	232.6731	24.5897
C1 . 30	**13044A**	**Es'hail 1 / Eutelsat 25B**					
	27-DEC-13	25.52				18	18
	23371.108681	42164.29199	0.0001316	0.0353	2.2122	298.3897	25.5003
C1 . 31	**10025A**	**Badr 5**					
	27-DEC-13	26.00				52	187
	23371.172951	42163.62538	0.0003672	0.0154	97.3094	131.3067	26.0457
C1 . 32	**06051A**	**Badr 4**					
	27-DEC-13	26.01				52	367
	23371.108681	42164.58550	0.0005802	0.0552	325.0377	324.1240	25.9979
C1 . 33	**08034B**	**Badr 6**					
	27-DEC-13	26.01				52	289
	23371.108681	42163.41094	0.0002891	0.0701	19.6334	282.2617	26.0594
C1 . 34	**98050A**	**Astra 2A**					
	27-DEC-13	28.18				36	671
	23371.114167	42164.93228	0.0001643	0.0270	110.5113	77.7751	28.2041
C1 . 35	**11041A**	**Astra 1N**					
	26-DEC-13	28.21				39	110
	23370.706528	42164.51121	0.0001803	0.0523	19.4695	350.3252	28.1996
C1 . 36	**12051A**	**Astra 2F**					
	27-DEC-13	28.21				37	50
	23371.723264	42164.09801	0.0004031	0.0768	250.3254	358.8309	28.2337
C1 . 37	**08065B**	**Eutelsat W2M**					
	27-DEC-13	28.50				50	262
	23371.723264	42164.54065	0.0005384	0.0698	276.4408	42.7364	28.5207
C1 . 38	**01011A**	**Eurobird 1**					
	27-DEC-13	28.50				52	654
	23371.723264	42164.21462	0.0003774	0.0636	6.4956	242.8595	28.4972
C1 . 39	**05005A**	**XTAR-EUR**					
	27-DEC-13	29.01				53	444
	23371.883113	42164.52579	0.0001354	0.0129	291.7941	7.2814	29.0009

C1 .nn	COSPAR	NAME					
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	MJD	a	e	i	Ω	ω	λ
C1 . 40	**10032B**	**Arabsat 5A**					
	25-DEC-13	30.49				53	186
	23369.974144	42164.96031	0.0003263	0.0532	351.3268	283.6369	30.5083
C1 . 41	**12043B**	**Hylas 2**					
	26-DEC-13	31.01				51	74
	23370.716898	42164.49327	0.0001609	0.0161	54.6986	218.0933	30.9993
C1 . 42	**97076A**	**Astra 1G**					
	27-DEC-13	31.50				42	649
	23371.831829	42165.06376	0.0002834	0.0566	324.1716	315.5787	31.5005
C1 . 43	**11016A**	**Intelsat New Dawn**					
	26-DEC-13	32.82				53	144
	23370.221771	42164.99031	0.0000369	0.0021	257.2760	137.1121	32.7958
C1 . 44	**02051A**	**Eutelsat W5**					
	27-DEC-13	33.11				53	561
	23371.176100	42164.57681	0.0003465	0.0423	303.5864	16.1625	33.0886
C1 . 45	**03043A**	**Eurobird 3**					
	27-DEC-13	33.13				52	525
	23371.228565	42164.59026	0.0001507	0.0477	40.3871	330.5209	33.0978
C1 . 46	**09065A**	**Eutelsat W7**					
	26-DEC-13	35.92				51	212
	23370.219641	42164.57905	0.0004317	0.0610	349.6434	281.5565	35.9166
C1 . 47	**00028A**	**Eutelsat W4**					
	26-DEC-13	36.10				51	686
	23370.219641	42164.24574	0.0004209	0.0633	355.5339	273.7943	36.1039
C1 . 48	**11042A**	**Paksat 1R**					
	27-DEC-13	37.99				51	125
	23371.170880	42165.67127	0.0003147	0.0308	155.1791	115.1299	38.0138
C1 . 49	**03020A**	**Hellas Sat 2**					
	27-DEC-13	39.00				51	539
	23371.611308	42164.55130	0.0003881	0.0124	9.1747	270.9542	38.9930
C1 . 50	**02062A**	**Nimiq 2**					
	27-DEC-13	39.03				50	561
	23371.588634	42164.93592	0.0003945	0.0749	255.6761	91.5328	38.9964
C1 . 51	**08030B**	**Turksat 3A**					
	27-DEC-13	42.00				52	292
	23371.058449	42163.72966	0.0003883	0.0573	138.5046	121.2980	42.0340
C1 . 52	**01002A**	**Turksat 2A (Eurasiasat 1)**					
	27-DEC-13	42.01				53	657
	23371.593796	42164.46075	0.0004328	0.0407	15.7331	275.7361	42.0082
C1 . 53	**11077A**	**Nigcomsat 1R**					
	27-DEC-13	42.50				50	107
	23371.593796	42164.63988	0.0000929	0.0482	168.4680	351.8261	42.4946

C1 .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$				N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
C1 . 54	**13056A**	**Astra 2E**					
	27-DEC-13	43.54				13	13
	23371.593796	42165.50474	0.0001673	0.0654	304.3158	357.4409	43.5033
C1 . 55	**00068A**	**Europe*Star F1**					
	25-DEC-13	45.01				53	661
	23369.909421	42164.17650	0.0002986	0.0152	341.8476	309.1638	45.0190
C1 . 56	**13006B**	**Azerspace**					
	27-DEC-13	46.00				47	47
	23371.751308	42164.29732	0.0002069	0.0196	280.6504	29.3368	45.9946
C1 . 57	**05041B**	**Syracuse 3A**					
	26-DEC-13	47.00				53	419
	23370.159225	42164.82463	0.0003314	0.0096	39.2091	233.0435	47.0014
C1 . 58	**01019A**	**PAS 10**					
	27-DEC-13	47.51				52	638
	23371.600266	42163.34591	0.0002506	0.0198	19.8712	248.0717	47.5857
C1 . 59	**12016A**	**Yahsat 1B**					
	27-DEC-13	47.61				52	89
	23371.775162	42164.44337	0.0001994	0.0116	38.2991	217.1846	47.6044
C1 . 60	**03053A**	**Yamal 200 N2 (Yamal 202)**					
	27-DEC-13	48.99				52	518
	23371.101157	42164.33741	0.0002689	0.0405	62.5144	200.1114	48.9418
C1 . 61	**13034A**	**IRNSS-R1A**					
	26-DEC-13	50.00				26	26
	23370.970069	42164.29676	0.0020738	27.1723	137.8746	180.8118	54.9152
C1 . 62	**99005A**	**Telstar 6**					
	25-DEC-13	50.36				53	750
	23369.987569	42164.05876	0.0003569	0.0173	311.8282	322.8102	50.0276
C1 . 63	**11016B**	**Yahsat 1A**					
	25-DEC-13	52.50				53	143
	23369.982685	42164.24153	0.0002569	0.0021	324.4444	288.7897	52.5173
C1 . 64	**12075A**	**Skynet 5D**					
	25-DEC-13	52.76				52	55
	23369.927697	42163.85889	0.0004134	0.0659	347.6005	269.8746	52.7743
C1 . 65	**03060A**	**Ekspress AM-22**					
	26-DEC-13	53.01				52	512
	23370.723102	42164.32339	0.0001519	0.0291	202.9358	109.9115	53.0230
C1 . 66	**12070A**	**Yamal-402**					
	27-DEC-13	54.88				52	56
	23371.616979	42164.49832	0.0001129	0.0202	289.3232	89.1618	54.8962
C1 . 67	**96021A**	**Astra 1F**					
	27-DEC-13	54.89				46	740
	23371.166111	42164.45150	0.0004482	0.0623	288.9379	349.8313	54.6425

C1 .nn	COSPAR	NAME					
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	MJD	a	e	i	Ω	ω	λ
C1 . 68	**03043E**	**Insat 3E**					
	27-DEC-13	55.03				53	506
	23371.047882	42164.72735	0.0005277	0.0891	260.0711	8.5520	55.1404
C1 . 69	**11022A**	**GSAT-8**					
	26-DEC-13	55.05				53	140
	23370.773438	42164.54962	0.0007502	0.0304	74.3524	185.5531	55.0840
C1 . 70	**09058A**	**NSS 12**					
	27-DEC-13	57.01				53	221
	23371.814051	42164.68109	0.0002705	0.0279	300.5977	346.4070	57.0058
C1 . 71	**12008A**	**Beidou DW 11**					
	27-DEC-13	58.70				53	100
	23371.058831	42164.73716	0.0001121	0.9693	336.6000	228.4329	58.6791
C1 . 72	**02007A**	**Intelsat 904**					
	27-DEC-13	60.00				52	603
	23371.523183	42164.73604	0.0002989	0.0143	344.3933	295.8525	60.0018
C1 . 73	**01039A**	**Intelsat 902**					
	26-DEC-13	62.00				52	628
	23370.740961	42164.49832	0.0003055	0.0016	350.8922	293.5080	62.0089
C1 . 74	**09054B**	**COMSATBw-1**					
	27-DEC-13	63.01				52	222
	23371.812905	42164.55018	0.0002146	0.0295	19.0106	261.6522	62.9754
C1 . 75	**02041A**	**Intelsat 906**					
	31-DEC-13	64.16				53	579
	23375.987500	42164.91854	0.0002298	0.0122	339.5818	307.6376	64.1419
C1 . 76	**10065B**	**Intelsat IS-17**					
	27-DEC-13	66.01				52	164
	23371.058993	42164.49411	0.0003122	0.0121	42.9105	235.7922	66.0127
C1 . 77	**12043A**	**Intelsat IS-20**					
	27-DEC-13	68.53				52	75
	23371.093252	42164.56223	0.0000894	0.0166	305.4737	356.0040	68.5394
C1 . 78	**13062A**	**Raduga-1M**					
	27-DEC-13	70.00				7	7
	23371.036713	42164.41197	0.0002929	0.0917	184.1293	233.1115	70.0426
C1 . 79	**12069A**	**Eutelsat 70B**					
	26-DEC-13	70.50				52	57
	23370.148252	42164.25807	0.0005038	0.0442	11.2967	221.4057	70.5288
C1 . 80	**12011A**	**Intelsat IS-22**					
	27-DEC-13	72.11				52	94
	23371.809907	42164.43832	0.0002973	0.0190	352.9709	260.3095	72.1338
C1 . 81	**02002A**	**Insat 3C**					
	27-DEC-13	74.00				53	613
	23371.526748	42164.40244	0.0000585	0.0857	259.9556	44.6610	74.0465

C1 .nn	COSPAR	NAME					
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C1 . 82	**07037A**	**INSAT 4CR**					
	27-DEC-13	74.01				51	327
	23371.525718	42164.37861	0.0003868	0.0431	65.0123	192.2782	74.0400
C1 . 83	**13044B**	**GSAT-7**					
	27-DEC-13	74.02				18	18
	23371.809537	42164.63372	0.0008695	0.0233	34.1186	231.3075	74.0226
C1 . 84	**04007A**	**MBSAT**					
	24-DEC-13	74.70				51	500
	23368.127095	42164.87593	0.0002275	0.0084	313.7952	316.8605	74.7412
C1 . 85	**99053A**	**LMI 1**					
	26-DEC-13	74.98				53	734
	23370.684560	42164.58466	0.0002476	0.0127	348.7935	265.4239	74.9912
C1 . 86	**11001A**	**Elektro-L No. 1**					
	27-DEC-13	76.03				52	156
	23371.809363	42164.99031	0.0002625	0.0443	108.9173	108.8166	76.1104
C1 . 87	**12013A**	**Apstar 7**					
	27-DEC-13	76.51				53	92
	23371.807512	42164.77949	0.0002578	0.0290	29.9307	234.4065	76.5083
C1 . 88	**06020B**	**Thaicom 5**					
	25-DEC-13	78.50				52	389
	23369.926505	42165.33989	0.0004108	0.0364	282.1674	23.1214	78.4637
C1 . 89	**11069A**	**Asiasat 7**					
	27-DEC-13	78.61				53	112
	23371.807697	42164.69203	0.0002120	0.0092	302.4415	344.2954	78.6108
C1 . 90	**11048A**	**Cosmos-2473**					
	26-DEC-13	79.93				53	122
	23370.617407	42164.81341	0.0001625	0.0616	85.4930	258.1117	79.9438
C1 . 91	**05010A**	**Ekspress AM-2**					
	27-DEC-13	80.00				51	448
	23371.807153	42164.83752	0.0000740	0.0325	166.7855	192.6417	80.0169
C1 . 92	**08019A**	**Tian Lian 1A**					
	27-DEC-13	80.08				53	301
	23371.020914	42165.26476	0.0038191	0.2074	79.9029	207.0584	80.0776
C1 . 93	**12059A**	**Beidou DW 16**					
	27-DEC-13	80.30				51	62
	23371.806968	42164.87004	0.0001872	0.9528	277.8433	13.1086	80.0689
C1 . 94	**99006A**	**JC-Sat 6**					
	27-DEC-13	81.98				53	756
	23371.539931	42164.70688	0.0002058	0.0413	253.5266	24.9351	81.9614
C1 . 95	**13038B**	**Insat 3D**					
	27-DEC-13	82.09				23	23
	23371.539942	42164.89892	0.0000898	0.0379	225.0207	114.4665	82.1086

C1 .nn	COSPAR	NAME					
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C1 . 96	**05049A**	**Insat 4A**					
	26-DEC-13	83.00				52	410
	23370.778021	42164.98134	0.0007590	0.0107	29.1959	244.6636	82.9941
C1 . 97	**12051B**	**GSAT-10**					
	26-DEC-13	83.00				51	67
	23370.759630	42165.05983	0.0004207	0.0667	264.3302	231.2853	83.0206
C1 . 98	**11034A**	**GSAT-12**					
	26-DEC-13	83.00				52	132
	23370.759630	42164.97377	0.0002263	0.0123	290.1764	299.7164	83.0373
C1 . 99	**07063B**	**Horizons 2**					
	26-DEC-13	84.85				52	313
	23370.784144	42164.75482	0.0002698	0.0055	349.8166	289.9544	84.8604
C1 . 100	**10002A**	**Raduga-1M**					
	27-DEC-13	85.00				53	208
	23371.802153	42164.70436	0.0002796	0.0007	332.4862	302.7881	85.0062
C1 . 101	**09067A**	**Intelsat IS-15**					
	27-DEC-13	85.15				52	215
	23371.091644	42164.84313	0.0002441	0.0110	33.4133	240.8980	85.1708
C1 . 102	**11035B**	**Kazsat-2**					
	25-DEC-13	86.47				52	130
	23369.852905	42165.15655	0.0001887	0.0199	230.0084	118.4555	86.5182
C1 . 103	**12067A**	**Zhongxing 12**					
	27-DEC-13	87.50				52	57
	23371.581968	42165.09347	0.0003486	0.0079	4.9872	258.8185	87.5021
C1 . 104	**11022B**	**ST-2**					
	27-DEC-13	87.93				53	139
	23371.737373	42165.12403	0.0002025	0.0175	4.4900	271.3132	88.0097
C1 . 105	**03053B**	**Yamal 200 N1 (Yamal 201)**					
	26-DEC-13	89.99				53	512
	23370.658067	42164.98105	0.0002367	0.0062	349.9557	270.6804	89.9749
C1 . 106	**12061B**	**Yamal-300K**					
	26-DEC-13	90.07				52	58
	23370.658067	42165.05338	0.0000644	0.0326	54.3848	215.2236	90.0721
C1 . 107	**06056A**	**Measat 3**					
	27-DEC-13	91.49				52	366
	23371.459248	42164.86612	0.0000619	0.0260	78.4449	202.8553	91.5143
C1 . 108	**09032A**	**Measat 3A**					
	27-DEC-13	91.50				52	238
	23371.802222	42164.97124	0.0003016	0.0399	269.6243	10.7253	91.5038
C1 . 109	**08028A**	**Zhongxing 9**					
	27-DEC-13	92.20				53	293
	23371.579190	42164.76632	0.0006040	0.0029	0.1552	276.6355	92.2149

C1 .nn	COSPAR	NAME					
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C1 . 110	**03013A**	**Insat 3A**					
	27-DEC-13	93.50				52	547
	23371.540197	42165.51007	0.0006612	0.1004	265.6898	3.0985	93.5028
C1 . 111	**07007A**	**Insat 4B**					
	26-DEC-13	93.50				52	353
	23370.655856	42164.39011	0.0000317	0.0158	42.0677	165.0344	93.5290
C1 . 112	**02057A**	**NSS 6**					
	27-DEC-13	95.00				42	549
	23371.702442	42164.63708	0.0002760	0.0125	313.8060	329.4968	95.0148
C1 . 113	**08003A**	**Ekspress AM-33**					
	27-DEC-13	96.49				53	310
	23371.713970	42165.21122	0.0000959	0.0325	197.0652	171.1683	96.4973
C1 . 114	**12028A**	**Zhongxing 2A**					
	25-DEC-13	98.27				52	85
	23369.895498	42164.58886	0.0005194	0.0549	100.7689	220.1526	98.2993
C1 . 115	**09042A**	**Asiasat 5**					
	26-DEC-13	100.52				52	231
	23370.536551	42165.44502	0.0001274	0.0268	255.1072	3.0925	100.4857
C1 . 116	**00016A**	**Asiastar**					
	26-DEC-13	105.00				52	707
	23370.690255	42165.49689	0.0004531	0.0290	12.9336	253.2094	104.9949
C1 . 117	**99013A**	**Asiasat 3S**					
	27-DEC-13	105.50				53	754
	23371.765810	42164.74501	0.0002688	0.0126	45.3092	223.1348	105.5314
C1 . 118	**09027A**	**Indostar II/Protostar II**					
	27-DEC-13	107.94				53	243
	23371.744641	42165.19019	0.0002981	0.0418	46.1358	235.4253	108.1655
C1 . 119	**99042A**	**Telkom 1**					
	26-DEC-13	107.99				52	736
	23370.777778	42164.90676	0.0002880	0.0334	229.9323	95.3686	108.0195
C1 . 120	**00059A**	**GE-1A**					
	26-DEC-13	108.20				53	677
	23370.777778	42164.81089	0.0001164	0.0190	328.7600	313.4791	108.2243
C1 . 121	**10056B**	**BSAT-3B**					
	27-DEC-13	109.86				51	167
	23371.026146	42165.02283	0.0005141	0.0762	301.0659	1.9961	109.8697
C1 . 122	**07036B**	**BSAT-3A**					
	27-DEC-13	109.87				53	324
	23371.026146	42164.87172	0.0004388	0.0582	236.5471	18.1166	109.8748
C1 . 123	**11041B**	**BSAT 3c**					
	27-DEC-13	109.95				53	126
	23371.026146	42165.04637	0.0000234	0.0096	345.4989	356.7126	109.9824

C1 .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$				N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
C1 . 124	**00060A**	**N-SAT-110**					
	25-DEC-13	110.06				51	672
	23369.899977	42165.58520	0.0000231	0.0202	297.8470	319.3237	110.0612
C1 . 125	**10024A**	**Beidou DW 4**					
	27-DEC-13	110.50				53	190
	23371.026146	42165.76182	0.0003660	1.7015	34.0483	295.6502	110.5282
C1 . 126	**11026A**	**Zhongxing 10**					
	25-DEC-13	110.51				52	133
	23369.899977	42165.54146	0.0005212	0.0133	258.4301	293.3035	110.5115
C1 . 127	**12002A**	**Fengyun 2F**					
	27-DEC-13	112.20				52	106
	23371.584815	42163.80367	0.0002619	0.8820	280.5955	235.4313	112.0399
C1 . 128	**09046A**	**Palapa D**					
	25-DEC-13	112.96				51	227
	23369.641551	42165.11422	0.0002412	0.0326	56.8717	237.0408	112.9731
C1 . 129	**06034A**	**Mugunghwa 5**					
	27-DEC-13	113.04				51	377
	23371.478600	42165.29196	0.0000365	0.0174	55.0444	157.2224	113.0555
C1 . 130	**13020A**	**Zhongxing 11**					
	25-DEC-13	115.53				37	37
	23369.845752	42164.49327	0.0008166	0.1681	270.3962	1.8332	115.5340
C1 . 131	**07031A**	**Zhongxing 6B**					
	27-DEC-13	115.55				52	339
	23371.739630	42165.72650	0.0003380	0.0105	358.8222	275.1031	115.5025
C1 . 132	**99046A**	**Mugunghwa 3 (Koreasat 3)**					
	27-DEC-13	115.98				52	719
	23371.739630	42165.48848	0.0003564	0.0158	248.9751	90.6997	115.9201
C1 . 133	**10070B**	**Koreasat 6**					
	26-DEC-13	116.01				52	159
	23370.012361	42165.25243	0.0001326	0.0473	257.6360	16.3040	116.0265
C1 . 134	**05046A**	**Telkom 2**					
	27-DEC-13	118.01				51	415
	23371.621042	42164.74837	0.0000980	0.0151	87.3492	175.9700	118.0447
C1 . 135	**05028A**	**Thaicom 4 (IPStar 1)**					
	27-DEC-13	119.48				51	429
	23371.478762	42165.53418	0.0002190	0.0021	344.1559	271.2325	119.5018
C1 . 136	**03014A**	**Asiasat 4**					
	27-DEC-13	122.15				52	551
	23371.480498	42165.83611	0.0000489	0.0019	4.3917	164.6476	122.0957
C1 . 137	**12023A**	**JCSAT 13**					
	26-DEC-13	124.21				51	85
	23370.600174	42164.83444	0.0001731	0.0158	320.7212	275.5209	124.0070

C1 .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$				N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
C1 . 138	**10042A**	**Zhongxing 6A**					
	27-DEC-13	125.02				53	175
	23371.731840	42164.99872	0.0001371	0.0403	203.6803	252.5625	125.0303
C1 . 139	**06033A**	**JCSAT 3A**					
	25-DEC-13	127.82				53	378
	23369.717361	42165.09347	0.0001838	0.0124	335.0384	308.4342	128.0189
C1 . 140	**09044A**	**JCSAT 12 (JCSAT-RA)**					
	26-DEC-13	127.93				52	230
	23370.556366	42165.10328	0.0001292	0.0697	40.3769	224.1520	127.9402
C1 . 141	**10032A**	**Chollian**					
	25-DEC-13	128.20				53	185
	23369.942593	42164.72987	0.0001172	0.0289	37.7806	233.8042	128.2835
C1 . 142	**11047A**	**Zhongxing 1A**					
	27-DEC-13	129.85				52	122
	23371.415012	42164.41422	0.0000735	0.0562	99.0276	212.1417	129.8473
C1 . 143	**10064A**	**Zhongxing 20A**					
	27-DEC-13	130.03				53	165
	23371.339097	42163.63155	0.0001157	0.0116	60.0267	270.3426	130.0209
C1 . 144	**12023B**	**Vinasat-2**					
	26-DEC-13	131.84				51	85
	23370.596944	42165.11562	0.0002274	0.0097	301.6725	343.3444	131.8510
C1 . 145	**08018A**	**Vinasat**					
	27-DEC-13	131.94				53	299
	23371.321991	42165.38531	0.0001965	0.0129	351.3244	280.4958	131.9400
C1 . 146	**06010A**	**JCSAT 9**					
	24-DEC-13	132.03				53	399
	23368.759780	42165.09319	0.0001880	0.0149	333.7782	267.7753	132.0448
C1 . 147	**05012A**	**Apstar 6**					
	27-DEC-13	134.00				53	449
	23371.413623	42164.72398	0.0002350	0.0282	56.8640	231.3198	134.0313
C1 . 148	**04024A**	**Telstar 18 (APstar 5)**					
	27-DEC-13	138.01				53	487
	23371.833171	42165.03348	0.0002199	0.0171	286.3495	341.6798	138.0092
C1 . 149	**10001A**	**Beidou DW 3**					
	27-DEC-13	140.00				53	209
	23371.672188	42163.77535	0.0003539	1.5794	0.0521	216.9516	140.0339
C1 . 150	**05023A**	**Ekspress AM-3**					
	26-DEC-13	140.02				52	437
	23370.595509	42164.35310	0.0003326	0.0337	273.2477	40.2466	139.9565
C1 . 151	**05006A**	**Himawari-6**					
	27-DEC-13	140.19				51	452
	23371.605810	42164.83191	0.0002348	0.0409	107.1523	259.8781	140.0420

C1 .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$				N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
C1 . 152	**98033A**	**Zhongwei 1**					
	27-DEC-13	142.02				53	806
	23371.671644	42165.36709	0.0001199	0.0181	294.9206	278.7629	142.0195
C1 . 153	**08007A**	**Kizuna**					
	26-DEC-13	142.98				53	303
	23370.593565	42164.93704	0.0002035	0.0533	273.3471	351.7610	143.0121
C1 . 154	**08038A**	**Superbird C2**					
	27-DEC-13	143.91				52	285
	23371.558461	42164.94153	0.0001922	0.0217	269.4168	32.5706	143.9478
C1 . 155	**06004A**	**MTSAT-2**					
	26-DEC-13	145.02				52	403
	23370.652303	42164.54317	0.0003788	0.0063	292.0072	354.8873	145.0364
C1 . 156	**07044A**	**Optus D2**					
	27-DEC-13	152.01				53	325
	23371.662396	42164.63736	0.0003272	0.0210	279.5150	351.4030	152.0371
C1 . 157	**02015A**	**JC-Sat 8**					
	24-DEC-13	154.00				53	602
	23368.565394	42164.79687	0.0001928	0.0056	32.8635	240.7022	154.0173
C1 . 158	**03028B**	**Optus C1 (Defense C1)**					
	25-DEC-13	156.01				52	538
	23369.586748	42164.78258	0.0003855	0.0227	188.0517	68.3893	156.0206
C1 . 159	**09044B**	**Optus D3**					
	27-DEC-13	156.01				53	230
	23371.601782	42165.09179	0.0003644	0.0382	348.0203	305.7053	156.0090
C1 . 160	**10057A**	**Beidou DW 6**					
	27-DEC-13	160.00				53	168
	23371.719167	42164.92807	0.0006432	0.8861	43.1950	173.1360	159.9790
C1 . 161	**06043B**	**Optus D1**					
	27-DEC-13	160.01				53	369
	23371.479826	42164.70240	0.0003445	0.0082	337.7439	284.8478	160.0156
C1 . 162	**00012A**	**Superbird 4**					
	27-DEC-13	162.02				53	711
	23371.767002	42164.55158	0.0002549	0.0277	248.2009	23.2255	162.0286
C1 . 163	**12012A**	**Cosmos-2479**					
	27-DEC-13	165.90				53	95
	23371.764734	42164.94125	0.0000874	1.0282	296.5147	30.0237	165.8880
C1 . 164	**12030A**	**Intelsat IS-19**					
	27-DEC-13	166.02				52	84
	23371.764734	42164.42375	0.0003516	0.0067	327.4954	297.7620	166.0265
C1 . 165	**98065A**	**PAS 8**					
	26-DEC-13	166.29				53	757
	23370.633229	42164.69567	0.0003199	0.0422	255.0076	23.0885	168.9956

C1 .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$				N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
C1 . 166	**11074B**	**Luch-5A**					
	27-DEC-13	167.00				53	107
	23371.339641	42164.00213	0.0005755	3.2913	254.2573	342.7618	167.1093
C1 . 167	**11032A**	**Tian Lian 1B**					
	27-DEC-13	167.02				53	132
	23371.764734	42164.30797	0.0032929	0.0186	300.1527	324.7143	166.9718
C1 . 168	**05052A**	**AMC 23**					
	26-DEC-13	172.01				52	412
	23370.660058	42164.52523	0.0004643	0.0254	2.5724	301.1672	172.0224
C1 . 169	**11056A**	**Intelsat IS-18**					
	31-DEC-13	180.01				52	118
	23375.454155	42164.14987	0.0002242	0.0159	5.5442	265.9251	180.0292
C1 . 170	**09008A**	**NSS 9**					
	27-DEC-13	183.02				43	249
	23371.543021	42164.41113	0.0002107	0.0203	324.4173	316.2595	182.9998
C1 . 171	**13004A**	**TDRS 11**					
	27-DEC-13	188.90				49	49
	23371.538368	42161.98448	0.0011612	6.7507	331.1389	255.9231	189.1373
C1 . 172	**00081B**	**GE 8 (Aurora 3)**					
	27-DEC-13	221.03				52	665
	23371.481447	42164.04110	0.0003225	0.0199	339.8145	314.3476	221.0172
C1 . 173	**00054B**	**GE 7**					
	25-DEC-13	223.01				52	677
	23369.346539	42164.00522	0.0003301	0.0155	334.0545	292.2923	223.0241
C1 . 174	**10008A**	**GOES 15**					
	27-DEC-13	224.90				53	203
	23371.538877	42161.33310	0.0001431	0.2050	258.7469	281.8419	225.2055
C1 . 175	**04003A**	**AMC-10 (GE 10)**					
	26-DEC-13	225.01				51	506
	23370.243600	42164.56644	0.0002865	0.0155	12.8584	268.8180	225.0066
C1 . 176	**05041A**	**Galaxy 15**					
	27-DEC-13	226.99				51	420
	23371.441007	42165.00629	0.0001573	0.0245	260.4345	36.1426	226.9954
C1 . 177	**04017A**	**AMC-11 (GE-11)**					
	25-DEC-13	229.01				51	490
	23369.433785	42164.26368	0.0002927	0.0191	2.7636	258.5403	229.0104
C1 . 178	**03013B**	**Galaxy XII**					
	26-DEC-13	231.01				52	548
	23370.537905	42164.33713	0.0002157	0.0454	222.9352	32.5294	231.0145
C1 . 179	**08063A**	**Ciel 2**					
	26-DEC-13	231.16				52	265
	23370.537905	42164.07081	0.0003484	0.0129	343.1370	287.7028	231.1817

C1 .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$				N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
C1 . 180	**03044A**	**Galaxy 13/Horizons-1**					
	27-DEC-13	233.00				52	518
	23371.460833	42164.36600	0.0000086	0.0240	3.8700	64.8092	233.0059
C1 . 181	**05030A**	**Galaxy 14**					
	27-DEC-13	235.01				52	432
	23371.539329	42164.45571	0.0002559	0.0157	319.5112	314.1101	235.0044
C1 . 182	**08038B**	**AMC 21**					
	26-DEC-13	235.11				52	286
	23370.342245	42164.34497	0.0002765	0.0161	356.8602	276.9624	235.1217
C1 . 183	**08024A**	**Galaxy 18**					
	26-DEC-13	237.00				53	297
	23370.658727	42164.49019	0.0003103	0.0090	301.0856	336.2204	236.9993
C1 . 184	**03034A**	**EchoStar 9 (Telstar 13)**					
	26-DEC-13	239.01				53	533
	23370.640150	42164.46916	0.0003289	0.0026	359.9433	280.6135	239.0209
C1 . 185	**13058A**	**Sirius FM6**					
	27-DEC-13	239.51				9	9
	23371.394850	42164.61830	0.0002910	0.0106	24.3009	283.1478	239.5073
C1 . 186	**04016A**	**DirecTV-7S**					
	27-DEC-13	240.91				53	492
	23371.547558	42164.34273	0.0003733	0.0159	356.2096	275.8613	240.9529
C1 . 187	**02006A**	**EchoStar 7**					
	27-DEC-13	241.05				52	606
	23371.394352	42164.45795	0.0001437	0.0169	327.4665	315.3165	241.2045
C1 . 188	**10010A**	**Echostar XIV**					
	27-DEC-13	241.11				52	199
	23371.547558	42165.58380	0.0002572	0.0036	20.1949	249.9104	241.1185
C1 . 189	**07009A**	**Anik F3**					
	27-DEC-13	241.30				51	348
	23371.547558	42164.44701	0.0002685	0.0178	280.7029	352.8408	241.3158
C1 . 190	**13012A**	**Satmex 8**					
	27-DEC-13	243.22				41	41
	23371.394016	42164.83836	0.0002853	0.0068	323.9573	316.0887	243.2035
C1 . 191	**01018A**	**XM Radio 1 (Roll)**					
	26-DEC-13	244.75				53	645
	23370.652176	42164.50280	0.0003746	0.1890	254.4329	328.3669	244.7830
C1 . 192	**01012A**	**XM Radio 2 (Rock)**					
	27-DEC-13	244.76				52	656
	23371.456539	42164.28639	0.0003690	0.1810	271.4346	46.8451	244.7480
C1 . 193	**06049A**	**XM Radio 4 (Blues)**					
	25-DEC-13	244.89				50	369
	23369.505521	42164.22612	0.0000258	0.0243	109.6271	93.1078	244.8067

C1 .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$				N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
C1 . 194	**11059A**	**ViaSat-1**					
	25-DEC-13	244.91				50	116
	23369.505521	42164.50616	0.0002649	0.0062	359.0235	282.5004	244.9202
C1 . 195	**06020A**	**Satmex 6**					
	27-DEC-13	246.99				53	392
	23371.535567	42164.99087	0.0002783	0.0434	184.2969	94.5328	247.0036
C1 . 196	**04027A**	**Anik F2**					
	27-DEC-13	248.87				53	480
	23371.474595	42164.48318	0.0000450	0.0253	1.6248	241.5288	248.9439
C1 . 197	**06054A**	**WildBlue 1**					
	27-DEC-13	248.91				53	365
	23371.339919	42164.50364	0.0002058	0.0046	276.3327	352.4495	248.8459
C1 . 198	**06003A**	**Echostar 10**					
	27-DEC-13	249.80				53	408
	23371.053681	42164.51009	0.0001507	0.0156	346.1736	283.2834	249.8340
C1 . 199	**02023A**	**DirecTV-5**					
	27-DEC-13	249.94				53	598
	23371.548449	42164.59279	0.0003399	0.0025	332.0781	303.4392	249.8916
C1 . 200	**08035A**	**Echostar 11**					
	25-DEC-13	250.01				53	290
	23369.347257	42164.42403	0.0003098	0.0111	345.8203	296.0854	250.0327
C1 . 201	**13014A**	**Anik G-1**					
	25-DEC-13	252.60				38	38
	23369.605602	42164.47309	0.0001678	0.0054	68.3570	170.2464	252.7197
C1 . 202	**00076A**	**Anik F1**					
	27-DEC-13	252.64				52	671
	23371.560093	42164.67633	0.0002467	0.0255	261.9006	21.5404	252.7052
C1 . 203	**05036A**	**Anik F1R**					
	27-DEC-13	252.70				53	426
	23371.501505	42164.54990	0.0001953	0.0121	353.4963	329.5631	252.7106
C1 . 204	**12035A**	**Echostar 17**					
	25-DEC-13	252.90				51	79
	23369.605718	42164.61325	0.0002596	0.0014	0.6969	267.4300	252.9116
C1 . 205	**09033A**	**GOES 14**					
	27-DEC-13	254.58				52	237
	23371.556319	42164.47533	0.0008636	0.1698	262.3696	314.1529	254.5808
C1 . 206	**04041A**	**AMC-15**					
	27-DEC-13	254.82				53	471
	23371.340081	42164.62026	0.0002499	0.0155	324.6947	300.0068	254.9742
C1 . 207	**06054B**	**AMC 18**					
	27-DEC-13	255.06				52	366
	23371.340081	42164.58157	0.0003236	0.0097	328.7640	305.6375	255.0699

C1 .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$				N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
C1 . 208	**11035A**	**SES-3**					
	27-DEC-13	256.91				53	131
	23371.520544	42164.69763	0.0002149	0.0121	335.8987	286.0888	256.9136
C1 . 209	**96054A**	**GE 1**					
	27-DEC-13	256.99				53	874
	23371.520544	42164.68193	0.0003210	0.0198	354.9048	280.5832	257.0134
C1 . 210	**05015A**	**Spaceway 1**					
	26-DEC-13	257.12				52	445
	23370.699005	42164.78902	0.0000452	0.0429	188.7181	165.0436	257.0825
C1 . 211	**07032A**	**DirecTV 10**					
	27-DEC-13	257.22				52	338
	23371.520243	42164.71978	0.0000432	0.0121	210.3280	334.4932	257.2056
C1 . 212	**09075A**	**DirecTV 12**					
	26-DEC-13	257.24				52	211
	23370.712581	42164.63512	0.0000231	0.0235	205.2669	103.8328	257.2578
C1 . 213	**10061A**	**SkyTerra 1**					
	27-DEC-13	258.70				53	166
	23371.546447	42164.63456	0.0004063	4.7309	322.6068	188.6685	258.7064
C1 . 214	**01052A**	**DirecTV-4S**					
	26-DEC-13	258.85				52	618
	23370.320486	42164.17173	0.0001995	0.0031	208.4011	68.5245	258.8348
C1 . 215	**06043A**	**DirecTV 9S**					
	27-DEC-13	258.90				53	372
	23371.551632	42164.62531	0.0003394	0.0096	284.9199	345.1241	258.9171
C1 . 216	**10016A**	**SES-1**					
	27-DEC-13	259.01				51	193
	23371.551632	42164.65670	0.0002694	0.0138	344.0873	304.3932	259.0144
C1 . 217	**05019A**	**DirectTV-8**					
	27-DEC-13	259.16				53	441
	23371.551632	42164.66399	0.0003210	0.0178	10.1890	261.5695	259.1611
C1 . 218	**08013A**	**DirecTV 11**					
	27-DEC-13	260.75				51	302
	23371.069919	42164.87256	0.0000086	0.0394	172.0662	116.6504	260.7729
C1 . 219	**05046B**	**Spaceway 2**					
	27-DEC-13	260.87				51	420
	23371.078993	42164.66175	0.0000261	0.0261	160.1270	211.8225	260.9122
C1 . 220	**06023A**	**Galaxy 16**					
	27-DEC-13	261.00				52	389
	23371.082535	42164.75202	0.0003576	0.0199	265.7845	4.2099	261.0126
C1 . 221	**08045A**	**Galaxy 19**					
	26-DEC-13	262.94				52	278
	23370.137106	42164.60624	0.0003586	0.0062	291.0117	338.8571	263.0270

C1 .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$				N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
C1 . 222	**09034A**	**Sirius FM5**					
	27-DEC-13	264.00				52	236
	23371.486563	42164.86864	0.0002158	0.0142	316.4492	45.6330	264.0189
C1 . 223	**02030A**	**Galaxy 3C**					
	27-DEC-13	264.95				52	588
	23371.085243	42164.69539	0.0000478	0.0231	185.0677	171.6146	264.9920
C1 . 224	**07036A**	**Spaceway 3**					
	24-DEC-13	265.05				53	334
	23368.270289	42164.92527	0.0000300	0.0385	153.5084	38.5013	265.0504
C1 . 225	**97026A**	**Telstar 5**					
	27-DEC-13	266.91				53	845
	23371.496377	42164.74445	0.0003265	0.0029	357.5810	290.0828	266.9166
C1 . 226	**12026A**	**Nimiq 6**					
	26-DEC-13	268.89				50	85
	23370.591319	42164.69735	0.0003088	0.0137	306.1848	345.8434	268.9276
C1 . 227	**07016B**	**Galaxy 17**					
	25-DEC-13	269.00				52	342
	23369.554919	42164.62615	0.0003302	0.0319	85.6932	191.0039	269.0224
C1 . 228	**05022A**	**Intelsat Americas 8 (Telstar 8)**					
	27-DEC-13	271.00				53	438
	23371.502616	42164.85154	0.0002365	0.0122	26.8379	159.8377	271.0077
C1 . 229	**11049A**	**SES-2**					
	27-DEC-13	273.00				53	120
	23371.571771	42164.82631	0.0002959	0.0288	303.1779	339.9056	273.0073
C1 . 230	**99027A**	**Nimiq**					
	25-DEC-13	273.53				53	743
	23369.971759	42165.21402	0.0005594	0.0735	270.2887	14.6740	273.4887
C1 . 231	**10053A**	**Sirius XM-5**					
	26-DEC-13	274.78				53	171
	23370.767373	42164.84397	0.0001370	0.0048	335.9339	110.0055	274.8063
C1 . 232	**05008A**	**XM Radio 3 (Rhythm)**					
	26-DEC-13	274.91				53	451
	23370.771215	42164.74249	0.0000066	0.0445	162.0212	312.9098	274.9269
C1 . 233	**04048A**	**AMC 16**					
	27-DEC-13	274.93				52	462
	23371.261852	42164.80500	0.0002423	0.0180	322.5352	319.3665	275.0215
C1 . 234	**00046A**	**Brasilsat B4**					
	26-DEC-13	276.00				53	685
	23370.412650	42164.67380	0.0002853	0.0482	194.4859	88.2445	276.0566
C1 . 235	**03024A**	**AMC-9 (GE-12)**					
	27-DEC-13	276.69				52	540
	23371.169271	42164.94938	0.0003242	0.0146	317.3339	310.5942	277.0123

C1 .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$				N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
C1 . 236	**08044A**	**Nimiq 4**					
	27-DEC-13	278.00				52	278
	23371.261354	42164.63680	0.0002272	0.0083	299.4182	339.7320	278.0158
C1 . 237	**10006A**	**Intelsat IS-16**					
	27-DEC-13	281.01				52	205
	23371.340741	42164.92162	0.0002528	0.0239	342.5706	291.6131	281.0163
C1 . 238	**08055A**	**Simon Bolivar**					
	27-DEC-13	282.00				50	270
	23371.482836	42165.06796	0.0002285	0.0423	218.9512	57.6228	281.9891
C1 . 239	**95073A**	**EchoStar 1**					
	27-DEC-13	282.85				52	886
	23371.391273	42164.52747	0.0002353	0.0151	287.0483	0.0075	282.8878
C1 . 240	**11054A**	**QuetzSat-1**					
	26-DEC-13	282.97				53	121
	23370.821620	42165.10805	0.0003124	0.0136	340.4614	279.4052	283.0120
C1 . 241	**02039A**	**EchoStar 8**					
	26-DEC-13	283.00				53	584
	23370.829375	42164.81453	0.0003073	0.0348	85.8388	198.9269	283.1149
C1 . 242	**12062A**	**Star One C3**					
	26-DEC-13	285.00				51	60
	23370.196111	42164.75931	0.0003022	0.0753	84.4648	182.9886	285.0197
C1 . 243	**06018A**	**GOES N**					
	27-DEC-13	285.16				52	396
	23371.554456	42162.43492	0.0001467	0.2408	90.1662	315.9971	285.3262
C1 . 244	**09050A**	**Nimiq 5**					
	27-DEC-13	287.30				53	227
	23371.552569	42164.84789	0.0002829	0.0026	346.0073	294.2234	287.3188
C1 . 245	**00067A**	**GE 6**					
	27-DEC-13	288.00				52	673
	23371.258657	42164.69455	0.0003054	0.0194	332.2106	297.8310	288.0220
C1 . 246	**08018B**	**Star One C2**					
	27-DEC-13	290.03				52	299
	23371.443391	42164.68502	0.0002442	0.0084	28.9004	288.2108	289.9990
C1 . 247	**99060A**	**GE 4**					
	27-DEC-13	293.00				53	721
	23371.552130	42164.90452	0.0000660	0.0239	36.9633	306.3704	293.0232
C1 . 248	**97050A**	**GE 3**					
	27-DEC-13	293.01				52	829
	23371.552130	42164.86023	0.0002884	0.0252	297.7647	342.4388	293.0136
C1 . 249	**07056A**	**Star One C1**					
	26-DEC-13	295.01				53	319
	23370.436030	42164.55999	0.0002442	0.0355	281.5087	12.1716	295.0337

C1 .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$				N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
C1 . 250	**11021A**	**Estrela do Sul 2**					
	31-DEC-13	296.97				54	141
	23375.126366	42165.20281	0.0000913	0.0054	340.9368	296.3975	296.9944
C1 . 251	**03033A**	**Rainbow 1**					
	27-DEC-13	298.47				53	535
	23371.351377	42164.63960	0.0000922	0.0184	315.5506	314.8808	298.6846
C1 . 252	**97059A**	**EchoStar 3**					
	26-DEC-13	298.49				53	824
	23370.461481	42164.90424	0.0002194	0.0168	352.5362	318.8508	298.2258
C1 . 253	**12065A**	**Echostar XVI**					
	27-DEC-13	298.50				52	59
	23371.351377	42165.02927	0.0002689	0.0037	11.2020	261.0935	298.5041
C1 . 254	**09054A**	**Amazonas 2**					
	27-DEC-13	299.01				52	225
	23371.351377	42164.58662	0.0002290	0.0463	152.4991	83.8600	299.0360
C1 . 255	**13006A**	**Amazonas 3**					
	27-DEC-13	299.01				48	48
	23371.351377	42165.42680	0.0004753	0.0446	225.7275	25.0513	298.9773
C1 . 256	**12045A**	**Intelsat IS-21**					
	26-DEC-13	302.00				52	73
	23370.184826	42165.08871	0.0002102	0.0168	353.7298	278.8347	302.0145
C1 . 257	**99071A**	**Galaxy 11**					
	27-DEC-13	304.42				53	719
	23371.250868	42164.94097	0.0001181	0.0510	190.7169	106.3707	304.4092
C1 . 258	**98037A**	**Intelsat 805**					
	27-DEC-13	304.51				53	787
	23371.255451	42164.96928	0.0003247	0.0055	304.5785	334.8760	304.5228
C1 . 259	**12057A**	**Intelsat IS-23**					
	31-DEC-13	307.02				54	66
	23375.507755	42165.03488	0.0001731	0.0211	329.7736	326.7749	306.9970
C1 . 260	**00072A**	**PAS 1R**					
	27-DEC-13	310.00				53	651
	23371.193391	42164.56391	0.0000519	0.0485	209.1286	4.1273	310.0316
C1 . 261	**98014A**	**Intelsat 806 (NSS 806)**					
	27-DEC-13	312.52				44	786
	23371.191528	42165.28102	0.0004333	0.0430	33.1409	251.5961	312.4982
C1 . 262	**10034A**	**Echostar XV**					
	27-DEC-13	314.91				52	183
	23371.439525	42164.28807	0.0002494	0.0201	1.8397	289.0455	314.9236
C1 . 263	**09064A**	**Intelsat IS-14**					
	27-DEC-13	314.99				53	216
	23371.439525	42165.15038	0.0002024	0.0188	58.0433	224.6548	315.0355

C1 .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$				N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
C1 . 264	**07044B**	**Intelsat IS-11**					
	26-DEC-13	316.97				51	321
	23370.119769	42164.87004	0.0003095	0.0069	284.1763	356.4166	317.0130
C1 . 265	**13026A**	**SES-6**					
	26-DEC-13	319.51				31	31
	23370.427454	42164.85995	0.0002476	0.0210	327.0425	307.7384	319.5130
C1 . 266	**09009A**	**Telstar 11N**					
	27-DEC-13	322.45				52	254
	23371.360637	42164.84789	0.0001976	0.0033	17.7462	265.1983	322.4622
C1 . 267	**05003A**	**AMC 12**					
	26-DEC-13	322.59				52	437
	23370.782500	42164.88602	0.0003392	0.0223	321.5498	315.8018	322.6085
C1 . 268	**04031A**	**Amazonas**					
	27-DEC-13	324.01				53	479
	23371.436863	42164.78958	0.0002026	0.0416	52.7360	247.3625	324.0272
C1 . 269	**02016A**	**Intelsat 903**					
	26-DEC-13	325.50				53	588
	23370.295729	42164.91293	0.0002907	0.0128	23.1775	252.3672	325.5126
C1 . 270	**10065A**	**Hylas**					
	26-DEC-13	326.51				51	163
	23370.295729	42165.23028	0.0001898	0.0319	302.2035	341.2945	326.4940
C1 . 271	**08034A**	**Protostar 1**					
	26-DEC-13	328.50				52	289
	23370.354144	42164.55494	0.0002771	0.0170	330.4368	272.3500	328.5318
C1 . 272	**06007A**	**Spainsat**					
	27-DEC-13	330.00				51	384
	23371.123762	42164.68418	0.0005436	0.0385	223.0557	30.8749	330.0357
C1 . 273	**02044A**	**Hispasat 1D**					
	27-DEC-13	330.00				52	561
	23371.797836	42164.72342	0.0005336	0.0296	319.1669	331.1805	330.0309
C1 . 274	**10070A**	**Hispasat 1E**					
	26-DEC-13	330.10				51	158
	23370.784722	42164.82659	0.0002610	0.0317	168.6188	77.6878	330.0116
C1 . 275	**03007A**	**Intelsat 907**					
	30-DEC-13	332.52				53	543
	23374.337292	42164.96956	0.0003383	0.0240	27.2306	245.8843	332.5107
C1 . 276	**02027A**	**Intelsat 905**					
	25-DEC-13	335.49				51	568
	23369.098461	42164.57148	0.0002663	0.0043	42.7554	222.5855	335.5287
C1 . 277	**12007A**	**SES-4**					
	27-DEC-13	338.00				52	101
	23371.136921	42164.52915	0.0002706	0.0182	329.1800	311.2052	338.0286

C1 .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$				N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
C1 . 278	**02019A**	**NSS-7**					
	27-DEC-13	339.53				44	589
	23371.292743	42164.58354	0.0002135	0.0202	311.5593	331.9617	340.0146
C1 . 279	**01024A**	**Intelsat 901**					
	27-DEC-13	342.00				53	642
	23371.294931	42164.75678	0.0003589	0.0116	345.4435	286.4129	342.0140
C1 . 280	**08030A**	**Skynet 5C**					
	27-DEC-13	342.21				52	292
	23371.294931	42164.79407	0.0003868	0.0660	343.2297	274.0714	342.1929
C1 . 281	**96053A**	**Inmarsat 3-F2**					
	25-DEC-13	344.51				51	881
	23369.332998	42164.75202	0.0006534	0.0109	44.2096	229.7840	344.5015
C1 . 282	**99059A**	**Orion 2**					
	27-DEC-13	345.00				52	727
	23371.188472	42164.67829	0.0002918	0.0221	275.5736	5.0386	345.0159
C1 . 283	**02040A**	**Atlantic Bird 1**					
	27-DEC-13	347.51				53	576
	23371.131053	42164.53392	0.0005467	0.0613	349.5992	288.5866	347.5392
C1 . 284	**09007A**	**Ekspress AM-44**					
	27-DEC-13	349.01				53	258
	23371.365729	42164.59952	0.0000729	0.0331	213.3611	111.6928	349.0096
C1 . 285	**01042A**	**Atlantic Bird 2**					
	26-DEC-13	351.92				51	624
	23370.062847	42164.40300	0.0006074	0.0599	4.9359	254.2033	351.9603
C1 . 286	**02038A**	**Hot Bird 6**					
	25-DEC-13	352.38				53	495
	23369.961238	42164.52102	0.0006442	0.0213	312.7074	334.0394	352.5201
C1 . 287	**11051A**	**Atlantic Bird 7**					
	27-DEC-13	352.71				52	121
	23371.295382	42164.68418	0.0005008	0.0585	358.2698	218.5686	352.6974
C1 . 288	**10037A**	**Nilesat 201**					
	27-DEC-13	353.00				51	179
	23371.056169	42164.60765	0.0004749	0.0611	178.8745	80.4327	353.0021
C1 . 289	**00046B**	**Nilesat 102**					
	27-DEC-13	353.01				52	683
	23371.223704	42164.04026	0.0005669	0.0394	288.1129	354.1559	353.0369
C1 . 290	**06033B**	**Syracuse 3B**					
	27-DEC-13	354.81				52	379
	23371.297130	42164.38618	0.0004248	0.0303	36.2085	226.6536	354.8211
C1 . 291	**02035A**	**Atlantic Bird 3**					
	26-DEC-13	355.00				53	583
	23370.278113	42164.68137	0.0006108	0.0382	334.9132	293.3669	355.0127

C1 .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$				N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
C1 . 292	**03059A**	**AMOS 2**					
	27-DEC-13	356.01				53	506
	23371.224063	42164.94994	0.0003788	0.0095	345.3588	273.6598	356.0216
C1 . 293	**08022A**	**Amos 3**					
	27-DEC-13	356.04				50	296
	23371.224063	42164.68081	0.0001615	0.0137	294.1170	333.6246	355.9806
C1 . 294	**04022A**	**Intelsat 10-02**					
	27-DEC-13	359.05				53	485
	23371.224248	42164.72651	0.0000665	0.0181	9.5498	250.3521	359.0455
C1 . 295	**09058B**	**Thor 6**					
	27-DEC-13	359.19				53	221
	23371.224248	42164.28667	0.0002259	0.0390	183.1134	91.1248	359.1852
C1 . 296	**08006A**	**Thor 2R**					
	27-DEC-13	359.25				53	304
	23371.224248	42164.54177	0.0002732	0.0359	239.1795	37.3647	359.2624
C1 . 297	**12035B**	**Meteosat 10**					
	27-DEC-13	359.90				51	77
	23371.169734	42164.18407	0.0000294	0.7367	228.1831	49.7443	359.6427

3.2 Satellites under longitude control (only E-W control)

In the case where the satellite is only under longitude control, there are 82 objects identified.

