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CLASSIFICATION OF GEOSYNCHRONOUS OBJECTS

Produced with the DISCOS Database

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Abstract

This is a status report on geosynchronous objects as of the end of 2011.

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 1234 objects for which orbital data are available, 406 are controlled inside their longitude slots, 629 are drifting above, below or through GEO, 172 are in a libration orbit and 18 whose status could not be determined. Furthermore, there are 74 uncontrolled objects without orbital data (of which 66 have not been catalogued). Thus the total number of known objects in the geostationary region is 1307 .

During 2011 at least sixteen spacecraft reached end-of-life. Thirteen of them were reorbited following the IADC recommendations, one of those below the GEO protected region. Three spacecraft were reorbited too low. We identified one spacecraft that seems to be abandoned or could not make any reorbiting manouevre at all in 2009 and is now librating inside the geostationary ring.

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

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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 4.7 (Unidentified objects) and 4.9 (Uncontrolled uncatalogued objects) are not included in this list.

COSPAR	NAME	TABLE	STATUS	No
63031A	Syncom 2	4.	I	1.
64047A	Syncom 3	2.	U	1.
65028A	Intelsat I F-1	1.	L2	24.
66053A	GGTS 1	1.	D	522.
66053B	IDCSP 1	1.	D	520.
66053C	IDCSP 2	1.	D	518.
66053D	IDCSP 3	1.	D	515.
66053E	IDCSP 4	1.	D	512.
66053F	IDCSP 5	1.	D	509.
66053G	IDCSP 6	1.	D	506.
66053H	IDCSP 7	1.	D	504.
66053J	Titan IIIC stage 3 (Transtage)	1.	D	502.
66110A	ATS 1	1.	D	407.
67001A	Intelsat II F-2	1.	D	405.
67003A	IDCSP 8	1.	D	526.
67003B	IDCSP 9	1.	D	525.
67003C	IDCSP 10	1.	D	524.
67003D	IDCSP 11	1.	D	523.
67003E	IDCSP 12	1.	D	521.
67003F	IDCSP 13	1.	D	514.
67003G	IDCSP 14	1.	D	511.
67003H	IDCSP 15	1.	D	507.
67026A	Intelsat II F-3	1.	L1	101.
67066A	IDCSP 16	1.	D	533.
67066B	IDCSP 17	1.	D	532.
67066C	IDCSP 18	1.	D	531.
67066D	IDCSP 19	1.	D	530.
67066E	LES 5	1.	D	529.
67066F	DODGE 1	1.	D	528.
67066G	Titan IIIC stage 3 (Transtage)	1.	D	527.
67094A	Intelsat II F-4	1.	L2	28.
67111A	ATS 3	1.	L2	5.
68050A	OPS 9341 (IDSCS 20)	1.	D	519.
68050B	OPS 9342 (IDSCS 21)	1.	D	517.
68050C	OPS 9343 (IDSCS 22)	1.	D	516.
68050D	OPS 9344 (IDSCS 23)	1.	D	513.
68050E	OPS 9345 (IDSCS 24)	1.	D	510.
68050F	OPS 9346 (IDSCS 25)	1.	D	508.
68050G	OPS 9347 (IDSCS 26)	1.	D	505.
68050H	OPS 9348 (IDSCS 27)	1.	D	503.
68050J	Titan IIIC stage 3 (Transtage)	1.	D	501.
68063A	OPS 2222 (CANYON 1)	2.	D1	69.
68063B	Atlas SLV-3A stage 2 (Agena D)	2.	D1	9.
68081A	OV2 5	1.	D	473.
68081D	LES 6	1.	L2	1.
68081E	Titan IIIC stage 3 (Transtage)	1.	D	471.
68081G	LES 6 operational debris	1.	D	447.

COSPAR	NAME	TABLE	STATUS	No
68081H	LES 6 operational debris	1.	D	476.