For explanation of symbols, see the definitions at the beginning of Chapter 3 on page 34.

C2 .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$				N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
C2 . 1	**93031A**	**Astra 1C**					
	26-DEC-13	2.00				46	842
	23370.280567	42164.85546	0.0004407	6.2995	58.0091	220.2902	1.9905
C2 . 2	**02040B**	**MSG 1**					
	27-DEC-13	3.67				51	564
	23371.296794	42165.58380	0.0000884	2.5138	62.5947	175.2313	3.5336
C2 . 3	**09010A**	**Raduga-1**					
	27-DEC-13	11.80				52	255
	23371.202813	42168.79019	0.0000963	3.1852	84.6961	210.5657	12.0113
C2 . 4	**00019A**	**Sesat**					
	27-DEC-13	14.50				53	699
	23371.230370	42164.59195	0.0003264	1.7776	73.5567	213.0495	14.4652
C2 . 5	**98013A**	**Hot Bird 4**					
	24-DEC-13	15.80				53	646
	23368.769942	42163.82581	0.0004981	1.8384	74.2462	194.1736	15.8199
C2 . 6	**98063A**	**AfriStar 1**					
	27-DEC-13	21.00				53	775
	23371.203021	42164.50392	0.0004825	1.2693	75.7768	197.6896	20.9886
C2 . 7	**01029A**	**Artemis**					
	27-DEC-13	21.41				53	638
	23371.156782	42163.61585	0.0004277	10.9781	47.4062	239.7301	21.4269
C2 . 8	**05044A**	**Inmarsat 4 F2**					
	25-DEC-13	25.09				52	418
	23369.221030	42164.21070	0.0003326	2.3277	352.5969	287.4683	25.1123
C2 . 9	**00081A**	**Astra 2D**					
	27-DEC-13	28.15				45	557
	23371.227523	42164.60877	0.0001078	1.2964	76.9633	191.4723	27.9643
C2 . 10	**08011A**	**AMC 14**					
	26-DEC-13	29.49				52	300
	23370.719525	42165.11954	0.0033223	16.6528	83.8895	351.3321	29.2967
C2 . 11	**95055A**	**Astra 1E**					
	27-DEC-13	31.26				45	725
	23371.827662	42164.87284	0.0003794	3.0188	69.6519	207.5778	31.2393
C2 . 12	**99009B**	**Skynet 4E**					
	27-DEC-13	32.39				51	730
	23371.228194	42165.34130	0.0002830	8.6030	39.3138	242.1686	32.3108
C2 . 13	**94034A**	**Intelsat VII F-2**					
	25-DEC-13	32.99				53	961
	23369.199236	42163.86253	0.0003479	2.0463	73.3339	211.9066	32.9248

C2 .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$				N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
C2 . 14	**93076A**	**NATO IVB**					
	27-DEC-13	35.04				53	942
	23371.173461	42163.43084	0.0003554	10.9136	35.8519	240.6887	35.4911
C2 . 15	**03026A**	**Thuraya 2**					
	26-DEC-13	44.04				52	541
	23370.064097	42164.03213	0.0005018	3.7363	21.4316	240.1324	44.0481
C2 . 16	**99018A**	**Eutelsat W3**					
	27-DEC-13	48.00				52	747
	23371.169109	42164.13781	0.0004799	0.8998	78.8886	189.9028	47.9936
C2 . 17	**96067A**	**Hot Bird 2**					
	27-DEC-13	48.24				53	676
	23371.169109	42165.17786	0.0005719	4.0523	64.8980	209.9842	48.3090
C2 . 18	**97046A**	**PAS 5**					
	27-DEC-13	50.17				53	810
	23371.101157	42163.73863	0.0002294	1.0030	78.0127	190.3395	50.1868
C2 . 19	**97053A**	**Intelsat VIII F-3 (NSS 803)**					
	27-DEC-13	50.51				46	813
	23371.171933	42164.62559	0.0003462	1.3119	76.4761	193.6694	50.4924
C2 . 20	**98056B**	**Sirius 3**					
	27-DEC-13	51.23				53	766
	23371.171933	42164.20845	0.0001240	4.1858	64.3551	223.4066	51.2536
C2 . 21	**96039A**	**Apstar 1A**					
	27-DEC-13	51.55				53	907
	23371.171933	42164.65474	0.0001109	7.3609	54.4337	229.3204	51.5057
C2 . 22	**94070A**	**Astra 1D**					
	27-DEC-13	52.16				45	854
	23371.036528	42163.91608	0.0003381	5.3872	60.0633	217.7245	52.1772
C2 . 23	**99056A**	**DirecTV-1R**					
	27-DEC-13	55.81				53	728
	23371.047882	42164.55214	0.0002528	1.2545	75.6873	204.3704	55.8055
C2 . 24	**98068A**	**Bonum 1**					
	27-DEC-13	55.99				53	778
	23371.058773	42164.59531	0.0002391	1.8525	74.6054	165.3205	55.9918
C2 . 25	**97049B**	**Meteosat 7**					
	26-DEC-13	57.48				52	831
	23370.670336	42165.18430	0.0000432	8.7821	50.0327	249.4025	57.4773
C2 . 26	**96020A**	**Inmarsat 3-F1**					
	27-DEC-13	64.16				53	869
	23371.812407	42164.21126	0.0006413	1.4901	73.4182	197.4567	64.5065
C2 . 27	**97007A**	**JC-Sat 4**					
	27-DEC-13	65.81				52	850
	23371.091840	42164.11595	0.0003659	5.2617	60.7430	210.3568	65.8039

C2 .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$				N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
C2 . 28	**99052A**	**Telstar 7**					
	27-DEC-13	66.23				52	725
	23371.812407	42164.39964	0.0003079	0.6556	79.5262	209.5601	66.2224
C2 . 29	**98052A**	**PAS 7**					
	27-DEC-13	68.66				53	777
	23371.093252	42164.52887	0.0003449	0.5790	80.4676	193.8862	68.6540
C2 . 30	**90002B**	**Leasat 5**					
	26-DEC-13	72.01				52	1130
	23370.081204	42164.32311	0.0002346	10.7592	22.8319	216.2245	72.0155
C2 . 31	**02043A**	**KALPANA-1 (METSAT-1)**					
	25-DEC-13	74.00				52	573
	23369.922616	42164.54205	0.0012611	4.0416	65.0239	208.6765	73.9514
C2 . 32	**96003A**	**Mugunghwa 2 (Koreasat 2)**					
	27-DEC-13	74.82				52	866
	23371.773611	42164.56840	0.0001752	6.0759	58.3849	214.7533	74.8377
C2 . 33	**95035B**	**TDRS 7**					
	26-DEC-13	84.77				53	936
	23370.837743	42163.31283	0.0025029	13.9390	29.3037	355.7296	84.8415
C2 . 34	**06053A**	**Fengyun 2D**					
	27-DEC-13	86.48				53	367
	23371.093449	42164.13949	0.0000714	2.0079	71.0830	349.1653	87.0084
C2 . 35	**00034A**	**TDRS 8**					
	26-DEC-13	89.08				53	691
	23370.658576	42165.83640	0.0005832	5.1467	69.0348	157.4061	89.0956
C2 . 36	**02042B**	**Kodama (DRTS)**					
	25-DEC-13	90.75				53	577
	23369.785428	42164.59363	0.0002528	2.6167	70.5852	188.3688	90.7772
C2 . 37	**97036A**	**Superbird C**					
	27-DEC-13	92.99				53	826
	23371.580104	42164.44617	0.0001454	4.3862	63.6803	212.9865	93.0281
C2 . 38	**08001A**	**Thuraya 3**					
	24-DEC-13	98.63				53	309
	23368.806817	42164.95975	0.0005237	4.6077	343.0812	280.2563	98.6586
C2 . 39	**00013A**	**Ekspress 2A**					
	27-DEC-13	102.77				53	711
	23371.772743	42163.48102	0.0029722	6.9099	55.8752	93.0634	103.0100
C2 . 40	**06038A**	**Zhongxing-22A (FengHuo 1, FH-1)**					
	27-DEC-13	102.91				53	379
	23371.580544	42164.75454	0.0002565	3.4398	66.9326	193.0470	101.5290
C2 . 41	**03052A**	**Zhongxing-20 (ShenTong 1, ST-1)**					
	27-DEC-13	103.26				52	519
	23371.550255	42164.26620	0.0005487	0.9624	77.8511	206.7771	103.3278

C2 .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$				N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
C2 . 42	**08066A**	**Fengyun 2E**					
	27-DEC-13	104.34				53	265
	23371.583542	42163.09671	0.0000500	1.6184	53.7992	132.9710	104.4772
C2 . 43	**00011A**	**Garuda 1**					
	26-DEC-13	123.01				53	702
	23370.587512	42163.21949	0.0002612	1.2592	228.1889	77.7787	122.9601
C2 . 44	**04042A**	**Fengyun 2C**					
	27-DEC-13	123.48				53	473
	23371.735509	42164.64381	0.0001220	5.1254	60.5828	325.3973	123.7429
C2 . 45	**02035B**	**N-Star 3 (N-Star c)**					
	27-DEC-13	135.98				52	581
	23371.674757	42164.48065	0.0002955	2.1635	73.4437	182.2435	136.0465
C2 . 46	**05009A**	**Inmarsat 4 F1**					
	27-DEC-13	143.50				53	452
	23371.345810	42165.11982	0.0003326	2.6437	353.8873	272.6170	143.5032
C2 . 47	**06059A**	**Kiku-8 (ETS VIII)**					
	27-DEC-13	145.88				51	360
	23371.604537	42164.39095	0.0004527	3.1721	68.1062	201.8475	145.7746
C2 . 48	**96063B**	**MEASAT 2**					
	25-DEC-13	148.02				53	871
	23369.646262	42165.61099	0.0001774	5.2978	60.5672	132.1920	147.9876
C2 . 49	**97075A**	**JC-Sat 5**					
	26-DEC-13	150.00				53	811
	23370.662523	42164.24966	0.0005710	3.1848	67.8833	200.5012	150.0454
C2 . 50	**96030A**	**Palapa C2**					
	26-DEC-13	150.50				53	869
	23370.662523	42165.06011	0.0002260	3.1695	68.0756	200.8278	150.4971
C2 . 51	**95023A**	**Intelsat VIIA F-1**					
	26-DEC-13	157.00				51	926
	23370.588056	42164.60204	0.0003503	1.9812	73.2526	201.9570	157.0240
C2 . 52	**94043A**	**Apstar 1**					
	27-DEC-13	162.79				53	1009
	23371.612836	42164.14538	0.0003926	8.0251	52.5268	225.8505	163.1172
C2 . 53	**94055A**	**Optus B3**					
	27-DEC-13	164.00				53	967
	23371.838148	42164.28358	0.0005756	5.1952	60.9477	200.6958	164.0277
C2 . 54	**96070A**	**Inmarsat 3-F3**					
	27-DEC-13	178.08				52	873
	23371.420000	42165.17225	0.0005652	0.8821	78.3403	206.0161	178.1099
C2 . 55	**02055A**	**TDRS 10**					
	27-DEC-13	185.70				53	553
	23371.780544	42162.95095	0.0010822	2.6971	63.9601	193.6620	185.6972

C2 .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$				N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
C2 . 56	**91054B**	**TDRS 5**					
	27-DEC-13	192.42				53	1124
	23371.206354	42162.62272	0.0012636	13.0491	35.7502	324.7614	192.4284
C2 . 57	**91018A**	**Inmarsat 2-F2**					
	27-DEC-13	217.26				52	1087
	23371.372940	42163.80058	0.0003409	9.1889	40.4935	225.1598	218.0312
C2 . 58	**98070A**	**Satmex 5**					
	27-DEC-13	243.30				53	771
	23371.377616	42164.59335	0.0004573	0.5865	80.3237	190.7769	245.1087
C2 . 59	**09035A**	**Terrestar 1**					
	27-DEC-13	249.00				52	238
	23371.472442	42164.42038	0.0003721	4.0309	327.7914	293.8882	249.0225
C2 . 60	**96022A**	**MSAT**					
	27-DEC-13	253.51				53	908
	23371.190174	42164.55438	0.0006235	5.5913	59.7121	213.2960	253.5179
C2 . 61	**95019A**	**AMSC-1**					
	27-DEC-13	258.59				52	945
	23371.468565	42164.54485	0.0005352	8.1391	52.5277	204.1702	256.7230
C2 . 62	**08039A**	**Inmarsat 4 F3**					
	27-DEC-13	262.37				53	285
	23371.340278	42164.44589	0.0003089	3.0068	348.7741	292.5442	262.3698
C2 . 63	**00038A**	**EchoStar 6**					
	27-DEC-13	263.83				53	689
	23371.492130	42164.77837	0.0002354	1.6884	74.7166	207.4900	263.8045
C2 . 64	**08016A**	**ICO G1**					
	26-DEC-13	267.15				52	299
	23370.430532	42164.57681	0.0003491	4.3797	342.3661	299.3396	267.1823
C2 . 65	**98006A**	**Brazilsat B-3A**					
	27-DEC-13	268.01				52	802
	23371.482350	42163.99989	0.0003241	1.5438	76.5831	200.1265	268.0189
C2 . 66	**97002A**	**GE 2**					
	27-DEC-13	279.16				50	858
	23371.208519	42164.56167	0.0007811	1.8703	73.4925	202.4552	279.1750
C2 . 67	**90021A**	**Intelsat VI F-3**					
	27-DEC-13	279.42				52	1144
	23371.524826	42164.90957	0.0003853	9.9320	47.4453	153.0308	279.4298
C2 . 68	**98063B**	**GE 5**					
	27-DEC-13	280.73				51	759
	23371.208519	42163.89589	0.0002569	2.9651	69.1301	194.9526	279.1116
C2 . 69	**95016A**	**Brazilsat B2**					
	26-DEC-13	296.81				50	923
	23370.350301	42165.06488	0.0002475	5.0108	61.8414	217.1265	296.8114

C2 .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$				N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
C2 . 70	**97027A**	**Inmarsat 3-F4**					
	27-DEC-13	306.01				52	842
	23371.193935	42164.85574	0.0005012	3.4158	66.2036	203.1312	306.0689
C2 . 71	**88091B**	**TDRS-West**					
	27-DEC-13	311.12				52	1137
	23371.168067	42163.59959	0.0014288	14.3216	21.7689	328.1022	311.2529
C2 . 72	**94064A**	**Intelsat VII F-3 (NSS 703)**					
	27-DEC-13	312.96				42	894
	23371.357188	42164.21406	0.0003759	3.6757	66.1946	198.8441	312.9908
C2 . 73	**93003B**	**TDRS 6**					
	27-DEC-13	314.12				53	1038
	23371.437037	42166.15488	0.0008044	12.4854	38.5612	305.3278	314.1332
C2 . 74	**00043A**	**PAS 9**					
	25-DEC-13	316.91				52	687
	23369.172650	42165.51988	0.0002634	0.9836	78.3952	180.9289	316.8894
C2 . 75	**02011A**	**TDRS 9**					
	26-DEC-13	319.02				53	601
	23370.438519	42166.51599	0.0010719	2.6405	104.4552	268.8437	318.9153
C2 . 76	**01005B**	**Skynet 4F**					
	27-DEC-13	326.01				52	646
	23371.298553	42163.76470	0.0003028	7.1051	46.6908	227.1425	325.9873
C2 . 77	**93066A**	**Intelsat VII F-1**					
	25-DEC-13	330.52				53	990
	23369.924155	42164.84789	0.0004198	1.6979	74.7982	229.9816	330.5075
C2 . 78	**12061A**	**Luch-5B**					
	27-DEC-13	344.03				52	59
	23371.188472	42164.96956	0.0002982	0.9575	91.5627	145.3421	344.1346
C2 . 79	**02029A**	**Ekspress A1R (Express 4A)**					
	27-DEC-13	346.02				53	595
	23371.749271	42164.67128	0.0001808	3.7371	66.1190	139.5461	346.0411
C2 . 80	**98035A**	**Thor III**					
	25-DEC-13	355.70				53	780
	23369.336505	42164.23088	0.0002702	3.0945	68.1594	193.9494	355.7371
C2 . 81	**97042A**	**Agila 2**					
	27-DEC-13	356.94				52	825
	23371.183854	42164.38226	0.0004913	2.4423	71.9769	197.9914	356.9244
C2 . 82	**90079A**	**Skynet 4C**					
	26-DEC-13	358.80				52	1109
	23370.219433	42164.48318	0.0003979	12.7469	29.6114	245.6026	358.6294

3.3 Objects in a drift orbit

In the case where the object is in a drift orbit, there are 585 objects identified.

For explanation of symbols, see the definitions at the beginning of Chapter 3 on page 34.

D .nn	COSPAR	NAME					
	Date	$\overline{\dot{\lambda}}$	$\overline{\Delta a}$	$\overline{\Delta r_p}$	$\overline{\Delta r_a}$	N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
D . 1	**69045A**	**Intelsat III F-4**					
	25-DEC-13	-36.83	3135.852	3016.235	3255.469	50	278
	23369.584259	45300.17477	0.0022913	13.9640	325.6412	335.0500	184.5355
D . 2	**68116A**	**Intelsat III F-2**					
	27-DEC-13	-36.29	3085.643	2628.798	3542.488	50	275
	23371.131782	45249.98186	0.0096782	13.7782	328.4740	343.7445	346.1974
D . 3	**06048A**	**Xinnuo 2**					
	25-DEC-13	-26.69	2215.140	2035.865	2394.416	52	367
	23369.699213	44379.60925	0.0040630	3.7103	122.5069	144.8097	9.8694
D . 4	**97040A**	**PAS 6**					
	27-DEC-13	-23.67	1949.998	-1117.190	5017.186	51	463
	23371.165741	44114.61063	0.0693195	13.9737	356.1260	145.1558	53.1168
D . 5	**78113D**	**Titan IIIC stage 3 (Transtage)**					
	25-DEC-13	-23.46	1931.720	729.068	3134.373	50	969
	23369.123090	44096.18520	0.0267708	18.0011	349.7293	310.9509	203.1567
D . 6	**78113A**	**OPS 9441 (DSCS II F-11)**					
	25-DEC-13	-22.47	1845.511	1728.844	1962.178	50	1095
	23369.362905	44009.92826	0.0028946	16.9392	354.7298	90.0869	134.4722
D . 7	**85024A**	**Ekran 14**					
	25-DEC-13	-19.72	1608.706	1533.325	1684.087	51	1081
	23369.745035	43772.90230	0.0016143	16.9672	1.2358	244.9657	142.7406
D . 8	**84115A**	**NATO IIID**					
	26-DEC-13	-19.15	1560.197	1128.260	1992.133	52	1112
	23370.433843	43724.66352	0.0102044	13.1386	28.8210	21.1242	215.1103
D . 9	**73100D**	**Titan IIIC stage 3 (Transtage)**					
	25-DEC-13	-18.99	1546.995	365.577	2728.413	51	995
	23369.058056	43711.76126	0.0263430	15.7425	333.9947	5.0612	56.4521
D . 10	**83016A**	**Ekran 10**					
	31-DEC-13	-18.88	1537.275	1388.982	1685.569	51	1076
	23375.144572	43701.27437	0.0030044	16.9837	352.6999	270.6419	20.7082
D . 11	**81122A**	**Marecs A**					
	27-DEC-13	-18.84	1534.091	1018.159	2050.023	50	1102
	23371.279884	43698.39676	0.0118111	15.5595	5.2679	150.2947	172.5877
D . 12	**82106A**	**DSCS II F-16**					
	26-DEC-13	-18.66	1518.640	1500.231	1537.050	53	1144
	23370.350822	43683.26299	0.0005271	16.2426	5.1708	100.3677	261.7988
D . 13	**08006C**	**Proton-M/Briz-M fourth stage (Briz-M)**					
	25-DEC-13	-18.55	1509.175	369.996	2648.355	52	146
	23369.473426	43673.66369	0.0262254	5.7032	45.1491	207.7669	263.5357

D .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$	$\overline{\Delta a}$	$\overline{\Delta r_p}$	$\overline{\Delta r_a}$	N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
D . 14	**88036A**	**Ekran 18**					
	27-DEC-13	-18.44	1500.317	1445.072	1555.561	50	1067
	23371.391759	43655.65811	0.0011519	16.3680	11.4065	343.0349	211.2763
D . 15	**77005A**	**NATO IIIB**					
	26-DEC-13	-18.01	1463.826	1271.721	1655.932	51	1078
	23370.254097	43628.30623	0.0042000	15.1473	348.3781	296.4941	314.7628
D . 16	**79098C**	**Titan IIIC stage 3 (Transtage)**					
	26-DEC-13	-17.84	1448.875	72.995	2824.754	50	1070
	23370.575637	43613.33982	0.0309861	17.2595	350.3443	315.9290	229.2612
D . 17	**77034B**	**OPS 9438 (DSCS II F-8)**					
	26-DEC-13	-17.45	1415.987	1263.608	1568.366	51	1050
	23370.421667	43580.36161	0.0033897	16.5928	344.8519	39.8223	236.8573
D . 18	**08022B**	**Zenit-3SLB third stage (Blok-DM-SL-B)**					
	26-DEC-13	-17.06	1383.338	-815.062	3581.737	52	290
	23370.801215	43547.90089	0.0514275	5.7306	65.6444	307.5309	78.4205
D . 19	**77034C**	**Titan IIIC stage 3 (Transtage)**					
	25-DEC-13	-16.97	1375.434	66.122	2684.747	51	1079
	23369.473171	43540.86957	0.0296985	16.9006	342.7526	341.7015	159.3810
D . 20	**79098A**	**OPS 9443 (DSCS II F-13)**					
	31-DEC-13	-16.83	1363.564	1321.611	1405.518	52	1109
	23375.681644	43527.90755	0.0008289	16.4818	354.2556	29.5872	216.1086
D . 21	**87109A**	**Ekran 17**					
	23-DEC-13	-15.81	1277.540	1094.876	1460.204	52	1058
	23367.783403	43441.93521	0.0043938	15.9642	13.9967	120.5661	161.6343
D . 22	**76053A**	**Marisat 2**					
	27-DEC-13	-15.75	1272.539	731.303	1813.776	52	1081
	23371.291389	43436.78421	0.0124727	15.5462	343.7783	212.4368	339.3305
D . 23	**84114B**	**Marecs B2**					
	25-DEC-13	-15.64	1263.992	757.936	1770.049	51	1150
	23369.512581	43428.56528	0.0112575	16.2887	12.7771	296.5969	284.1769
D . 24	**87028A**	**Raduga 20**					
	23-DEC-13	-15.52	1253.496	1131.825	1375.166	50	1022
	23367.192454	43418.02719	0.0028716	16.8338	9.5868	56.8920	31.6219
D . 25	**84090A**	**Ekran 13**					
	25-DEC-13	-15.30	1235.370	1168.086	1302.654	52	1102
	23369.490266	43399.32657	0.0019694	16.4575	357.9809	92.0810	153.1291
D . 26	**97029A**	**Fengyun 2A (Fengyun 2-1R)**					
	27-DEC-13	-15.20	1226.829	810.206	1643.452	53	836
	23371.191296	43391.05336	0.0098903	11.9684	43.8947	120.4588	179.8583
D . 27	**84028A**	**Ekran 12**					
	26-DEC-13	-15.17	1224.012	1182.473	1265.551	52	1076
	23370.512245	43388.48159	0.0007805	16.4830	354.7420	52.9021	70.8225

D .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$	$\overline{\Delta a}$	$\overline{\Delta r_p}$	$\overline{\Delta r_a}$	N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
D . 28	**91084B**	**Inmarsat 2-F3**					
	26-DEC-13	-15.16	1223.303	1171.427	1275.178	51	1032
	23370.715278	43387.56560	0.0011740	9.5188	45.4486	344.1140	353.1858
D . 29	**87073A**	**Ekran 16**					
	26-DEC-13	-13.64	1096.841	1077.303	1116.380	52	997
	23370.064201	43261.49647	0.0005030	16.0111	7.6232	104.0836	48.3636
D . 30	**86038A**	**Ekran 15**					
	25-DEC-13	-13.42	1078.347	1024.425	1132.270	51	1044
	23369.906806	43242.85907	0.0008323	16.1483	2.7734	250.6928	103.9077
D . 31	**88108A**	**Ekran 19**					
	25-DEC-13	-13.04	1046.596	922.749	1170.443	50	1140
	23369.670521	43211.17008	0.0030270	15.6709	16.1953	95.7699	199.1955
D . 32	**77034A**	**OPS 9437 (DSCS II F-7)**					
	31-DEC-13	-12.96	1040.330	965.450	1115.210	54	1037
	23375.859340	43204.74015	0.0016604	16.3408	341.5575	232.7824	110.7838
D . 33	**86090A**	**Gorizont 13**					
	26-DEC-13	-12.77	1025.018	958.932	1091.104	51	1053
	23370.032245	43189.63593	0.0013590	15.8389	8.4450	245.1716	67.3811
D . 34	**88051A**	**Meteosat 3**					
	27-DEC-13	-11.97	958.923	934.261	983.584	51	1111
	23371.230370	43123.23151	0.0002611	15.3185	22.0338	280.2247	14.2340
D . 35	**85028C**	**Leasat 3**					
	25-DEC-13	-11.92	954.427	625.435	1283.419	51	1170
	23369.565752	43118.70185	0.0077354	17.7441	354.4932	178.2262	137.1844
D . 36	**92060B**	**Satcom C-3**					
	25-DEC-13	-11.75	940.176	838.334	1042.017	51	1072
	23369.736840	43104.02104	0.0023199	8.1082	53.6779	264.6114	174.1652
D . 37	**89020B**	**Meteosat 4**					
	27-DEC-13	-11.39	910.952	826.949	994.955	50	1081
	23371.338067	43075.15907	0.0019902	14.9346	26.7296	79.9524	178.8875
D . 38	**96030B**	**AMOS 1**					
	25-DEC-13	-11.36	908.723	863.071	954.374	51	896
	23369.135671	43072.80475	0.0009655	4.7039	63.8260	66.8990	356.4923
D . 39	**95040A**	**PAS 4**					
	26-DEC-13	-11.33	905.997	807.748	1004.247	52	882
	23370.214722	43070.33752	0.0025211	3.3104	68.7572	133.2886	35.3081
D . 40	**92032A**	**Intelsat K (NSS K)**					
	27-DEC-13	-11.14	890.246	503.856	1276.636	51	1049
	23371.447014	43054.51605	0.0085886	10.2014	49.8356	242.4815	263.5218
D . 41	**71095C**	**Titan IIIC stage 3 (Transtage)**					
	26-DEC-13	-11.11	887.602	208.781	1566.423	51	1058
	23370.343727	43052.21594	0.0153147	12.9644	326.4062	57.9700	291.5239

D .nn	COSPAR	NAME					
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	MJD	a	e	i	Ω	ω	λ
D . 42	**84023A**	**Intelsat V F-8**					
	26-DEC-13	-10.74	857.510	768.254	946.765	51	1169
	23370.813588	43021.77722	0.0019296	15.4118	17.9545	97.5996	99.6548
D . 43	**00003A**	**Zhongxing-22 (FengHuo 1, FH-1)**					
	26-DEC-13	-10.62	848.159	837.558	858.760	53	720
	23370.490972	43012.78524	0.0003769	4.9456	60.2997	201.9916	242.4766
D . 44	**98024A**	**Nilesat 101**					
	27-DEC-13	-10.37	827.253	731.415	923.092	52	794
	23371.502153	42991.89518	0.0026693	0.8772	78.5228	184.2061	264.2089
D . 45	**89070A**	**Himawari-4**					
	27-DEC-13	-10.30	821.854	624.637	1019.071	51	1131
	23371.546887	42986.55822	0.0047469	14.7399	27.3060	29.8250	258.9280
D . 46	**84093C**	**Leasat 2**					
	23-DEC-13	-10.14	808.806	677.746	939.865	53	1152
	23367.997060	42973.45293	0.0032301	16.7200	356.9981	154.1167	102.4728
D . 47	**85107F**	**Proton-K/DM fourth stage (Blok-DM)**					
	27-DEC-13	-10.00	797.151	712.410	881.893	52	1042
	23371.101157	42961.74976	0.0016653	15.6340	3.3129	13.6986	48.8362
D . 48	**73100B**	**OPS 9434 (DSCS II F-4)**					
	27-DEC-13	-9.92	790.364	490.735	1089.993	51	1083
	23371.470532	42954.95086	0.0068870	13.8699	331.8370	316.9368	285.1278
D . 49	**78073F**	**Proton-K/DM fourth stage (Blok-DM)**					
	23-DEC-13	-9.74	775.654	708.514	842.795	53	1068
	23367.843438	42939.81280	0.0014956	15.1208	337.3980	60.4428	146.0981
D . 50	**82113F**	**Proton-K/DM fourth stage (Blok-DM)**					
	31-DEC-13	-9.73	774.741	679.418	870.065	52	1060
	23375.697396	42938.98104	0.0024742	15.6140	353.1127	160.5899	193.9062
D . 51	**76101A**	**Marisat 3**					
	23-DEC-13	-9.66	769.268	348.622	1189.913	52	1134
	23367.776076	42933.24694	0.0099905	13.1231	343.6267	239.0610	171.1491
D . 52	**86082F**	**Proton-K/DM fourth stage (Blok-DM)**					
	25-DEC-13	-9.63	766.738	648.025	885.451	51	986
	23369.195150	42931.21577	0.0028993	15.5691	6.5695	55.9541	11.1457
D . 53	**83088F**	**Proton-K/DM fourth stage (Blok-DM)**					
	27-DEC-13	-9.57	761.928	691.942	831.914	50	1063
	23371.357350	42926.52264	0.0014908	15.7781	355.7520	35.5186	307.6100
D . 54	**83066F**	**Proton-K/DM fourth stage (Blok-DM)**					
	27-DEC-13	-9.56	761.214	714.977	807.452	53	1061
	23371.490567	42926.12863	0.0012116	15.7193	355.4715	79.6090	229.7262
D . 55	**69013B**	**Titan IIIC stage 3 (Transtage)**					
	26-DEC-13	-9.55	760.732	202.787	1318.677	52	1000
	23370.136563	42924.90266	0.0128702	8.9432	314.4164	86.9348	355.5579

D .nn	COSPAR	NAME					
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	MJD	a	e	i	Ω	ω	λ
D . 56	**80016D**	**Proton-K/DM fourth stage (Blok-DM)**					
	25-DEC-13	-9.54	759.925	696.826	823.025	51	1086
	23369.591076	42924.78159	0.0017297	15.4456	341.6899	164.2029	255.8416
D . 57	**09007D**	**Proton-M/Briz-M fourth stage (Briz-M)**					
	25-DEC-13	-9.51	757.537	-64.112	1579.187	50	254
	23369.952882	42922.13210	0.0194703	4.2199	67.9004	313.3901	51.9755
D . 58	**73100A**	**OPS 9433 (DSCS II F-3)**					
	26-DEC-13	-9.43	750.367	624.173	876.561	51	987
	23370.545046	42914.72746	0.0032399	14.4383	330.9013	110.2781	206.8639
D . 59	**87040A**	**Gorizont 14**					
	26-DEC-13	-9.42	749.630	624.842	874.417	52	1097
	23370.288322	42913.76128	0.0032092	15.7432	1.0159	93.8939	319.4546
D . 60	**81027F**	**Proton-K/DM fourth stage (Blok-DM)**					
	26-DEC-13	-9.40	748.118	673.701	822.535	52	1062
	23370.275833	42912.24766	0.0019902	15.8376	344.5150	97.8220	334.7826
D . 61	**79062D**	**Proton-K/DM fourth stage (Blok-DM)**					
	25-DEC-13	-9.37	746.192	726.412	765.972	51	1027
	23369.403414	42910.47584	0.0007016	15.4719	341.2490	135.2440	190.9181
D . 62	**86044F**	**Proton-K/DM fourth stage (Blok-DM)**					
	25-DEC-13	-9.37	745.893	702.682	789.104	50	1078
	23369.429063	42910.36571	0.0012325	15.5355	5.5103	88.8028	179.8290
D . 63	**96005D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	27-DEC-13	-9.36	744.617	690.103	799.131	52	842
	23371.093623	42909.62880	0.0015007	13.1937	37.5861	67.9926	87.1050
D . 64	**86027F**	**Proton-K/DM fourth stage (Blok-DM)**					
	25-DEC-13	-9.30	740.189	584.603	895.775	52	1067
	23369.464873	42905.26043	0.0035788	16.1399	4.8908	30.0508	274.3807
D . 65	**81069F**	**Proton-K/DM fourth stage (Blok-DM)**					
	25-DEC-13	-9.27	737.388	644.135	830.640	52	1065
	23369.535949	42902.31270	0.0022690	15.7000	345.9391	73.0774	267.0523
D . 66	**82113A**	**Raduga 11**					
	24-DEC-13	-9.24	734.979	558.145	911.813	50	1001
	23368.793681	42898.91295	0.0042625	15.4937	353.4554	165.5088	180.2666
D . 67	**77071F**	**Proton-K/DM fourth stage (Blok-DM)**					
	26-DEC-13	-9.13	725.930	676.243	775.618	52	1042
	23370.003160	42891.07362	0.0009142	14.6499	334.3278	36.2005	76.0440
D . 68	**01045A**	**Raduga 1-6**					
	26-DEC-13	-9.10	724.190	651.680	796.700	52	623
	23370.755104	42888.38691	0.0017792	9.4646	51.8417	84.1630	193.2258
D . 69	**88028D**	**Proton-K/DM fourth stage (Blok-DM)**					
	25-DEC-13	-8.96	712.760	620.843	804.678	50	1079
	23369.878947	42876.95524	0.0020265	15.7403	12.0001	17.0874	108.7348

D .nn	COSPAR	NAME					
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D . 70	**85076D**	**Leasat 4**					
	26-DEC-13	-8.91	708.215	682.321	734.109	50	1053
	23370.400370	42872.55836	0.0004661	13.8359	4.9407	235.9502	128.6172
D . 71	**86007F**	**Proton-K/DM fourth stage (Blok-DM)**					
	25-DEC-13	-8.91	708.102	574.333	841.871	51	1063
	23369.263993	42872.66153	0.0033493	15.6122	3.4784	60.8768	346.8940
D . 72	**77108D**	**Mage 1 (Meteosat 1 AKM)**					
	25-DEC-13	-8.89	706.574	325.701	1087.448	51	658
	23369.447755	42871.18163	0.0085024	15.2962	334.9951	19.2917	167.1997
D . 73	**85070F**	**Proton-K/DM fourth stage (Blok-DM)**					
	26-DEC-13	-8.89	706.511	656.111	756.911	52	1070
	23370.639931	42870.62378	0.0012996	15.5919	2.0661	71.6592	168.1729
D . 74	**88028A**	**Gorizont 15**					
	27-DEC-13	-8.81	700.030	551.432	848.627	51	1105
	23371.079583	42864.16729	0.0037641	15.6895	12.2016	74.8984	310.8700
D . 75	**92043D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	25-DEC-13	-8.79	698.400	591.001	805.798	51	952
	23369.068773	42863.34445	0.0026703	14.6013	27.2903	73.9623	63.0797
D . 76	**89101G**	**Cosmos 2054 debris**					
	30-DEC-13	-8.72	693.291	561.928	824.654	51	695
	23374.198993	42857.50913	0.0028696	15.1559	18.1985	206.8607	315.0274
D . 77	**89098D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	25-DEC-13	-8.71	692.027	614.117	769.938	52	1033
	23369.214630	42857.08107	0.0020621	15.4007	18.4292	71.3749	40.3510
D . 78	**90102D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	25-DEC-13	-8.66	688.036	607.259	768.812	51	992
	23369.540718	42852.37373	0.0020762	15.0060	21.4197	87.4807	192.9592
D . 79	**89048D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	25-DEC-13	-8.57	681.134	586.015	776.252	51	1000
	23369.068229	42846.06272	0.0022389	15.2191	16.4169	32.0541	59.0103
D . 80	**89030D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	31-DEC-13	-8.46	671.590	596.465	746.716	52	1068
	23375.887303	42836.47135	0.0019745	15.1761	15.5184	84.7482	118.0060
D . 81	**80049F**	**Proton-K/DM fourth stage (Blok-DM)**					
	24-DEC-13	-8.41	667.716	541.824	793.607	51	1079
	23368.791817	42832.01050	0.0032088	15.5337	343.6315	95.5088	137.0214
D . 82	**88095F**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	26-DEC-13	-8.40	667.295	607.461	727.128	51	1058
	23370.304780	42831.98455	0.0016120	15.2720	14.0227	135.9996	244.1782
D . 83	**95067A**	**Telecom 2C**					
	27-DEC-13	-8.40	666.864	605.546	728.181	51	915
	23371.778565	42830.77520	0.0016065	8.8585	51.6213	190.0810	158.9805

D .nn	COSPAR	NAME					
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D . 84	**92021B**	**Inmarsat 2-F4**					
	26-DEC-13	-8.39	665.941	635.635	696.248	51	1051
	23370.556134	42830.37901	0.0003576	7.7408	40.8425	20.5150	119.2090
D . 85	**90116D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	27-DEC-13	-8.38	665.663	518.968	812.358	52	1052
	23371.036817	42830.88453	0.0031621	14.9789	21.8116	342.3062	276.8909
D . 86	**96034D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	27-DEC-13	-8.37	664.942	528.881	801.002	52	857
	23371.185660	42829.29134	0.0030438	13.0329	38.3933	344.9943	321.8014
D . 87	**88018B**	**Telecom 1C**					
	27-DEC-13	-8.34	662.255	238.977	1085.534	52	1041
	23371.461019	42826.60467	0.0100620	14.4492	30.7085	33.6819	206.2918
D . 88	**01014C**	**Proton-M/Briz-M fourth stage (Briz-M)**					
	26-DEC-13	-8.31	659.513	-81.914	1400.941	52	635
	23370.749433	42824.21189	0.0167715	9.9924	54.4533	113.9725	42.0925
D . 89	**94008D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	27-DEC-13	-8.30	658.924	564.894	752.953	51	920
	23371.437037	42823.59641	0.0018936	14.1234	32.2809	311.1821	313.2944
D . 90	**89004F**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	27-DEC-13	-8.20	650.913	549.097	752.730	51	1070
	23371.203113	42815.68221	0.0022874	15.1975	14.8351	17.1484	24.9999
D . 91	**93013D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	27-DEC-13	-8.14	645.760	574.634	716.886	52	902
	23371.167604	42809.61763	0.0016936	14.4372	29.4468	13.2519	355.8589
D . 92	**91087D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	25-DEC-13	-8.11	643.753	565.729	721.777	51	953
	23369.965637	42808.95929	0.0015453	14.7879	25.1926	321.3218	54.3085
D . 93	**92082D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	31-DEC-13	-8.10	642.489	598.102	686.877	53	946
	23375.673877	42806.89242	0.0008483	14.5274	28.1091	359.4281	34.8526
D . 94	**99010D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	27-DEC-13	-8.02	636.316	549.318	723.315	51	716
	23371.531019	42801.19678	0.0019091	12.6970	47.7904	217.3094	242.4280
D . 95	**96053D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	31-DEC-13	-7.85	622.682	406.687	838.676	52	771
	23375.896782	42786.31359	0.0052679	11.9623	42.9129	195.9952	141.7634
D . 96	**97031A**	**Intelsat VIII F-2**					
	25-DEC-13	-7.79	617.921	512.070	723.771	51	831
	23369.815949	42781.71578	0.0027806	2.5351	69.8191	183.1090	140.1344
D . 97	**94012D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	24-DEC-13	-7.79	617.864	471.111	764.617	52	896
	23368.868981	42781.80328	0.0034469	14.0578	32.1593	6.5225	161.9918

D .nn	COSPAR	NAME					
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D . 98	**88012A**	**Sakura 3A**					
	31-DEC-13	-7.69	609.901	576.276	643.525	53	1061
	23375.945208	42774.03273	0.0007485	14.1085	33.1898	214.0686	17.0594
D . 99	**88063B**	**Eutelsat I F-5 (ECS 5)**					
	24-DEC-13	-7.59	601.671	547.884	655.459	51	1026
	23368.460475	42765.53701	0.0012195	14.6061	27.1491	43.3325	151.3868
D . 100	**83088A**	**Raduga 13**					
	24-DEC-13	-7.56	599.173	526.521	671.825	50	986
	23368.180185	42763.24684	0.0013637	15.5367	355.3330	319.4049	15.6139
D . 101	**69069C**	**JPL SR-28-3 (ATS 5 AKM)**					
	25-DEC-13	-7.54	597.348	39.453	1155.243	50	835
	23369.069907	42761.48135	0.0132938	10.5200	319.9202	176.2149	32.9868
D . 102	**00052A**	**Eutelsat W1**					
	27-DEC-13	-7.54	597.208	562.811	631.606	52	675
	23371.533519	42761.94971	0.0011492	2.0327	78.8553	183.2808	280.0506
D . 103	**00049D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	27-DEC-13	-7.50	594.436	521.716	667.155	53	660
	23371.056424	42758.26736	0.0013546	10.2571	48.0428	266.3399	320.7309
D . 104	**89101D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	24-DEC-13	-7.28	577.005	533.497	620.512	52	1022
	23368.770486	42741.55332	0.0012199	15.0318	18.0945	105.6852	14.1545
D . 105	**76023J**	**LES 8, LES 9 operational debris**					
	25-DEC-13	-7.25	573.900	-35.611	1183.411	51	845
	23369.002766	42738.62782	0.0156002	12.2738	112.9915	317.0274	50.6075
D . 106	**76023F**	**Titan IIIC stage 3 (Transtage)**					
	26-DEC-13	-7.24	573.487	-26.070	1173.044	52	1047
	23370.756771	42737.76547	0.0153838	12.2782	112.9316	318.1026	112.8687
D . 107	**83118A**	**Gorizont 8**					
	27-DEC-13	-7.22	571.497	460.119	682.876	51	993
	23371.394931	42735.75153	0.0028676	15.3610	356.4896	70.5258	304.0240
D . 108	**91001A**	**NATO IVA**					
	26-DEC-13	-7.16	567.188	541.888	592.488	51	1101
	23370.271829	42731.38931	0.0005051	11.9644	29.2817	107.1044	316.0312
D . 109	**85025A**	**Intelsat VA F-10**					
	31-DEC-13	-7.15	566.289	429.724	702.854	53	1155
	23375.525961	42731.22671	0.0031323	14.9305	21.3215	257.8135	99.8145
D . 110	**88109B**	**Astra 1A**					
	27-DEC-13	-6.97	551.841	483.139	620.544	52	1039
	23371.365729	42715.69766	0.0014805	11.1410	44.8166	2.2983	348.8394
D . 111	**83066A**	**Gorizont 7**					
	27-DEC-13	-6.94	548.840	501.246	596.435	49	1006
	23371.463079	42713.54155	0.0010814	15.3695	354.9696	214.7640	249.5119

D .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$	$\overline{\Delta a}$	$\overline{\Delta r_p}$	$\overline{\Delta r_a}$	N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
D . 112	**79098B**	**OPS 9444 (DSCS II F-14)**					
	25-DEC-13	-6.92	547.743	525.870	569.615	52	1086
	23369.540139	42711.61414	0.0002599	15.3757	349.9463	29.6129	164.6651
D . 113	**84081B**	**Telecom 1A**					
	25-DEC-13	-6.74	532.809	378.257	687.360	51	1047
	23369.540718	42697.47863	0.0033916	15.1989	14.8471	286.1957	192.8944
D . 114	**82097A**	**Intelsat V F-5**					
	24-DEC-13	-6.71	530.902	426.570	635.234	52	1117
	23368.767338	42696.03955	0.0022239	15.1236	11.7609	290.9586	97.1927
D . 115	**90056A**	**Intelsat VI F-4**					
	27-DEC-13	-6.62	523.609	497.313	549.905	50	1048
	23371.511748	42687.75856	0.0005430	10.2861	48.2743	211.1537	194.7212
D . 116	**78113B**	**OPS 9442 (DSCS II F-12)**					
	27-DEC-13	-6.59	521.438	493.501	549.374	50	1058
	23371.207523	42685.80429	0.0007149	15.3919	348.3604	76.6939	314.6813
D . 117	**91074A**	**Gorizont 24**					
	26-DEC-13	-6.59	521.154	442.551	599.757	51	1084
	23370.221944	42685.45942	0.0020532	14.5893	24.4145	138.8803	26.3080
D . 118	**96044B**	**Telecom 2D**					
	27-DEC-13	-6.57	519.666	457.102	582.231	52	861
	23371.839051	42683.43459	0.0016322	6.6283	56.9486	255.1014	165.6687
D . 119	**91015B**	**Meteosat 5**					
	27-DEC-13	-6.56	518.676	496.136	541.216	51	1107
	23371.462593	42683.38199	0.0007582	13.9407	30.8683	155.0047	229.1354
D . 120	**98057A**	**Hot Bird 5**					
	26-DEC-13	-6.54	517.304	491.113	543.494	53	724
	23370.087535	42682.26634	0.0008383	0.8495	77.3387	288.7005	80.4264
D . 121	**86082A**	**Raduga 19**					
	26-DEC-13	-6.53	516.124	467.512	564.735	51	1086
	23370.362153	42680.59763	0.0012824	15.2152	6.0049	76.9667	302.2037
D . 122	**96015A**	**Intelsat VIIA F-2**					
	27-DEC-13	-6.45	509.947	224.478	795.416	52	892
	23371.482211	42674.39069	0.0067048	0.9569	77.5977	246.1661	211.0450
D . 123	**89021B**	**TDRS 4**					
	25-DEC-13	-6.45	509.472	456.693	562.251	52	1164
	23369.872315	42673.79762	0.0016683	11.7537	29.0077	215.6637	122.3362
D . 124	**78106A**	**NATO IIIC**					
	26-DEC-13	-6.44	508.682	488.362	529.003	51	1075
	23370.290880	42673.26350	0.0004116	14.8904	356.0061	199.8428	332.4590
D . 125	**91015A**	**Astra 1B**					
	25-DEC-13	-6.35	501.690	477.580	525.800	52	924
	23369.700845	42665.69228	0.0006295	7.2172	56.1172	234.9994	1.6216

D .nn	COSPAR	NAME					
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	MJD	a	e	i	Ω	ω	λ
D . 126	**82020A**	**Gorizont 5**					
	27-DEC-13	-6.27	495.701	353.989	637.414	51	1015
	23371.224248	42659.44890	0.0036656	15.6238	347.7951	126.0843	358.6282
D . 127	**90001B**	**JC-Sat 2**					
	27-DEC-13	-6.25	493.769	239.297	748.241	51	1096
	23371.450498	42658.16367	0.0061632	11.0673	54.3116	202.2359	212.3416
D . 128	**79038A**	**OPS 6392 (FLTSATCOM F2)**					
	27-DEC-13	-6.23	492.274	421.178	563.369	51	1166
	23371.224063	42655.91093	0.0014333	14.9956	347.0310	320.3278	355.6025
D . 129	**84113C**	**Leasat 1**					
	27-DEC-13	-6.23	491.851	366.049	617.652	52	1054
	23371.449664	42656.52849	0.0029551	13.5720	13.7973	178.3598	288.0471
D . 130	**88040A**	**Intelsat VA F-13 (NSS 513)**					
	27-DEC-13	-6.11	482.662	425.906	539.417	51	1204
	23371.512616	42647.72380	0.0012303	14.1484	30.1776	348.9563	254.7505
D . 131	**94079A**	**Orion 1**					
	27-DEC-13	-6.09	481.056	401.264	560.847	52	912
	23371.166308	42645.39054	0.0019810	8.4982	52.3702	263.5223	26.1274
D . 132	**75011F**	**Aerojet SVM-5 (SMS 2 AKM)**					
	23-DEC-13	-6.07	479.421	55.949	902.892	51	864
	23367.776887	42643.36440	0.0095638	13.1938	328.6174	5.3483	175.7830
D . 133	**81073A**	**FLTSATCOM F5**					
	27-DEC-13	-6.00	473.821	431.217	516.424	51	1071
	23371.442303	42638.97382	0.0009849	19.6890	0.6075	46.9726	246.8586
D . 134	**90063A**	**TDF 2**					
	25-DEC-13	-5.99	472.643	275.025	670.261	50	1055
	23369.807049	42635.81307	0.0050304	12.8149	39.5791	202.0446	192.9531
D . 135	**74033A**	**SMS 1**					
	27-DEC-13	-5.98	472.241	407.357	537.125	51	991
	23371.153310	42636.52530	0.0014896	14.0034	321.5922	297.8756	28.9161
D . 136	**91079D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	25-DEC-13	-5.95	469.969	444.728	495.209	52	950
	23369.147650	42633.93390	0.0004512	14.6727	24.2569	27.9320	344.7520
D . 137	**76029A**	**RCA Satcom II**					
	27-DEC-13	-5.94	468.714	221.961	715.468	51	1017
	23371.493831	42633.82409	0.0058005	15.3638	352.6579	115.9335	246.0824
D . 138	**84041D**	**Proton-K/DM fourth stage (Blok-DM)**					
	27-DEC-13	-5.93	468.119	403.166	533.071	51	1076
	23371.227720	42632.47797	0.0017896	15.2569	357.0996	100.3086	314.5322
D . 139	**80049A**	**Gorizont 4**					
	27-DEC-13	-5.92	467.600	448.658	486.542	52	997
	23371.520220	42632.27740	0.0003022	15.0935	342.9784	186.2270	270.2661

D .nn	COSPAR	NAME					
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	MJD	a	e	i	Ω	ω	λ
D . 140	**94047A**	**DirecTV-2**					
	27-DEC-13	-5.90	465.661	421.858	509.465	51	992
	23371.203090	42629.92003	0.0009849	6.1776	58.8983	226.4997	24.2646
D . 141	**82020F**	**Proton-K/DM fourth stage (Blok-DM)**					
	25-DEC-13	-5.89	465.295	349.500	581.091	52	1069
	23369.689896	42629.71891	0.0029289	15.6690	347.3391	86.1170	122.7718
D . 142	**88066D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	27-DEC-13	-5.81	458.724	316.084	601.365	50	1062
	23371.512801	42622.82134	0.0033048	15.0433	12.4768	27.2851	207.3988
D . 143	**79105E**	**Proton-K/DM fourth stage (Blok-DM)**					
	31-DEC-13	-5.72	451.532	382.353	520.711	51	1042
	23375.302755	42615.48119	0.0018893	15.0168	341.0407	169.4417	357.0721
D . 144	**92010B**	**Insat-IIDT (Arabsat 1C)**					
	27-DEC-13	-5.72	451.263	348.915	553.611	52	1003
	23371.299317	42615.39857	0.0026887	9.7691	49.4328	158.7391	15.3029
D . 145	**87078B**	**Eutelsat I F-4 (ECS 4)**					
	27-DEC-13	-5.71	450.213	416.522	483.904	51	1091
	23371.301933	42614.09651	0.0006628	14.6501	23.2626	290.5587	5.7710
D . 146	**89048A**	**Raduga 1-1**					
	25-DEC-13	-5.64	444.648	363.609	525.687	51	1160
	23369.459016	42609.59690	0.0020475	14.9334	15.9602	38.3662	251.9516
D . 147	**81057A**	**Meteosat 2**					
	27-DEC-13	-5.58	439.901	314.381	565.421	51	1072
	23371.059132	42605.11316	0.0029143	15.2660	0.9797	260.4824	72.9031
D . 148	**97009A**	**Intelsat VIII F-1**					
	27-DEC-13	-5.54	437.000	394.000	480.000	51	812
	23371.751933	42600.59234	0.0010180	4.6069	63.4838	255.8861	351.4635
D . 149	**83026B**	**TDRS-1**					
	26-DEC-13	-5.51	434.223	342.427	526.018	51	1204
	23370.222512	42598.69318	0.0022119	13.9652	357.2387	143.8499	32.3313
D . 150	**99050A**	**EchoStar 5**					
	27-DEC-13	-5.50	433.597	414.470	452.724	51	730
	23371.165035	42598.23273	0.0004960	3.9579	65.7009	187.7177	35.9225
D . 151	**98049A**	**ST-1**					
	27-DEC-13	-5.49	433.000	411.000	455.000	51	778
	23371.367847	42596.77899	0.0005228	1.9623	73.2650	195.1541	339.6800
D . 152	**97016A**	**Thaicom 3**					
	26-DEC-13	-5.48	431.857	73.711	790.003	52	830
	23370.458079	42596.69358	0.0084817	6.4567	58.2026	294.8965	276.8192
D . 153	**84093B**	**SBS IV**					
	24-DEC-13	-5.44	428.883	386.346	471.419	51	1210
	23368.996262	42594.07199	0.0008243	14.4906	22.4861	0.6564	77.4394

D .nn	COSPAR	NAME					
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	MJD	a	e	i	Ω	ω	λ
D . 154	**89070C**	**Star 27 (Himawari-4 AKM)**					
	27-DEC-13	-5.43	428.271	-629.948	1486.490	50	679
	23371.512801	42592.87822	0.0241455	14.5217	16.9699	300.4390	206.8979
D . 155	**00031A**	**Ekspress 3A**					
	27-DEC-13	-5.43	428.243	414.296	442.190	51	691
	23371.526921	42592.45502	0.0003996	4.8044	62.6839	113.7937	67.6188
D . 156	**91060A**	**Yuri 3B**					
	25-DEC-13	-5.34	421.175	397.382	444.969	52	996
	23369.452118	42585.69551	0.0005208	11.7480	33.0528	57.8236	220.7016
D . 157	**84081A**	**Eutelsat I F-2 (ECS 2)**					
	25-DEC-13	-5.32	419.048	385.164	452.933	49	1077
	23369.407326	42583.01096	0.0009803	15.0953	14.0822	98.7643	189.8768
D . 158	**95025A**	**GOES 9**					
	27-DEC-13	-5.30	418.220	396.343	440.098	51	945
	23371.540509	42582.88080	0.0003872	8.9656	51.0207	37.5846	105.7660
D . 159	**90077A**	**Yuri 3A**					
	31-DEC-13	-5.27	415.309	376.006	454.612	50	1062
	23375.896782	42578.93409	0.0011256	13.2905	40.1115	156.5005	141.9727
D . 160	**83081A**	**Sakura 2B**					
	26-DEC-13	-5.26	414.702	392.624	436.781	51	1024
	23370.411817	42579.59598	0.0001698	15.2298	5.7765	313.4660	279.2801
D . 161	**86007A**	**Raduga 18**					
	27-DEC-13	-5.26	414.563	112.561	716.566	51	1061
	23371.449664	42579.40924	0.0075618	15.2158	2.6277	80.6651	286.5663
D . 162	**72090A**	**Anik A1**					
	26-DEC-13	-5.20	410.113	349.801	470.425	51	959
	23370.392662	42574.64940	0.0014436	14.4067	340.0676	81.4718	298.1616
D . 163	**04001A**	**Estrela do Sul 1 (Telstar 14)**					
	27-DEC-13	-5.19	409.144	392.778	425.511	51	503
	23371.493681	42573.37744	0.0004723	2.0912	71.7944	231.3155	206.1573
D . 164	**71006A**	**Intelsat IV F-2**					
	27-DEC-13	-5.17	407.345	347.361	467.328	51	1010
	23371.421435	42571.50227	0.0010905	13.5838	330.6958	325.9794	193.0466
D . 165	**81050A**	**Intelsat V F-1**					
	27-DEC-13	-5.10	402.016	379.530	424.503	51	1145
	23371.394028	42566.86376	0.0004718	15.1088	5.6259	155.8028	304.7555
D . 166	**94065A**	**Solidaridad 2**					
	27-DEC-13	-5.06	397.000	280.000	515.000	53	973
	23371.773484	42562.94286	0.0002765	4.9873	61.8691	215.9427	151.1104
D . 167	**83058A**	**Eutelsat I F-1 (ECS 1)**					
	26-DEC-13	-5.05	398.025	354.534	441.516	51	1106
	23370.206632	42562.42397	0.0011511	15.0561	10.6481	78.3078	312.0199

D .nn	COSPAR	NAME					
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D . 168	**90093A**	**Inmarsat 2-F1**					
	27-DEC-13	-5.03	396.270	384.744	407.795	51	1054
	23371.131968	42560.79134	0.0005057	9.8311	39.2431	232.0067	286.4981
D . 169	**80098A**	**Intelsat V F-2**					
	24-DEC-13	-4.99	393.391	338.383	448.399	51	1139
	23368.866910	42556.62368	0.0012337	15.0329	7.7518	197.5443	144.1577
D . 170	**94022A**	**GOES 8**					
	26-DEC-13	-4.93	387.946	363.777	412.115	50	995
	23370.556065	42552.49690	0.0005857	9.4361	52.3187	212.2610	116.1692
D . 171	**87078A**	**Optus A3**					
	26-DEC-13	-4.92	387.670	360.070	415.270	51	1074
	23370.434074	42551.31722	0.0004526	13.4632	31.8055	263.7803	171.9608
D . 172	**84113B**	**Arabsat 1D**					
	31-DEC-13	-4.92	387.557	271.062	504.052	52	1124
	23375.162477	42551.19648	0.0025481	14.5194	22.5976	266.4696	345.0962
D . 173	**91046A**	**Gorizont 23**					
	31-DEC-13	-4.92	387.267	361.823	412.711	52	1004
	23375.738067	42551.13625	0.0005259	14.6632	22.8493	198.7143	16.8747
D . 174	**00069A**	**Beidou**					
	26-DEC-13	-4.91	386.913	312.800	461.027	52	678
	23370.391019	42551.90002	0.0016512	4.8158	63.6024	282.6218	265.5641
D . 175	**77118A**	**Sakura**					
	27-DEC-13	-4.89	385.455	367.168	403.742	50	1027
	23371.224248	42549.20187	0.0000962	15.0842	344.3915	99.8221	358.5620
D . 176	**87095A**	**TV-Sat 1**					
	25-DEC-13	-4.88	384.426	129.681	639.170	52	856
	23369.335046	42548.15605	0.0060437	14.8602	8.2430	12.7216	328.6747
D . 177	**91003B**	**Eutelsat II F-2**					
	26-DEC-13	-4.80	378.050	353.472	402.628	51	1034
	23370.280567	42541.83490	0.0004484	11.9587	42.1058	47.1014	2.1111
D . 178	**91084A**	**Telecom 2A**					
	27-DEC-13	-4.76	374.794	358.883	390.705	52	1078
	23371.474225	42538.61559	0.0001910	10.8697	45.6918	170.6051	184.5830
D . 179	**98028A**	**EchoStar 4**					
	27-DEC-13	-4.76	374.684	334.305	415.062	51	792
	23371.202384	42538.68552	0.0014539	4.6541	56.0383	186.4942	353.0548
D . 180	**97025A**	**Thor II**					
	26-DEC-13	-4.69	368.872	359.072	378.673	51	822
	23370.500521	42532.38679	0.0003304	4.5576	61.3358	217.5375	171.1086
D . 181	**95013A**	**Intelsat VII F-5**					
	26-DEC-13	-4.68	368.403	283.632	453.174	51	942
	23370.063808	42532.80191	0.0017778	3.5268	66.6663	355.3237	31.7100

D .nn	COSPAR	NAME					
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D . 182	**93073B**	**Meteosat 6**					
	27-DEC-13	-4.64	365.408	344.915	385.901	53	970
	23371.232940	42528.97936	0.0004781	11.7164	40.5630	114.6080	157.8538
D . 183	**93078A**	**DirecTV-1**					
	25-DEC-13	-4.64	364.888	323.054	406.722	52	1027
	23369.066146	42528.66200	0.0008621	4.3957	64.3160	80.9261	332.7173
D . 184	**00066A**	**Thuraya 1**					
	25-DEC-13	-4.63	364.707	335.062	394.352	52	664
	23369.963750	42529.94810	0.0006623	5.5561	29.1852	260.2137	59.3153
D . 185	**90091A**	**SBS VI**					
	25-DEC-13	-4.61	363.052	326.910	399.194	51	1123
	23369.203889	42527.78499	0.0007157	5.5770	61.0470	20.9451	44.9941
D . 186	**90001A**	**Skynet 4A**					
	31-DEC-13	-4.60	361.680	311.617	411.744	52	1090
	23375.921586	42526.05058	0.0012906	12.4085	24.9506	195.3766	36.0609
D . 187	**95029A**	**DirecTV-3**					
	27-DEC-13	-4.58	360.495	343.453	377.537	51	917
	23371.538773	42524.77652	0.0005372	4.1195	65.2955	278.6049	207.5132
D . 188	**89087A**	**Intelsat VI F-2**					
	25-DEC-13	-4.56	359.014	334.036	383.992	51	1095
	23369.212002	42522.69282	0.0004404	10.4590	45.8132	77.6864	348.1103
D . 189	**91037A**	**Aurora II**					
	26-DEC-13	-4.54	357.058	340.706	373.411	51	1104
	23370.385833	42521.50690	0.0004147	11.1456	44.9978	152.5939	272.9076
D . 190	**92057A**	**Satcom C-4**					
	26-DEC-13	-4.52	356.027	344.338	367.716	52	992
	23370.556563	42519.89967	0.0001657	8.5043	52.2729	151.2126	135.3606
D . 191	**97011A**	**Tempo 2**					
	24-DEC-13	-4.47	351.713	231.718	471.707	53	843
	23368.867326	42515.81985	0.0030413	6.9333	56.5062	201.4937	126.7955
D . 192	**00022A**	**GOES 11**					
	27-DEC-13	-4.43	348.634	327.273	369.994	52	703
	23371.338125	42512.26437	0.0003109	2.3334	93.1968	56.3071	180.9607
D . 193	**94049B**	**Turksat 1B**					
	27-DEC-13	-4.41	347.336	278.303	416.370	52	927
	23371.130868	42511.14099	0.0015854	8.4158	52.4469	354.2996	334.5372
D . 194	**84005A**	**Yuri 2A**					
	25-DEC-13	-4.39	345.624	294.796	396.453	52	1042
	23369.425949	42510.90207	0.0010089	15.1422	6.0847	120.3244	101.7032
D . 195	**92010A**	**Superbird B1**					
	27-DEC-13	-4.39	345.316	277.263	413.370	50	1083
	23371.059144	42510.49005	0.0011467	10.8597	45.6220	13.5620	72.0203

D .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$	$\overline{\Delta a}$	$\overline{\Delta r_p}$	$\overline{\Delta r_a}$	N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
D . 196	**96002B**	**MEASAT 1**					
	31-DEC-13	-4.36	342.970	336.123	349.816	54	902
	23375.987488	42507.83651	0.0003502	5.3739	60.2025	221.5693	53.4274
D . 197	**89004A**	**Gorizont 17**					
	31-DEC-13	-4.35	342.054	254.310	429.799	52	1189
	23375.685775	42506.00116	0.0021500	14.8296	14.0378	52.4402	200.3474
D . 198	**07063A**	**Rascom-QAF 1**					
	26-DEC-13	-4.35	341.902	295.250	388.553	52	311
	23370.592662	42507.07071	0.0008467	2.7189	70.9560	329.9358	259.2897
D . 199	**92041B**	**Eutelsat II F-4**					
	26-DEC-13	-4.30	338.357	313.481	363.232	50	965
	23370.418125	42503.60886	0.0005782	11.1370	45.3975	147.6884	250.6310
D . 200	**96002A**	**PAS 3R**					
	27-DEC-13	-4.27	335.949	293.474	378.423	53	890
	23371.165035	42500.44882	0.0012649	3.7044	65.6544	172.0477	35.8948
D . 201	**89006A**	**Intelsat VA F-15**					
	25-DEC-13	-4.20	330.543	238.819	422.267	52	1160
	23369.476204	42494.10564	0.0021052	13.2915	35.9272	0.5753	166.3199
D . 202	**09007B**	**Ekspress MD-1**					
	27-DEC-13	-4.18	329.016	306.119	351.913	53	258
	23371.571771	42494.07191	0.0007534	0.3745	80.8766	232.1734	272.2685
D . 203	**85087A**	**Intelsat VA F-12**					
	26-DEC-13	-4.17	327.804	307.796	347.812	51	1154
	23370.689317	42492.76223	0.0006000	14.5184	25.6977	196.3016	114.8807
D . 204	**92084A**	**Superbird A1**					
	26-DEC-13	-4.16	326.958	261.306	392.610	53	1045
	23370.703530	42492.02911	0.0014065	6.6482	52.7475	43.9202	91.6502
D . 205	**98024B**	**BSAT-1b**					
	27-DEC-13	-4.16	326.700	313.032	340.369	53	785
	23371.502639	42490.09173	0.0002929	2.3390	81.4684	135.1035	163.7960
D . 206	**97016B**	**BSAT-1a**					
	26-DEC-13	-4.15	326.375	314.477	338.273	52	825
	23370.276910	42489.75166	0.0003546	2.6945	64.9234	168.2940	347.1902
D . 207	**83059B**	**Anik C2**					
	25-DEC-13	-4.14	325.631	164.496	486.766	51	1173
	23369.527245	42490.69702	0.0036181	14.8491	17.6111	1.0593	236.9568
D . 208	**97019A**	**GOES 10**					
	26-DEC-13	-4.14	325.506	215.564	435.447	52	847
	23370.556690	42489.25900	0.0027761	7.2208	54.6836	120.9519	140.2017
D . 209	**95044A**	**N-Star 1**					
	26-DEC-13	-4.12	324.211	281.924	366.497	51	894
	23370.630301	42489.32730	0.0012736	7.2307	55.4627	251.9905	245.9957

D .nn	COSPAR	NAME					
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	MJD	a	e	i	Ω	ω	λ
D . 210	**91026A**	**Anik E2**					
	25-DEC-13	-4.12	324.106	292.539	355.673	51	1121
	23369.212002	42487.66138	0.0006067	9.4004	49.8999	277.0750	347.6006
D . 211	**01031A**	**GOES 12**					
	26-DEC-13	-4.09	321.410	296.524	346.296	53	636
	23370.603113	42485.61965	0.0006910	3.8900	71.8120	189.2252	119.1727
D . 212	**78044A**	**OTS 2**					
	23-DEC-13	-4.08	320.715	290.422	351.008	47	964
	23367.232674	42484.53516	0.0007059	15.0137	348.9390	220.9825	4.4842
D . 213	**90100B**	**Gstar 4**					
	25-DEC-13	-4.07	320.009	305.292	334.726	52	1152
	23369.521146	42484.90855	0.0004684	9.9534	48.4092	211.7023	277.9349
D . 214	**73058A**	**Intelsat IV F-7**					
	31-DEC-13	-4.06	319.247	293.753	344.741	52	1023
	23375.187650	42482.80859	0.0006375	14.9442	344.1839	98.5678	3.8371
D . 215	**95043A**	**JC-Sat 3**					
	26-DEC-13	-4.05	318.364	251.570	385.158	53	895
	23370.535706	42483.60643	0.0014441	7.7317	49.7045	325.5259	93.2430
D . 216	**94040B**	**BS-3N**					
	26-DEC-13	-4.04	317.608	301.186	334.030	52	917
	23370.438519	42481.61031	0.0003048	7.5804	54.8601	275.2123	318.3332
D . 217	**07003A**	**Beidou 4**					
	27-DEC-13	-4.04	317.571	68.187	566.955	50	350
	23371.571771	42482.20044	0.0060972	0.4275	233.8028	17.0638	273.6731
D . 218	**98075A**	**PAS 6B**					
	24-DEC-13	-4.03	316.989	237.462	396.515	52	750
	23368.803600	42482.32870	0.0017241	5.0421	61.8805	52.8103	87.2184
D . 219	**98002A**	**Skynet 4D**					
	25-DEC-13	-4.03	316.866	290.575	343.157	50	770
	23369.474028	42482.14331	0.0005466	8.8723	42.5255	52.8663	261.4640
D . 220	**70003A**	**Intelsat III F-6**					
	24-DEC-13	-4.02	315.980	274.268	357.692	51	605
	23368.638067	42480.27560	0.0008812	9.0175	314.6612	325.5376	120.3003
D . 221	**83047A**	**Intelsat V F-6**					
	25-DEC-13	-3.99	313.855	258.462	369.248	51	1104
	23369.881296	42478.91758	0.0029818	14.9079	14.8961	201.9030	112.2889
D . 222	**68081S**	**Transtage 5 debris**					
	27-DEC-13	-3.99	313.769	-1040.605	1668.142	22	37
	23371.004259	42477.41860	0.0323548	8.4817	326.3689	274.4403	225.5543
D . 223	**91067A**	**Anik E1**					
	27-DEC-13	-3.97	312.196	291.376	333.015	52	1103
	23371.469005	42477.12190	0.0009163	9.3960	50.3341	210.4379	258.1714

D .nn	COSPAR	NAME					
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	MJD	a	e	i	Ω	ω	λ
D . 224	**01011B**	**BSAT-2a**					
	27-DEC-13	-3.95	310.235	287.181	333.289	53	643
	23371.481771	42474.68769	0.0003021	1.4417	75.0842	108.5094	216.1186
D . 225	**98044A**	**ZX 5B (ChinaSat 5B)**					
	26-DEC-13	-3.94	309.669	277.735	341.602	52	797
	23370.747917	42472.93271	0.0005290	1.9062	73.2674	103.1282	174.0303
D . 226	**96035A**	**Intelsat VII F-6**					
	25-DEC-13	-3.94	309.284	280.911	337.658	53	882
	23369.669294	42473.14141	0.0009655	1.4164	75.8610	154.0740	195.3992
D . 227	**95001A**	**Intelsat VII F-4**					
	27-DEC-13	-3.93	309.072	289.341	328.804	51	932
	23371.360833	42473.03578	0.0002750	3.9495	65.1646	36.9296	319.8381
D . 228	**93078B**	**Thaicom 1**					
	26-DEC-13	-3.93	308.585	287.748	329.422	52	953
	23370.495093	42473.77121	0.0004289	4.1263	64.2678	85.9193	252.8704
D . 229	**89027A**	**Tele-X**					
	27-DEC-13	-3.93	308.476	281.791	335.160	51	1068
	23371.512361	42472.95356	0.0002728	13.6058	34.4473	112.5815	203.8295
D . 230	**90100A**	**Satcom C-1**					
	25-DEC-13	-3.92	308.288	283.616	332.960	52	1152
	23369.420729	42471.79708	0.0007126	8.4446	50.2276	283.5524	145.2932
D . 231	**89067A**	**Sirius 1**					
	24-DEC-13	-3.91	307.431	277.244	337.617	50	1075
	23368.261424	42471.08286	0.0006089	12.1100	41.2017	289.5750	339.2331
D . 232	**94040A**	**PAS 2**					
	27-DEC-13	-3.89	305.420	273.900	336.939	52	988
	23371.123762	42469.18839	0.0003887	4.3466	67.1740	309.2630	331.9112
D . 233	**88098A**	**TDF 1**					
	31-DEC-13	-3.88	305.044	279.176	330.912	53	1076
	23375.789514	42469.47182	0.0006155	13.8431	32.3749	133.9560	36.6012
D . 234	**78068A**	**Comstar 3**					
	25-DEC-13	-3.87	304.416	219.203	389.629	51	1056
	23369.757593	42468.34299	0.0020942	15.0900	357.6388	192.0739	129.6575
D . 235	**04043A**	**Ekspress AM-1**					
	25-DEC-13	-3.87	304.207	280.681	327.733	52	470
	23369.479468	42469.49094	0.0004914	3.0165	68.4313	158.0136	252.7695
D . 236	**03028A**	**BSAT-2c**					
	25-DEC-13	-3.86	303.663	282.801	324.524	52	521
	23369.540058	42468.71916	0.0006516	0.4672	74.4505	201.4980	241.6629
D . 237	**92054A**	**Optus B1**					
	27-DEC-13	-3.84	302.031	259.341	344.721	51	1052
	23371.539201	42466.37891	0.0008343	6.5670	57.3857	13.7792	209.5452

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D . 238	**76017A**	**Marisat 1**					
	27-DEC-13	-3.84	301.739	256.639	346.838	51	1100
	23371.543519	42466.06842	0.0011723	13.9150	340.2251	93.0250	208.0311
D . 239	**97062A**	**Apstar 2R**					
	27-DEC-13	-3.83	300.827	267.855	333.800	52	837
	23371.340289	42466.06699	0.0011155	1.3957	76.1144	192.6109	263.1665
D . 240	**90074A**	**Thor I**					
	24-DEC-13	-3.83	300.777	287.013	314.541	51	1050
	23368.733519	42464.19249	0.0002463	10.7793	46.2242	132.6528	170.2558
D . 241	**82058A**	**Westar V**					
	26-DEC-13	-3.81	299.247	232.250	366.244	52	1022
	23370.578866	42464.17480	0.0016676	14.8469	18.9132	149.0818	45.8501
D . 242	**94013A**	**Galaxy IR-A**					
	27-DEC-13	-3.79	297.357	284.918	309.797	52	1001
	23371.555324	42462.51563	0.0001188	6.8483	55.2643	182.5529	241.5191
D . 243	**88086A**	**Sakura 3B**					
	31-DEC-13	-3.78	296.644	275.518	317.769	52	1045
	23375.673160	42459.95514	0.0003912	13.3682	35.6081	217.1421	152.3959
D . 244	**82017A**	**Intelsat V F-4**					
	25-DEC-13	-3.76	295.274	164.834	425.715	51	1103
	23369.221030	42459.78826	0.0034719	14.9577	8.6876	114.6229	23.8979
D . 245	**96040A**	**Arabsat 2A**					
	25-DEC-13	-3.76	295.238	254.970	335.507	53	873
	23369.527245	42460.42442	0.0005612	10.1238	47.4197	308.0979	237.8502
D . 246	**80074A**	**GOES 4**					
	26-DEC-13	-3.76	295.056	146.856	443.257	51	970
	23370.779120	42460.51343	0.0030823	15.0642	348.5346	342.1319	84.7367
D . 247	**06022A**	**KAZSAT**					
	27-DEC-13	-3.74	294.072	276.716	311.429	53	389
	23371.339653	42459.19692	0.0003913	3.8999	65.9538	69.0418	238.3721
D . 248	**04015A**	**Ekspress AM-11**					
	31-DEC-13	-3.73	293.153	271.594	314.711	53	488
	23375.187824	42456.78382	0.0006186	6.7453	56.7517	175.2054	11.0019
D . 249	**92043A**	**Gorizont 26**					
	26-DEC-13	-3.71	291.421	163.971	418.872	50	1081
	23370.779120	42456.86568	0.0032915	14.1232	25.9508	147.2980	86.3039
D . 250	**90030A**	**AsiaSat 1**					
	24-DEC-13	-3.71	291.265	277.807	304.723	51	1095
	23368.540602	42455.23060	0.0001512	12.4170	40.3944	211.5020	196.5557
D . 251	**94049A**	**Brazilsat B1**					
	25-DEC-13	-3.69	289.682	264.251	315.113	51	957
	23369.652326	42453.59426	0.0004361	5.9697	59.2025	75.6450	124.7251

D .nn	COSPAR	NAME					
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D . 252	**77065A**	**Himawari**					
	26-DEC-13	-3.69	289.550	219.848	359.253	51	991
	23370.779421	42453.39722	0.0019446	14.6279	341.0412	120.4260	324.1499
D . 253	**93015A**	**USA 98 (UFO F1)**					
	25-DEC-13	-3.68	288.898	260.287	317.509	53	934
	23369.862326	42452.23951	0.0007899	17.2338	157.6057	123.0412	347.0162
D . 254	**00082A**	**Beidou 1B**					
	27-DEC-13	-3.68	288.623	-46.687	623.934	52	668
	23371.479618	42452.16823	0.0081034	5.7925	59.2352	336.0901	152.2576
D . 255	**75042A**	**Intelsat IV F-1**					
	25-DEC-13	-3.65	286.343	234.455	338.232	52	1053
	23369.068183	42451.62761	0.0013922	14.9990	350.5714	142.7667	57.5554
D . 256	**96007A**	**N-Star 2**					
	27-DEC-13	-3.65	286.292	262.128	310.456	51	871
	23371.103877	42450.36083	0.0007226	6.1657	58.6474	184.8887	20.3917
D . 257	**98056A**	**Eutelsat W2**					
	25-DEC-13	-3.64	285.934	266.821	305.048	51	759
	23369.195926	42449.72534	0.0004142	3.3989	67.9231	72.2297	15.1084
D . 258	**04036A**	**GSAT 3 (EDUSAT)**					
	27-DEC-13	-3.62	284.560	268.509	300.610	52	472
	23371.540509	42449.48757	0.0002328	2.7383	70.4610	31.0543	106.2524
D . 259	**02029D**	**Proton-K/DM-2M fourth stage (Blok DM-2M)**					
	24-DEC-13	-3.62	284.227	228.465	339.989	52	577
	23368.263507	42447.39026	0.0009918	9.8821	48.2349	270.6113	340.3845
D . 260	**92013A**	**Galaxy V**					
	26-DEC-13	-3.55	278.456	215.556	341.355	52	1105
	23370.467303	42442.83479	0.0014493	7.9216	53.8286	340.4151	210.1333
D . 261	**86016A**	**Yuri 2B**					
	27-DEC-13	-3.54	277.695	200.591	354.799	53	1072
	23371.305231	42442.19530	0.0015346	14.9461	13.7592	104.0971	303.1669
D . 262	**91083A**	**Eutelsat II F-3**					
	27-DEC-13	-3.52	276.062	262.418	289.705	51	1033
	23371.110382	42439.57093	0.0000937	11.8465	42.3930	169.2555	357.7363
D . 263	**95064A**	**AsiaSat 2**					
	27-DEC-13	-3.49	273.631	245.502	301.760	51	905
	23371.156076	42437.79706	0.0010825	2.6531	70.2388	213.3967	22.8139
D . 264	**95016B**	**Hot Bird 1**					
	27-DEC-13	-3.45	270.761	255.527	285.994	51	728
	23371.523935	42435.61575	0.0003436	6.9029	56.8339	36.5755	288.6121
D . 265	**92060A**	**Hispasat 1A**					
	27-DEC-13	-3.44	270.229	249.366	291.092	51	980
	23371.229653	42433.88046	0.0004923	9.8535	48.5416	185.7127	184.1992

D .nn	COSPAR	NAME					
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D . 266	**91055A**	**Intelsat VI F-5**					
	26-DEC-13	-3.41	267.986	257.134	278.838	52	1105
	23370.556979	42431.23516	0.0001048	8.1243	53.4797	126.3742	150.9205
D . 267	**68081Q**	**Transtage 5 debris**					
	27-DEC-13	-3.39	266.505	-857.014	1390.025	49	73
	23371.024190	42431.29639	0.0270419	8.4824	326.1009	306.2138	219.3109
D . 268	**87070A**	**Kiku-5**					
	27-DEC-13	-3.38	265.448	230.533	300.363	52	1128
	23371.548067	42429.46843	0.0005564	14.8743	16.9741	298.1607	200.0905
D . 269	**90079B**	**Eutelsat II F-1**					
	27-DEC-13	-3.34	261.862	241.776	281.949	52	996
	23371.295914	42425.48827	0.0004010	12.5825	39.4877	155.1853	9.2110
D . 270	**06053C**	**Fengyun 2D AKM (FG-36 AKM)**					
	26-DEC-13	-3.30	259.238	-174.361	692.837	53	356
	23370.428727	42424.66981	0.0100061	3.5580	69.2872	295.7076	253.8747
D . 271	**81057F**	**Mage 1 (Meteosat 2 AKM)**					
	27-DEC-13	-3.24	254.391	-60.021	568.802	51	827
	23371.202650	42418.85173	0.0075242	15.0758	345.8535	86.4420	4.2207
D . 272	**78071A**	**ESA GEOS 2**					
	25-DEC-13	-3.22	253.025	231.116	274.934	51	994
	23369.767523	42418.31160	0.0003336	14.1476	336.9664	201.4834	97.7815
D . 273	**82106D**	**IUS second stage**					
	27-DEC-13	-3.21	251.747	60.473	443.021	50	1018
	23371.477870	42414.97933	0.0042050	15.4770	355.0882	304.6272	172.1771
D . 274	**97002B**	**Nahuel 1A**					
	26-DEC-13	-3.19	250.653	225.471	275.835	52	853
	23370.755104	42414.15113	0.0004906	5.5291	60.3609	87.3848	192.5409
D . 275	**88051C**	**PAS 1**					
	25-DEC-13	-3.17	248.983	230.291	267.676	51	1112
	23369.221620	42413.40632	0.0002961	11.1223	44.6319	229.9358	303.2207
D . 276	**12002C**	**Fengyun 2F AKM (FG-36 AKM)**					
	25-DEC-13	-3.17	248.784	15.421	482.148	52	98
	23369.152292	42412.48148	0.0055504	0.9348	282.6264	259.8389	16.9399
D . 277	**07058A**	**Cosmos-2434 (Raduga-1M1)**					
	31-DEC-13	-3.15	247.422	238.120	256.724	53	317
	23375.685775	42411.26711	0.0001390	0.5130	74.7792	286.2448	200.9739
D . 278	**77048A**	**GOES 2**					
	26-DEC-13	-3.15	247.381	183.834	310.929	51	1163
	23370.978426	42412.91217	0.0012776	14.4676	341.3090	282.9288	89.0807
D . 279	**89052A**	**Gorizont 18**					
	24-DEC-13	-3.14	246.592	101.862	391.321	51	1100
	23368.187558	42411.31262	0.0034260	14.6921	15.5688	227.1073	38.9798

D .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$	$\overline{\Delta a}$	$\overline{\Delta r_p}$	$\overline{\Delta r_a}$	N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
D . 280	**85016F**	**Proton-K/DM fourth stage (Blok-DM)**					
	23-DEC-13	-3.13	245.528	137.846	353.210	51	1082
	23367.322581	42409.20353	0.0028300	15.0327	358.7560	126.3654	337.3294
D . 281	**97071A**	**Sirius 2**					
	27-DEC-13	-3.13	245.223	227.255	263.192	52	807
	23371.058472	42410.38305	0.0001275	4.3137	64.4833	316.9645	42.9822
D . 282	**95011B**	**Himawari-5**					
	26-DEC-13	-3.12	245.097	212.042	278.152	52	874
	23370.402951	42409.94190	0.0008153	10.9708	43.4835	34.2192	220.7488
D . 283	**83006A**	**Sakura 2A**					
	25-DEC-13	-3.12	244.915	204.987	284.843	51	1018
	23369.504248	42408.23882	0.0009722	15.0347	2.4006	197.4731	147.7269
D . 284	**96063A**	**Arabsat 2B**					
	27-DEC-13	-3.10	243.106	227.042	259.170	53	824
	23371.835706	42406.93887	0.0002711	1.1628	77.9843	180.0861	134.0506
D . 285	**83094A**	**RCA Satcom IIR**					
	25-DEC-13	-3.10	242.841	173.488	312.194	53	1153
	23369.531539	42408.19701	0.0014219	14.2689	28.2979	311.2000	283.3408
D . 286	**84031F**	**Proton-K/DM fourth stage (Blok-DM)**					
	27-DEC-13	-3.06	239.734	173.206	306.262	52	1057
	23371.547014	42405.57675	0.0017761	14.9895	355.6030	125.0128	65.0395
D . 287	**94038D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	31-DEC-13	-3.03	238.018	132.594	343.442	52	896
	23375.620451	42402.56937	0.0025751	12.7989	34.1990	28.9831	40.4832
D . 288	**00031D**	**Proton-K/DM-2M fourth stage (Blok DM-2M)**					
	27-DEC-13	-3.00	235.581	177.582	293.581	51	674
	23371.165394	42400.95004	0.0012883	11.3895	43.6367	357.7035	60.2826
D . 289	**77041A**	**Intelsat IVA F-4**					
	26-DEC-13	-2.99	234.581	181.255	287.907	52	1064
	23370.142442	42398.55658	0.0014467	15.0016	354.5225	139.6862	21.2949
D . 290	**04011A**	**Superbird A2 (Superbird 6)**					
	26-DEC-13	-2.92	229.019	171.527	286.511	51	489
	23370.473484	42394.19834	0.0027337	8.0214	53.2352	283.6380	225.6343
D . 291	**85048B**	**Morelos 1**					
	27-DEC-13	-2.90	227.176	210.012	244.340	52	1085
	23371.528264	42390.68328	0.0003989	14.4883	25.2527	41.2024	188.9414
D . 292	**94002D**	**Proton-K/DM-2M fourth stage (Blok DM-2M)**					
	26-DEC-13	-2.90	227.119	58.335	395.903	50	918
	23370.530602	42392.09450	0.0043348	14.2895	26.0457	26.5844	283.5892
D . 293	**81119A**	**Intelsat V F-3**					
	26-DEC-13	-2.89	226.615	126.928	326.302	50	1119
	23370.032512	42391.91493	0.0022590	14.9023	8.4390	114.5929	287.6992

D .nn	COSPAR	NAME					
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	MJD	a	e	i	Ω	ω	λ
D . 294	**78062D**	**Aerojet SVM-5 (GOES 3 AKM)**					
	25-DEC-13	-2.87	224.762	-251.794	701.319	50	910
	23369.087975	42388.63897	0.0110852	14.9893	338.2122	317.9866	326.2910
D . 295	**69069A**	**ATS 5**					
	23-DEC-13	-2.81	220.609	200.596	240.621	50	952
	23367.074873	42383.79793	0.0005115	9.8885	317.3671	203.8427	342.7752
D . 296	**68081W**	**Transtage 5 debris**					
	27-DEC-13	-2.81	220.458	-670.717	1111.634	23	41
	23371.067593	42383.66218	0.0215900	8.0550	324.9439	255.7884	202.5665
D . 297	**75011A**	**SMS 2**					
	23-DEC-13	-2.75	215.326	158.832	271.820	51	940
	23367.804896	42379.10419	0.0014427	14.1994	335.8125	136.2082	130.1077
D . 298	**83077A**	**Arabsat 1D-R**					
	30-DEC-13	-2.70	211.264	102.592	319.937	53	1127
	23374.790185	42374.43220	0.0026469	14.5284	24.1801	49.3154	345.7312
D . 299	**90034A**	**Palapa B-2R**					
	31-DEC-13	-2.68	210.123	164.582	255.664	52	1079
	23375.290000	42373.19444	0.0010386	11.5672	43.7593	23.4032	342.7106
D . 300	**92021A**	**Telecom 2B**					
	26-DEC-13	-2.67	209.553	170.370	248.737	51	1044
	23370.452211	42373.88497	0.0011248	11.2660	43.8967	358.0516	132.5174
D . 301	**89020A**	**JC-Sat 1**					
	27-DEC-13	-2.66	208.381	189.425	227.338	50	1087
	23371.331319	42372.44320	0.0003042	13.3831	35.5005	42.9163	311.2913
D . 302	**96033A**	**Galaxy IX**					
	26-DEC-13	-2.64	206.808	162.524	251.093	52	882
	23370.658576	42372.32429	0.0009484	4.5929	63.1307	53.9538	89.1414
D . 303	**90063B**	**DFS-Kopernikus 2**					
	27-DEC-13	-2.61	204.490	189.511	219.469	53	1062
	23371.471956	42370.12782	0.0001740	11.2978	43.9384	166.1595	239.5375
D . 304	**85015B**	**Brazilsat 1**					
	27-DEC-13	-2.61	204.272	187.452	221.092	49	1174
	23371.232940	42367.21723	0.0002863	14.2769	27.1943	217.9842	156.9354
D . 305	**81076A**	**Himawari-2**					
	27-DEC-13	-2.60	203.353	159.154	247.552	49	988
	23371.379144	42368.96188	0.0010717	14.9131	349.3592	185.2277	244.9743
D . 306	**86003B**	**Satcom Ku-1**					
	27-DEC-13	-2.59	202.959	185.384	220.534	52	1155
	23371.228507	42366.07617	0.0001544	13.6286	33.4695	101.5733	184.8962
D . 307	**00019D**	**Proton-K/DM-2M fourth stage (Blok DM-2M)**					
	25-DEC-13	-2.58	201.944	144.490	259.399	53	679
	23369.807049	42365.43390	0.0013788	11.7245	42.8818	197.5973	193.5019

D .nn	COSPAR	NAME					
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	MJD	a	e	i	Ω	ω	λ
D . 308	**85109B**	**Morelos 2**					
	25-DEC-13	-2.55	200.081	175.443	224.719	52	1212
	23369.281944	42363.40369	0.0005439	12.6818	38.3807	31.1747	4.8290
D . 309	**91028A**	**Spacenet 4**					
	25-DEC-13	-2.53	198.564	186.690	210.438	51	1120
	23369.550787	42364.01696	0.0002299	8.8828	50.8611	221.5771	235.2432
D . 310	**01014A**	**Ekran 21 (Ekran-M)**					
	25-DEC-13	-2.47	193.375	64.984	321.766	51	652
	23369.813530	42356.09730	0.0028574	9.6246	53.8974	314.0974	169.5508
D . 311	**82004A**	**RCA Satcom IV**					
	26-DEC-13	-2.46	192.972	173.069	212.876	51	1064
	23370.323866	42358.29904	0.0005673	14.7905	17.5028	80.5850	271.4834
D . 312	**91075A**	**Intelsat VI F-1**					
	26-DEC-13	-2.46	192.643	182.722	202.564	52	1061
	23370.071285	42358.35122	0.0002081	8.0890	52.4263	220.7134	255.0023
D . 313	**94065B**	**Thaicom 2**					
	26-DEC-13	-2.46	192.493	175.966	209.020	51	896
	23370.732025	42357.19289	0.0003289	3.2311	67.2397	79.3695	110.2591
D . 314	**96006A**	**Palapa C1**					
	27-DEC-13	-2.45	191.880	155.519	228.241	51	902
	23371.093449	42357.89979	0.0005441	1.7517	75.0609	65.6176	86.8689
D . 315	**75117A**	**RCA Satcom I**					
	31-DEC-13	-2.43	190.015	95.109	284.921	53	1010
	23375.278854	42352.43934	0.0020748	14.8723	349.5799	148.8906	333.7866
D . 316	**85109D**	**Satcom Ku-2**					
	26-DEC-13	-2.40	188.118	154.055	222.180	53	1198
	23370.155810	42351.35965	0.0009229	13.4121	34.6914	159.3131	10.6893
D . 317	**71116A**	**Intelsat IV F-3**					
	30-DEC-13	-2.35	183.734	130.494	236.975	53	1042
	23374.226806	42346.60065	0.0009447	14.5678	340.5051	356.9425	347.9386
D . 318	**97070D**	**Proton-K/DM-2M fourth stage (Blok DM-2M)**					
	25-DEC-13	-2.30	180.292	114.455	246.129	51	772
	23369.552164	42345.64544	0.0016770	13.0935	36.3444	38.6981	247.3278
D . 319	**86026B**	**Brazilsat 2**					
	26-DEC-13	-2.28	178.214	163.342	193.086	51	1202
	23370.793704	42344.44605	0.0001922	13.6224	32.6543	224.0014	79.8693
D . 320	**00002A**	**Galaxy 10R**					
	27-DEC-13	-2.28	178.153	160.763	195.544	51	717
	23371.298553	42341.55375	0.0002440	4.8568	62.3973	41.6439	325.4190
D . 321	**93069A**	**Gorizont 28**					
	25-DEC-13	-2.24	175.015	29.109	320.920	51	1041
	23369.923623	42340.96991	0.0033936	13.7254	29.7202	48.7851	91.1323

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D . 322	**99016A**	**Insat 2E**					
	27-DEC-13	-2.22	174.200	150.490	197.910	53	741
	23371.058275	42338.59482	0.0006081	2.8858	69.4302	144.5399	34.4384
D . 323	**00016B**	**Insat 3B**					
	27-DEC-13	-2.22	173.349	155.084	191.614	51	698
	23371.340544	42335.49679	0.0002855	1.8009	74.1506	142.1896	165.4503
D . 324	**88018A**	**Spacenet 3R**					
	24-DEC-13	-2.20	172.242	156.773	187.711	52	1112
	23368.771898	42337.56840	0.0002708	12.0864	40.9648	117.8373	104.7182
D . 325	**85028B**	**Anik C1**					
	22-DEC-13	-2.20	171.843	107.706	235.979	52	1141
	23366.923796	42337.91620	0.0015321	13.4850	34.7395	26.7138	63.1718
D . 326	**95041A**	**Mugunghwa 1 (Koreasat 1)**					
	25-DEC-13	-2.18	170.436	152.552	188.319	51	866
	23369.421053	42333.06272	0.0002580	12.2938	40.0812	46.8565	158.5199
D . 327	**88109A**	**Skynet 4B**					
	26-DEC-13	-2.12	166.047	148.765	183.330	52	1097
	23370.474398	42332.95060	0.0004197	14.8089	19.2641	179.6858	252.9991
D . 328	**76010A**	**Intelsat IVA F-2**					
	24-DEC-13	-2.11	165.148	141.926	188.371	52	1032
	23368.072095	42330.36515	0.0006718	14.8486	349.2238	157.8348	44.8688
D . 329	**83105A**	**Intelsat V F-7**					
	22-DEC-13	-2.08	162.758	134.369	191.148	51	1099
	23366.769549	42325.27441	0.0003721	14.8277	12.8855	343.9861	161.0022
D . 330	**92072A**	**Galaxy VII**					
	25-DEC-13	-2.07	161.947	129.320	194.575	51	1034
	23369.873854	42325.18979	0.0008478	11.3010	43.6828	268.2619	133.7085
D . 331	**97078A**	**Galaxy VIII-i**					
	26-DEC-13	-2.06	161.492	132.669	190.315	51	810
	23370.192211	42327.50187	0.0006152	9.7823	48.3174	291.2670	252.8262
D . 332	**91074D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	31-DEC-13	-2.04	159.838	145.989	173.688	51	938
	23375.900625	42322.98415	0.0003373	14.3540	23.1357	85.8106	134.5315
D . 333	**93048A**	**Hispasat 1B**					
	25-DEC-13	-1.98	154.657	126.593	182.722	50	935
	23369.497697	42319.35454	0.0009335	8.9832	50.2321	207.3896	298.7828
D . 334	**92066A**	**DFS-Kopernikus 3**					
	27-DEC-13	-1.95	152.787	134.672	170.902	51	990
	23371.339433	42318.35589	0.0002380	10.4267	46.3299	123.9326	230.6758
D . 335	**89041A**	**Superbird A**					
	25-DEC-13	-1.89	148.226	121.980	174.471	51	1021
	23369.673333	42311.47894	0.0005591	14.8062	14.1492	266.0095	185.0220

D .nn	COSPAR	NAME					
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D . 336	**84080E**	**Star 27 (Himawari-3 AKM)**					
	23-DEC-13	-1.89	148.054	-433.061	729.170	49	639
	23367.646563	42311.79311	0.0133511	14.8941	358.7616	345.4528	181.8574
D . 337	**84114A**	**Spacenet 2**					
	27-DEC-13	-1.86	145.498	105.493	185.503	51	1134
	23371.301933	42308.36806	0.0007442	13.4260	34.4741	327.1895	5.6350
D . 338	**90091B**	**Galaxy VI**					
	25-DEC-13	-1.84	143.961	127.263	160.660	52	1091
	23369.808461	42306.70597	0.0003849	9.7397	48.4481	103.2465	141.1396
D . 339	**85076B**	**Optus A1**					
	27-DEC-13	-1.84	143.782	125.289	162.275	51	993
	23371.447164	42309.01326	0.0001405	14.6315	21.1474	254.2088	221.8509
D . 340	**82014A**	**Westar IV**					
	27-DEC-13	-1.81	141.386	124.274	158.499	50	1078
	23371.033970	42307.97139	0.0003409	14.7483	16.9740	155.8163	84.1860
D . 341	**03021A**	**Beidou 3**					
	27-DEC-13	-1.79	140.261	124.749	155.773	52	544
	23371.832280	42303.12706	0.0003277	2.7578	72.5843	110.3023	139.9596
D . 342	**84093D**	**Telstar 3C**					
	24-DEC-13	-1.78	138.967	118.894	159.040	51	1152
	23368.463391	42301.30213	0.0004073	14.1769	27.9559	50.6334	152.3524
D . 343	**95067B**	**Insat-IIC**					
	26-DEC-13	-1.77	138.312	119.127	157.497	51	862
	23370.556586	42301.35187	0.0003011	10.2482	47.8463	253.2345	136.3150
D . 344	**74093A**	**Intelsat IV F-8**					
	27-DEC-13	-1.75	136.981	113.869	160.093	51	1037
	23371.398438	42302.90547	0.0004904	14.8311	349.7440	83.8244	274.2692
D . 345	**88081B**	**SBS V**					
	25-DEC-13	-1.73	135.641	112.140	159.141	50	1150
	23369.421400	42297.82411	0.0005552	11.7818	41.9937	202.7995	171.9369
D . 346	**86026A**	**Gstar 2**					
	23-DEC-13	-1.72	134.679	116.130	153.229	51	1138
	23367.618657	42300.92344	0.0003199	14.1407	28.5310	341.2280	66.1429
D . 347	**73023A**	**Anik A2**					
	27-DEC-13	-1.71	133.772	77.490	190.054	50	979
	23371.216586	42299.26604	0.0009586	14.6628	343.8186	304.5770	227.2027
D . 348	**92059D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	26-DEC-13	-1.71	133.604	84.975	182.233	53	943
	23370.617025	42300.75190	0.0010326	14.2633	25.7732	202.4667	64.4426
D . 349	**78116A**	**Anik B1**					
	27-DEC-13	-1.65	128.827	91.418	166.237	51	1054
	23371.547616	42293.87447	0.0022353	14.8849	358.7238	205.4393	212.4797

D .nn	COSPAR	NAME					
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D . 350	**80091A**	**SBS I**					
	26-DEC-13	-1.62	126.921	96.566	157.276	50	1107
	23370.644722	42291.37859	0.0007435	15.0649	0.8008	66.6539	29.5085
D . 351	**76042A**	**Comstar 1A**					
	25-DEC-13	-1.62	126.826	109.544	144.108	48	1035
	23369.218356	42289.40977	0.0003041	14.8186	349.8446	196.4441	334.2883
D . 352	**94067A**	**Ekspress 1**					
	26-DEC-13	-1.61	125.956	107.185	144.728	51	971
	23370.807083	42292.84398	0.0004540	11.5229	42.7394	110.5836	67.4875
D . 353	**72003A**	**Intelsat IV F-4**					
	31-DEC-13	-1.60	124.757	105.047	144.468	54	1055
	23375.683171	42287.96021	0.0002281	14.6043	342.8037	66.3850	195.6936
D . 354	**84080A**	**Himawari-3**					
	27-DEC-13	-1.59	124.019	93.042	154.996	52	996
	23371.471620	42289.18215	0.0006619	14.8258	5.4192	40.6262	219.9692
D . 355	**00020A**	**Galaxy IVR**					
	26-DEC-13	-1.58	123.158	107.014	139.303	52	703
	23370.802049	42289.61367	0.0003380	6.4103	57.5140	112.7483	95.5271
D . 356	**84101A**	**Galaxy III**					
	26-DEC-13	-1.57	122.336	92.126	152.546	51	1166
	23370.205509	42285.63235	0.0004701	14.1902	27.7460	279.0097	319.8352
D . 357	**76035A**	**NATO IIIA**					
	26-DEC-13	-1.55	120.861	18.182	223.540	51	1054
	23370.414734	42287.25171	0.0024715	12.9594	339.5561	196.6145	268.2313
D . 358	**89062A**	**TV-Sat 2**					
	24-DEC-13	-1.52	119.192	87.767	150.618	52	1050
	23368.401204	42281.95486	0.0002604	12.7604	37.8655	109.2036	331.8300
D . 359	**03018A**	**GSAT-2**					
	27-DEC-13	-1.52	119.212	104.160	134.263	53	544
	23371.230185	42282.37293	0.0003139	2.5623	70.6723	218.9280	16.1286
D . 360	**92017A**	**Gorizont 25**					
	25-DEC-13	-1.52	119.068	4.323	233.813	52	1125
	23369.744861	42281.18931	0.0025762	14.1791	24.4711	355.5039	146.2003
D . 361	**74075A**	**Westar II**					
	27-DEC-13	-1.51	117.962	97.605	138.320	50	948
	23371.539201	42282.31901	0.0004751	14.6443	346.1397	112.6794	209.4347
D . 362	**83030A**	**RCA Satcom IR**					
	26-DEC-13	-1.49	116.746	73.914	159.577	52	1073
	23370.105405	42280.34391	0.0007825	14.6064	20.8515	18.6624	326.2386
D . 363	**99047A**	**Yamal-100 No. 1**					
	24-DEC-13	-1.47	114.740	-266.483	495.963	49	693
	23368.183194	42277.71739	0.0084132	12.0351	40.8916	300.0177	12.1874

D .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$	$\overline{\Delta a}$	$\overline{\Delta r_p}$	$\overline{\Delta r_a}$	N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
D . 364	**84022F**	**Proton-K/DM fourth stage (Blok-DM)**					
	26-DEC-13	-1.46	113.753	13.644	213.862	52	1055
	23370.373692	42277.98973	0.0021981	15.9977	353.2946	28.3825	119.0956
D . 365	**87028D**	**Proton-K/DM fourth stage (Blok-DM)**					
	26-DEC-13	-1.45	113.403	-2.702	229.508	50	1060
	23370.292130	42275.41803	0.0024757	15.5747	5.1388	354.9264	346.6514
D . 366	**85048D**	**Telstar 3D**					
	25-DEC-13	-1.43	111.639	98.507	124.772	48	1155
	23369.946667	42278.48673	0.0003011	14.0603	28.9427	110.2369	58.6275
D . 367	**95063A**	**Gals 2**					
	27-DEC-13	-1.39	108.771	82.503	135.038	52	931
	23371.077442	42273.79388	0.0005614	11.3858	43.2553	226.5314	218.2146
D . 368	**96005A**	**Gorizont 31**					
	25-DEC-13	-1.38	107.519	20.974	194.065	52	919
	23369.537361	42273.97559	0.0022040	12.7574	36.0834	113.3647	272.7874
D . 369	**91064B**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	24-DEC-13	-1.36	106.341	88.692	123.991	53	946
	23368.859132	42271.31507	0.0000908	14.4588	22.1782	313.0663	117.2909
D . 370	**74022A**	**Westar I**					
	31-DEC-13	-1.35	105.395	78.384	132.406	51	973
	23375.220301	42267.19026	0.0004076	14.6413	345.1062	256.8198	343.5509
D . 371	**87022A**	**GOES 7**					
	26-DEC-13	-1.34	104.856	90.470	119.241	50	1194
	23370.779120	42272.50675	0.0001575	14.5293	19.6099	322.9281	83.3876
D . 372	**82110C**	**Anik C3**					
	26-DEC-13	-1.32	103.313	86.914	119.711	51	1153
	23370.364560	42267.94982	0.0001114	14.7253	16.2741	46.9087	211.7443
D . 373	**78002A**	**Intelsat IVA F-3**					
	31-DEC-13	-1.31	102.372	85.295	119.448	50	1030
	23375.875069	42269.71558	0.0004536	14.8428	355.9236	144.2125	80.3985
D . 374	**87029A**	**Agila 1**					
	30-DEC-13	-1.30	101.786	81.484	122.087	52	1145
	23374.636435	42263.64959	0.0002086	13.8635	30.8363	312.6646	143.1812
D . 375	**75091A**	**Intelsat IVA F-1**					
	27-DEC-13	-1.24	96.754	72.588	120.920	51	1046
	23371.237234	42260.11079	0.0007090	14.7523	349.5541	122.8090	198.7999
D . 376	**82110B**	**SBS III**					
	26-DEC-13	-1.22	95.379	58.953	131.805	51	1176
	23370.254537	42259.69975	0.0006245	14.7126	16.4838	356.2941	316.4658
D . 377	**92027A**	**Palapa B4**					
	24-DEC-13	-1.20	93.734	75.938	111.530	50	1008
	23368.753796	42261.51229	0.0001881	7.8964	52.7819	274.1913	82.5147

D .nn	COSPAR	NAME					
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	MJD	a	e	i	Ω	ω	λ
D . 378	**82009A**	**Ekran 8**					
	27-DEC-13	-1.20	93.427	-22.390	209.243	53	1087
	23371.224063	42255.66768	0.0027983	14.7131	344.4609	211.5108	356.2365
D . 379	**85109C**	**Optus A2**					
	27-DEC-13	-1.18	92.508	77.850	107.166	51	1173
	23371.093252	42260.32054	0.0003124	14.4502	22.4530	181.1016	68.1706
D . 380	**79072A**	**Westar III**					
	26-DEC-13	-1.17	91.706	74.738	108.674	50	998
	23370.710208	42254.62092	0.0002413	14.8452	3.3107	180.7174	130.9367
D . 381	**74101A**	**Symphonie A**					
	23-DEC-13	-1.13	88.523	70.039	107.007	49	955
	23367.911308	42254.61895	0.0003900	13.6099	332.3664	182.4173	117.9454
D . 382	**91003A**	**Italsat 1**					
	27-DEC-13	-1.11	86.499	25.309	147.689	50	1008
	23371.450949	42252.05644	0.0012264	13.4062	34.0666	291.9722	217.0666
D . 383	**80081F**	**Proton-K/DM fourth stage (Blok-DM)**					
	26-DEC-13	-1.10	86.385	62.985	109.785	52	1053
	23370.164711	42253.13714	0.0002286	14.3637	340.1776	261.6675	47.9820
D . 384	**75077A**	**Symphonie B**					
	26-DEC-13	-1.09	84.988	62.573	107.404	52	990
	23370.057581	42246.09312	0.0003795	13.2113	330.5555	250.7604	352.3998
D . 385	**93048B**	**Insat-IIB**					
	26-DEC-13	-1.09	84.949	19.656	150.242	49	941
	23370.452211	42247.20894	0.0015326	11.3526	43.3016	97.1689	132.4090
D . 386	**88071A**	**Gorizont 16**					
	26-DEC-13	-1.07	83.820	22.838	144.803	53	1085
	23370.616840	42251.10880	0.0011627	14.6502	11.3195	329.6688	56.5312
D . 387	**76073A**	**Comstar 2**					
	26-DEC-13	-1.06	82.941	67.283	98.600	50	1146
	23370.802396	42249.17707	0.0002516	14.7117	350.0863	107.2820	104.9690
D . 388	**84049A**	**Chinasat 5 (Spacenet 1)**					
	27-DEC-13	-1.04	80.926	62.134	99.717	51	1173
	23371.118137	42245.19343	0.0002592	13.8121	31.0513	159.2140	207.1084
D . 389	**93073E**	**Mage 1 (Meteosat 6 AKM)**					
	27-DEC-13	-1.03	80.664	-202.394	363.722	48	728
	23371.167604	42241.50163	0.0065195	13.9101	29.7356	346.3714	355.0036
D . 390	**99047B**	**Yamal-100 No. 2**					
	26-DEC-13	-1.03	80.398	69.325	91.470	53	738
	23370.192211	42248.04873	0.0002362	9.0102	50.1849	231.5801	253.0529
D . 391	**97041D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	25-DEC-13	-0.97	75.686	-1389.883	1541.255	51	792
	23369.207836	42236.93362	0.0357635	12.1761	39.6521	179.7818	1.5400

D .nn	COSPAR	NAME					
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	MJD	a	e	i	Ω	ω	λ
D . 392	**09010B**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	26-DEC-13	-0.95	74.716	64.906	84.526	51	245
	23370.560139	42239.95535	0.0001174	3.1865	85.0840	103.5561	216.9340
D . 393	**77014A**	**Kiku-2**					
	27-DEC-13	-0.95	74.179	56.587	91.771	50	908
	23371.018403	42242.84385	0.0002126	13.9576	335.8016	189.9346	81.9837
D . 394	**90016D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	26-DEC-13	-0.89	69.188	-100.475	238.850	52	980
	23370.297396	42230.78595	0.0042411	14.5444	17.0300	116.4243	336.3130
D . 395	**90112D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	27-DEC-13	-0.88	69.104	-43.813	182.020	53	1007
	23371.458889	42237.32102	0.0028530	14.4202	19.9923	60.3571	263.4547
D . 396	**81057B**	**APPLE**					
	26-DEC-13	-0.85	66.589	-34.051	167.229	50	997
	23370.444549	42234.95115	0.0026919	14.6437	344.6689	101.4455	92.4632
D . 397	**77092J**	**Ekran 2 fragmentation debris**					
	25-DEC-13	-0.83	65.171	-0.035	130.377	52	487
	23369.821250	42231.74849	0.0011683	13.4286	331.2463	145.8474	107.0677
D . 398	**03053E**	**Proton-K/DM-2M fourth stage (Blok DM-2M)**					
	27-DEC-13	-0.83	64.905	-848.534	978.344	50	497
	23371.400764	42231.49687	0.0226914	8.8761	50.9131	184.8814	285.3794
D . 399	**77018A**	**Palapa 2**					
	24-DEC-13	-0.83	64.943	41.656	88.230	49	972
	23368.790856	42225.01835	0.0002639	14.8063	354.2504	21.0958	176.4354
D . 400	**87084D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	27-DEC-13	-0.81	63.738	-57.205	184.680	51	1067
	23371.448866	42231.64182	0.0031297	14.6398	8.1400	121.1864	235.7902
D . 401	**83028F**	**Proton-K/DM fourth stage (Blok-DM)**					
	27-DEC-13	-0.81	63.512	-42.116	169.140	49	1057
	23371.058368	42229.29384	0.0028079	14.8336	351.4287	98.3346	37.6877
D . 402	**98025D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	25-DEC-13	-0.81	63.181	-71.720	198.082	50	764
	23369.813704	42222.95345	0.0033053	10.7839	42.9906	13.4798	178.5687
D . 403	**75038A**	**Anik A3**					
	25-DEC-13	-0.80	62.943	44.137	81.749	51	995
	23369.067639	42227.96198	0.0001049	14.7253	348.6564	145.9378	33.5989
D . 404	**92088D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	31-DEC-13	-0.75	58.616	15.258	101.975	52	952
	23375.887477	42222.85949	0.0010750	13.3375	29.5301	42.0760	121.5089
D . 405	**94060D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	24-DEC-13	-0.71	55.595	20.677	90.512	52	863
	23368.340382	42214.57011	0.0009467	13.4178	32.3388	32.1131	160.2664

D .nn	COSPAR	NAME					
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	MJD	a	e	i	Ω	ω	λ
D . 406	**94087D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	25-DEC-13	-0.70	54.727	8.815	100.640	50	874
	23369.452801	42218.20118	0.0010880	13.3143	33.2480	20.7191	311.4913
D . 407	**00032A**	**Fengyun 2B**					
	26-DEC-13	-0.67	52.057	38.463	65.651	49	687
	23370.460394	42215.78703	0.0001331	7.9769	52.8176	183.3213	123.5475
D . 408	**76066A**	**Palapa 1**					
	25-DEC-13	-0.65	50.948	31.333	70.563	50	950
	23369.824722	42212.48680	0.0005505	14.6810	350.1069	117.7146	133.7573
D . 409	**85055A**	**Intelsat VA F-11**					
	26-DEC-13	-0.63	49.041	-5.345	103.427	51	1136
	23370.532025	42209.17119	0.0011616	14.5272	21.3180	334.5449	140.7543
D . 410	**88034D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	26-DEC-13	-0.61	47.367	-57.260	151.993	50	1060
	23370.801053	42214.75905	0.0026044	14.7464	9.5268	69.6450	111.1171
D . 411	**75097F**	**Proton-K/DM fourth stage (Blok-DM)**					
	25-DEC-13	-0.58	45.594	-50.675	141.864	51	1031
	23369.490926	42214.17114	0.0023678	11.9491	324.3267	92.2027	279.6093
D . 412	**72041A**	**Intelsat IV F-5**					
	24-DEC-13	-0.58	45.479	27.093	63.864	48	1023
	23368.874907	42212.72942	0.0005478	14.1606	338.1324	142.0464	289.6755
D . 413	**81114A**	**RCA Satcom IIIR**					
	25-DEC-13	-0.56	44.103	26.689	61.517	50	1010
	23369.517222	42213.91107	0.0003852	14.7435	14.1788	184.0148	272.0546
D . 414	**04010F**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	27-DEC-13	-0.56	43.829	-80.202	167.859	52	485
	23371.548681	42213.71314	0.0025882	7.5710	60.0947	249.5334	272.9612
D . 415	**82082A**	**Anik D1**					
	23-DEC-13	-0.56	43.675	19.129	68.220	51	1066
	23367.488773	42208.61495	0.0004619	14.6795	15.1293	214.2765	119.4499
D . 416	**93003D**	**IUS second stage**					
	26-DEC-13	-0.55	43.203	-245.787	332.193	51	920
	23370.427454	42205.41896	0.0067784	12.6510	21.2256	8.2612	318.3195
D . 417	**94069D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	27-DEC-13	-0.55	43.204	-54.767	141.175	48	860
	23371.446736	42211.37187	0.0023976	13.7101	32.3904	29.8458	225.6896
D . 418	**91010F**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	25-DEC-13	-0.52	41.127	-27.767	110.020	52	996
	23369.564271	42209.98717	0.0019173	13.9036	23.7205	102.5896	45.5310
D . 419	**83065A**	**Galaxy I**					
	25-DEC-13	-0.52	40.507	26.356	54.659	51	1129
	23369.881296	42207.39179	0.0001502	14.3472	24.4176	144.4599	113.0798

D .nn	COSPAR	NAME					
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D . 420	**77092K**	**Ekran 2 fragmentation debris**					
	31-DEC-13	-0.51	40.316	-30.999	111.630	51	380
	23375.278519	42200.08421	0.0019147	13.2767	330.7640	198.7590	329.4733
D . 421	**04043D**	**Proton-K/DM-2M fourth stage (Blok DM-2M)**					
	25-DEC-13	-0.50	39.636	7.645	71.626	53	464
	23369.548426	42206.17968	0.0008781	8.0111	52.1742	34.5687	215.8825
D . 422	**99047E**	**Proton-K/DM-2M fourth stage (Blok DM-2M)**					
	27-DEC-13	-0.49	38.450	-407.147	484.047	52	693
	23371.165567	42211.12787	0.0098668	11.9926	40.7501	298.7803	64.0603
D . 423	**91015E**	**Mage 1 (Meteosat 5 AKM)**					
	26-DEC-13	-0.49	38.309	-638.202	714.819	48	726
	23370.461366	42200.34238	0.0158630	13.8899	18.6789	111.2873	201.4860
D . 424	**81096A**	**SBS II**					
	26-DEC-13	-0.48	37.979	13.205	62.752	52	1158
	23370.704363	42200.87026	0.0005685	14.7780	3.7210	107.9857	127.2689
D . 425	**93072A**	**Gorizont 29**					
	25-DEC-13	-0.48	37.374	-11.310	86.058	51	1024
	23369.828125	42210.59461	0.0009755	13.6854	29.5884	241.4731	71.0874
D . 426	**68081AJ**	**Transtage 5 debris**					
	28-DEC-13	-0.45	44.352	-694.580	783.284	50	835
	23370.731296	41808.16427	0.0082906	7.6409	320.9132	291.5960	116.5430
D . 427	**99009A**	**Arabsat 3A**					
	25-DEC-13	-0.45	34.939	14.757	55.120	51	737
	23369.657685	42206.46408	0.0004818	4.4672	63.6696	234.0249	50.4928
D . 428	**85107A**	**Raduga 17**					
	27-DEC-13	-0.41	32.254	-17.092	81.599	52	1069
	23371.346366	42188.06044	0.0014096	14.6490	0.5241	106.7188	153.3521
D . 429	**95045D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	26-DEC-13	-0.40	32.155	-56.746	121.057	50	845
	23370.573241	42205.23518	0.0017677	13.0060	35.2473	295.8866	254.3417
D . 430	**79035E**	**Proton-K/DM fourth stage (Blok-DM)**					
	27-DEC-13	-0.38	30.037	-95.230	155.304	50	1032
	23371.301725	42191.85205	0.0031474	13.9427	335.4441	121.0669	321.3309
D . 431	**00032C**	**Fengyun 2B AKM**					
	24-DEC-13	-0.37	30.308	-75.797	136.413	47	581
	23368.716262	42203.74056	0.0022512	10.6554	47.0735	280.5070	56.9507
D . 432	**83059C**	**Palapa Pacific System**					
	23-DEC-13	-0.33	26.325	4.630	48.020	52	1078
	23367.988785	42197.22015	0.0002927	14.7001	11.5930	19.7836	109.3356
D . 433	**96034A**	**Gorizont 32**					
	27-DEC-13	-0.32	27.876	-2.975	58.726	52	908
	23371.780891	42180.18067	0.0007323	12.6402	36.8315	246.1780	173.3878

D .nn	COSPAR	NAME					
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	MJD	a	e	i	Ω	ω	λ
D . 434	**00036D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	25-DEC-13	-0.30	24.780	-58.563	108.123	52	661
	23369.336505	42181.89097	0.0017775	10.1209	46.4544	320.6182	355.9475
D . 435	**92082A**	**Gorizont 27**					
	27-DEC-13	-0.30	24.226	-30.484	78.935	51	1069
	23371.185069	42181.35443	0.0010698	14.0436	26.4612	267.8376	344.8405
D . 436	**87091D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	25-DEC-13	-0.29	5.738	-80.788	92.265	52	1070
	23369.684803	42173.66543	0.0022926	14.6140	7.4656	134.1598	149.0165
D . 437	**68081AH**	**Transtage 5 debris**					
	30-DEC-13	-0.29	16.829	-1110.292	1143.950	50	835
	23370.731296	41808.16427	0.0082906	7.6409	320.9132	291.5960	116.5430
D . 438	**83098A**	**Galaxy II**					
	26-DEC-13	-0.27	22.226	-5.239	49.690	50	1168
	23370.087535	42201.60942	0.0004589	14.2945	24.7915	350.3399	79.5927
D . 439	**92041A**	**Insat-IIA**					
	27-DEC-13	-0.25	21.018	3.657	38.379	51	1017
	23371.296609	42184.04937	0.0005564	13.2724	34.5807	155.0372	12.1736
D . 440	**81102F**	**Proton-K/DM fourth stage (Blok-DM)**					
	27-DEC-13	-0.24	20.187	-29.814	70.188	51	1043
	23371.337650	42190.23507	0.0012703	14.4306	342.9568	99.2597	304.3324
D . 441	**64047A**	**Syncom 3**					
	26-DEC-13	-0.22	16.490	5.220	27.760	44	238
	23370.524572	42168.01209	0.0002565	3.1827	295.3835	210.1856	159.0114
D . 442	**67001A**	**Intelsat II F-2**					
	25-DEC-13	-0.21	16.669	-46.611	79.950	51	721
	23369.668380	42168.00115	0.0012635	6.8682	308.5037	243.7252	157.5296
D . 443	**00029B**	**Proton-K/Briz-M fourth stage (Briz-M)**					
	25-DEC-13	0.24	-21.179	-1133.116	1090.758	49	665
	23369.207836	42148.66809	0.0271250	9.9097	44.6774	216.4727	0.7259
D . 444	**66110A**	**ATS 1**					
	25-DEC-13	0.26	-17.529	-48.101	13.043	51	970
	23369.812384	42161.31124	0.0007316	5.1430	303.8405	204.6161	159.7529
D . 445	**82103E**	**Proton-K/DM fourth stage (Blok-DM)**					
	31-DEC-13	0.30	-24.827	-79.602	29.948	54	1045
	23375.603218	42150.08474	0.0013755	14.4339	347.5849	76.1530	150.5451
D . 446	**81027A**	**Raduga 8**					
	27-DEC-13	0.37	-29.733	-391.490	332.023	51	1056
	23371.227928	42135.04654	0.0089196	14.4509	340.5506	138.3330	311.5460
D . 447	**85048C**	**Arabsat 1B**					
	25-DEC-13	0.50	-39.039	-99.833	21.754	50	1079
	23369.335671	42131.13702	0.0014537	14.5853	16.6759	265.0072	338.1692

D .nn	COSPAR	NAME					
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D . 448	**85015A**	**Arabsat 1A**					
	27-DEC-13	0.53	-41.666	-65.207	-18.126	50	983
	23371.297130	42128.38591	0.0000837	14.6199	13.4584	251.5126	353.7141
D . 449	**69013A**	**TACSAT 1**					
	26-DEC-13	0.54	-41.933	-120.152	36.287	51	855
	23370.041875	42122.52290	0.0019419	7.1331	311.3240	210.9637	26.4733
D . 450	**89020E**	**Mage 1 (Meteosat 4 AKM)**					
	25-DEC-13	0.61	-48.073	-606.141	509.995	50	682
	23369.942211	42109.21807	0.0130254	13.9714	11.3479	129.7361	82.6869
D . 451	**03015A**	**Cosmos-2397**					
	27-DEC-13	0.71	-55.324	-239.607	128.959	51	541
	23371.438090	42106.20346	0.0041208	7.0319	53.9142	249.6752	285.1756
D . 452	**88091D**	**IUS second stage**					
	25-DEC-13	0.71	-55.590	-134.036	22.857	53	1068
	23369.217384	42113.24436	0.0017861	14.9136	14.3981	173.4036	340.9137
D . 453	**79087C**	**Proton-K/DM fourth stage (Blok-DM)**					
	25-DEC-13	0.73	-56.711	-223.070	109.647	50	1027
	23369.683472	42104.81508	0.0039241	13.9381	336.4410	222.3482	223.7120
D . 454	**93069D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	27-DEC-13	0.76	-59.513	-85.557	-33.470	50	897
	23371.295914	42107.91074	0.0002751	13.6576	29.2420	309.0188	8.3240
D . 455	**75123F**	**Proton-K/DM fourth stage (Blok-DM)**					
	24-DEC-13	0.80	-62.016	-126.497	2.466	52	1059
	23368.735556	42106.93234	0.0015941	12.0347	325.4842	87.7461	153.3620
D . 456	**95035D**	**IUS second stage**					
	25-DEC-13	0.80	-62.324	-107.864	-16.785	50	839
	23369.542234	42100.48165	0.0012213	15.9055	29.6280	49.2680	219.9383
D . 457	**90054D**	**Proton-K/DM fourth stage (Blok-DM)**					
	26-DEC-13	0.84	-65.174	-132.453	2.105	48	1009
	23370.434329	42100.87710	0.0013626	14.4737	18.0117	347.6742	126.5537
D . 458	**88071D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	25-DEC-13	0.99	-77.018	-157.416	3.379	49	1079
	23369.393137	42088.61297	0.0021723	14.4638	10.9089	110.0484	311.7156
D . 459	**87096D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	26-DEC-13	1.07	-82.922	-175.524	9.681	50	1089
	23370.322106	42080.15500	0.0024588	14.5269	8.1728	117.4663	227.4596
D . 460	**77048G**	**Aerojet SVM-5 (GOES 2 AKM)**					
	24-DEC-13	1.08	-84.165	-1014.402	846.072	50	746
	23368.643426	42080.49809	0.0222412	13.1621	331.5164	327.9414	115.8075
D . 461	**68081AG**	**Transtage 5 debris**					
	12-DEC-13	1.14	-90.556	-812.640	631.529	50	835
	23370.731296	41808.16427	0.0082906	7.6409	320.9132	291.5960	116.5430

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D . 462	**89081D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	26-DEC-13	1.21	-94.277	-214.978	26.423	50	1011
	23370.617280	42067.00763	0.0026268	14.3730	14.8559	5.6022	75.8457
D . 463	**89021D**	**IUS second stage**					
	25-DEC-13	1.21	-94.348	-199.818	11.123	52	1036
	23369.068333	42067.07536	0.0027298	13.6799	359.5662	76.4156	64.5342
D . 464	**85102D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	25-DEC-13	1.27	-98.899	-187.964	-9.835	50	1041
	23369.900463	42064.54564	0.0020414	14.4974	0.4877	41.3538	285.2771
D . 465	**97049E**	**Mage 1 (Meteosat 7 AKM)**					
	31-DEC-13	1.34	-104.262	-418.592	210.069	51	673
	23375.794178	42058.25770	0.0077556	11.6870	40.4811	212.0635	102.2752
D . 466	**89041B**	**DFS-Kopernikus 1**					
	26-DEC-13	1.40	-108.713	-158.834	-58.593	52	1005
	23370.061308	42054.96839	0.0013120	13.7537	29.7599	185.6912	291.9338
D . 467	**74039C**	**Titan IIIC stage 3 (Transtage)**					
	25-DEC-13	1.41	-109.561	-211.887	-7.236	51	1042
	23369.536435	42054.20918	0.0024786	12.2594	325.0609	212.3459	219.3482
D . 468	**88034A**	**Cosmos 1940**					
	27-DEC-13	1.41	-109.807	-194.436	-25.178	51	1009
	23371.461481	42056.46604	0.0020797	14.5708	8.8939	161.3249	196.5904
D . 469	**68081R**	**Transtage 5 debris**					
	27-DEC-13	1.57	-121.711	-916.987	673.566	50	75
	23371.377083	42040.09222	0.0192774	7.3722	321.4014	269.7148	87.5136
D . 470	**04015D**	**Proton-K/DM-2M fourth stage (Blok DM-2M)**					
	27-DEC-13	1.58	-122.689	-198.934	-46.443	53	490
	23371.039074	42041.38288	0.0017042	8.4050	51.6158	212.2404	299.3586
D . 471	**00013D**	**Proton-K/DM-2M fourth stage (Blok DM-2M)**					
	26-DEC-13	1.76	-136.191	-170.616	-101.766	52	672
	23370.420602	42029.94291	0.0006376	11.5027	42.6191	325.8076	330.4152
D . 472	**68081M**	**Transtage 5 debris**					
	27-DEC-13	1.80	-139.606	-755.654	476.443	41	208
	23371.291505	42024.72877	0.0161896	8.1143	323.0411	307.1882	120.7766
D . 473	**74017A**	**Cosmos 637**					
	27-DEC-13	1.82	-141.223	-306.494	24.047	51	1056
	23371.298947	42024.74156	0.0037439	10.4951	320.9574	290.0980	330.9672
D . 474	**96044A**	**Italsat 2**					
	27-DEC-13	1.84	-142.763	-250.977	-34.548	52	816
	23371.698160	42023.74546	0.0025117	10.0566	46.2845	27.1603	174.4225
D . 475	**94082D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	25-DEC-13	1.89	-146.415	-266.729	-26.101	52	880
	23369.537164	42017.65533	0.0029712	12.8677	37.5768	16.1327	294.4172

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D . 476	**05023H**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	25-DEC-13	1.94	-150.157	-208.145	-92.169	52	429
	23369.211817	42015.62235	0.0012329	7.3411	54.5298	214.9911	7.7576
D . 477	**87109D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	27-DEC-13	2.02	-156.661	-428.398	115.076	51	1070
	23371.492130	42006.93689	0.0066141	14.4735	8.9395	150.2402	264.2286
D . 478	**68081Z**	**Transtage 5 debris**					
	25-DEC-13	2.10	-163.047	-605.302	279.208	24	32
	23369.965185	41999.81208	0.0107633	7.8377	322.3015	277.1398	239.0461
D . 479	**90094D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	25-DEC-13	2.12	-164.104	-312.996	-15.213	52	1035
	23369.201400	42000.13799	0.0035529	14.3161	18.7798	33.1173	36.0247
D . 480	**68081J**	**Transtage 5 debris**					
	27-DEC-13	2.26	-175.523	-726.970	375.925	46	298
	23371.275625	41988.68582	0.0144810	7.8652	322.2714	305.0902	125.8387
D . 481	**68081N**	**Transtage 5 debris**					
	25-DEC-13	2.37	-183.641	-1358.592	991.310	38	140
	23369.925266	41979.44975	0.0296731	7.7904	322.2166	307.6988	251.9401
D . 482	**91046D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	25-DEC-13	2.37	-183.382	-253.217	-113.546	52	1005
	23369.382766	41982.66718	0.0019666	14.1607	21.3869	120.7110	144.4540
D . 483	**94080A**	**Zongxing 6 (A)**					
	27-DEC-13	2.49	-193.130	-590.489	204.229	52	908
	23371.698322	41972.16753	0.0095508	13.8202	27.8737	256.3124	195.3755
D . 484	**82009F**	**Proton-K/DM fourth stage (Blok-DM)**					
	25-DEC-13	2.55	-197.472	-357.765	-37.180	50	1049
	23369.923785	41967.96014	0.0039443	14.2276	343.1378	73.8279	358.8364
D . 485	**74017F**	**Proton-K/DM fourth stage (Blok-DM)**					
	27-DEC-13	2.62	-202.960	-396.249	-9.671	49	1054
	23371.017222	41959.91326	0.0044908	10.3485	320.6368	300.4560	70.4380
D . 486	**06022D**	**Proton-K/DM-2M fourth stage (Blok DM-2M)**					
	27-DEC-13	2.64	-204.083	-421.706	13.541	53	388
	23371.504178	41961.71183	0.0048413	6.4519	56.7860	283.0679	161.0247
D . 487	**81061F**	**Proton-K/DM fourth stage (Blok-DM)**					
	25-DEC-13	2.64	-204.589	-222.147	-187.031	51	1079
	23369.623206	41959.43886	0.0000302	14.0374	340.9757	136.3501	221.9057
D . 488	**68081G**	**Transtage 5 debris**					
	26-DEC-13	2.74	-211.690	-698.460	275.080	52	759
	23370.810046	41951.99341	0.0118199	7.8411	322.0775	289.7228	103.2278
D . 489	**83100F**	**Proton-K/DM fourth stage (Blok-DM)**					
	25-DEC-13	2.80	-216.756	-301.166	-132.346	52	1068
	23369.824722	41948.80510	0.0018901	14.2250	348.5121	40.7505	134.9260

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D . 490	**97065C**	**IABS**					
	25-DEC-13	2.84	-219.484	-326.337	-112.630	51	772
	23369.800035	41943.91240	0.0034527	12.8825	35.2313	29.3064	76.8687
D . 491	**92017D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	25-DEC-13	2.94	-227.065	-322.846	-131.284	50	966
	23369.214630	41937.19677	0.0019949	13.9940	23.6157	307.5762	41.2994
D . 492	**83016F**	**Proton-K/DM fourth stage (Blok-DM)**					
	27-DEC-13	2.97	-229.605	-287.831	-171.378	48	1033
	23371.018947	41933.29677	0.0015544	14.1292	344.6954	184.5142	65.1740
D . 493	**88036E**	**Proton-K/DM fourth stage (Blok-DM)**					
	26-DEC-13	3.04	-235.026	-330.216	-139.835	50	1057
	23370.747917	41931.27840	0.0024282	14.4009	5.2567	64.4420	173.0509
D . 494	**92074D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	27-DEC-13	3.13	-242.349	-333.859	-150.838	50	929
	23371.260694	41921.24436	0.0022376	13.7762	25.7584	27.4889	243.2714
D . 495	**68081AB**	**Transtage 5 debris**					
	26-DEC-13	3.16	246.900	-802.500	-1296.500	50	835
	23370.731296	41808.16427	0.0082906	7.6409	320.9132	291.5960	116.5430
D . 496	**05049E**	**MSG-2 operational debris (SEVIRI cooler cover)**					
	25-DEC-13	3.23	-249.567	-286.045	-213.089	28	247
	23369.820949	41914.72175	0.0013242	5.5926	68.6176	144.2435	38.5375
D . 497	**85024D**	**Proton-K/DM fourth stage (Blok-DM)**					
	27-DEC-13	3.44	-265.441	-325.036	-205.845	49	1064
	23371.209352	41897.78990	0.0017064	14.3782	353.6148	119.8380	252.3476
D . 498	**82093F**	**Proton-K/DM fourth stage (Blok-DM)**					
	26-DEC-13	3.53	-272.782	-297.741	-247.823	53	1075
	23370.748102	41892.97137	0.0008328	13.9901	344.5015	161.8358	175.9100
D . 499	**95011D**	**Star 27 (Himawari-5 AKM)**					
	27-DEC-13	3.53	-272.986	-1233.781	687.810	49	697
	23371.496817	41889.98704	0.0226685	13.1130	30.8908	247.6682	261.0105
D . 500	**84090F**	**Proton-K/DM fourth stage (Blok-DM)**					
	27-DEC-13	3.57	-275.494	-347.192	-203.795	51	1078
	23371.055185	41889.18560	0.0016543	14.2651	351.6131	50.3250	211.4667
D . 501	**77092G**	**Proton-K/DM fourth stage (Blok-DM)**					
	27-DEC-13	3.63	-280.677	-327.055	-234.299	51	1090
	23371.032164	41882.88414	0.0009940	12.7205	329.2241	61.9694	93.2194
D . 502	**79015D**	**Proton-K/DM fourth stage (Blok-DM)**					
	31-DEC-13	3.84	-296.268	-334.068	-258.468	53	1048
	23375.888044	41867.40140	0.0010977	13.2327	333.1014	176.6784	110.6960
D . 503	**80104E**	**Proton-K/DM fourth stage (Blok-DM)**					
	26-DEC-13	3.84	-296.769	-429.939	-163.600	50	1076
	23370.072905	41867.12212	0.0032213	13.7709	338.8458	71.2954	56.7121

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D . 504	**04042C**	**Fengyun 2C AKM**					
	24-DEC-13	3.85	-296.940	-392.557	-201.323	50	453
	23368.738843	41866.65557	0.0021848	7.0532	53.2770	218.5928	68.5510
D . 505	**76023K**	**LES 8, LES 9 operational debris**					
	26-DEC-13	3.85	-297.413	-313.531	-281.294	51	1048
	23370.777731	41866.58314	0.0001524	13.4873	335.2188	206.0587	96.5640
D . 506	**89053A**	**Olympus 1**					
	26-DEC-13	3.95	-304.602	-368.094	-241.110	50	1116
	23370.364560	41859.46016	0.0014195	14.3710	17.4831	215.8381	212.3258
D . 507	**86038D**	**Proton-K/DM fourth stage (Blok-DM)**					
	25-DEC-13	3.96	-305.315	-393.745	-216.886	52	1009
	23369.946968	41858.54402	0.0022196	14.3066	357.4447	61.3233	73.8835
D . 508	**87073D**	**Proton-K/DM fourth stage (Blok-DM)**					
	25-DEC-13	4.00	-308.323	-384.704	-231.941	52	1080
	23369.663090	41856.56216	0.0017268	14.2890	2.5550	40.2814	28.1944
D . 509	**68081P**	**Transtage 5 debris**					
	27-DEC-13	4.04	-311.573	-682.239	59.093	39	199
	23371.415185	41851.53699	0.0092980	7.6243	320.9180	298.1210	74.3846
D . 510	**84028F**	**Proton-K/DM fourth stage (Blok-DM)**					
	27-DEC-13	4.15	-320.434	-403.883	-236.984	50	1066
	23371.244375	41844.54417	0.0017245	14.0809	347.6688	284.6280	340.1373
D . 511	**76107F**	**Proton-K/DM fourth stage (Blok-DM)**					
	26-DEC-13	4.27	-329.176	-376.616	-281.737	50	1074
	23370.283958	41836.10793	0.0010777	12.1430	326.1053	76.1960	192.4112
D . 512	**68081X**	**Transtage 5 debris**					
	29-DEC-13	4.30	-331.600	-2160.500	-1497.200	48	67
	23373.530694	41829.96436	0.0449865	6.0702	328.2023	0.1927	36.6962
D . 513	**88108D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	27-DEC-13	4.47	-344.640	-407.446	-281.834	50	1086
	23371.202813	41820.71314	0.0017301	14.4101	11.2330	79.4148	10.9464
D . 514	**68081E**	**Titan IIIC stage 3 (Transtage)**					
	27-DEC-13	4.48	-345.427	-744.318	53.464	52	1047
	23371.224433	41819.88151	0.0096250	7.6862	320.8717	285.4442	2.9587
D . 515	**79007A**	**Scatha**					
	26-DEC-13	4.52	-348.268	-7910.866	7214.331	50	1082
	23370.137164	41816.18801	0.1794794	18.2125	344.8569	345.3592	31.0135
D . 516	**68081A**	**OV2 5**					
	26-DEC-13	4.62	-356.253	-701.004	-11.502	50	835
	23370.731296	41808.16427	0.0082906	7.6409	320.9132	291.5960	116.5430
D . 517	**79007C**	**Scatha AKM**					
	25-DEC-13	4.74	-364.816	-7825.316	7095.683	46	371
	23369.624606	41799.15386	0.1775688	18.1459	344.9071	345.1261	245.4979

D .nn	COSPAR	NAME					
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D . 518	**80060F**	**Proton-K/DM fourth stage (Blok-DM)**					
	31-DEC-13	4.80	-369.449	-443.652	-295.245	52	1040
	23375.885243	41795.13229	0.0020668	13.5768	336.9267	153.1306	126.3251
D . 519	**68081H**	**Transtage 5 debris**					
	25-DEC-13	5.16	-397.009	-700.274	-93.745	47	550
	23369.751412	41768.29051	0.0072735	7.5855	320.3239	346.8682	72.5508
D . 520	**68081L**	**Transtage 5 debris**					
	27-DEC-13	5.59	-429.814	-722.728	-136.899	23	145
	23371.123194	41733.83442	0.0080599	7.5647	320.1046	311.0229	179.3797
D . 521	**75100F**	**Aerojet SVM-5 (GOES 1 AKM)**					
	31-DEC-13	5.97	-458.669	-1640.257	722.919	53	873
	23375.420324	41705.58679	0.0289131	11.7786	323.9448	301.3004	299.9272
D . 522	**74039A**	**ATS 6**					
	27-DEC-13	6.15	-471.996	-598.555	-345.438	52	1100
	23371.321007	41693.21513	0.0031365	11.4410	322.6926	182.3513	134.8028
D . 523	**68081AF**	**Transtage 5 debris**					
	25-DEC-13	6.35	-487.197	-1426.075	451.682	50	835
	23370.731296	41808.16427	0.0082906	7.6409	320.9132	291.5960	116.5430
D . 524	**68081K**	**Transtage 5 debris**					
	25-DEC-13	6.42	-493.058	-703.239	-282.876	46	227
	23369.435486	41669.48239	0.0054580	7.7094	320.0499	10.9629	69.3764
D . 525	**08066C**	**Fengyun 2E AKM (FG-36 AKM)**					
	25-DEC-13	6.55	-502.712	-653.375	-352.050	50	257
	23369.271435	41661.44749	0.0035399	1.4726	53.3865	226.3332	220.8961
D . 526	**68081AC**	**Transtage 5 debris**					
	01-DEC-13	6.94	-531.851	-1363.944	300.242	50	835
	23370.731296	41808.16427	0.0082906	7.6409	320.9132	291.5960	116.5430
D . 527	**68081AE**	**Transtage 5 debris**					
	26-DEC-13	6.96	-533.552	-1289.995	222.892	50	835
	23370.731296	41808.16427	0.0082906	7.6409	320.9132	291.5960	116.5430
D . 528	**05049F**	**MSG-2 operational debris (entry baffle cover)**					
	03-DEC-13	7.05	-540.012	-782.003	-298.021	32	235
	23347.339699	41623.89965	0.0045734	5.4949	68.7954	285.5009	233.4455
D . 529	**70055A**	**Intelsat III F-8**					
	27-DEC-13	7.16	-548.651	-1949.975	852.674	51	1046
	23371.809363	41614.88752	0.0351448	4.5490	300.6616	157.4498	74.5890
D . 530	**97049A**	**Hot Bird 3**					
	26-DEC-13	7.94	-607.320	-709.808	-504.832	50	663
	23370.805764	41556.71650	0.0024266	4.0667	64.1971	284.3125	98.6478
D . 531	**68081AA**	**Transtage 5 debris**					
	31-DEC-13	8.84	-674.502	-1136.775	-212.229	50	835
	23370.731296	41808.16427	0.0082906	7.6409	320.9132	291.5960	116.5430

D .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$	$\overline{\Delta a}$	$\overline{\Delta r_p}$	$\overline{\Delta r_a}$	N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
D . 532	**11001B**	**Zenit-3SLBF third stage (Fregat-SB)**					
	26-DEC-13	9.09	-693.109	-1307.084	-79.134	53	157
	23370.512245	41470.30658	0.0150173	1.8447	66.5138	325.6369	72.2045
D . 533	**68081T**	**Transtage 5 debris**					
	27-DEC-13	9.18	-699.763	-1135.280	-264.247	41	61
	23371.534514	41464.75424	0.0106151	6.5289	315.4279	227.8083	26.0434
D . 534	**97029C**	**Fengyun 2A AKM**					
	26-DEC-13	9.38	-714.602	-1646.327	217.124	49	680
	23370.145590	41449.56092	0.0215633	12.2149	38.2091	309.5277	277.8584
D . 535	**87040D**	**Proton-K/DM fourth stage (Blok-DM)**					
	24-DEC-13	9.88	-752.276	-814.540	-690.012	51	1065
	23368.437384	41412.09574	0.0016382	13.7781	354.2080	180.9743	104.4857
D . 536	**85007D**	**Proton-K/DM fourth stage (Blok-DM)**					
	27-DEC-13	9.90	-753.886	-819.441	-688.331	51	1092
	23371.036713	41410.59263	0.0017944	13.5761	355.3948	162.1243	70.8742
D . 537	**89052D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	27-DEC-13	10.04	-764.099	-892.052	-636.145	52	1054
	23371.178275	41400.46784	0.0032886	13.7077	12.2462	141.4308	266.9913
D . 538	**93072D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	25-DEC-13	10.41	-791.717	-869.778	-713.655	51	910
	23369.553414	41372.48015	0.0020225	13.0752	27.4939	44.5747	259.2072
D . 539	**84063F**	**Proton-K/DM fourth stage (Blok-DM)**					
	27-DEC-13	10.86	-825.087	-895.417	-754.757	50	1082
	23371.435602	41339.43574	0.0020201	13.4675	351.8722	126.7166	249.9981
D . 540	**87100D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	26-DEC-13	11.26	-854.567	-919.248	-789.887	50	1078
	23370.217292	41310.76686	0.0018288	14.0872	5.4407	130.2239	346.5951
D . 541	**91014D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	27-DEC-13	11.37	-863.136	-969.530	-756.741	52	1040
	23371.293090	41301.96983	0.0025372	14.1511	17.7674	21.2102	313.3514
D . 542	**68081U**	**Transtage 5 debris**					
	28-DEC-13	11.64	-882.468	-1245.155	-519.781	31	50
	23372.553947	41281.49779	0.0078526	7.6391	317.2725	117.5261	21.5700
D . 543	**01015A**	**GSAT-1**					
	27-DEC-13	12.78	-966.600	-1902.910	-30.290	50	650
	23371.753565	41197.97634	0.0233718	9.5785	45.0359	168.4461	26.4772
D . 544	**94030D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	26-DEC-13	12.84	-971.298	-1157.506	-785.089	53	909
	23370.061308	41193.21870	0.0048169	12.8715	28.1133	60.7498	292.2567
D . 545	**08003B**	**Proton-M/Briz-M fourth stage (Briz-M)**					
	26-DEC-13	13.43	-1014.117	-1763.476	-264.758	52	288
	23370.492211	41149.93805	0.0183486	4.7642	60.8047	118.0086	263.2692

D .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$	$\overline{\Delta a}$	$\overline{\Delta r_p}$	$\overline{\Delta r_a}$	N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
D . 546	**10002B**	**Proton-M/Briz-M fourth stage (Briz-M)**					
	26-DEC-13	13.57	-1024.407	-1840.154	-208.659	52	206
	23370.209560	41140.14131	0.0204349	3.0330	71.6490	135.5067	357.8683
D . 547	**13062B**	**Proton-M/Briz-M fourth stage (Briz-M)**					
	25-DEC-13	14.16	-1068.090	-2084.989	-51.192	7	7
	23369.881910	41096.11827	0.0255550	0.0685	170.6729	269.2745	310.8685
D . 548	**11048B**	**Proton-M/Briz-M fourth stage (Briz-M)**					
	26-DEC-13	14.36	-1082.639	-2035.964	-129.313	51	119
	23370.721053	41081.36878	0.0234209	1.6078	71.4063	332.3559	64.9990
D . 549	**68081Y**	**Transtage 5 debris**					
	26-DEC-13	14.81	-1115.464	-1691.408	-539.519	50	75
	23370.385833	41047.96925	0.0143665	6.0385	310.8949	244.8574	75.5891
D . 550	**07058C**	**Proton-M/Briz-M fourth stage (Briz-M)**					
	25-DEC-13	14.96	-1126.031	-2115.414	-136.649	51	311
	23369.218194	41038.53358	0.0235475	4.9978	59.6986	91.9658	339.9856
D . 551	**97027B**	**Insat-IID**					
	27-DEC-13	16.26	-1220.694	-2555.224	113.835	53	807
	23371.228194	40943.31260	0.0325964	12.4249	31.7055	356.6344	32.1149
D . 552	**68081AD**	**Transtage 5 debris**					
	27-DEC-13	18.54	-1384.323	-2439.499	-329.147	50	835
	23370.731296	41808.16427	0.0082906	7.6409	320.9132	291.5960	116.5430
D . 553	**68050J**	**Titan IIIC stage 3 (Transtage)**					
	27-DEC-13	19.16	-1429.191	-2127.130	-731.251	52	1038
	23371.137870	40735.70408	0.0165184	1.5695	313.5053	12.5925	335.8217
D . 554	**66053J**	**Titan IIIC stage 3 (Transtage)**					
	26-DEC-13	23.21	-1715.572	-2379.219	-1051.925	51	1055
	23370.387442	40448.62335	0.0167334	0.7374	350.9876	130.3295	226.9503
D . 555	**68050H**	**OPS 9348 (IDSCS 27)**					
	23-DEC-13	23.37	-1727.150	-2047.855	-1406.445	47	491
	23367.058403	40436.90643	0.0082463	2.2025	308.8281	146.3532	296.5968
D . 556	**66053H**	**IDCSP 7**					
	27-DEC-13	23.74	-1753.206	-2089.389	-1417.022	42	453
	23371.773472	40410.87331	0.0082100	0.7742	0.6462	124.2985	81.2801
D . 557	**68050G**	**OPS 9347 (IDSCS 26)**					
	25-DEC-13	24.34	-1794.792	-2057.125	-1532.458	50	489
	23369.536435	40369.33808	0.0066084	2.1012	310.2418	146.4799	217.9779
D . 558	**66053G**	**IDCSP 6**					
	31-DEC-13	24.78	-1825.358	-2092.651	-1558.064	51	475
	23375.652523	40338.73387	0.0064873	0.7974	9.7211	120.9900	103.9969
D . 559	**67003H**	**IDCSP 15**					
	25-DEC-13	25.04	-1843.806	-2130.168	-1557.444	46	546
	23369.524190	40320.64749	0.0067261	0.9897	341.0921	14.0942	197.0213

D .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$	$\overline{\Delta a}$	$\overline{\Delta r_p}$	$\overline{\Delta r_a}$	N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
D . 560	**68050F**	**OPS 9346 (IDSCS 25)**					
	25-DEC-13	25.25	-1858.022	-2048.582	-1667.463	48	509
	23369.643866	40306.21161	0.0049976	1.9474	311.4478	146.9268	194.3433
D . 561	**66053F**	**IDCSP 5**					
	23-DEC-13	25.65	-1885.794	-2101.613	-1669.974	44	437
	23367.177593	40278.14138	0.0051203	0.8057	19.3687	118.5995	264.3702
D . 562	**68050E**	**OPS 9345 (IDSCS 24)**					
	31-DEC-13	25.93	-1905.739	-2059.933	-1751.544	50	504
	23375.379699	40258.18068	0.0038346	1.8857	312.8684	146.9321	240.9003
D . 563	**67003G**	**IDCSP 14**					
	27-DEC-13	26.05	-1913.965	-2142.755	-1685.176	50	513
	23371.798866	40250.32363	0.0053538	0.9021	349.1917	18.1074	336.9033
D . 564	**66053E**	**IDCSP 4**					
	31-DEC-13	26.32	-1932.542	-2100.355	-1764.730	46	412
	23375.303252	40231.55283	0.0041434	0.8544	23.9635	122.6958	240.3680
D . 565	**68050D**	**OPS 9344 (IDSCS 23)**					
	25-DEC-13	26.52	-1946.096	-2051.464	-1840.728	51	501
	23369.625255	40217.84890	0.0028136	1.7850	313.7591	148.8283	66.1664
D . 566	**67003F**	**IDCSP 13**					
	26-DEC-13	26.91	-1973.204	-2155.437	-1790.971	44	447
	23370.356157	40190.90793	0.0043625	0.9109	356.1990	25.8264	222.5034
D . 567	**66053D**	**IDCSP 3**					
	26-DEC-13	26.93	-1974.585	-2116.297	-1832.872	45	510
	23370.137106	40189.42691	0.0033605	0.8843	30.6261	127.3858	263.7109
D . 568	**68050C**	**OPS 9343 (IDSCS 22)**					
	26-DEC-13	26.94	-1975.349	-2053.946	-1896.753	51	532
	23370.112141	40188.70759	0.0020897	1.7309	314.6695	149.9623	264.2960
D . 569	**68050B**	**OPS 9342 (IDSCS 21)**					
	27-DEC-13	27.16	-1990.816	-2055.003	-1926.628	50	484
	23371.906377	40173.47882	0.0017128	1.7016	315.2314	151.6999	38.4786
D . 570	**66053C**	**IDCSP 2**					
	31-DEC-13	27.27	-1998.462	-2126.352	-1870.572	46	508
	23375.094398	40165.52398	0.0029766	0.9168	33.5890	133.9857	288.8064
D . 571	**68050A**	**OPS 9341 (IDSCS 20)**					
	24-DEC-13	27.29	-1999.521	-2056.992	-1942.051	50	636
	23368.467014	40164.67936	0.0015456	1.7275	315.3917	150.4690	244.2263
D . 572	**66053B**	**IDCSP 1**					
	27-DEC-13	27.49	-2013.157	-2129.057	-1897.257	41	662
	23371.098889	40150.80358	0.0028452	0.9220	31.4653	143.1250	245.6431
D . 573	**67003E**	**IDCSP 12**					
	31-DEC-13	27.61	-2021.360	-2208.702	-1834.019	45	467
	23375.757928	40142.63782	0.0038864	0.8684	3.5217	34.6203	117.1250

D .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$	$\overline{\Delta a}$	$\overline{\Delta r_p}$	$\overline{\Delta r_a}$	N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
D . 574	**66053A**	**GGTS 1**					
	26-DEC-13	27.71	-2028.524	-2140.410	-1916.637	53	532
	23370.516563	40135.34775	0.0026278	0.9524	34.4143	153.2660	257.9393
D . 575	**67003D**	**IDCSP 11**					
	25-DEC-13	28.19	-2061.733	-2205.701	-1917.766	46	392
	23369.275220	40102.54091	0.0036751	0.9038	7.1431	47.1384	222.8610
D . 576	**67003C**	**IDCSP 10**					
	27-DEC-13	28.61	-2090.460	-2234.973	-1945.948	51	405
	23371.130521	40073.67926	0.0036960	0.9111	10.9072	55.4766	285.4879
D . 577	**67003B**	**IDCSP 9**					
	27-DEC-13	28.83	-2105.403	-2247.239	-1963.567	46	484
	23371.769653	40058.91410	0.0037681	0.9167	12.7655	59.4254	38.6609
D . 578	**67003A**	**IDCSP 8**					
	27-DEC-13	28.96	-2114.033	-2259.706	-1968.359	48	509
	23371.758877	40050.25611	0.0038628	0.8868	15.0153	60.0950	41.5126
D . 579	**67066G**	**Titan IIIC stage 3 (Transtage)**					
	27-DEC-13	31.08	-2258.744	-2569.950	-1947.538	51	1081
	23371.482211	39905.56893	0.0076738	7.3524	311.0665	227.0865	211.9148
D . 580	**67066F**	**DODGE 1**					
	31-DEC-13	32.02	-2322.459	-2526.433	-2118.484	53	1061
	23375.521019	39841.72867	0.0050104	7.2553	310.1424	248.3206	278.6974
D . 581	**67066E**	**LES 5**					
	27-DEC-13	32.92	-2383.492	-2593.047	-2173.936	50	1071
	23371.905914	39780.72251	0.0051920	7.1303	309.5679	269.3094	55.4729
D . 582	**67066D**	**IDCSP 19**					
	22-DEC-13	33.66	-2433.059	-2651.685	-2214.432	49	709
	23366.316215	39731.43712	0.0054087	7.0441	309.1125	281.2602	161.7932
D . 583	**67066C**	**IDCSP 18**					
	25-DEC-13	34.24	-2472.046	-2706.176	-2237.916	46	683
	23369.766088	39692.17813	0.0059287	6.9990	308.6490	291.4957	73.5575
D . 584	**67066B**	**IDCSP 17**					
	26-DEC-13	34.64	-2498.792	-2747.921	-2249.662	49	538
	23370.720602	39665.46142	0.0063484	6.9069	308.3780	297.6147	55.6115
D . 585	**67066A**	**IDCSP 16**					
	27-DEC-13	34.85	-2512.821	-2769.646	-2255.997	49	740
	23371.611840	39651.43328	0.0065207	6.9172	308.1913	300.4201	48.9028

3.4 Objects in a libration orbit around the Eastern stable point

In the case where the object is in a libration orbit around the Eastern stable point (longitude 75 E), there are 105 objects identified.

For explanation of symbols, see the definitions at the beginning of Chapter 3 on page 34.

L1 .nn	**COSPAR**	**NAME**					
	Date	P_{lib}	$\Delta\lambda$	λ_{min}	λ_{max}	N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
L1 . 1	**91087A**	**Raduga 28**					
	27-DEC-13	9	87.9	30.1	117.9	51	1096
	23371.051944	42142.74090	0.0006351	14.2688	23.4306	56.0669	54.7694
L1 . 2	**95054A**	**Luch 1-1**					
	26-DEC-13	740	5.0	72.5	77.5	50	911
	23370.078275	42166.39936	0.0007120	12.3748	42.2974	26.2747	74.7514
L1 . 3	**93039A**	**Galaxy IV**					
	26-DEC-13	741	6.3	71.9	78.2	52	1000
	23370.617303	42166.68337	0.0010073	12.7599	37.3303	184.7361	75.6494
L1 . 4	**00036A**	**Cosmos-2371**					
	25-DEC-13	742	10.0	70.0	80.1	50	691
	23369.761065	42166.17927	0.0003232	10.1352	46.4930	57.5309	70.8736
L1 . 5	**90061A**	**Cosmos 2085**					
	27-DEC-13	742	10.2	70.0	80.2	51	1042
	23371.798426	42166.92981	0.0004551	14.4869	18.4638	107.8466	71.3503
L1 . 6	**94087A**	**Raduga 32**					
	25-DEC-13	742	10.3	69.9	80.2	52	958
	23369.770081	42164.99816	0.0007581	13.2998	33.1987	140.8905	80.2359
L1 . 7	**88066A**	**Cosmos 1961**					
	25-DEC-13	742	10.4	69.8	80.3	52	1147
	23369.551030	42165.58296	0.0004279	14.5898	11.2480	61.5791	80.2049
L1 . 8	**08033A**	**Cosmos-2440**					
	26-DEC-13	742	10.7	69.7	80.4	50	290
	23370.617396	42163.57016	0.0002167	2.3705	58.7463	85.2837	79.7654
L1 . 9	**84022A**	**Cosmos 1540**					
	26-DEC-13	742	10.8	69.6	80.5	50	949
	23370.843519	42161.18203	0.0009715	15.8724	353.0220	135.8789	74.6240
L1 . 10	**91010A**	**Cosmos 2133**					
	26-DEC-13	742	11.1	69.5	80.6	52	1110
	23370.087535	42165.53922	0.0006377	13.9100	24.1815	72.5863	80.3278
L1 . 11	**81018A**	**Comstar 4**					
	25-DEC-13	742	11.3	69.4	80.7	52	1116
	23369.829155	42166.27151	0.0000869	14.7269	354.7848	27.1025	70.0606
L1 . 12	**98025A**	**Cosmos 2350**					
	27-DEC-13	743	12.2	69.0	81.1	53	778
	23371.742350	42160.84458	0.0006967	10.7763	42.9410	43.1214	74.6771

L1 .nn	COSPAR	NAME					
	Date	P_{lib}	$\Delta\lambda$	λ_{min}	λ_{max}	N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
L1 . 13	**84031A**	**Cosmos 1546**					
	24-DEC-13	743	12.7	68.7	81.4	51	962
	23368.752072	42168.66990	0.0019973	14.6828	354.8494	249.8110	73.8150
L1 . 14	**90051A**	**Insat-ID**					
	26-DEC-13	744	13.9	68.1	82.0	51	1083
	23370.663877	42164.35395	0.0013362	13.0002	36.4637	75.2532	81.5914
L1 . 15	**94069A**	**Elektro 1**					
	27-DEC-13	744	14.5	67.8	82.3	53	942
	23371.030891	42160.67193	0.0007780	13.7221	32.3125	128.0124	78.6117
L1 . 16	**82044A**	**Cosmos 1366**					
	26-DEC-13	744	14.6	67.7	82.4	52	964
	23370.074896	42160.87597	0.0004080	15.6417	347.6225	26.3497	79.6105
L1 . 17	**93062A**	**Raduga 30**					
	26-DEC-13	745	16.8	66.6	83.5	52	1047
	23370.081551	42165.70070	0.0003265	13.7453	29.4320	177.1991	81.0005
L1 . 18	**83028A**	**Raduga 12**					
	26-DEC-13	747	20.0	65.0	85.0	51	1035
	23370.509178	42168.76187	0.0002151	14.7972	351.3691	121.5288	67.3571
L1 . 19	**81102A**	**Raduga 10**					
	26-DEC-13	748	20.9	64.6	85.5	50	943
	23370.005961	42158.26824	0.0007946	14.4921	343.2101	117.7702	71.7629
L1 . 20	**79035A**	**Raduga 5**					
	27-DEC-13	748	21.2	64.4	85.6	49	1022
	23371.018403	42158.92230	0.0004952	13.9845	335.6308	124.6574	81.1049
L1 . 21	**75123A**	**Raduga 1**					
	24-DEC-13	748	21.6	64.2	85.8	50	976
	23368.786725	42171.75236	0.0009808	12.2644	326.1529	136.1961	74.6757
L1 . 22	**84016A**	**Raduga 14**					
	26-DEC-13	750	23.2	63.4	86.6	51	935
	23370.074896	42157.79662	0.0004554	14.6645	354.2818	95.2151	79.9026
L1 . 23	**76092A**	**Raduga 2**					
	25-DEC-13	750	23.3	63.3	86.7	51	1023
	23369.128634	42162.19386	0.0025448	12.8122	328.1991	255.6187	64.2030
L1 . 24	**77080A**	**SIRIO 1**					
	26-DEC-13	750	1.5	74.4	75.9	49	861
	23370.746389	42164.98750	0.0007246	14.6074	346.0688	63.7645	75.7894
L1 . 25	**06053D**	**Fengyun 2D debris**					
	24-DEC-13	750	23.9	63.0	87.0	43	218
	23368.752928	42166.81094	0.0079926	3.5523	68.9703	238.9838	63.4549
L1 . 26	**88014A**	**STTW-2**					
	24-DEC-13	753	27.2	61.4	88.6	52	1103
	23368.568634	42157.79634	0.0007320	14.4204	22.1470	60.9440	84.2849
L1 . 27	**79062A**	**Gorizont 2**					
	27-DEC-13	757	30.6	59.7	90.3	52	1059
	23371.087674	42170.99487	0.0004416	14.1993	337.7626	187.0840	63.4761

L1 .nn	COSPAR	NAME					
	Date	P_{lib}	$\Delta\lambda$	λ_{min}	λ_{max}	N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
L1 . 28	**08033D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	26-DEC-13	758	31.6	59.2	90.8	50	288
	23370.736204	42157.51920	0.0030795	2.3400	58.5987	234.6448	64.1974
L1 . 29	**83118F**	**Proton-K/DM fourth stage (Blok-DM)**					
	27-DEC-13	761	33.8	58.0	91.8	51	996
	23371.524745	42168.87796	0.0043990	14.6208	354.2872	216.0506	59.4398
L1 . 30	**97070A**	**Kupon 1**					
	26-DEC-13	766	37.5	56.1	93.7	52	782
	23370.663877	42174.81911	0.0003478	12.8366	36.8750	168.2524	82.4697
L1 . 31	**88063A**	**Insat-IC**					
	26-DEC-13	766	38.2	55.8	94.0	51	966
	23370.616898	42171.69458	0.0005527	14.7515	9.7956	53.3385	59.5019
L1 . 32	**85102A**	**Cosmos 1700**					
	26-DEC-13	768	39.1	55.3	94.5	51	1047
	23370.790336	42161.17698	0.0007495	14.6718	0.9548	109.7706	93.9231
L1 . 33	**90112A**	**Raduga 26**					
	31-DEC-13	774	42.9	53.4	96.3	50	1104
	23375.079653	42153.10693	0.0004283	14.3914	19.8083	25.2099	62.6791
L1 . 34	**90054A**	**Gorizont 20**					
	27-DEC-13	775	44.0	52.9	96.8	50	1151
	23371.787245	42163.25060	0.0009097	14.5572	18.2439	104.2320	96.9627
L1 . 35	**84041A**	**Gorizont 9**					
	23-DEC-13	776	44.4	52.6	97.0	50	953
	23367.978681	42175.00648	0.0008124	14.6453	355.4579	138.4899	89.7930
L1 . 36	**87096A**	**Cosmos 1897**					
	26-DEC-13	776	44.6	52.5	97.1	50	1020
	23370.462905	42170.81342	0.0004295	14.6464	8.5441	45.1232	95.4130
L1 . 37	**79087A**	**Ekran 4**					
	24-DEC-13	777	44.7	52.5	97.2	51	967
	23368.485822	42178.05166	0.0006700	14.1328	337.1117	50.2511	82.6487
L1 . 38	**76092F**	**Proton-K/DM fourth stage (Blok-DM)**					
	24-DEC-13	777	45.1	52.3	97.4	51	1002
	23368.782546	42167.46533	0.0016237	12.7849	328.3293	72.3987	52.9517
L1 . 39	**76107A**	**Ekran 1**					
	27-DEC-13	778	45.4	52.1	97.5	52	1039
	23371.086516	42172.04038	0.0062854	12.8772	328.5241	50.0401	55.6289
L1 . 40	**90011A**	**DFH-2A**					
	27-DEC-13	780	46.4	51.6	98.0	52	1132
	23371.098507	42178.82406	0.0005546	13.9720	29.2828	53.4394	80.9129
L1 . 41	**80104A**	**Ekran 6**					
	24-DEC-13	780	46.8	51.4	98.2	52	1048
	23368.752072	42150.08950	0.0003527	14.3698	340.6221	301.6264	73.5326
L1 . 42	**03060D**	**Proton-K/DM-2M fourth stage (Blok DM-2M)**					
	25-DEC-13	783	48.1	50.7	98.9	52	496
	23369.077442	42150.27828	0.0016497	8.7296	50.9779	106.3869	82.2751

L1 .nn	COSPAR	NAME					
	Date	P_{lib}	$\Delta\lambda$	λ_{min}	λ_{max}	N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
L1 . 43	**92074A**	**Ekran 20**					
	26-DEC-13	784	49.1	50.2	99.3	52	1057
	23370.811551	42156.92656	0.0006504	13.9803	26.4925	94.0561	96.0107
L1 . 44	**84016F**	**Proton-K/DM fourth stage (Blok-DM)**					
	31-DEC-13	785	49.2	50.2	99.4	52	1032
	23375.993600	42161.15064	0.0040682	14.6564	354.2945	104.1507	99.0803
L1 . 45	**77092A**	**Ekran 2**					
	27-DEC-13	785	49.4	50.1	99.5	52	1014
	23371.086852	42177.58118	0.0035354	13.3478	331.0875	239.5899	61.5416
L1 . 46	**79015A**	**Ekran 3**					
	26-DEC-13	786	50.0	49.8	99.8	52	1043
	23370.806169	42170.13730	0.0038043	13.8668	335.0335	233.2263	98.4173
L1 . 47	**81061A**	**Ekran 7**					
	25-DEC-13	788	51.0	49.3	100.2	51	1058
	23369.697396	42173.61018	0.0001327	14.4564	342.1562	83.7807	53.9393
L1 . 48	**94008A**	**Raduga 1-3**					
	26-DEC-13	790	51.8	48.8	100.7	52	999
	23370.535706	42176.39056	0.0002506	13.6721	30.7012	76.8730	92.8480
L1 . 49	**90116A**	**Raduga 1-2**					
	26-DEC-13	790	51.9	48.8	100.7	51	1136
	23370.669572	42161.00153	0.0006233	14.4120	19.9974	37.1643	49.5201
L1 . 50	**83100A**	**Ekran 11**					
	25-DEC-13	795	54.3	47.6	101.8	51	955
	23369.605775	42179.05749	0.0003726	14.6109	349.6325	158.8369	61.0286
L1 . 51	**86010A**	**STTW-1**					
	26-DEC-13	800	56.6	46.4	103.0	50	999
	23370.579109	42156.65308	0.0004783	14.7737	5.6859	124.7963	49.8451
L1 . 52	**96058A**	**Ekspress 2**					
	25-DEC-13	801	57.1	46.1	103.2	52	871
	23369.133380	42181.90304	0.0005228	12.8914	36.7476	225.9201	68.5441
L1 . 53	**01045D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	27-DEC-13	803	57.8	45.8	103.5	53	605
	23371.059074	42147.13702	0.0024805	9.2479	50.7306	268.6079	69.4300
L1 . 54	**05010F**	**Proton-K/DM-2M fourth stage (Blok DM-2M)**					
	24-DEC-13	805	58.8	45.2	104.0	52	447
	23368.775903	42148.00602	0.0020737	7.6158	53.8628	151.2136	86.2149
L1 . 55	**00049A**	**Raduga 1-5**					
	25-DEC-13	806	59.1	45.1	104.2	52	687
	23369.723819	42149.89484	0.0001856	10.0163	47.0315	33.9067	56.0505
L1 . 56	**82093A**	**Ekran 9**					
	25-DEC-13	809	60.3	44.5	104.8	51	957
	23369.869988	42157.07535	0.0023625	14.4563	346.0146	237.3995	47.3666
L1 . 57	**89098A**	**Raduga 24**					
	25-DEC-13	809	60.6	44.3	104.9	53	1058
	23369.655012	42169.30726	0.0003723	14.7660	16.4109	118.5596	45.2649

L1 .nn	COSPAR	NAME					
	Date	P_{lib}	$\Delta\lambda$	λ_{min}	λ_{max}	N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
L1 . 58	**94012A**	**Raduga 31**					
	26-DEC-13	810	60.9	44.2	105.1	51	932
	23370.089595	42147.59462	0.0003502	13.6451	30.6566	43.7557	87.6340
L1 . 59	**80016A**	**Raduga 6**					
	26-DEC-13	822	65.4	41.8	107.2	52	968
	23370.774641	42151.30207	0.0005449	14.1436	338.0221	150.8294	98.9826
L1 . 60	**07018A**	**Nigcomsat 1**					
	26-DEC-13	826	66.8	41.1	107.9	53	346
	23370.785486	42144.80581	0.0005124	4.3754	63.6234	24.4459	67.0407
L1 . 61	**74060A**	**Molniya 1-S**					
	27-DEC-13	826	66.9	41.0	108.0	50	1043
	23371.086678	42169.26716	0.0012341	11.0927	321.1424	131.7315	41.9993
L1 . 62	**78039A**	**Yuri**					
	24-DEC-13	828	67.5	40.7	108.3	50	990
	23368.741447	42156.17506	0.0017716	14.0678	336.6041	182.1619	105.2762
L1 . 63	**86044A**	**Gorizont 12**					
	25-DEC-13	835	69.9	39.5	109.4	51	1006
	23369.067801	42160.65624	0.0004162	14.6499	3.0390	153.9688	40.1656
L1 . 64	**79105A**	**Gorizont 3**					
	22-DEC-13	835	70.0	39.4	109.4	52	989
	23366.903287	42154.75958	0.0016030	14.2637	338.9489	131.4350	105.3458
L1 . 65	**78073A**	**Raduga 4**					
	25-DEC-13	846	73.6	37.5	111.2	53	1030
	23369.857130	42144.73525	0.0009005	13.6993	333.4276	242.9067	90.0143
L1 . 66	**88111A**	**STTW-3**					
	24-DEC-13	846	73.7	37.5	111.2	50	1186
	23368.933067	42177.75147	0.0007257	14.0312	28.4472	58.7789	104.0823
L1 . 67	**75097A**	**Cosmos 775**					
	27-DEC-13	863	78.6	35.0	113.5	51	1049
	23371.454039	42184.89193	0.0010102	11.9362	324.2507	54.5393	93.6358
L1 . 68	**89081A**	**Gorizont 19**					
	31-DEC-13	864	78.8	34.8	113.7	52	1139
	23375.956030	42172.82372	0.0004729	14.4941	15.0980	155.5780	110.9880
L1 . 69	**99010A**	**Raduga 1-4**					
	26-DEC-13	864	78.9	34.8	113.7	52	760
	23370.801053	42158.45711	0.0003049	12.3969	46.3904	133.0222	112.0727
L1 . 70	**81069A**	**Raduga 9**					
	23-DEC-13	866	79.5	34.5	114.0	53	970
	23367.908819	42171.40936	0.0003323	14.4758	342.5425	103.7791	112.5621
L1 . 71	**77071A**	**Raduga 3**					
	26-DEC-13	866	79.6	34.4	114.0	50	1033
	23370.083032	42166.31553	0.0012173	13.2774	330.5646	151.3327	34.4319
L1 . 72	**96058D**	**Proton-K/DM-2M fourth stage (Blok DM-2M)**					
	26-DEC-13	872	81.0	33.7	114.7	52	783
	23370.221586	42177.39377	0.0009774	13.3249	33.5620	12.3774	41.1545

L1 .nn	COSPAR	NAME					
	Date	P_{lib}	$\Delta\lambda$	λ_{min}	λ_{max}	N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
L1 . 73	**94002A**	**Gals 1**					
	31-DEC-13	874	81.5	33.4	114.9	52	1010
	23375.148484	42157.74646	0.0011825	12.9586	36.2086	96.2330	35.4955
L1 . 74	**84078F**	**Proton-K/DM fourth stage (Blok-DM)**					
	26-DEC-13	877	82.5	32.9	115.4	51	967
	23370.534329	42146.90178	0.0025602	14.6676	356.7186	90.6977	102.5756
L1 . 75	**01037D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	25-DEC-13	886	84.7	31.7	116.4	50	611
	23369.071493	42190.22833	0.0020728	8.3840	50.4298	327.7481	77.6086
L1 . 76	**97071B**	**Cakrawatra 1**					
	26-DEC-13	896	87.1	30.5	117.6	52	803
	23370.214907	42159.56294	0.0000824	7.2195	54.8184	170.1474	31.9763
L1 . 77	**89030A**	**Raduga 23**					
	26-DEC-13	911	90.6	28.6	119.2	52	1147
	23370.779120	42189.73224	0.0022143	14.5048	13.5655	80.8070	85.9341
L1 . 78	**82031A**	**Insat-IA**					
	26-DEC-13	924	93.4	27.1	120.5	51	627
	23370.714398	42167.23991	0.0018060	14.5785	345.6669	296.3231	120.8520
L1 . 79	**74060F**	**Proton-K/DM fourth stage (Blok-DM)**					
	24-DEC-13	932	95.1	26.2	121.3	50	929
	23368.821759	42181.26772	0.0019083	11.0843	320.9631	89.4281	109.9357
L1 . 80	**90061D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	26-DEC-13	942	97.0	25.2	122.2	53	1022
	23370.617118	42191.74704	0.0035699	14.4633	18.4511	91.4809	68.7263
L1 . 81	**97021A**	**Zhongxing 6 (B)**					
	25-DEC-13	986	105.0	20.9	125.9	52	851
	23369.215208	42158.23881	0.0008293	8.6684	50.9667	10.7825	22.3903
L1 . 82	**09018A**	**Beidou DW 2 (Compass G2)**					
	25-DEC-13	993	106.1	20.3	126.4	51	246
	23369.753970	42159.43431	0.0077061	2.9616	67.5004	174.6402	123.1147
L1 . 83	**86090D**	**Proton-K/DM fourth stage (Blok-DM)**					
	31-DEC-13	1007	108.4	19.0	127.4	51	1060
	23375.720903	42154.11632	0.0010930	14.6689	4.6299	67.9866	24.3695
L1 . 84	**91014A**	**Raduga 27**					
	26-DEC-13	1024	110.9	17.6	128.5	51	1120
	23370.737581	42165.77920	0.0002740	14.9148	20.5663	66.0120	17.5305
L1 . 85	**04010A**	**Raduga-1**					
	25-DEC-13	1030	111.7	17.2	128.9	52	499
	23369.757593	42169.09555	0.0002365	7.5692	59.8684	85.8705	128.6869
L1 . 86	**84063A**	**Raduga 15**					
	25-DEC-13	1032	112.0	17.0	129.0	50	963
	23369.874549	42151.40431	0.0006116	14.6798	355.2921	96.8334	121.8519
L1 . 87	**96040B**	**Turksat 1C**					
	26-DEC-13	1047	114.1	15.8	130.0	51	867
	23370.063438	42164.18323	0.0004749	4.9262	61.4965	66.1182	16.1352

L1 .nn	COSPAR	NAME					
	Date	P_{lib}	$\Delta\lambda$	λ_{min}	λ_{max}	N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
L1 . 88	**77092H**	**Ekran 2 fragmentation debris**					
	27-DEC-13	1049	114.3	15.7	130.0	50	713
	23371.176285	42179.17141	0.0008402	13.2748	330.8257	137.6624	26.9587
L1 . 89	**03015F**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	27-DEC-13	1075	117.6	13.9	131.5	52	531
	23371.540544	42141.45896	0.0009906	7.0252	54.0847	290.3546	107.7869
L1 . 90	**83089B**	**Insat-IB**					
	27-DEC-13	1077	117.9	13.7	131.6	52	1038
	23371.415012	42171.74478	0.0011142	14.7239	9.1199	120.2343	129.6889
L1 . 91	**01037A**	**Cosmos-2379**					
	26-DEC-13	1099	120.5	12.2	132.7	50	632
	23370.460394	42150.05505	0.0004330	8.4236	50.2895	99.8257	123.0419
L1 . 92	**95054D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	31-DEC-13	1106	121.4	11.7	133.1	52	778
	23375.780243	42194.74469	0.0019679	12.3676	42.2034	341.9225	89.3361
L1 . 93	**93013A**	**Raduga 29**					
	26-DEC-13	1113	122.1	11.3	133.4	50	1068
	23370.704363	42153.22739	0.0004482	13.9391	27.6645	40.3570	128.3393
L1 . 94	**77108A**	**Meteosat 1**					
	27-DEC-13	1127	123.5	10.5	134.0	52	1043
	23371.058032	42149.51980	0.0010770	13.8417	334.9284	332.0448	23.7360
L1 . 95	**88095A**	**Raduga 22**					
	27-DEC-13	1135	124.4	10.0	134.4	51	1171
	23371.203044	42179.03112	0.0007231	14.5758	11.9118	87.9840	21.9464
L1 . 96	**84035A**	**STW F-2**					
	26-DEC-13	1141	125.1	9.6	134.7	49	941
	23370.774803	42192.64108	0.0011470	14.5702	0.0080	82.0309	99.4551
L1 . 97	**95063D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	25-DEC-13	1171	128.0	7.9	135.8	51	783
	23369.875544	42137.91825	0.0044641	13.6539	30.8228	66.0976	103.7303
L1 . 98	**90102A**	**Gorizont 22**					
	26-DEC-13	1320	139.0	1.0	140.0	50	1122
	23370.149514	42150.29285	0.0001714	14.3882	19.3583	187.6855	16.7929
L1 . 99	**74094A**	**Skynet 2B**					
	26-DEC-13	1373	141.8	359.1	140.9	51	842
	23370.164282	42163.23406	0.0002800	12.5673	331.3455	92.9088	359.0584
L1 . 100	**78035A**	**Intelsat IVA F-6**					
	24-DEC-13	1422	144.1	357.5	141.6	51	984
	23368.932222	42145.97460	0.0006961	14.7156	355.4200	170.2118	124.4254
L1 . 101	**70032A**	**Intelsat III F-7**					
	25-DEC-13	1461	145.6	356.4	142.0	49	117
	23369.966204	42131.27440	0.0002055	7.8200	309.3076	214.2669	66.5403
L1 . 102	**93062D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	25-DEC-13	1562	148.6	354.1	142.7	49	813
	23369.893634	42147.15046	0.0009522	13.7206	29.3452	338.0408	126.8895

L1 .nn	COSPAR	NAME					
	Date	P_{lib}	$\Delta\lambda$	λ_{min}	λ_{max}	N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
L1 . 103	**85035B**	**Telecom 1B**					
	25-DEC-13	1665	150.7	352.4	143.1	52	1047
	23369.882303	42183.99268	0.0000482	14.7246	3.3127	73.1198	124.2353
L1 . 104	**92088A**	**Cosmos 2224**					
	27-DEC-13	1675	150.9	352.3	143.1	51	1051
	23371.753773	42169.80136	0.0004715	13.3070	29.2991	135.9576	357.6592
L1 . 105	**67026A**	**Intelsat II F-3**					
	25-DEC-13	1743	151.8	351.4	143.3	50	530
	23369.650336	42171.75376	0.0022034	5.8877	309.6196	251.4141	140.3142

3.5 Objects in a libration orbit around the Western stable point

In the case where the object is in a libration orbit around the Western stable point (longitude 105 W), there are 40 objects identified.

For explanation of symbols, see the definitions at the beginning of Chapter 3 on page 34.

L2 .nn	**COSPAR**	**NAME**					
	Date	P_{lib}	$\Delta\lambda$	λ_{min}	λ_{max}	N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
L2 . 1	**68081D**	**LES 6**					
	25-DEC-13	10	90.7	210.9	301.6	51	1071
	23369.379051	42186.94320	0.0006990	8.3181	321.8549	290.0845	262.5778
L2 . 2	**93058B**	**ACTS**					
	26-DEC-13	890	1.2	254.1	255.3	53	1027
	23370.485451	42164.69539	0.0016522	12.6784	37.8488	351.1357	254.0845
L2 . 3	**88081A**	**Gstar 3**					
	26-DEC-13	900	0.3	254.5	254.8	52	1107
	23370.353322	42164.63848	0.0007073	15.7912	4.0522	69.0018	254.6014
L2 . 4	**85035A**	**Gstar 1**					
	27-DEC-13	900	0.3	254.6	254.9	53	1216
	23371.142338	42164.63232	0.0004740	13.6948	31.5693	336.1847	254.6348
L2 . 5	**71009A**	**NATO IIB**					
	25-DEC-13	900	0.9	254.2	255.1	51	1018
	23369.591076	42164.71922	0.0005046	10.8889	320.4266	113.6916	255.1795
L2 . 6	**67111A**	**ATS 3**					
	27-DEC-13	900	0.3	254.6	254.9	53	1168
	23371.552986	42164.78790	0.0016415	6.9626	308.3328	99.3401	254.7888
L2 . 7	**69101A**	**Skynet 1A**					
	25-DEC-13	910	4.1	252.6	256.7	52	935
	23369.468738	42165.43802	0.0025293	9.3722	318.0708	190.0352	256.6093
L2 . 8	**78062A**	**GOES 3**					
	27-DEC-13	911	8.0	250.7	258.8	51	1212
	23371.454826	42164.35170	0.0004517	14.4505	344.8584	118.8238	258.5724
L2 . 9	**93073A**	**Solidaridad 1**					
	27-DEC-13	911	8.1	250.7	258.8	52	1012
	23371.511701	42163.05382	0.0005504	11.3231	43.2152	122.7442	256.9378
L2 . 10	**70021A**	**NATO I**					
	27-DEC-13	912	10.5	249.5	260.0	52	943
	23371.375394	42162.13836	0.0004647	9.8972	321.7747	154.9977	255.4290
L2 . 11	**71095A**	**OPS 9431 (DSCS II F-1)**					
	26-DEC-13	913	13.0	248.3	261.3	51	1142
	23370.418495	42166.56702	0.0005163	11.2762	321.9154	178.3341	260.4146
L2 . 12	**76023A**	**LES 8 (RTGPP)**					
	25-DEC-13	913	13.9	247.8	261.7	52	1194
	23369.554873	42166.20787	0.0012650	13.3489	106.9012	5.3874	253.9356

L2 .nn	COSPAR	NAME					
	Date	P_{lib}	$\Delta\lambda$	λ_{min}	λ_{max}	N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
L2 . 13	**93077A**	**Telstar 4A**					
	27-DEC-13	914	16.5	246.5	263.1	52	1032
	23371.512616	42160.35299	0.0008696	13.4199	33.6130	32.7344	255.0873
L2 . 14	**76023B**	**LES 9 (RTGPP)**					
	27-DEC-13	920	5.0	252.5	257.5	51	1205
	23371.544722	42165.66846	0.0021790	13.3125	106.8559	32.8618	257.0418
L2 . 15	**95049A**	**Telstar 402R**					
	27-DEC-13	925	32.2	238.8	271.0	51	923
	23371.446574	42167.98573	0.0001722	8.9284	50.0738	236.5121	269.7578
L2 . 16	**85076C**	**ASC 1**					
	25-DEC-13	940	45.6	232.3	277.9	51	1149
	23369.548773	42163.62903	0.0004121	14.2150	26.2062	301.9141	277.9793
L2 . 17	**75100A**	**GOES 1**					
	27-DEC-13	943	48.5	230.9	279.4	51	1171
	23371.545799	42153.74063	0.0003124	13.5796	332.7303	192.3643	242.7698
L2 . 18	**82105A**	**Aurora I**					
	25-DEC-13	950	0.7	254.4	255.1	51	1204
	23369.487488	42164.48150	0.0002538	14.6521	14.6292	295.4013	254.7698
L2 . 19	**83041A**	**GOES 6**					
	27-DEC-13	962	60.0	225.4	285.4	53	1205
	23371.420081	42150.29481	0.0004325	14.7434	3.4852	112.6934	244.3846
L2 . 20	**95069A**	**Galaxy IIIR**					
	25-DEC-13	965	61.3	224.8	286.1	52	918
	23369.513634	42166.54459	0.0000731	8.0972	52.4392	30.0941	285.9551
L2 . 21	**81049A**	**GOES 5**					
	27-DEC-13	995	75.3	218.1	293.4	51	1143
	23371.520544	42145.70241	0.0003874	14.7553	358.6395	157.3283	257.2743
L2 . 22	**76004A**	**Hermes**					
	26-DEC-13	1006	79.5	216.1	295.7	51	1138
	23370.343241	42147.05973	0.0016954	13.1516	329.8329	142.8376	272.4872
L2 . 23	**96055A**	**EchoStar 2**					
	26-DEC-13	1032	88.4	212.0	300.3	51	862
	23370.455046	42172.09984	0.0002881	4.6391	62.7291	356.9242	214.6981
L2 . 24	**87100A**	**Raduga 21**					
	27-DEC-13	1099	105.9	203.8	309.8	50	1209
	23371.447454	42141.26216	0.0003995	15.0631	8.4907	100.5430	237.1618
L2 . 25	**65028A**	**Intelsat I F-1**					
	25-DEC-13	1124	111.2	201.4	312.7	40	499
	23369.228241	42190.97068	0.0006577	2.9714	295.0600	174.5816	261.5523
L2 . 26	**97086A**	**HGS-1**					
	25-DEC-13	1285	135.5	190.7	326.3	52	775
	23369.748275	42172.79343	0.0044200	5.3888	73.4589	282.6395	194.3501
L2 . 27	**84078A**	**Gorizont 10**					
	23-DEC-13	1306	137.7	189.8	327.6	50	1084
	23367.305104	42164.02877	0.0002654	14.6315	356.4861	151.8803	327.8102

L2 .nn	COSPAR	NAME					
	Date	P_{lib}	$\Delta\lambda$	λ_{min}	λ_{max}	N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
L2 . 28	**90016A**	**Raduga 25**					
	27-DEC-13	1323	139.5	189.1	328.6	51	1160
	23371.439340	42147.22859	0.0004506	14.4798	16.6911	107.3450	308.1173
L2 . 29	**67094A**	**Intelsat II F-4**					
	27-DEC-13	1325	139.7	189.0	328.7	50	829
	23371.441007	42191.32530	0.0017576	6.0746	305.8360	198.8623	226.9652
L2 . 30	**82103A**	**Gorizont 6**					
	26-DEC-13	1339	141.0	188.5	329.5	48	1038
	23370.302338	42186.73492	0.0005357	14.4721	347.6675	130.2576	297.7475
L2 . 31	**85070A**	**Raduga 16**					
	27-DEC-13	1349	142.0	188.1	330.1	47	1035
	23371.483299	42191.69144	0.0003599	14.6594	359.4107	130.7220	282.0863
L2 . 32	**80081A**	**Raduga 7**					
	26-DEC-13	1452	150.0	185.1	335.1	52	1025
	23370.171875	42137.50486	0.0010336	14.1917	339.6150	185.1182	284.5868
L2 . 33	**94038A**	**Cosmos 2282**					
	27-DEC-13	1489	152.3	184.3	336.6	51	987
	23371.780544	42169.49654	0.0008701	12.6556	33.5979	7.9611	185.0764
L2 . 34	**92059A**	**Cosmos 2209**					
	26-DEC-13	1495	152.7	184.2	336.8	51	1046
	23370.393576	42187.24720	0.0004073	14.1547	25.2946	134.7371	300.5320
L2 . 35	**85016A**	**Cosmos 1629**					
	27-DEC-13	1502	153.1	184.0	337.1	50	1041
	23371.497546	42152.70745	0.0007420	14.6979	357.6028	120.2093	192.1024
L2 . 36	**87091A**	**Cosmos 1894**					
	27-DEC-13	1515	153.7	183.8	337.6	51	1154
	23371.528576	42195.20695	0.0002957	14.6010	7.3435	153.5902	238.8196
L2 . 37	**80004A**	**OPS 6393 (FLTSATCOM F3)**					
	27-DEC-13	1543	155.1	183.4	338.5	51	1120
	23371.535150	42192.83876	0.0028978	13.2069	346.2432	127.2019	227.6668
L2 . 38	**89101A**	**Cosmos 2054**					
	25-DEC-13	1662	159.8	182.1	341.9	52	1136
	23369.547488	42136.61905	0.0002173	14.4847	16.2368	74.0041	284.0141
L2 . 39	**94082A**	**Luch 1**					
	31-DEC-13	1856	163.9	181.3	345.2	51	962
	23375.167106	42168.19574	0.0005410	12.9713	37.6645	71.1458	341.3043
L2 . 40	**94060A**	**Cosmos 2291**					
	31-DEC-13	2373	167.0	181.0	348.0	51	963
	23375.763796	42156.95177	0.0006948	13.4001	31.9616	86.8419	184.1721

3.6 Objects in a libration orbit around both stable points

In the case where the object is in a libration orbit around both stable points, there are 16 objects identified.

It is important to note that this category is special and only a smaller number of objects is concerned. It is a borderline case, just between a libration around one stable point and a drift around the Earth. Thus, some perturbations which could be neglected in the other cases have a strong influence here. The main consequence is that this category is more sensitive to errors in the measurements than the others and the libration period may have a low accuracy.

For explanation of symbols, see the definitions at the beginning of Chapter 3 on page 34.

L3 .nn	**COSPAR**	**NAME**					
	Date	P_{lib}	$\Delta\lambda$	λ_{min}	λ_{max}	N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
L3 . 1	**82044F**	**Proton-K/DM fourth stage (Blok-DM)**					
	24-DEC-13	2936	334.9	174.6	149.5	51	967
	23368.796898	42148.02646	0.0017769	15.5872	347.3167	76.0306	129.0368
L3 . 2	**97083A**	**Intelsat 804**					
	27-DEC-13	2936	335.1	174.5	149.6	52	808
	23371.545498	42133.87683	0.0003054	7.7597	53.3860	209.5542	231.3166
L3 . 3	**71095B**	**OPS 9432 (DSCS II F-2)**					
	23-DEC-13	2937	335.6	174.3	149.8	52	1026
	23367.776887	42160.20473	0.0000913	11.2266	322.2282	346.1784	175.3633
L3 . 4	**91054D**	**IUS second stage**					
	31-DEC-13	2937	334.1	175.0	149.1	52	904
	23375.291609	42175.14618	0.0034367	15.8359	18.9153	222.7718	359.9991
L3 . 5	**91064A**	**Cosmos 2155**					
	24-DEC-13	2943	332.7	175.8	148.4	48	1101
	23368.860475	42145.53972	0.0001584	14.3608	21.7756	84.9881	127.5467
L3 . 6	**86027A**	**Cosmos 1738**					
	26-DEC-13	2945	337.4	173.4	150.7	50	1094
	23370.400370	42148.81569	0.0012275	15.1971	2.0043	14.9650	129.9215
L3 . 7	**97041A**	**Cosmos 2345**					
	26-DEC-13	2996	329.0	146.6	177.6	51	812
	23370.484306	42166.51599	0.0164495	12.1361	39.4327	179.1428	164.4400
L3 . 8	**12012D**	**Proton-K/DM-2 fourth stage (Blok DM-2)**					
	26-DEC-13	3014	328.3	178.0	146.3	50	92
	23370.292130	42167.34982	0.0011227	1.0580	296.4255	339.9187	346.4759
L3 . 9	**90094A**	**Gorizont 21**					
	25-DEC-13	3066	326.9	178.7	145.6	52	1157
	23369.459016	42132.24554	0.0006844	14.4671	19.1409	140.3661	252.2903
L3 . 10	**00029A**	**Gorizont 33**					
	31-DEC-13	3109	326.1	179.1	145.2	53	692
	23375.423588	42152.35252	0.0002271	10.1707	45.6745	57.1225	327.9354
L3 . 11	**94067D**	**Proton-K/DM-2M fourth stage (Blok DM-2M)**					
	26-DEC-13	3604	323.0	180.8	143.7	51	865
	23370.398542	42170.31089	0.0007930	13.9918	27.6365	32.7846	142.5095

L3 .nn	COSPAR	NAME					
	Date	P_{lib}	$\Delta\lambda$	λ_{min}	λ_{max}	N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
L3 . 12	**85007A**	**Gorizont 11**					
	25-DEC-13	3648	322.9	180.8	143.7	52	1060
	23369.549120	42159.82918	0.0003875	14.6056	358.1862	102.1018	143.4554
L3 . 13	**91079A**	**Cosmos 2172**					
	25-DEC-13	3729	322.7	180.9	143.6	52	1060
	23369.873657	42176.82455	0.0002354	14.2760	22.8197	260.4540	135.3194
L3 . 14	**87084A**	**Cosmos 1888**					
	27-DEC-13	3750	322.7	180.9	143.6	53	1176
	23371.491539	42184.90428	0.0004422	14.5643	7.7703	117.1312	204.1062
L3 . 15	**95045A**	**Cosmos 2319**					
	27-DEC-13	3786	322.7	180.9	143.6	51	923
	23371.457488	42195.33979	0.0007026	12.9979	35.0598	116.2873	236.7581
L3 . 16	**94030A**	**Gorizont 30**					
	31-DEC-13	3918	322.5	181.0	143.5	52	1003
	23375.739977	42184.56523	0.0003195	13.5822	30.5917	125.7731	24.3623

The longitude histories of objects in this category are plotted in Fig 3.1 to 3.16.

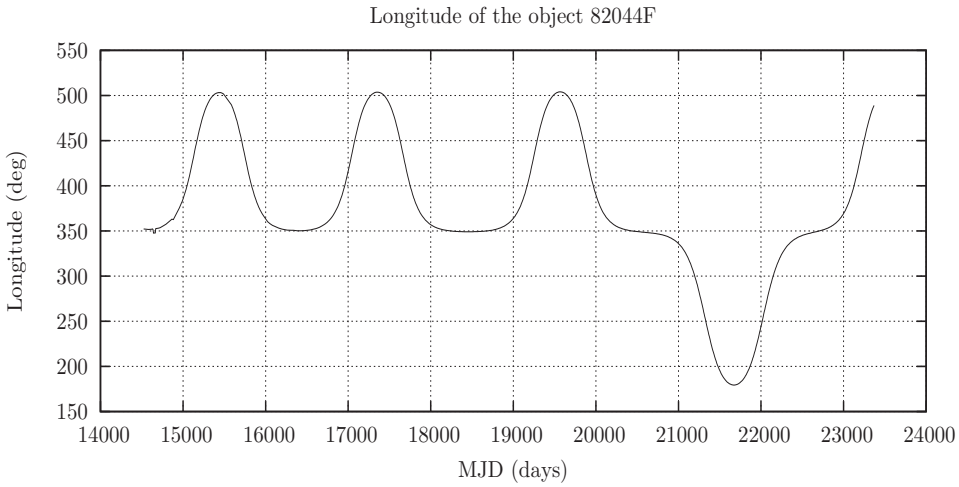

Figure 3.1: Longitude history of 82044F

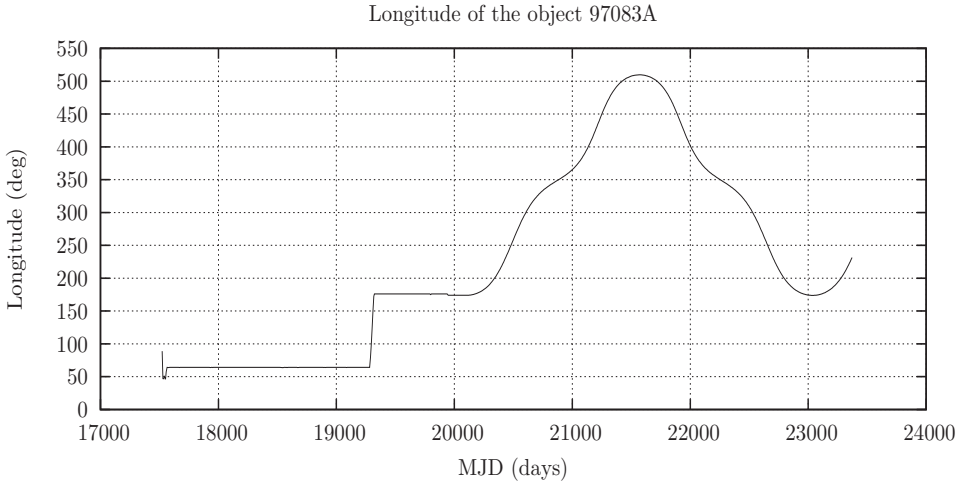

Figure 3.2: Longitude history of 97083A

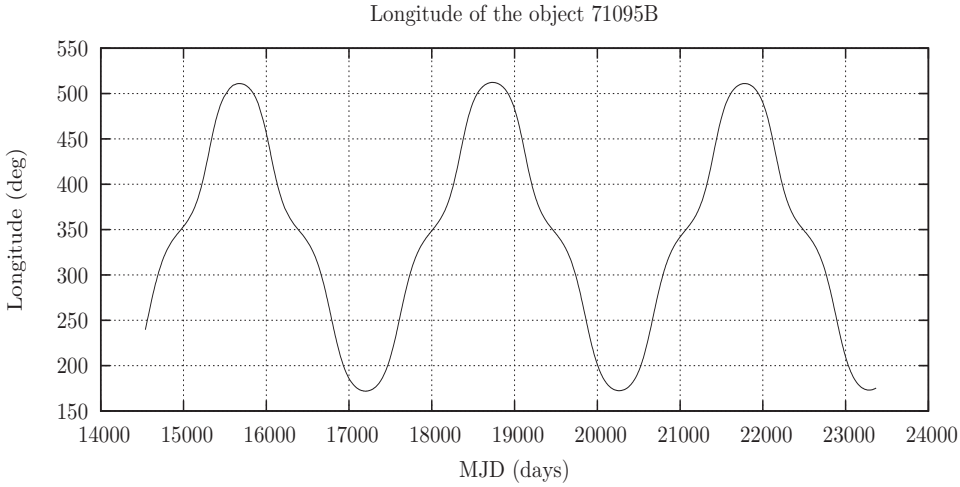

Figure 3.3: Longitude history of 71095B

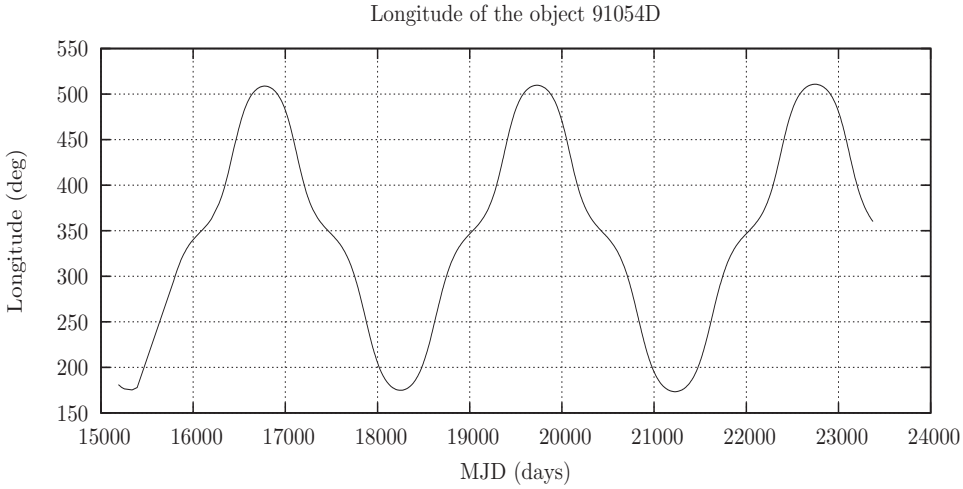

Figure 3.4: Longitude history of 91054D

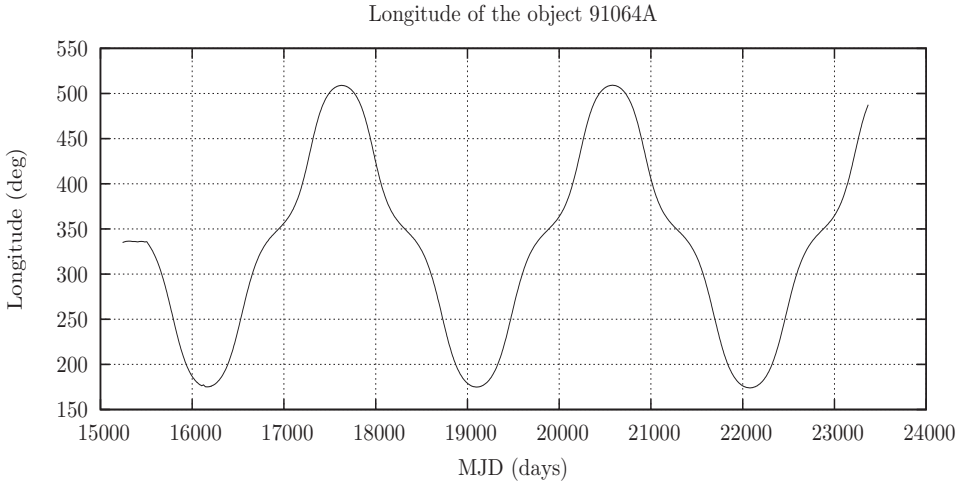

Figure 3.5: Longitude history of 91064A

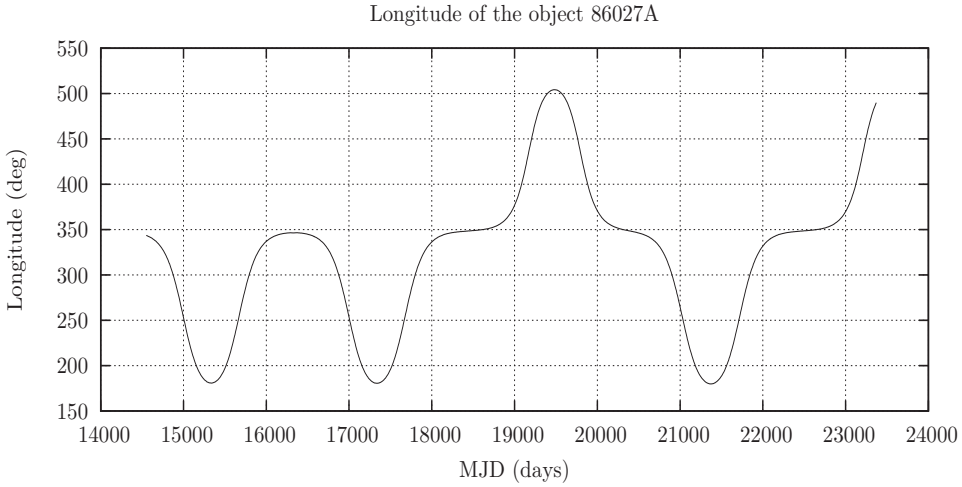

Figure 3.6: Longitude history of 86027A

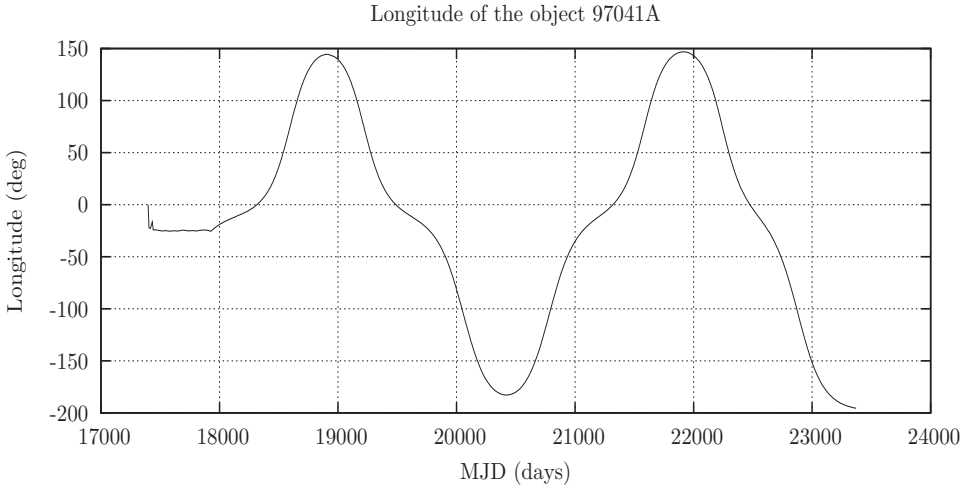

Figure 3.7: Longitude history of 97041A

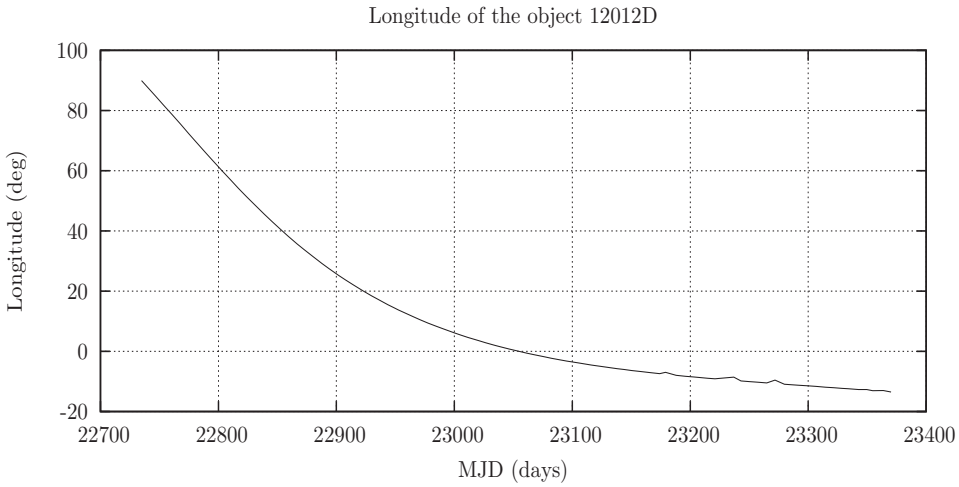

Figure 3.8: Longitude history of 12012D

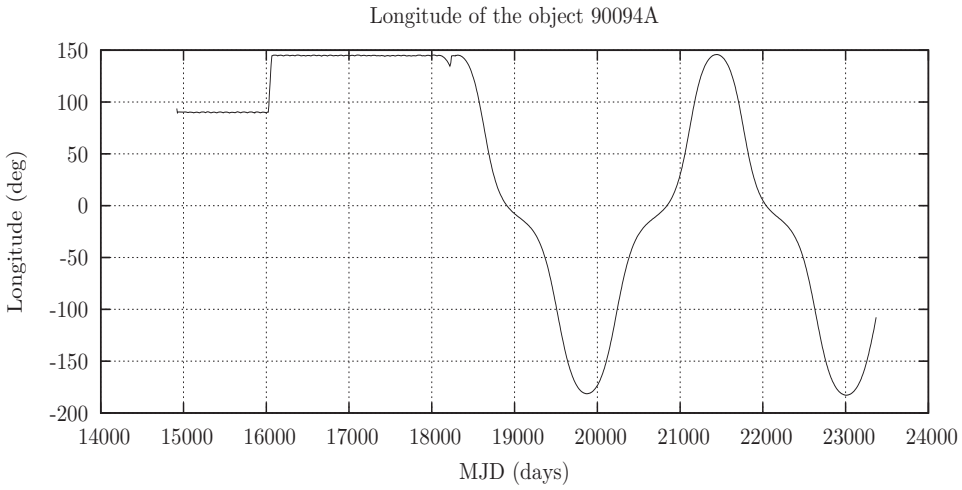

Figure 3.9: Longitude history of 90094A

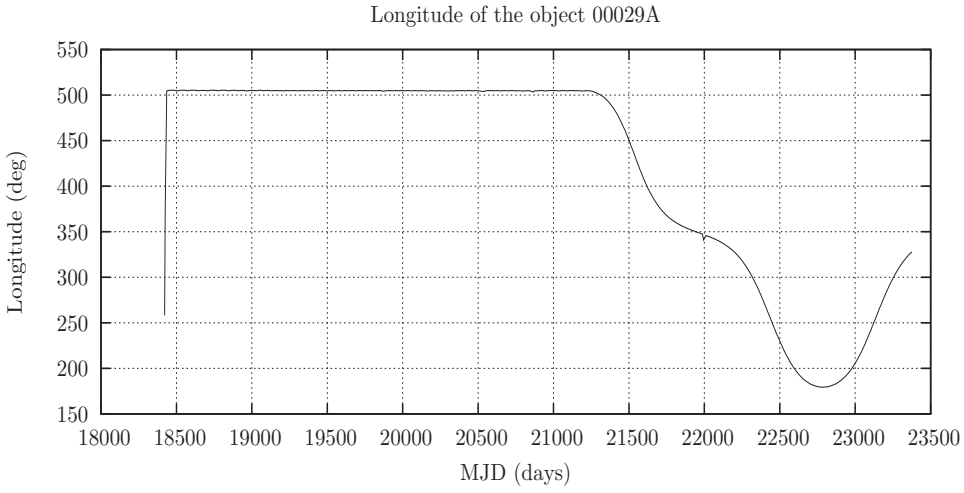

Figure 3.10: Longitude history of 00029A

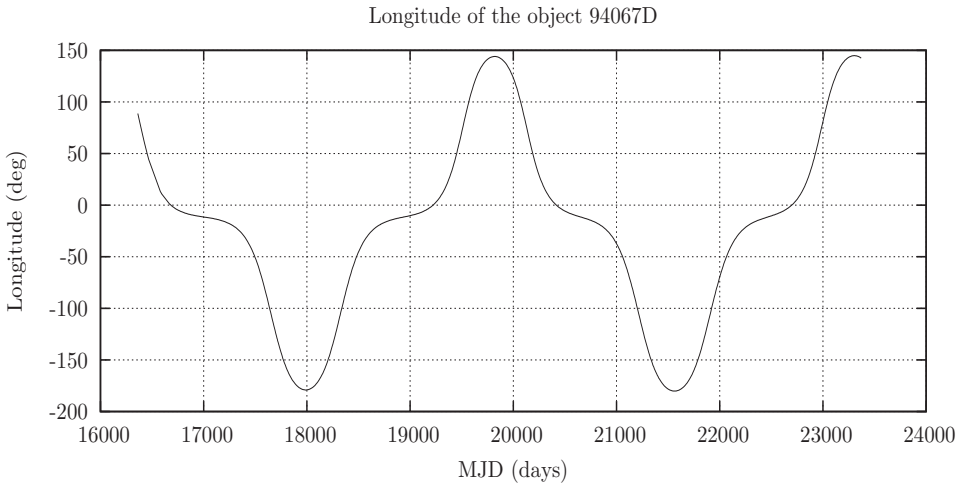

Figure 3.11: Longitude history of 94067D

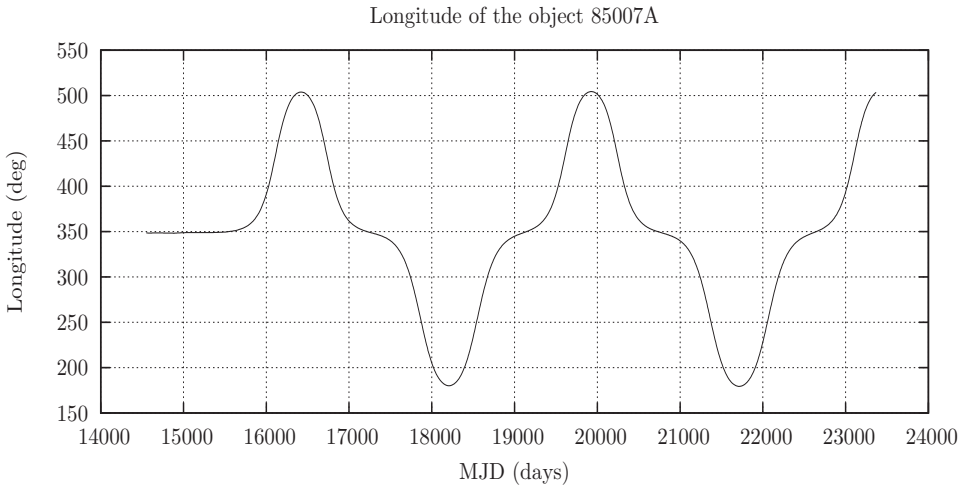

Figure 3.12: Longitude history of 85007A

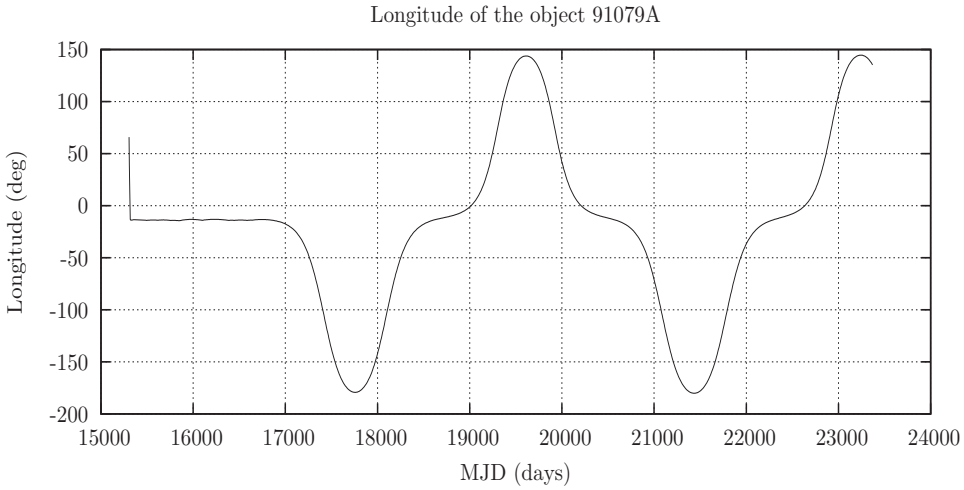

Figure 3.13: Longitude history of 91079A

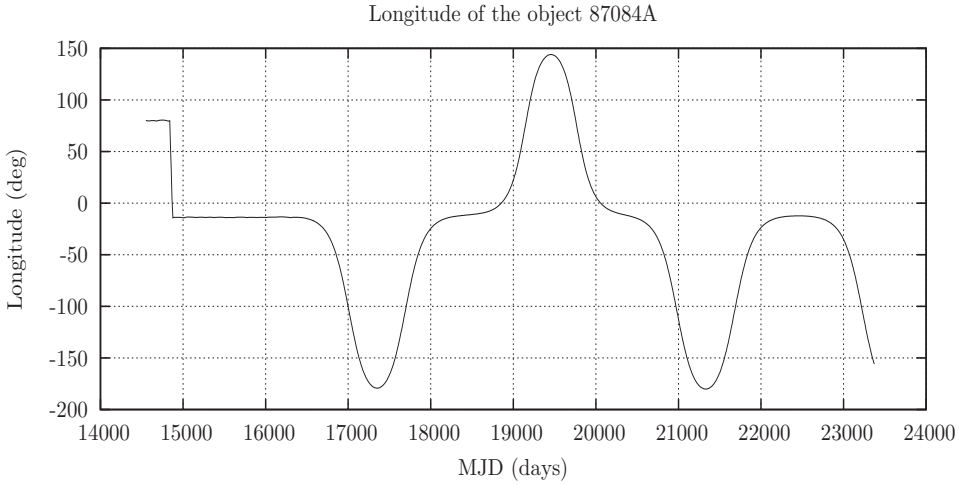

Figure 3.14: Longitude history of 87084A

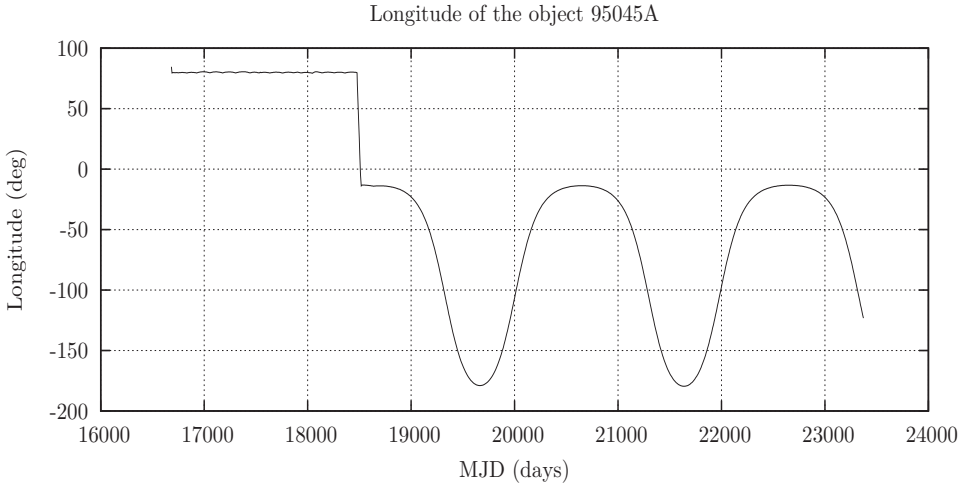

Figure 3.15: Longitude history of 95045A

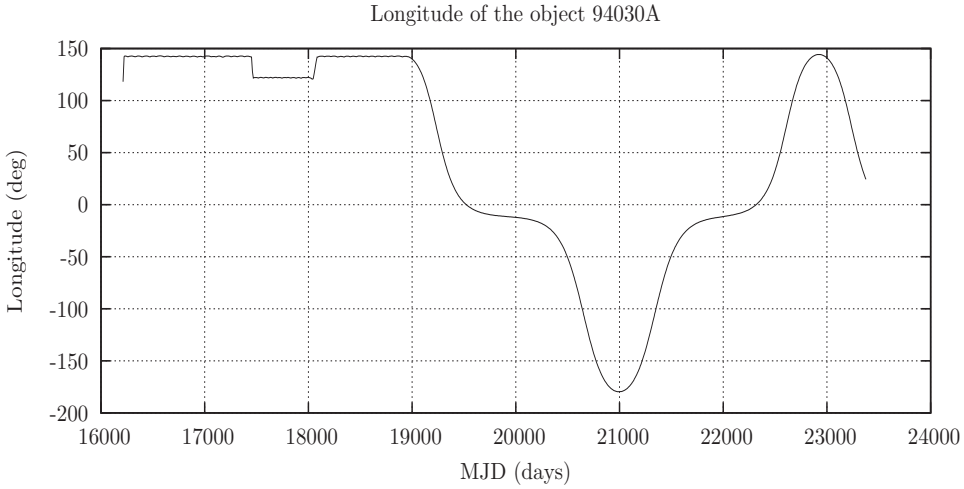

Figure 3.16: Longitude history of 94030A

4 Table 2: Objects without Two-Line-Element data

This table contains all objects for which the TLEs were not updated during the last six months or for which no TLEs are available at all.

They are ordered according to the following criteria:

1. Status C1, then according to the ascending order of longitude of station keeping.
2. Status C2, then according to the ascending order of longitude of station keeping.
3. Status C, then according to the COSPAR identifier.
4. Status D, then according to the ascending order of the semi-major axis.
5. Status L1, then according to the ascending order of the longitude.
6. Status L2, then according to the ascending order of the longitude.
7. Status L3, then according to the ascending order of the longitude.
8. Status Ind, then according to the ascending order of the longitude.
9. Status UI (unidentified objects), then according to their UI number.
10. Status U (uncontrolled objects), then according to the COSPAR identifier.
11. Status UU (uncontrolled uncatalogued objects), then according to the COSPAR identifier.

The objects listed in chapters 4.1 to 4.8 were observed repeatedly by ground based telescopes. They were listed in issues 7 to 13 as 'Unidentified objects'. During the years 2011-2012 most of them were correlated to a launch thanks to the excellent work of satellite analysts and amateur observers. But for the objects in chapter 4.8 their origin is not yet determined with the required reliability.

Orbits were established by processing of optical measurements and propagation to Jan 1, 2014 00:00:00 UTC except a few cases when the orbit was propagated to UTC midnight closest to the last obtained measurement. For most of the orbits this time point is within the orbit determination time interval but for some of them it is outside due to visibility constraints of the participating optical facilities.

The numerical integration model used in the data processing is taking into account the Earth gravity field (16x16, EGM-96), the Moon and the Sun gravity (DE-405 ephemeris) and solar radiation pressure (diffuse Lamberthian sphere model).

All objects are usually relatively bright as a rule (brighter than 15th magnitude at favorable phase angles) and have no significant short term variations in brightness. Though there are a few exceptions.

The listed orbits are produced from measurements obtained in 2013. They are a joint product of the wide cooperation of organizations including:

- Center on collection, processing and analysis of information on space debris at the Keldysh Institute of Applied Mathematics of the Russian Academy of Sciences (KIAM RAS, Moscow, Russia),
- International scientific observation facilities network (ISON) coordinated by KIAM RAS and including the following observatories:

- Ussuriysk Astrophysical Observatory of the Far East branch of the RAS (Gornotayozhnoye, Primorsky Krai, Russia),
- Zvenigorod observatory of the Astronomy Institute of the RAS (INASAN) (Moscow region, Russia),
- Ulugbek Astronomical Observatory (Kitab facilitiy, Qashqadaryo Province, Uzbekistan),
- Observation facilities operated by the Astronomical Scientific Center NPP "Proekt-tekhnika", JSC:
  * Artem (Primorsky Krai, Russia),
  * Blagoveshchensk (Amur region, Russia),
  * Kislovodsk observatory (Karachaevo-Cherkesskaya Republic, Russia),
  * Lesosibirsk (Krasnoyarsky Krai, Russia),
  * Milkovo (Kamchatka Krai, Russia),
- Andrushivka Observatory (Zhytomyrs'ka region, Ukraine),
- National observatory of Bolivia (Tarija, Bolivia),
- Observation facility of the PGU (Tiraspol),
- Gissar and Sanglok observatories of the Institute for Astrophysics of Tajikistan,
- Odessa State University Astronomical Observatory (Mayaki, Odes'ka region, Ukraine),
- Derenovka observation facility of the Space research laboratory of the Physics faculty of Uzhgorod national university (Zakarpats'ka region,Ukraine),
- Chuguyev observation facility of the Astronomy scientific and research institute of Kharkov national university (Kharkiv'ska region, Ukraine),
- Cosalá observation facility of the The Autonomous University of Sinaloa (Universidad Autónoma de Sinaloa, UAS, Mexico),
- Khureltogoot observatory of the The Research Centre of Astronomy and Geophysics of the Mongolian Academy of Sciences

- Astronomical Institute of the University of Bern, partner of ISON, operating the Zimmerwald observatory (Switzerland) and, for space debris observation, the ESA 1m telescope at the optical ground station (OGS), Izaña, Tenerife, Spain,
- Telescope Fabra ROA Montsec (TFRM) operated by the Reial Acadèmia de Ciències i Arts de Barcelona - Observatori Fabra, the Real Instituto y Observatorio de la Armada (ROA) and the Departament d'Astronomia i Meteorologia, Universitat de Barcelona, Spain.

The following symbols are used:

- TYPE - type of orbital motion performed by the object as determined from 5 years observations:
  - C1 - maintains longitude and near-zero inclination,
  - C2 - maintains longitude only,
  - C3 - maintains longitude and a non-zero inclination,
  - C4 - maintains a drift orbit inside the GEO protected zone,
  - D1 - drifts along GEO under natural perturbations influence only,

  - D2 - drifts along GEO under natural perturbations and accelerations produced by on-board energy sources,
  - L1 - librates around Eastern stable point,
  - L2 - librates around Western stable point,
  - L3 - librates around both stable points
  - Ind - indeterminate status
- COSPAR - the COSPAR identifier
- NAME - the object's common name
- UInnn - number of object (used by KIAM before identification)
- YYYYMMDD HHMMSS.SS - date and time of given set of elements, UTC
- t_{osc} - osculating period, min
- H_p - perigee height, km
- H_a - apogee heigh, km
- λ - geodetic longitude at closest ascending node preceding date and time of given set of elements, degrees East
- i - inclination, degrees
- Ω - right ascension of ascending node, degrees
- ω - argument of perigee, degrees
- a - semimajor axis, km
- e - eccentricity
- u - argument of latitude, degrees

The osculating orbital elements are given in the standard Earth equator J2000 reference frame.

4.1 Satellites under longitude and inclination control (E-W and N-S control)

In the case where the satellite is under longitude and inclination control, there are 8 objects identified.

For explanation of symbols, see the definitions at the beginning of Chapter 4 on page 124.

C1 .nn	**COSPAR**	**NAME**				
UInnn	YYYYMMDD	HH:MM:SS.SS	t_{osc}	H_p	H_a	λ
	i	Ω	ω	a	e	u
C1 . 1	**09020A**	**SICRAL 1B**				
UI179	20140101	00:00:00.0	1436.1955	35787.7	35789.4	011.703
	00.1861	083.7036	037.2943	42166.662	0.0000197	028.3866
C1 . 2	**09047A**	**USA 207 (PAN)**				
UI158	20140101	00:00:00.0	1436.1341	35756.3	35818.4	047.697
	00.1442	052.7871	294.1829	42165.461	0.0007368	095.2443
C1 . 3	**09017A**	**USA 204 (WGS F2)**				
UI156	20140101	00:00:00.0	1436.0898	35781.7	35791.2	060.184
	00.0975	074.8668	306.5538	42164.593	0.0001130	085.7025
C1 . 4	**12003A**	**WGS SV-4**				
UI169	20140101	00:00:00.0	1436.0638	35783.6	35788.3	088.421
	00.0928	075.2038	359.2459	42164.083	0.0000562	113.6124
C1 . 5	**07046A**	**USA 195 (WGS F1)**				
UI152	20140101	00:00:00.0	1436.2175	35786.5	35791.4	175.033
	00.1051	069.0675	201.0821	42167.093	0.0000580	206.3310
C1 . 6	**13041A**	**USA 244 (WGS SV-6)**				
UI180	20140101	00:00:00.0	1436.0936	35784.4	35788.6	238.121
	00.1096	069.0507	253.1921	42164.667	0.0000494	269.4509
C1 . 7	**13024A**	**USA 243 (WGS SV-5)**				
UI176	20140101	00:00:00.0	1436.1887	35781.0	35795.8	307.750
	00.1195	071.0630	080.1578	42166.529	0.0001746	337.0478
C1 . 8	**09068A**	**USA 211 (WGS F3)**				
UI159	20140101	00:00:00.0	1436.2204	35783.3	35794.8	348.007
	00.0963	074.6436	028.0980	42167.149	0.0001364	013.7542

4.2 Satellites under longitude control (only E-W control)

In the case where the satellite is only under longitude control, there are 49 objects identified.

For explanation of symbols, see the definitions at the beginning of Chapter 4 on page 124.

C2 .nn	**COSPAR**	**NAME**				
UInnn	YYYYMMDD	HH:MM:SS.SS	t_{osc}	H_p	H_a	λ
	i	Ω	ω	a	e	u
C2 . 1	**97008A**	**USA 130 (DSP F18)**				
UI125	20140101	00:00:00.0	1436.2918	35787.8	35793.3	008.185
	11.2589	043.9935	153.8419	42168.546	0.0000647	064.5661
C2 . 2	**13011A**	**USA 241 (SBIRS GEO-2)**				
UI175	20140101	00:00:00.0	1436.1772	35784.1	35792.4	020.622
	05.2725	320.8750	314.8740	42166.303	0.0000984	160.1112
C2 . 3	**93056A**	**USA 95 (UFO F2)**				
UI069	20140101	00:00:00.0	1436.2080	35777.8	35800.8	028.700
	09.5272	034.2359	285.5858	42166.906	0.0002719	094.8192
C2 . 4	**02001A**	**USA 164 (Milstar-2 F3)**				
UI063	20140101	00:00:00.0	1436.1089	35779.6	35794.5	030.052
	05.9410	044.5291	265.0991	42164.967	0.0001773	085.8888
C2 . 5	**01005A**	**Sicral**				
UI178	20140101	00:00:00.0	1436.1441	35774.0	35801.4	036.998
	05.2065	061.0842	247.5044	42165.655	0.0003248	076.2583
C2 . 6	**09001A**	**USA 202 (NROL-26)**				
UI155	20140101	00:00:00.0	1436.1065	35755.4	35818.2	044.030
	03.7212	022.1838	007.8661	42164.920	0.0007442	122.3205
C2 . 7	**96026A**	**USA 118 (MERCURY 2)**				
UI073	20140101	00:00:00.0	1436.0770	33266.8	38306.1	046.403
	09.2981	008.8963	221.7514	42164.343	0.0597587	126.3361
C2 . 8	**94054A**	**USA 105 (MERCURY 1)**				
UI008	20140101	00:00:00.0	1436.1755	35657.8	35919.5	047.982
	09.2781	047.0983	101.8229	42166.270	0.0031027	101.6117
C2 . 9	**12034A**	**USA 237 (NROL-15)**				
UI173	20140101	00:00:00.0	1436.1150	35591.7	35982.2	052.524
	02.5351	303.8601	357.8076	42165.085	0.0046309	208.7520
C2 . 10	**00065A**	**USA 153 (DSCS III B-11)(DSCS III F12)**				
UI105	20140101	00:00:00.0	1436.1197	35783.1	35791.1	056.790
	03.8932	065.6991	210.4124	42165.178	0.0000952	091.4615
C2 . 11	**04004A**	**USA 176 (DSP F22)**				
UI108	20140101	00:00:00.0	1436.1831	35787.1	35789.6	066.112
	05.7418	055.9033	144.6690	42166.419	0.0000289	110.5886
C2 . 12	**03041A**	**USA 171 (Advanced ORION 3)**				
UI118	20140101	00:00:00.0	1436.0795	35562.4	36010.2	067.970
	06.8887	085.4951	188.8840	42164.392	0.0053104	082.1853
C2 . 13	**99063A**	**USA 146 (UFO F10)**				
UI065	20140101	00:00:00.0	1436.1596	35782.4	35793.4	071.832
	05.0679	043.9568	225.3801	42165.958	0.0001309	128.2305

C2 .nn	COSPAR	NAME				
UInnn	YYYYMMDD	HH:MM:SS.SS	t_{osc}	H_p	H_a	λ
	i	Ω	ω	a	e	u
C2 . 14	**90097B**	**USA 67 (SDS 2 F2)(QUASAR 2)**				
UI092	20140101	00:00:00.0	1436.0518	35250.0	36321.5	075.432
	16.0621	017.9930	187.9742	42163.850	0.0127073	156.8801
C2 . 15	**03057A**	**USA 174 (UFO F11)**				
UI117	20140101	00:00:00.0	1436.0542	35776.4	35795.2	075.661
	03.6747	031.8815	282.5229	42163.896	0.0002229	144.1278
C4 . 16	**06024C**	**USA 189 (NRL Upper Stage/Satellite)**				
UI140	20140101	00:00:00.0	1384.1530	34742.2	34785.5	078.741
	06.0566	056.0629	074.0821	41141.764	0.0005255	127.7892
C4 . 17	**06024A**	**USA 187 (MITEx OSC satellite)**				
UI149	20140101	00:00:00.0	1433.8687	35739.2	35746.7	089.531
	00.8144	074.9759	292.4438	42121.106	0.0000893	115.1105
C2 . 18	**11011A**	**USA 227 (NROL-27)**				
UI165	20140101	00:00:00.0	1436.0749	35784.0	35788.5	092.079
	04.7987	352.9344	130.5810	42164.300	0.0000525	199.5427
C2 . 19	**11019A**	**USA 230 (SBIRS-GEO 1)**				
UI166	20140101	00:00:00.0	1436.0602	35776.9	35795.0	094.013
	05.2718	320.6568	322.8148	42164.014	0.0002141	233.7074
C2 . 20	**10063A**	**USA 223 (NROL-32)**				
UI160	20140101	00:00:00.0	1436.0669	35588.7	35983.3	095.581
	04.4604	243.4641	018.9758	42164.144	0.0046795	312.1872
C2 . 21	**86096A**	**USA 20 (FLTSATCOM F7)**				
UI134	20140101	00:00:00.0	1436.0687	35694.7	35879.5	099.468
	14.1665	020.1482	115.0576	42164.179	0.0021918	180.1640
C2 . 22	**89035A**	**USA 37 (VORTEX 6)**				
UI018	20140101	00:00:00.0	1436.2787	31634.6	39946.3	102.345
	07.5332	013.2562	250.0328	42168.290	0.0985535	167.5035
C2 . 23	**00080A**	**USA 155 (SDS 3 F2)**				
UI007	20140101	00:00:00.0	1436.0520	35754.2	35817.4	110.162
	06.3231	044.3134	215.3163	42163.854	0.0007503	166.1245
C2 . 24	**01033A**	**USA 159 (DSP F21)**				
UI001	20140101	00:00:00.0	1435.3067	35762.5	35780.5	119.569
	07.8540	050.3248	290.1420	42149.262	0.0002133	169.6786
C2 . 25	**95022A**	**USA 110 (Advanced ORION 1)**				
UI128	20140101	00:00:00.0	1436.1284	35460.1	36115.3	126.941
	11.9533	055.3487	045.6588	42165.349	0.0077699	173.3149
C2 . 26	**00001A**	**USA 148 (DSCS III B-08)(DSCS III F11)**				
UI104	20140101	00:00:00.0	1436.1760	35771.5	35805.0	149.770
	04.5566	063.6192	237.4497	42166.279	0.0003963	186.4521
C2 . 27	**01009A**	**USA 157 (Milstar-2 F2)**				
UI112	20140101	00:00:00.0	1436.1953	35773.4	35804.0	152.162
	06.5801	045.0972	227.6977	42166.657	0.0003626	207.3896
C2 . 28	**98016A**	**USA 138 (UFO F8)**				
UI111	20140101	00:00:00.0	1436.2123	35778.7	35799.3	171.466
	05.8131	045.0689	235.2094	42166.991	0.0002443	226.7360

C2 .nn	COSPAR	NAME				
UInnn	YYYYMMDD	HH:MM:SS.SS	t_{osc}	H_p	H_a	λ
	i	Ω	ω	a	e	u
C2 . 29	**95038A**	**USA 113 (DSCS III B-07)(DSCS III F9)**				
UI115	20140101	00:00:00.0	1436.2601	35778.6	35801.5	179.765
	08.4831	051.6873	230.6355	42167.926	0.0002712	228.4107
C2 . 30	**12009A**	**MUOS 1**				
UI170	20140101	00:00:00.0	1436.2711	35568.9	36011.1	183.082
	04.4366	328.6889	182.8996	42168.141	0.0052436	315.1525
C2 . 31	**00024A**	**USA 149 (DSP F20)**				
UI004	20140101	00:00:00.0	1436.0790	35780.0	35793.1	194.570
	08.8352	047.6076	231.1237	42164.382	0.0001561	247.3402
C2 . 32	**95060A**	**USA 115 (Milstar DFS-2)**				
UI124	20140101	00:00:00.0	1436.1494	35776.6	35799.5	209.998
	10.9181	043.4983	230.0019	42165.760	0.0002718	266.8680
C2 . 33	**01046A**	**USA 162 (SDS 3 F3)**				
UI151	20131001	00:00:00.0	1436.1754	35781.9	35794.7	218.847
	06.7823	071.0457	311.3774	42166.268	0.0001513	157.4818
C2 . 34	**03008A**	**USA 167 (DSCS III A-3)(DSCS III F13)**				
UI106	20131108	00:00:00.0	1436.1572	35777.9	35797.6	224.665
	02.1170	073.4433	169.0619	42165.913	0.0002337	198.3938
C2 . 35	**97065A**	**USA 134 (DSCS III B-13)(DSCS III F10)**				
UI110	20140101	00:00:00.0	1436.0980	35772.7	35800.8	229.933
	06.9098	055.8020	218.0029	42164.753	0.0003336	274.5223
C2 . 36	**93074A**	**USA 97 (DSCS III B-10)(DSCS III F8)**				
UI066	20140101	00:00:00.0	1436.1348	35781.5	35794.1	248.302
	08.8194	051.0468	278.1324	42165.474	0.0001494	297.6187
C4 . 37	**13050A**	**USA 246 (AEHF SV-3)**				
UI181	20131228	00:00:00.0	1450.4544	34612.2	37522.1	254.702
	04.8218	304.5352	179.8726	42445.296	0.0342775	043.4036
C2 . 38	**95057A**	**USA 114 (UFO F6)**				
UI119	20140101	00:00:00.0	1436.0537	35751.1	35820.9	254.763
	07.5987	038.7707	122.3743	42163.886	0.0008274	316.4417
C2 . 39	**95003A**	**USA 108 (UFO F4)**				
UI121	20140101	00:00:00.0	1436.0308	35766.9	35804.6	260.236
	08.2439	037.5166	271.1587	42163.437	0.0004461	323.1058
C2 . 40	**03012A**	**USA 169 (Milstar-2 F4)**				
UI109	20140101	00:00:00.0	1436.0594	35776.3	35795.5	270.063
	05.2421	064.1135	203.2361	42163.998	0.0002275	306.3549
C2 . 41	**92037A**	**USA 82 (DSCS III B-12)(DSCS III F6)**				
UI123	20140101	00:00:00.0	1436.1080	35773.2	35800.5	283.533
	10.1183	047.2494	195.1770	42164.949	0.0003241	336.6764
C2 . 42	**10039A**	**USA 214 (AEHF SV-1)**				
UI167	20140101	00:00:00.0	1436.0651	35780.3	35791.7	291.943
	02.5794	270.1837	308.0370	42164.109	0.0001356	122.1380
C2 . 43	**94084A**	**USA 107 (DSP F17)**				
UI131	20140101	00:00:00.0	1436.1111	35778.6	35797.0	310.931
	12.8781	036.8581	068.0805	42165.009	0.0002184	014.4641

C2 .nn	COSPAR	NAME				
UInnn	YYYYMMDD	HH:MM:SS.SS	t_{osc}	H_p	H_a	λ
	i	Ω	ω	a	e	u
C2 . 44	**94009A**	**USA 99 (Milstar DFS-1)**				
UI142	20140101	00:00:00.0	1436.2343	35780.0	35798.6	321.000
	09.8292	084.7138	189.9475	42167.421	0.0002209	336.6458
C2 . 45	**98029A**	**USA 139 (Advanced ORION 2)**				
UI074	20140101	00:00:00.0	1436.2026	35625.3	35952.5	333.591
	09.0333	005.0594	220.7697	42166.800	0.0038800	068.4165
C2 . 46	**96042A**	**USA 127 (UFO F7)**				
UI116	20140101	00:00:00.0	1436.2815	35779.9	35801.0	337.247
	06.8030	040.0333	287.3437	42168.344	0.0002501	037.5963
C2 . 47	**12019A**	**USA 235 (AEHF 2)**				
UI171	20140101	00:00:00.0	1436.2100	35781.0	35796.7	343.540
	02.9205	316.2936	322.1027	42166.946	0.0001857	127.6147
C2 . 48	**89077A**	**USA 46 (FLTSATCOM F8)**				
UI130	20140101	00:00:00.0	1436.2290	35786.4	35792.3	344.591
	11.9948	027.8054	026.0174	42167.317	0.0000701	057.1753
C2 . 49	**12033A**	**USA 236 (SDS 3 F7)**				
UI172	20140101	00:00:00.0	1436.2339	35784.6	35794.1	350.063
	03.6883	266.5283	283.7665	42167.414	0.0001119	183.8770

4.3 Objects in a drift orbit

In the case where the object is in a drift orbit, there are 94 objects identified.

For explanation of symbols, see the definitions at the beginning of Chapter 4 on page 124.

D1 .nn	**COSPAR**	**NAME**				
UInnn	YYYYMMDD	HH:MM:SS.SS	t_{osc}	H_p	H_a	λ
	i	Ω	ω	a	e	u
D1 . 1	**92006C**	**IABS**				
UI132	20140101	00:00:00.0	1299.8609	30559.3	35593.3	204.285
	11.1942	009.4913	315.5204	39454.036	0.0637968	321.9431
D1 . 2	**10063B**	**Delta-4 second stage**				
UI161	20140101	00:00:00.0	1384.1952	33806.4	35722.5	009.130
	04.5931	241.7942	186.4530	41142.601	0.0232862	238.0215
D1 . 3	**69036B**	**Atlas SLV-3A stage 2 (Agena D)**				
UI012	20140101	00:00:00.0	1386.5136	30679.7	38941.6	061.564
	06.8694	081.6294	109.3439	41188.529	0.1002937	090.9082
D1 . 4	**12034B**	**DELTA 4 R/B**				
UI174	20140101	00:00:00.0	1396.0564	34240.6	35757.7	039.243
	02.6179	302.5972	204.5993	41377.300	0.0183328	201.6913
D1 . 5	**77038C**	**Atlas SLV-3A stage 2 (Agena D)**				
UI082	20140101	00:00:00.0	1407.1208	28977.1	41459.3	260.489
	11.1983	357.9108	066.6859	41595.635	0.1500415	003.5447
D1 . 6	**72101B**	**Atlas SLV-3A stage 2 (Agena D)**				
UI059	20140101	00:00:00.0	1407.4825	29925.8	40523.6	304.122
	17.8505	315.5777	010.4944	41602.764	0.1273692	107.7825
D1 . 7	**93046C**	**IABS**				
UI028	20140101	00:00:00.0	1409.9232	34921.5	35624.1	264.304
	14.0267	021.0972	013.6026	41650.845	0.0084349	349.8054
D1 . 8	**75055B**	**Atlas SLV-3A stage 2 (Agena D)**				
UI103	20140101	00:00:00.0	1410.6300	29757.3	40816.6	017.298
	19.0631	321.1062	337.4642	41664.764	0.1327172	154.8451
D1 . 9	**68063B**	**Atlas SLV-3A stage 2 (Agena D)**				
UI055	20140101	00:00:00.0	1415.0778	30760.9	39989.3	145.340
	13.7340	331.6118	118.9033	41752.299	0.1105132	291.4909
D1 . 10	**70069B**	**Atlas SLV-3A stage 2 (Agena D)**				
UI145	20140101	00:00:00.0	1415.7861	29791.5	40984.7	066.928
	13.6935	263.1938	356.3003	41766.230	0.1339980	251.8023
D1 . 11	**92037C**	**IABS**				
UI085	20140101	00:00:00.0	1416.7061	35322.9	35490.5	215.481
	14.2177	017.4801	319.6813	41784.322	0.0020058	302.2505
D1 . 12	**81025C**	**Titan IIIC stage 3 (Transtage)**				
UI040	20140101	00:00:00.0	1421.0644	35266.5	35717.2	213.135
	14.0007	345.9324	190.6859	41869.974	0.0053826	331.3278
D1 . 13	**89046D**	**IUS second stage**				
UI080	20140101	00:00:00.0	1421.4094	35322.6	35676.7	249.232
	13.7135	020.0211	247.4398	41876.751	0.0042278	333.0331

D1 .nn	COSPAR	NAME				
UInnn	YYYYMMDD	HH:MM:SS.SS	t_{osc}	H_p	H_a	λ
	i	Ω	ω	a	e	u
D1 . 14	**91080D**	**IUS second stage**				
UI078	20140101	00:00:00.0	1421.8409	35429.3	35586.1	304.126
	13.9925	026.5223	223.8470	41885.224	0.0018718	018.1168
D1 . 15	**95038C**	**IABS**				
UI022	20140101	00:00:00.0	1421.9971	35442.0	35578.3	298.800
	13.7474	029.0394	179.8145	41888.292	0.0016276	010.2161
D1 . 16	**82019B**	**Titan IIIC stage 3 (Transtage)**				
UI039	20140101	00:00:00.0	1422.2428	35464.7	35566.3	324.478
	14.4846	349.0558	039.4621	41893.118	0.0012129	076.7199
D1 . 17	**89069D**	**Titan 34D stage 3 (Transtage)**				
UI088	20140101	00:00:00.0	1422.4528	35234.0	35805.5	187.201
	14.4359	010.5247	222.4471	41897.242	0.0068204	279.8441
D1 . 18	**87097B**	**Titan 34D stage 3 (Transtage)**				
UI029	20140101	00:00:00.0	1422.4912	35477.5	35563.8	323.062
	13.4246	013.2017	125.1854	41897.995	0.0010296	050.7115
D1 . 19	**94084D**	**IUS second stage**				
UI019	20140101	00:00:00.0	1423.3484	35512.0	35562.5	001.361
	12.7340	036.3321	047.2550	41914.824	0.0006019	066.0747
D1 . 20	**00001C**	**IABS**				
UI015	20140101	00:00:00.0	1423.3544	35479.3	35595.6	351.616
	11.5996	041.5461	240.4728	41914.942	0.0013869	050.7976
D1 . 21	**84037B**	**Titan 34D stage 3 (Transtage)**				
UI095	20140101	00:00:00.0	1423.3580	35402.8	35671.1	248.330
	14.6576	356.1905	191.6700	41915.014	0.0032011	355.7026
D1 . 22	**00065C**	**IABS**				
UI011	20140101	00:00:00.0	1423.3714	35297.3	35777.2	172.672
	11.1327	042.8661	158.4393	41915.276	0.0057239	233.1221
D1 . 23	**84129B**	**Titan 34D stage 3 (Transtage)**				
UI032	20140101	00:00:00.0	1423.5322	35503.0	35580.1	295.191
	15.3313	002.1805	111.7570	41918.433	0.0009194	033.6882
D1 . 24	**03008C**	**IABS (Apogee Boost Subsystem)**				
UI006	20140101	00:00:00.0	1424.0530	35506.5	35595.4	040.385
	09.2729	049.0549	117.5247	41928.657	0.0010597	092.5493
D1 . 25	**85092E**	**IUS second stage**				
UI033	20140101	00:00:00.0	1424.4950	35310.5	35810.1	286.556
	15.2730	000.9294	059.6236	41937.333	0.0059560	026.4423
D1 . 26	**03041B**	**Titan IVB stage 3 (Centaur)**				
UI072	20140101	00:00:00.0	1427.8110	35456.0	35792.6	045.630
	06.8649	098.0070	333.8295	42002.390	0.0040071	048.5297
D1 . 27	**85010D**	**IUS second stage**				
UI047	20140101	00:00:00.0	1428.4079	35513.5	35758.8	309.824
	17.8287	004.4777	161.9038	42014.094	0.0029193	045.7832
D1 . 28	**89090B**	**USA 48 (MAGNUM 2)**				
UI136	20140101	00:00:00.0	1429.5677	34481.2	36836.4	025.457
	17.0949	031.5787	344.2066	42036.834	0.0280136	096.8264

D1 .nn	**COSPAR**	**NAME**				
UInnn	YYYYMMDD	HH:MM:SS.SS	t_{osc}	H_p	H_a	λ
	i	Ω	ω	a	e	u
D1 . 29	**03040C**	**IABS (Apogee Boost Subsystem)**				
UI002	20140101	00:00:00.0	1429.6418	35615.4	35704.9	167.545
	08.8759	050.0586	184.8901	42038.286	0.0010649	218.9119
D1 . 30	**72010B**	**Titan IIIC stage 3 (Transtage)**				
UI038	20140101	00:00:00.0	1430.6817	35434.1	35927.2	181.400
	08.9456	316.0815	028.3156	42058.670	0.0058611	326.6612
D1 . 31	**03012B**	**Titan IVB stage 3 (Centaur)**				
UI064	20140101	00:00:00.0	1431.6427	35607.5	35791.2	216.523
	05.7203	046.2750	172.9032	42077.501	0.0021834	271.7520
D1 . 32	**94009B**	**Titan IVA stage 3 (Centaur)**				
UI014	20140101	00:00:00.0	1431.6582	35649.3	35751.2	021.784
	09.8270	075.8136	097.5922	42077.806	0.0012109	046.5310
D1 . 33	**77007D**	**OPS 3151 operational debris (Telescope aperture suncover)**				
UI100	20140101	00:00:00.0	1431.7525	34708.8	36694.3	165.225
	12.5123	325.3774	354.8022	42079.653	0.0235920	298.6784
D1 . 34	**95060B**	**Titan IVA stage 3 (Centaur)**				
UI016	20140101	00:00:00.0	1431.7622	35550.7	35854.5	004.945
	11.9916	040.8408	093.8671	42079.842	0.0036096	064.8999
D1 . 35	**95022B**	**Titan IVA stage 3 (Centaur)**				
UI021	20140101	00:00:00.0	1431.9205	35670.0	35741.2	097.092
	13.8040	058.2077	234.5972	42082.944	0.0008462	139.5004
D1 . 36	**75118C**	**Titan IIIC stage 3 (Transtage)**				
UI050	20140101	00:00:00.0	1432.0605	35648.6	35768.3	057.221
	11.8118	324.0560	086.5764	42085.688	0.0014220	194.4135
D1 . 37	**76059C**	**Titan IIIC stage 3 (Transtage)**				
UI054	20140101	00:00:00.0	1432.0890	35646.6	35771.0	210.561
	12.2052	325.4073	124.0018	42086.246	0.0014781	346.5283
D1 . 38	**78038A**	**OPS 8790 (AQUACADE 4)**				
UI091	20140101	00:00:00.0	1432.8201	35645.7	35799.2	252.231
	10.4829	340.1171	188.1783	42100.567	0.0018241	012.4850
D1 . 39	**01009B**	**Titan IVB stage 3 (Centaur)**				
UI003	20140101	00:00:00.0	1433.1161	35652.6	35804.1	293.894
	08.4316	045.6698	028.4960	42106.367	0.0017988	349.2988
D1 . 40	**75118A**	**OPS 3165 (DSP F5)**				
UI052	20140101	00:00:00.0	1433.5386	35618.2	35856.0	354.484
	11.8453	323.9794	235.0138	42114.641	0.0028224	130.5453
D1 . 41	**71039B**	**Titan IIIC stage 3 (Transtage)**				
UI093	20140101	00:00:00.0	1433.5801	35611.1	35863.5	258.177
	08.2541	313.6926	351.4837	42115.454	0.0029965	045.1765
D1 . 42	**69036A**	**OPS 3148 (CANYON 2)**				
UI070	20140101	00:00:00.0	1434.6854	31947.3	39570.8	183.051
	04.5911	092.9757	053.5388	42137.099	0.0904616	204.0691
D1 . 43	**80060G**	**Ekran 5 debris**				
UI137	20140101	00:00:00.0	1435.5988	35706.8	35847.3	170.149
	13.9300	336.5998	203.5102	42154.982	0.0016661	294.1485

D1 .nn	COSPAR	NAME				
UInnn	YYYYMMDD	HH:MM:SS.SS	t_{osc}	H_p	H_a	λ
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D1 . 44	**79086A**	**OPS 1948 (VORTEX 2) (CHALET 2)**				
UI023	20140101	00:00:00.0	1436.6021	30671.2	40921.8	155.857
	06.9024	355.5426	007.0581	42174.619	0.1215259	249.3288
D1 . 45	**02001B**	**Titan IVB stage 3 (Centaur)**				
UI013	20140101	00:00:00.0	1437.3644	35573.4	36049.5	124.128
	04.2474	040.2572	040.4774	42189.539	0.0056413	184.8895
D1 . 46	**78058A**	**OPS 9454 (VORTEX 1) (CHALET 1)**				
UI009	20140101	00:00:00.0	1438.6595	29901.4	41772.2	249.201
	06.2215	035.0348	321.2677	42214.878	0.1405998	299.1841
D1 . 47	**90095D**	**IUS second stage**				
UI081	20140101	00:00:00.0	1441.0697	35595.4	36172.8	080.614
	14.5088	024.9501	337.7434	42262.012	0.0068311	155.2503
D1 . 48	**01033D**	**IUS second stage**				
UI061	20140101	00:00:00.0	1441.5896	35875.6	35913.2	256.740
	07.8968	050.4038	283.3766	42272.177	0.0004446	305.5196
D1 . 49	**04004D**	**IUS second stage**				
UI062	20140101	00:00:00.0	1442.6044	35899.9	35928.0	179.835
	05.7851	056.1590	314.8612	42292.012	0.0003321	222.9843
D1 . 50	**73040A**	**OPS 6157 (DSP F4)**				
UI048	20140101	00:00:00.0	1442.6482	35891.1	35939.5	196.507
	10.6417	317.9561	242.3226	42292.868	0.0005721	337.4014
D1 . 51	**85010B**	**USA 8 (MAGNUM 1)**				
UI097	20140101	00:00:00.0	1442.6904	35352.4	36482.4	170.509
	17.7455	003.8828	283.9845	42293.692	0.0133585	263.7840
D1 . 52	**72010A**	**OPS 1570 (DSP F3)**				
UI144	20140101	00:00:00.0	1443.3147	35895.1	35961.0	020.668
	09.4802	317.4733	228.0124	42305.893	0.0007793	162.6147
D1 . 53	**00024E**	**DSP F20 Aperture Cover**				
UI005	20140101	00:00:00.0	1444.1963	34944.5	36946.2	284.742
	09.2400	047.5956	231.0352	42323.119	0.0236480	336.1329
D1 . 54	**00024D**	**IUS second stage**				
UI067	20140101	00:00:00.0	1444.2976	35907.3	35987.3	225.802
	08.9026	047.8747	056.4423	42325.098	0.0009445	276.7503
D1 . 55	**79086C**	**Titan IIIC stage 3 (Transtage)**				
UI024	20140101	00:00:00.0	1444.6654	30305.8	41603.1	000.011
	07.1504	353.8002	062.1371	42332.283	0.1334361	132.7697
D1 . 56	**78058B**	**Titan IIIC stage 3 (Transtage)**				
UI010	20140101	00:00:00.0	1445.4192	29558.4	42379.5	353.504
	05.9925	032.0372	034.5149	42347.008	0.1513812	082.3346
D1 . 57	**81107C**	**Titan IIIC stage 3 (Transtage)**				
UI076	20140101	00:00:00.0	1445.7305	31804.7	40145.7	131.843
	07.7188	350.4462	050.6795	42353.088	0.0984693	245.4106
D1 . 58	**94054B**	**Titan IVA stage 3 (Centaur)**				
UI017	20140101	00:00:00.0	1446.0928	35475.8	36489.4	195.639
	11.4035	028.3219	237.3781	42360.164	0.0119634	265.3276

D1 .nn	**COSPAR**	**NAME**				
UInnn	YYYYMMDD	HH:MM:SS.SS	t_{osc}	H_p	H_a	λ
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D1 . 59	**96026B**	**Titan IVA stage 3 (Centaur)**				
UI075	20140101	00:00:00.0	1446.2986	34036.3	37936.7	150.036
	09.4472	000.7345	299.5209	42364.181	0.0460337	238.8926
D1 . 60	**73040B**	**Titan IIIC stage 3 (Transtage)**				
UI049	20140101	00:00:00.0	1446.4025	35872.1	36105.4	311.395
	10.8340	318.4647	287.0668	42366.211	0.0027538	092.4310
D1 . 61	**97008E**	**USA 130 operational debris (Telescope aperture suncover)**				
UI164	20140101	00:00:00.0	1446.8204	35848.8	36143.8	294.473
	11.4923	044.2046	165.0544	42374.371	0.0034801	348.1328
D1 . 62	**89090D**	**IUS second stage**				
UI090	20140101	00:00:00.0	1447.0034	34612.4	37387.8	047.936
	17.2251	032.1138	335.1451	42377.944	0.0327456	116.1945
D1 . 63	**97008D**	**IUS second stage**				
UI071	20140101	00:00:00.0	1447.2685	35894.7	36116.6	084.172
	11.3690	044.4094	066.4495	42383.120	0.0026174	139.6281
D1 . 64	**76059A**	**OPS 2112 (DSP F6)**				
UI056	20140101	00:00:00.0	1447.6256	35981.0	36044.8	101.183
	12.7820	327.3551	110.0050	42390.090	0.0007528	232.5002
D1 . 65	**84009C**	**Titan 34D stage 3 (Transtage)**				
UI025	20140101	00:00:00.0	1448.0179	31848.8	40190.6	057.996
	08.2003	356.3635	025.4948	42397.749	0.0983746	171.8744
D1 . 66	**79053C**	**Titan IIIC stage 3 (Transtage)**				
UI051	20140101	00:00:00.0	1448.0739	35760.4	36281.1	069.789
	14.7447	342.8736	169.0382	42398.842	0.0061414	186.0910
D1 . 67	**89035C**	**Titan 34D stage 3 (Transtage)**				
UI020	20140101	00:00:00.0	1448.2503	31788.8	40259.8	157.712
	07.8058	012.2012	320.5070	42402.285	0.0998880	225.4975
D1 . 68	**85092C**	**USA 12 (DSCS III B-05)**				
UI077	20140101	00:00:00.0	1449.8438	36045.0	36067.7	162.833
	14.1243	029.4983	068.9428	42433.382	0.0002666	231.5400
D1 . 69	**93074B**	**IABS**				
UI084	20140101	00:00:00.0	1450.8329	36061.8	36089.6	305.393
	14.6332	024.1922	293.3837	42452.680	0.0003269	021.3729
D1 . 70	**68063A**	**OPS 2222 (CANYON 1)**				
UI102	20140101	00:00:00.0	1450.9540	32093.4	40063.1	066.485
	14.8485	337.0342	100.3794	42455.042	0.0938603	209.0042
D1 . 71	**89069B**	**USA 44 (DSCS III A-02)**				
UI126	20140101	00:00:00.0	1452.8346	36099.0	36129.7	150.952
	11.4510	044.1427	284.4540	42491.718	0.0003616	204.7256
D1 . 72	**93046A**	**USA 93 (DSCS III B-09)(DSCS III F7)**				
UI120	20140101	00:00:00.0	1453.8797	36117.1	36150.9	028.428
	09.0668	050.9058	021.0632	42512.093	0.0003972	077.0105
D1 . 73	**92006A**	**USA 78 (DSCS III B-14)**				
UI127	20140101	00:00:00.0	1453.9759	36121.3	36151.3	067.970
	11.7857	043.0796	224.7605	42513.970	0.0003530	123.6676

D1 .nn	COSPAR	NAME				
UInnn	YYYYMMDD	HH:MM:SS.SS	t_{osc}	H_p	H_a	λ
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D1 . 74	**78016A**	**OPS 6391 (FLTSATCOM F1)**				
UI101	20140101	00:00:00.0	1454.5754	36111.1	36184.7	015.751
	15.2194	341.7043	148.5523	42525.654	0.0008653	132.7497
D1 . 75	**85092B**	**USA 11 (DSCS III B-04)**				
UI079	20140101	00:00:00.0	1454.6731	36134.3	36164.8	279.712
	14.3031	027.9511	018.0921	42527.558	0.0003582	347.6372
D1 . 76	**80087A**	**OPS 6394 (FLTSATCOM F4)**				
UI096	20140101	00:00:00.0	1455.2341	36150.8	36171.2	274.137
	14.9789	348.9494	138.0179	42538.491	0.0002389	025.2327
D1 . 77	**06024B**	**USA 188 (MITEx Lockheed satellite)**				
UI148	20140101	00:00:00.0	1456.6090	36152.4	36221.9	221.051
	03.6342	066.8840	038.3187	42565.282	0.0008160	250.9738
D1 . 78	**84129A**	**USA 7 (DSP F12)**				
UI034	20140101	00:00:00.0	1456.7544	36178.5	36204.0	167.010
	16.0148	004.8410	118.5238	42568.114	0.0002990	258.8813
D1 . 79	**01020A**	**USA 158 (GeoLITE)**				
UI114	20140101	00:00:00.0	1456.8746	36107.3	36277.4	097.498
	04.3321	052.3506	015.6962	42570.455	0.0019984	143.6997
D1 . 80	**81025A**	**OPS 7350 (DSP F9)**				
UI045	20140101	00:00:00.0	1457.0625	36111.1	36281.4	118.829
	15.0391	349.3025	155.2811	42574.116	0.0019997	226.9155
D1 . 81	**89046A**	**USA 39 (DSP F14)**				
UI150	20140101	00:00:00.0	1457.2022	36186.6	36213.3	075.740
	14.0796	020.7766	086.4488	42576.837	0.0003137	153.1677
D1 . 82	**95027A**	**USA 111 (UFO F5)**				
UI122	20140101	00:00:00.0	1458.2065	36214.9	36222.5	090.742
	08.6235	037.3388	255.4008	42596.396	0.0000894	151.4369
D1 . 83	**79053A**	**OPS 7484 (DSP F8)**				
UI053	20140101	00:00:00.0	1458.3115	36170.8	36270.3	307.215
	14.9789	343.8626	154.3918	42598.442	0.0011682	062.6927
D1 . 84	**84037A**	**OPS 7641 (DSP F11)**				
UI037	20140101	00:00:00.0	1459.3660	36200.3	36282.5	181.893
	15.6294	359.0633	143.9132	42618.975	0.0009646	278.8402
D1 . 85	**89069A**	**USA 43 (DSCS II F-15)**				
UI087	20140101	00:00:00.0	1460.2904	36183.7	36335.3	071.137
	14.9222	017.1613	136.3649	42636.969	0.0017785	151.9999
D1 . 86	**90095A**	**USA 65 (DSP F15)**				
UI083	20140101	00:00:00.0	1463.4638	36299.3	36341.9	064.248
	14.5498	024.7257	355.6293	42698.718	0.0004989	137.3227
D1 . 87	**87097A**	**USA 28 (DSP F13)**				
UI030	20140101	00:00:00.0	1463.5869	36218.7	36427.8	081.519
	14.0502	015.7526	153.2240	42701.113	0.0024488	163.2060
D1 . 88	**82019A**	**OPS 8701 (DSP F10)**				
UI046	20140101	00:00:00.0	1466.6015	36355.7	36408.6	316.149
	15.7000	353.2255	143.5440	42759.728	0.0006191	061.9657

D1 .nn	COSPAR	NAME				
UInnn	YYYYMMDD	HH:MM:SS.SS	t_{osc}	H_p	H_a	λ
	i	Ω	ω	a	e	u
D1 . 89	**98058A**	**USA 140 (UFO F9)**				
UI113	20140101	00:00:00.0	1466.7920	36334.4	36436.5	042.346
	06.3756	040.2786	305.6429	42763.430	0.0011932	100.2579
D1 . 90	**71039A**	**OPS 3811 (DSP F2)**				
UI042	20140101	00:00:00.0	1467.0052	36312.8	36467.2	098.425
	09.6399	318.6019	251.0998	42767.573	0.0018047	234.8925
D1 . 91	**82106B**	**DSCS III A-01**				
UI135	20140101	00:00:00.0	1472.0768	36404.7	36574.0	175.851
	15.0760	013.2468	079.4196	42866.086	0.0019739	256.7922
D1 . 92	**77007A**	**OPS 3151 (DSP F7)**				
UI057	20140101	00:00:00.0	1476.5640	36247.8	36904.7	339.566
	13.7804	332.8003	275.3395	42953.150	0.0076467	103.2229
D1 . 93	**09001B**	**Delta 4 second stage**				
UI154	20140101	00:00:00.0	1499.1530	35922.7	38101.3	031.794
	03.7609	024.2483	359.9738	43390.116	0.0251047	106.1677
D1 . 94	**07054B**	**Delta 4 second stage**				
UI147	20140101	00:00:00.0	1502.1484	35930.3	38209.2	003.790
	01.4772	094.1659	014.5409	43447.895	0.0262251	010.0838

4.4 Objects in a libration orbit around the Eastern stable point

In the case where the object is in a libration orbit around the Eastern stable point (longitude 75 E), there are 7 objects.

For explanation symbols, see definition at the beginning of Chapter 4 on page 124.

L1 .nn	**COSPAR**	**NAME**				
UInnn	YYYYMMDD	HH:MM:SS.SS	t_{osc}	H_p	H_a	λ
	i	Ω	ω	a	e	u
L1 . 1	**98029B**	**Titan IVB stage 3 (Centaur)**				
UI027	20140101	00:00:00.0	1437.0375	35585.4	36026.0	021.203
	10.5813	003.4523	074.7633	42183.142	0.0052228	119.0535
L1 . 2	**77038A**	**OPS 9751 (CANYON 7)**				
UI086	20140101	00:00:00.0	1436.5099	30589.4	41000.1	060.116
	11.7189	359.5070	019.0125	42172.816	0.1234291	172.1400
L1 . 3	**73013A**	**OPS 6063 (Rhyolite 2)**				
UI043	20140101	00:00:00.0	1436.0117	35677.3	35893.0	075.847
	10.0823	319.3780	144.5891	42163.063	0.0025573	217.3165
L1 . 4	**70046A**	**OPS 5346 (Rhyolite 1)**				
UI035	20140101	00:00:00.0	1435.7759	35745.4	35815.8	080.672
	07.7972	311.1567	118.0895	42158.448	0.0008352	230.1244
L1 . 5	**72101A**	**OPS 9390 (CANYON 5)**				
UI138	20140101	00:00:00.0	1437.6064	30173.2	41461.3	095.369
	18.9648	320.3938	315.6275	42194.274	0.1337633	210.0027
L1 . 6	**07054A**	**USA 197 (DSP F23)**				
UI141	20140101	00:00:00.0	1437.4644	35807.4	35819.3	103.317
	01.5558	087.3113	045.8313	42191.494	0.0001414	116.3081
L1 . 7	**75055A**	**OPS 4966 (CANYON 6)**				
UI060	20140101	00:00:00.0	1435.3647	30292.1	41257.4	141.867
	20.0528	325.4886	278.2066	42150.398	0.1300733	257.5899

4.5 Objects in a libration orbit around the Western stable point

In the case where the object is in a libration orbit around the Western stable point (longitude 105 W), there are 5 objects identified.

For explanation of symbols, see the definitions at the beginning of Chapter 4 on page 124.

L2 .nn	**COSPAR**	**NAME**				
UInnn	YYYYMMDD	HH:MM:SS.SS	t_{osc}	H_p	H_a	λ
	i	Ω	ω	a	e	u
L2 . 1	**94035A**	**USA 104 (UFO F3)**				
UI068	20140101	00:00:00.0	1437.5117	35811.2	35818.5	106.375
	09.4532	038.3211	089.2880	42192.421	0.0000866	168.2933
L2 . 2	**77114A**	**OPS 4258 (AQUACADE 3)**				
UI146	20140101	00:00:00.0	1435.6698	35696.7	35863.0	188.874
	18.7258	339.1627	238.2182	42156.372	0.0019727	310.2086
L2 . 3	**77007C**	**Titan IIIC stage 3 (Transtage)**				
UI162	20140101	00:00:00.0	1436.8011	35750.1	35852.7	280.714
	12.7335	327.8229	261.5975	42178.515	0.0012158	053.1808
L2 . 4	**70069A**	**OPS 7329 (CANYON 3)**				
UI157	20140101	00:00:00.0	1434.5766	32225.8	39290.7	288.175
	15.4419	275.2202	281.4471	42134.968	0.0838367	103.7591
L2 . 5	**81107A**	**OPS 4029 (VORTEX 3)**				
UI129	20140101	00:00:00.0	1434.9091	31905.8	39621.5	291.615
	07.8270	358.1300	300.1218	42141.479	0.0915460	035.6362

4.6 Objects in a libration orbit around both stable points

In the case where the object is in a libration orbit around both stable points, there are 2 objects identified.

For explanation of symbols, see the definitions at the beginning of Chapter 4 on page 124.

L3 .nn	**COSPAR**	**NAME**				
UInnn	YYYYMMDD	HH:MM:SS.SS	t_{osc}	H_p	H_a	λ
	i	Ω	ω	a	e	u
L3 . 1	**80060A**	**Ekran 5**				
UI098	20140101	00:00:00.0	1437.6696	35764.9	35872.4	051.403
	14.0120	336.7816	092.1128	42195.509	0.0012736	175.1057
L3 . 2	**84009A**	**OPS 0441 (VORTEX 4)**				
UI026	20140101	00:00:00.0	1437.5168	31429.0	40200.1	227.465
	07.9290	354.8206	319.9665	42192.521	0.1039423	326.7875

4.7 Satellites with indeterminate status

In this list there are 3 objects for which no TLEs are available and from the KIAM data it is unclear whether they are controlled.

For explanation of symbols, see the definitions at the beginning of Chapter 4 on page 124.

U .nn	**COSPAR**	**NAME**				
UInnn	YYYYMMDD	HH:MM:SS.SS	t_{osc}	H_p	H_a	λ
	i	Ω	ω	a	e	u
U . 1	**13036A**	**MUOS 2**				
UI177	20140101	00:00:00.0	1425.0893	35563.2	35578.6	242.585
	04.9371	328.4736	014.8863	41948.995	0.0001834	014.6176
U . 2	**91080B**	**USA 75 (DSP F16)**				
UI133	20140101	00:00:00.0	1434.9955	35754.9	35775.3	254.348
	14.2027	027.2297	192.6034	42143.170	0.0002410	327.7652
U . 3	**03040A**	**USA 170 (DSCS III B-6)(DSCS III F14)**				
UI107	20140101	00:00:00.0	1434.2857	35744.3	35758.0	313.677
	01.3162	076.8671	140.6148	42129.272	0.0001619	337.6236

4.8 Unidentified uncatalogued objects

In this list there are 6 objects which were observed repeatedly by ground-based telescopes, but which were not finally correlated to a specific launch (i.e. their origin is not determined yet with the required reliability).

For explanation of symbols, see the definitions at the beginning of Chapter 4 on page 124.

UInnn	YYYYMMDD	HH:MM:SS.SS	t_{osc}	H_p	H_a	λ
TYPE	i	Ω	ω	a	e	u
UI031	20140101	00:00:00.0	1413.1755	34406.5	36267.4	313.376
D1	05.8630	315.2030	247.2430	41714.872	0.0223055	096.5175
UI041	20140101	00:00:00.0	1436.5144	35591.3	36000.6	108.244
L1	14.2282	346.3436	256.3573	42172.904	0.0048525	221.3615
UI044	20140101	00:00:00.0	1435.1638	35590.5	35946.4	075.599
L1	14.5050	345.9857	339.8473	42146.465	0.0042221	189.7140
UI058	20140101	00:00:00.0	1526.6589	37417.2	37667.0	330.774
D1	17.2777	347.2676	312.9231	43919.244	0.0028432	078.9420
UI139	20140101	00:00:00.0	1436.8378	35608.9	35993.6	244.119
L2	14.5911	019.8694	158.9066	42179.232	0.0045602	324.7812
UI168	20130512	00:00:00.0	1437.3609	34981.7	36641.4	348.198
D1	14.0320	013.9225	023.9946	42189.469	0.0196690	204.7238

4.9 Uncontrolled uncatalogued objects

In this list there are 6 objects for which no orbital elements are available and which are no longer controlled according to information provided by KIAM.

U .nn	COSPAR	NAME	TYPE
U . 1	75118D	OPS 3165 operational debris (Telescope aperture suncover)	Debris
U . 2	76059D	OPS 2112 operational debris (Telescope aperture suncover)	Debris
U . 3	79053D	OPS 7484 operational debris (Telescope aperture suncover)	Debris
U . 4	87022F	Star 27 (GOES 7 AKM)	Debris
U . 5	89046E	USA 39 operational debris (Telescope aperture suncover)	Debris
U . 6	01033E	USA 159 operational debris (Telescope aperture suncover)	Debris

For the following objects old TLEs are available. For an explanation of the symbols, see the definitions at the beginning of Chapter 3 on page 34.

D.	COSPAR	NAME					
	Date	$\overline{\dot{\lambda}}$	$\overline{\Delta a}$	$\overline{\Delta r_p}$	$\overline{\Delta r_a}$	N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
D.	**67003J**	**Titan IIIC stage 3 (Transtage)**					
	19-JUL-95	28.86	-2107.470	-2225.921	-1989.020	0	3
	16635.000000	40057.05212	0.0029345	11.3730	343.9923	194.5544	69.2907
D.	**68081V**	**Transtage 5 debris**					
	26-DEC-12	-3.42	269.022	-1637.87	2175.912	0	24
	23005.971019	42433.26980	0.0445202	8.4913	327.1699	255.0743	236.8556

LX.	COSPAR	NAME					
	Date	P_{lib}	$\Delta\lambda$	λ_{min}	λ_{max}	N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
L1.	**68081C**	**OV5 4**					
	19-JUL-95	1688	151.1	352.1	143.2	0	2
	16635.000000	42172.17641	0.0006806	13.5815	11.0544	79.3747	139.5031
L3.	**77092L**	**Ekran 2 fragmentation debris**					
	27-DEC-12	2945	337.5	173.3	150.8	20	68
	23006.018472	42133.87767	0.0120587	13.5968	334.4370	291.3082	230.6170

For the following object without TLEs old data is available. For explanation of symbols, see the definitions at the beginning of Chapter 4 on page 124.

D.	**COSPAR**	**NAME**				
UInnn	YYYYMMDD	HH:MM:SS.SS	t_{osc}	H_p	H_a	λ
	i	Ω	ω	a	e	u
D.	**90095E**	**USA 65 operational debris (telescope aperture cover)**				
UI143	20120101	00:00:00.0	1450.3835	35702.9	36428.7	081.644
	13.6963	032.1723	124.2235	42443.913	0.0085501	024.4917

4.10 Uncontrolled uncatalogued objects

In this list there are 73 objects which are known to have been released from satellites in GEO, but which have not been catalogued by USSTRATCOM. The list of objects has been compiled by Vladimir Agapov (KIAM) and Jonathan McDowell (Harvard-Smithsonian Center for Astrophysics).

UU.nn	COSPAR	NAME	TYPE
UU. 1	71039	OPS 3811 debris (Telescope aperture suncover)	Debris
UU. 2	72010	OPS 1570 debris (Telescope aperture suncover)	Debris
UU. 3	73040	OPS 6157 debris (Telescope aperture suncover)	Debris
UU. 4	75011	SMS 2 debris (VISSR cover)	Debris
UU. 5	75100	GOES 1 debris (VISSR cover)	Debris
UU. 6	76004	Hermes debris (CTS JBSA)	Debris
UU. 7	76004	Hermes debris (CTS JBSA)	Debris
UU. 8	77048	GOES 2 debris (VISSR cover)	Debris
UU. 9	77065	Himawari debris (VISSR cover)	Debris
UU. 10	77065	Star 27 (Himawari AKM)	Rocket Body
UU. 11	77108	Meteosat 1 debris (MVIRI cover)	Debris
UU. 12	77108	Meteosat 1 debris (MVIRI cooler cover)	Debris
UU. 13	78062	GOES 3 debris (VISSR cover)	Debris
UU. 14	80074	GOES 4 debris (VAS cover)	Debris
UU. 15	81025	OPS 7350 debris (Telescope aperture suncover)	Debris
UU. 16	81049	GOES 5 debris (VAS cover)	Debris
UU. 17	81057	Meteosat 2 debris (MVIRI cover)	Debris
UU. 18	81057	Meteosat 2 debris (MVIRI cooler cover)	Debris
UU. 19	81076	Himawari-2 debris (VISSR cover)	Debris
UU. 20	81076	Star 27 (Himawari-2 AKM)	Rocket Body
UU. 21	81114	Satcom IIIR debris (Array restraint cable)	Debris
UU. 22	82004	Satcom IV debris (Array restraint cable)	Debris
UU. 23	82019	OPS 8701 debris (Telescope aperture suncover)	Debris
UU. 24	82105	Aurora I debris (Array restraint cable)	Debris
UU. 25	83030	Satcom IR debris (Array restraint cable)	Debris
UU. 26	83041	GOES 6 debris (VAS cover)	Debris
UU. 27	83094	Satcom IIR debris (Array restraint cable)	Debris
UU. 28	84037	OPS 7641 debris (Telescope aperture suncover)	Debris
UU. 29	84049	Spacenet 1 debris (Array restraint cable)	Debris
UU. 30	84080	Himawari-3 debris (VISSR cover)	Debris
UU. 31	84114	Spacenet 2 debris (Array restraint cable)	Debris
UU. 32	84129	USA 7 debris (Telescope aperture suncover)	Debris
UU. 33	85035	Gstar 1 debris (Array restraint cable)	Debris
UU. 34	85076	ASC 1 debris (Array restraint cable)	Debris
UU. 35	86026	Gstar 2 debris (Array restraint cable)	Debris
UU. 36	87022	GOES 7 debris (VAS cover)	Debris
UU. 37	87097	USA 28 debris (Telescope aperture suncover)	Debris
UU. 38	88018	Spacenet 3R debris (Array restraint cable)	Debris
UU. 39	88051	Meteosat 3 debris (MVIRI cover)	Debris
UU. 40	88051	Meteosat 3 debris (MVIRI cooler cover)	Debris
UU. 41	88051	Mage 1 (Meteosat 3 AKM)	Rocket Body
UU. 42	88051	PAS 1 debris (Array restraint cable)	Debris

UU.nn	COSPAR	NAME	TYPE
UU. 43	89020	Meteosat 4 debris (MVIRI cover)	Debris
UU. 44	89020	Meteosat 4 debris (MVIRI cooler cover)	Debris
UU. 45	89070	Himawari-4 debris (VISSR cover)	Debris
UU. 46	90100	Satcom C-1 debris (Array restraint cable)	Debris
UU. 47	90100	Gstar 4 debris (Array restraint cable)	Debris
UU. 48	91015	Meteosat 5 debris (MVIRI cover)	Debris
UU. 49	91015	Meteosat 5 debris (MVIRI cooler cover)	Debris
UU. 50	91028	Spacenet 4 debris (Array restraint cable)	Debris
UU. 51	91037	Aurora II debris (Array restraint cable)	Debris
UU. 52	91080	USA 75 debris (Telescope aperture suncover)	Debris
UU. 53	92057	Satcom C-4 debris (Array restraint cable)	Debris
UU. 54	92060	Satcom C-3 debris (Array restraint cable)	Debris
UU. 55	93073	Meteosat 6 debris (MVIRI cover)	Debris
UU. 56	93073	Meteosat 6 debris (MVIRI cooler cover)	Debris
UU. 57	94040	BS-3N debris (Array restraint cable)	Debris
UU. 58	94084	USA 107 debris (Telescope aperture suncover)	Debris
UU. 59	95011	Himawari-5 debris (VISSR cover)	Debris
UU. 60	96003	Koreasat 2 debris (Array restraint cable)	Debris
UU. 61	97029	FengYun 2A debris (VISSR cover?)	Debris
UU. 62	97049	Meteosat 7 debris (MVIRI cover)	Debris
UU. 63	97049	Meteosat 7 debris (MVIRI cooler cover)	Debris
UU. 64	00032	FengYun 2B debris (VISSR cover?)	Debris
UU. 65	02040	Meteosat 8 debris (cooler cover)	Debris
UU. 66	02040	Meteosat 8 debris (entry baffle cover)	Debris
UU. 67	04004	USA 176 debris (Telescope aperture suncover)	Debris
UU. 68	04042	FengYun 2C debris (VISSR cover?)	Debris
UU. 69	07054	USA 197 debris (Telescope aperture suncover)	Debris
UU. 70	08066	FengYun 2E debris (VISSR cover?)	Debris
UU. 71	12002	FengYun 2F debris (VISSR cover?)	Debris
UU. 72	12035	Meteosat 10 debris (cooler cover)	Debris
UU. 73	12035	Meteosat 10 debris (entry baffle cover)	Debris

For the following objects classified as 'uncontrolled uncatalogued' the following orbital data have been provided by KIAM.

UUnnn	YYYYMMDD	HH:MM:SS.SS	t_{osc}	H_p	H_a	λ
TYPE	i	Ω	ω	a	e	u
UU.020	20131210	00:00:00.000	1449.9814	35711.8	36404.2	328.750
D1	14.8860	347.2501	350.2408	42436.068	0.0081582	060.3467
UU.052	20131109	00:00:00.000	1421.9828	35013.8	36008.3	064.924
D1	13.7766	026.2747	281.8151	41888.011	0.0118701	086.6899
UU.062	20140101	00:00:00.000	1437.2948	34769.4	36850.6	018.513
D1	11.7009	040.7218	358.7600	42188.176	0.0246657	080.8450
UU.072	20131213	00:00:00.000	1418.5976	35297.4	35589.4	130.737
D1	00.7164	224.1325	052.8299	41821.504	0.0034909	352.5265

UUnnn	YYYYMMDD	HH:MM:SS.SS	t_{osc}	H_p	H_a	λ
TYPE	i	Ω	ω	a	e	u
UU.073	20140101	00:00:00.000	1401.4664	34760.6	35451.4	070.256
D1	00.6714	222.3518	347.1506	41484.129	0.0083269	315.1914
UU.061	20140101	00:00:00.000	1436.4381	35428.6	36158.1	045.831
L1	12.7189	039.8598	013.7252	42171.410	0.0086491	107.5559
UU.068	20131023	00:00:00.000	1436.4322	35553.9	36033.1	103.883
L1	07.1020	054.0394	275.3164	42171.295	0.0056819	080.7355
UU.070	20140101	00:00:00.000	1435.3361	35385.5	36157.9	116.351
L1	01.7079	055.1496	233.4562	42149.840	0.0091623	159.8203
UU.071	20140101	00:00:00.000	1434.8302	35449.4	36074.2	073.542
L1	00.7995	283.7683	325.9021	42139.935	0.0074144	249.0779

5 Table 3: Objects in highly inclined orbits

This table contains all the objects in highly inclined orbits that meet the applied classification scheme.

The 9 objects are ordered according to their COSPAR designation.

For an explanation of the symbols, see the definitions at the beginning of Chapter 3 on page 34.

I .nn	**COSPAR**	**NAME**					
	Date					N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
I . 1	**63031A**	**Syncom 2**					
	26-DEC-13					47	285
	23370.980625	42159.65935	0.0008079	35.6734	3.3515	108.3322	83.2746
I . 2	**78012A**	**IUE**					
	31-DEC-13					50	1067
	23375.481806	42223.29552	0.1482124	43.9819	353.3466	186.3794	294.3531
I . 3	**10005A**	**Solar Dynamics Observatory**					
	27-DEC-13					53	206
	23371.231343	42164.74445	0.0001338	27.8838	163.6640	175.8773	258.2452
I . 4	**10036A**	**Beidou DW 5**					
	26-DEC-13					52	181
	23370.745231	42160.73948	0.0032121	54.4722	206.1214	183.9033	120.5377
I . 5	**10045A**	**Michibiki**					
	27-DEC-13					53	173
	23371.585255	42161.76081	0.0747970	40.6030	177.8006	270.0263	137.5661
I . 6	**10068A**	**Beidou DW 7**					
	27-DEC-13					53	161
	23371.521921	42158.34586	0.0023734	54.5084	325.9022	202.2527	118.3546
I . 7	**11013A**	**Beidou DW 8**					
	26-DEC-13					53	145
	23370.537894	42171.81069	0.0025363	56.3333	86.2681	182.5999	116.1220
I . 8	**11038A**	**Beidou DW 9**					
	26-DEC-13					52	129
	23370.600405	42164.45851	0.0024542	54.7911	208.2855	186.8990	95.9832
I . 9	**11073A**	**Beidou DW 10**					
	27-DEC-13					51	111
	23371.518646	42167.59207	0.0023619	54.6119	325.3261	202.3394	93.5775

6 Table 4: Objects of indeterminate status

This table contains all the objects of which the status cannot be determined by our software. The main reason for the difficulty to classify an object is that there are not enough TLEs available or that the status has recently changed (satellite newly launched or recently manoeuvred). Indeed, at least 5 TLEs with the same status are needed to determine the category in which the object falls. Some bad measurements can also cause the failure to classify an object correctly. The 12 objects are ordered according to their COSPAR designation.

Note that the numbering continues from Section 4.7.

For an explanation of the symbols, see the definitions at the beginning of Chapter 3 on page 34.

Ind.nn	**COSPAR**	**NAME**					
	Date					N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
Ind. 1	**99033A**	**Astra 1H**					
	27-DEC-13					44	590
	23371.850127	42207.25211	0.0001087	1.2981	76.7221	180.4893	25.7830
Ind. 2	**00007A**	**Hispasat 1C**					
	27-DEC-13					52	695
	23371.438958	42249.93864	0.0002396	0.1271	69.8699	261.0813	291.5828
Ind. 3	**02015B**	**Astra 3A**					
	27-DEC-13					44	551
	23371.542951	42165.26448	0.0001580	1.3342	75.7679	236.2278	183.1699
Ind. 4	**12075B**	**Mexsat Bicentenario**					
	26-DEC-13					53	56
	23370.652176	42164.54121	0.0000770	0.0052	271.4514	330.6749	245.2051
Ind. 5	**13045A**	**Amos 4**					
	27-DEC-13					17	17
	23371.812407	42165.20028	0.0002145	0.0497	264.5219	43.6662	65.0089
Ind. 6	**13071A**	**SES-8**					
	27-DEC-13					4	4
	23371.098507	42164.78930	0.0000887	0.0761	259.4397	121.9225	81.0143
Ind. 7	**13073A**	**Inmarsat 5F1**					
	24-DEC-13					3	3
	23368.060752	42127.62729	0.0008288	0.0468	167.5143	207.5136	64.9778
Ind. 8	**13075A**	**Tupac Katari (TKSat 1)**					
	21-DEC-13					2	2
	23365.333021	27447.76894	0.7609842	24.7827	337.1570	179.6848	13.5323
Ind. 9	**13077A**	**Ekspress AM-5**					
	26-DEC-13					1	1
	23370.575035	9005.38852	0.2625741	50.5653	266.5348	359.7130	221.6560

Note that 13077A, Ekspress AM-5, is known to have reached GEO by the end of the year, which is not yet reflected in the orbital elements.

The longitude histories of objects in this category are plotted in Figures 6.1 to 6.9.

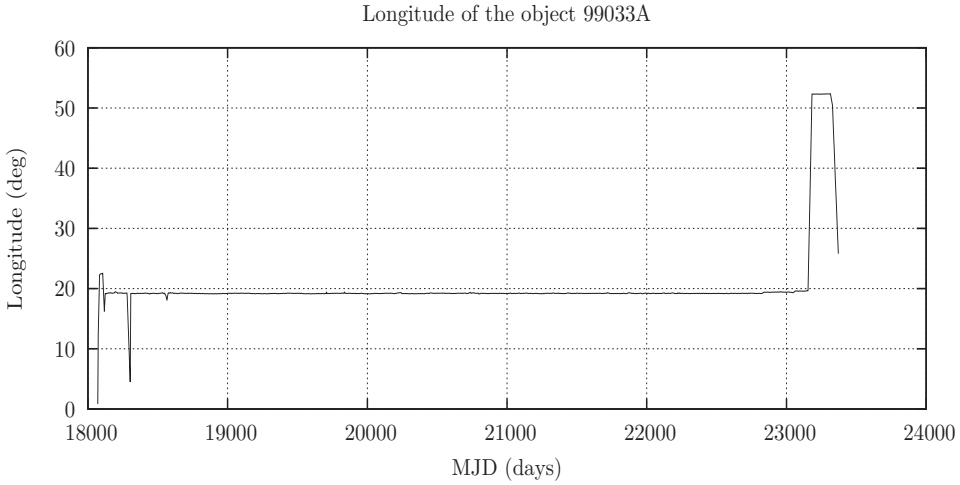

Figure 6.1: Longitude history of 99033A

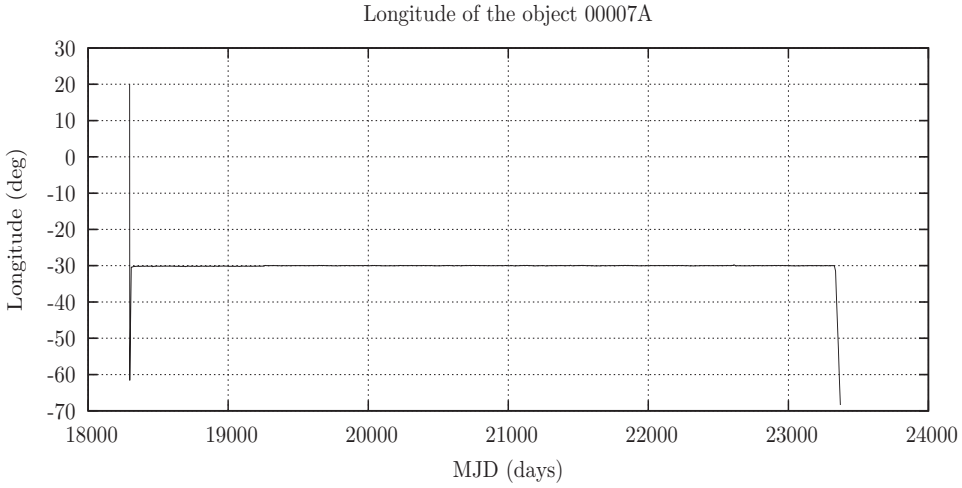

Figure 6.2: Longitude history of 00007A

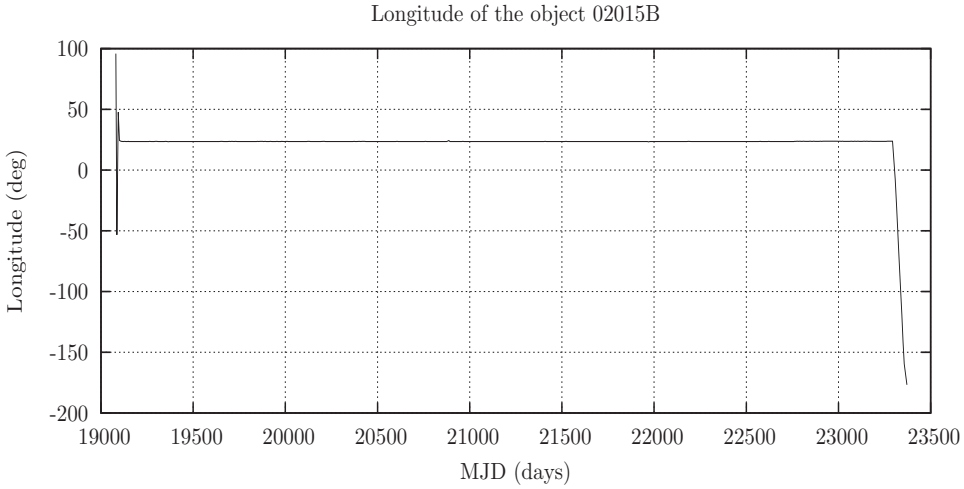

Figure 6.3: Longitude history of 02015B

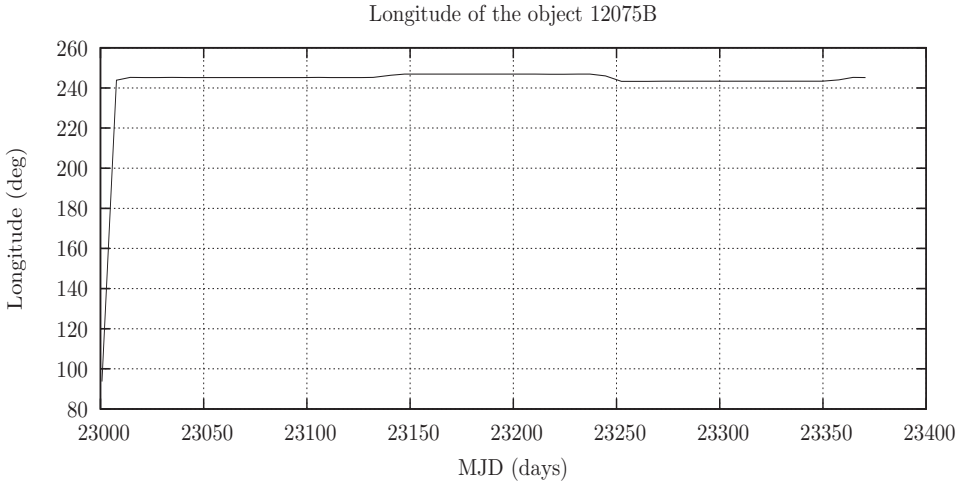

Figure 6.4: Longitude history of 12075B

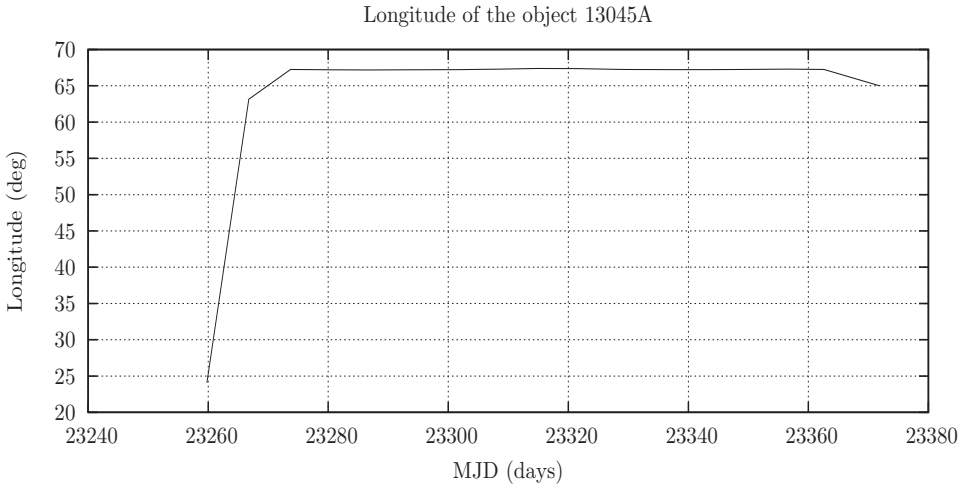

Figure 6.5: Longitude history of 13045A

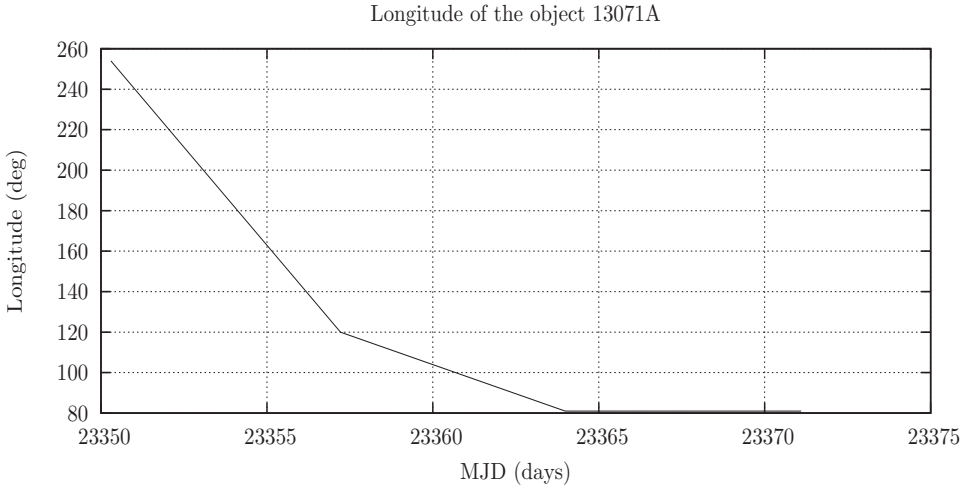

Figure 6.6: Longitude history of 13071A

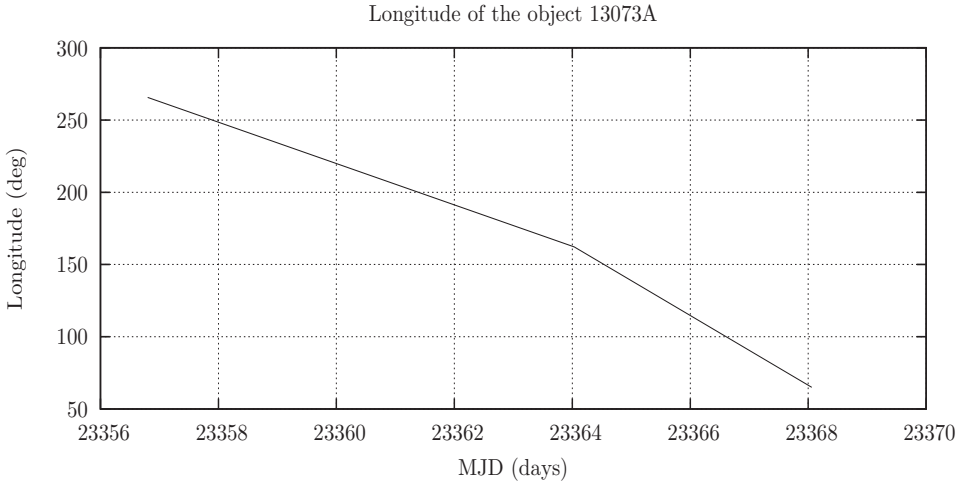

Figure 6.7: Longitude history of 13073A

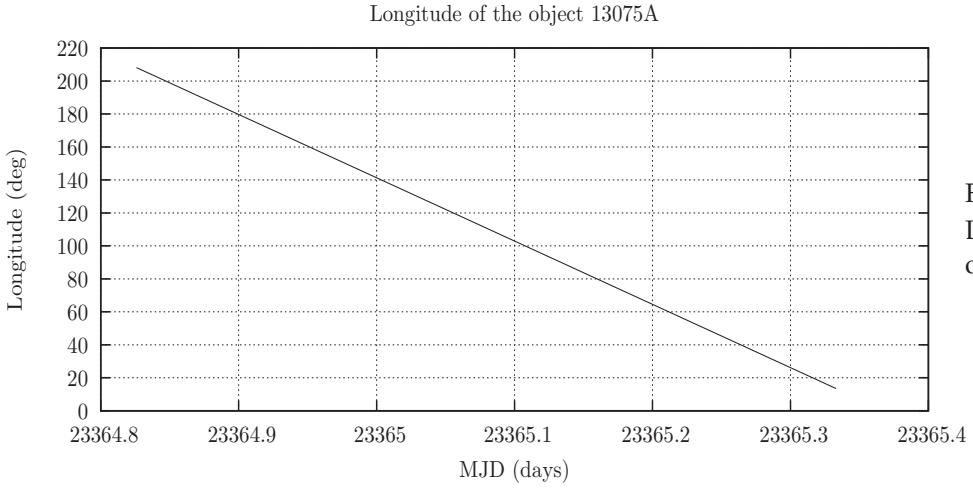

Figure 6.8: Longitude history of 13075A

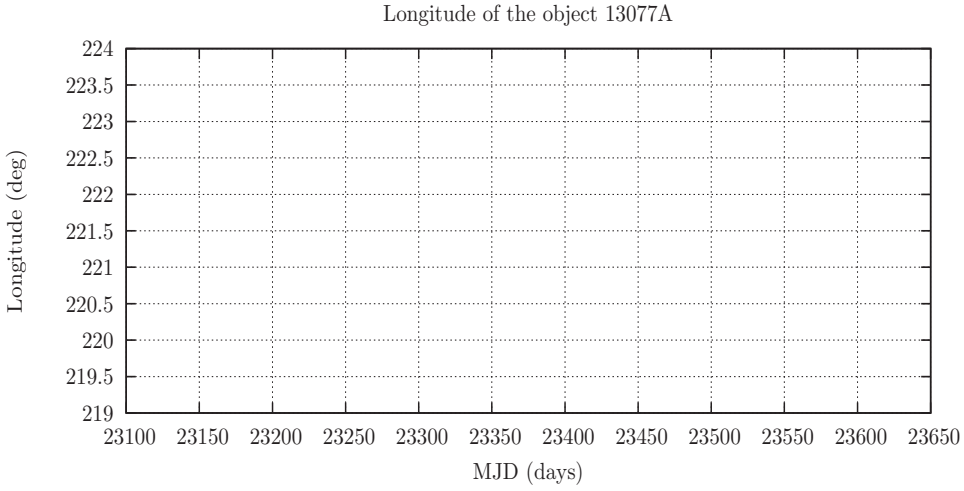

Figure 6.9: Longitude history of 13077A

7 Figures

The previous tables are now illustrated by seven graphs. They give a global view of the situation near the GEO protected region and the distribution of the objects in each category.

- Figure 7.1: Number of objects in each category
- Figure 7.2: Number of objects under control, in drift orbit or in libration orbit according to the launch year
- Figure 7.3: Distribution of the longitude of the satellites (with TLEs) under control
- Figure 7.4: Distribution and altitude range of the objects (with TLEs) in drift orbit
- Figure 7.5: Zoom in the distribution and altitude range of the objects (with TLEs) in drift orbit
- Figure 7.6: Distribution of the perigee mean deviation from the geostationary altitude for the objects (with TLEs) in drift orbit
- Figure 7.7: Number of objects (with TLEs) librating through a given longitude

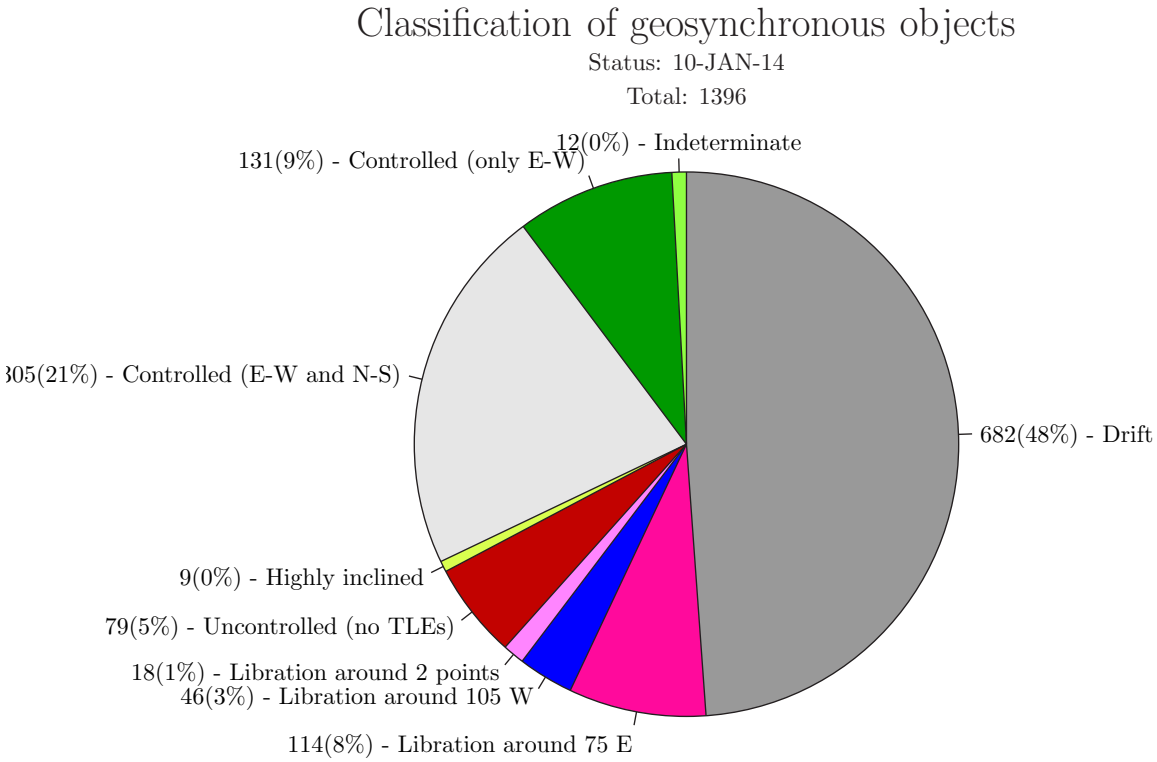

Figure 7.1:
Number of objects in each category

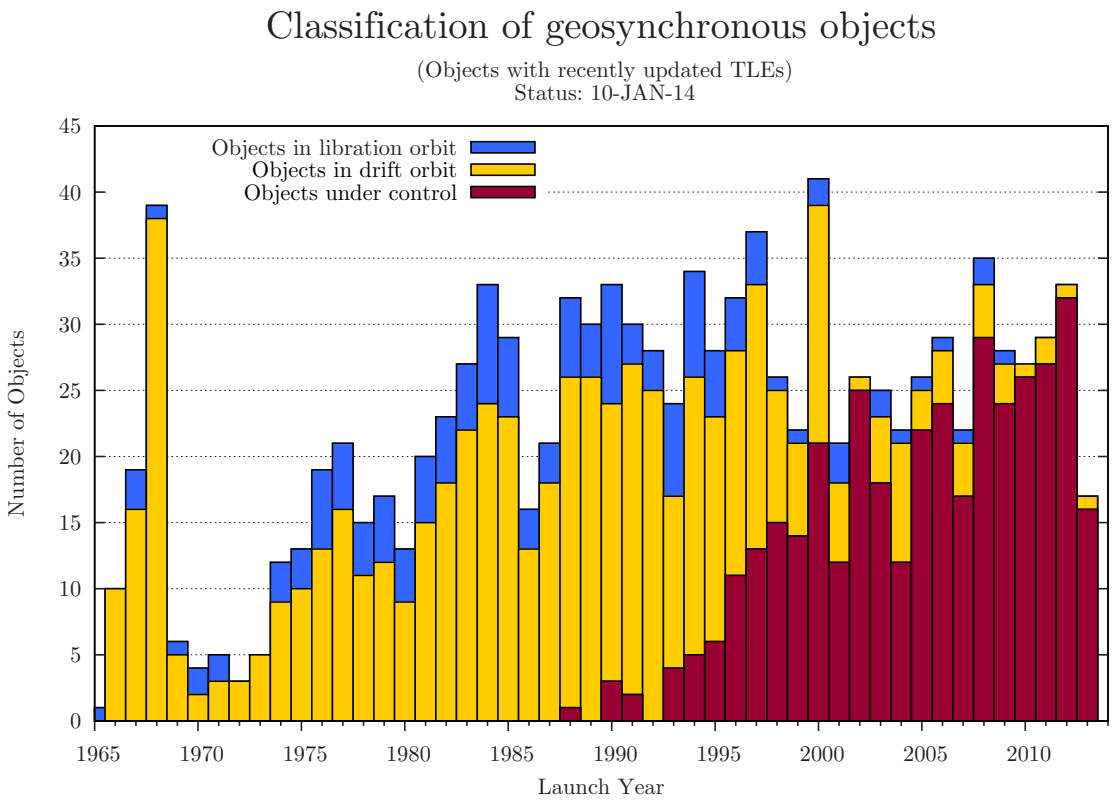

Figure 7.2:
Number of objects in each category according to the launch year.

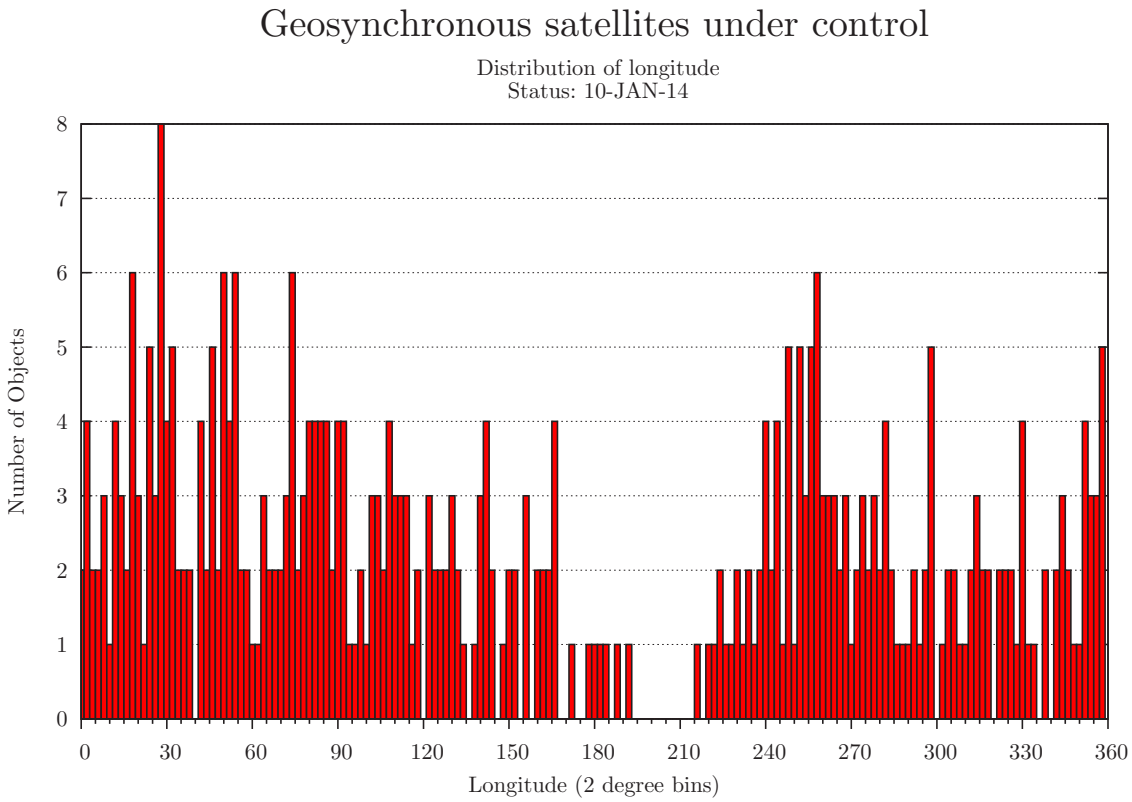

Figure 7.3:
Distribution of the longitude of the 350 satellites under control (with updated TLEs).

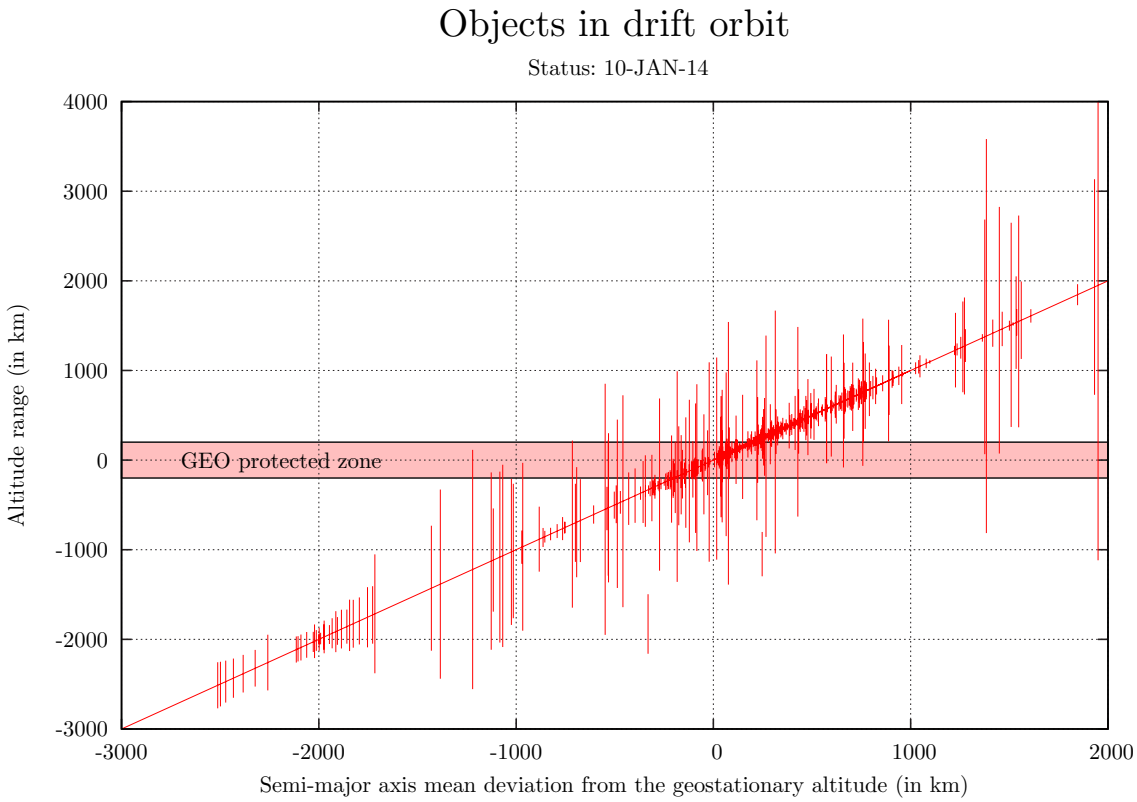

Figure 7.4:
Distribution and altitude range of the objects in drift orbit.

This figure illustrates the distribution of the objects in drift orbit. Each vertical line represents one object.

The horizontal axis gives the semi-major axis mean deviation from the geostationary altitude, which is inversely proportional to the mean drift rate of the object.

The vertical axis gives the perigee and apogee mean deviation from the geostationary altitude. The altitude of the object librates between these two values. One can see that if the eccentricity is large, the object can go through the geostationary altitude.

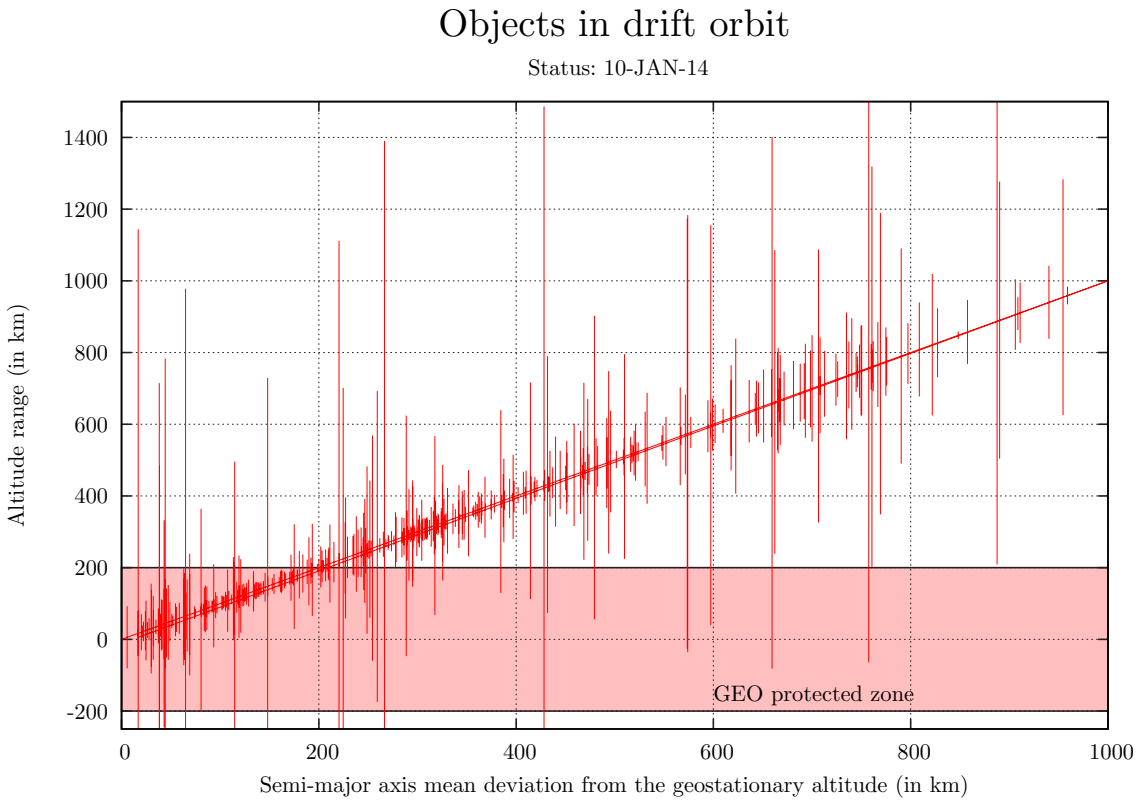

Figure 7.5:
Zoom in the distribution and altitude range of the objects in drift orbit.

This figure is a zoom of the previous figure. This area is important because, according to the IADC recommendations, a satellite should be reorbited at its end-of-life to a graveyard orbit with a perigee altitude which is about 300 km above the GEO ring.

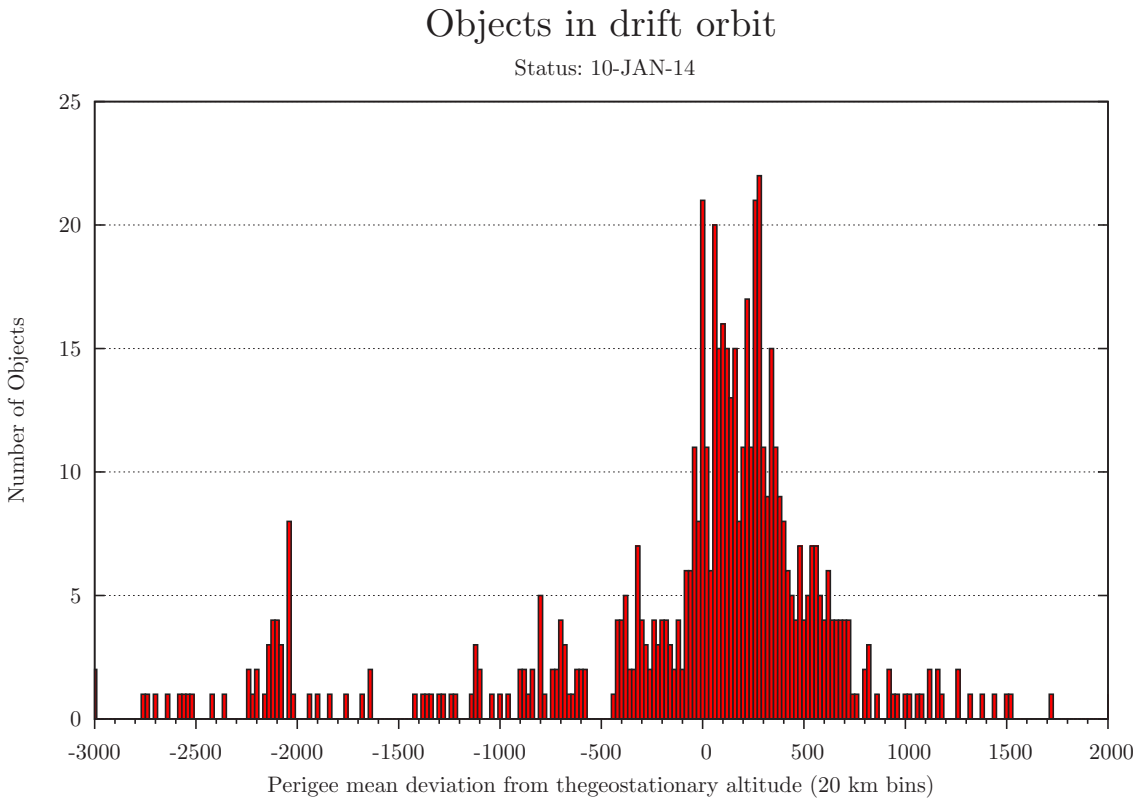

Figure 7.6:
Distribution of the perigee mean deviation from the geostationary altitude.

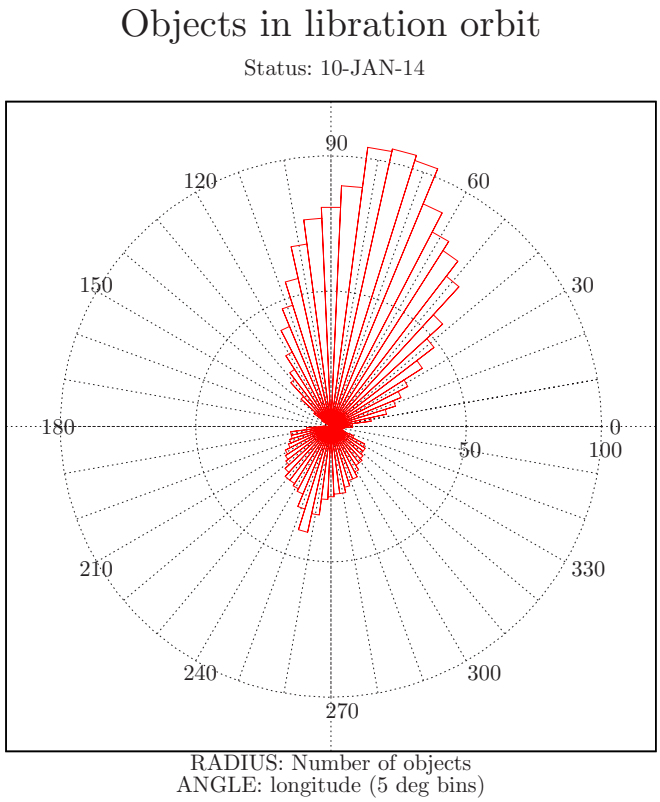

Figure 7.7:
Distribution of the objects in libration orbit in 5-deg bins of geographic longitude.

This figure illustrates the distribution of the objects in a libration orbit (objects with updated TLEs only). For every interval of 5 degrees, the number of objects librating through this longitude interval is given. For instance, an object librating between 64 deg E and 86 deg E is counted in the 5 intervals 62.5-67.5, 67.5-72.5, 72.5-77.5, 77.5-82.5 and 82.5-87.5.

For the same reason, all the objects classified as librating around the Eastern stable point or around the 2 stable points are counted in the interval 72.5-77.5, because they all go through the longitude 75 deg E. Thus, the number of objects at 75 deg E shown in this figure is equal to the sum of the objects in the L1 and L3 categories.

8 Summary

All geostationary or near-geostationary objects catalogued in ESA's DISCOS Database (Database and Information System Characterising Objects in Space) are listed in this document. An object is considered as geostationary or near-geostationary if it meets the following criteria:

- eccentricity smaller than 0.2,
- mean motion between 0.9 and 1.1 revolution per sideral day, corresponding to a semi-major axis between 42164 - 2500 km and 42164 + 3150 km,
- inclination lower than 70 degree.

1143 objects met these criteria as of 31 December 2013. 253 more objects are also known to be in this orbital region. For 174 of them KIAM provided orbital elements; 168 objects can be correlated with a launch and 6 are tracked objects that cannot be correlated with a launch. Thus, the total number of known objects in the geostationary region is 1396 .

They can be classified as follows:

- 436 are controlled (305 under longitude and inclination control),
- 682 are in a drift orbit,
- 178 are in a libration orbit,
- 6 are uncontrolled with no recent orbital elements available,
- 73 are uncatalogued objects which can, however, be associated with a launch,
- 9 are in highly-inclined orbits,
- 12 could not be classified.

Compared with the past issue of February 2013 the following changes can be observed: There were 27 new objects (26 payloads, and 1 rocket body) launched into or near GEO in 2013.

Three objects (68081AG, AH, AJ) were newly catalogued, while 68081V, 77092L and 90095E appear lost from the last issue. Thus the total number of listed objects increased by 26.

At least 20 spacecraft reached end of life as far as can be inferred from the orbital elements stored in DISCOS, from data provided by KIAM, or declared by spacecraft operators. Only 15 were reorbited more than 250 km above GEO and complied with the IADC reorbiting guidelines:

- Inmarsat 2-F1 (90093A, INMARSAT, 385 km $\times$ 408 km),
- Solidaridad 2 (94065A, MEXICO, 280 km $\times$ 515 km),
- MEASAT 1 (96002B, MALAYSIA, 336 km $\times$ 350 km),
- Intelsat VII F-6 (96035A, INTELSAT, 280 km $\times$ 337 km),
- Intelsat VIII F-1 (97009A, INTELSAT, 394 km $\times$ 480 km),
- Thor II (97025A, NORWAY, 359 km $\times$ 379 km),

- Nilesat 101 (98024A, EGYPT, 731 km × 923 km),
- BSAT-1b (98024B, JAPAN, 313 km × 340 km),
- ZX 5B (ChinaSat 5B) (98044A, CHINA, 278 km × 342 km),
- ST-1 (98049A, INTELSAT, 411 km × 455 km),
- Hot Bird 5 (98057A, EUTELSAT, 491 km × 543 km),
- GOES 12 (01031A, USA, 297 km × 346 km),
- BSAT-2c (03028A, JAPAN, 283 km × 325 km),
- Ekspress AM-1 (04043A, RUSSIA, 281 km × 328 km),
- Ekspress MD-1 (09007B, RUSSIA, 306 km × 352 km).

Solidaridad 2, Intelsat VII F-6 (96035A), ZX 5B (98044A), BSAT-2c (03028A), and Ekspress AM-1 (04035A) were reorbited so that they might marginally touch the protected zone around GEO in a long-term forecast.

Three spacecraft were reorbited too low:

- Intelsat VIIA F-2 (96015A, INTELSAT, 224 km × 795 km),
- Arabsat 2B (96063A, SAUDI ARABIA, 227 km × 259 km),
- Cosmos-2434 (Raduga-1M1) (07058A, RUSSIA, 238 km × 256 km),

Two spacecraft listed in Table 2 were reorbited in 2013 into an orbit that would not comply with the IADC reorbiting guidelines:

- USA 8 (85010B, USA, -434 km km × 696 km),
- USA 48 (89090B, USA, -1305 km × 1050 km),

One spacecraft listed in Table 2, and counted as indeterminate in the previous issue, has possibly been left abandoned librating around L1 and L2, already in 2012:

- OPS 0441 (84009A)

We note that one spacecraft listed in Table 2 has started drifting eastward slowly in March, and it might have been abandoned, but we still list it as indeterminate:

- USA 75 (91080B)

One rocket body (Proton-M/Briz-M fourth stage (13062B, RUSSIA) was left in a drift orbit with the apogee 51 km below GEO.

This analysis has shown that in 2013, sixteen years after the IADC guidelines were established, there is a wide compliance with the guidelines. Only a few satellites were not or could not be properly reorbited.

9 References

1. Samsom P., "Classification of Geostationary Objects", ESOC - MAS WP 420, 1999.

2. Jehn, R., and Hernández, C., "Reorbiting statistics of geostationary objects in the years 1997 - 2001", in: Proceedings of the Third European Conference on Space Debris, 19 - 21 March 2001, Darmstadt, Germany, edited by H. Sawaya-Lacoste, ESA SP-473, 2001.

10 Acknowledgements

The author thanks Nicholas Johnson (NASA) and Vladimir Agapov (KIAM) for their suggestions and valuable contributions. He also thanks Agnes Minoves for improving the report's layout, and Benjamin Bastida Virgili and Stijn Lemmens for providing technical support.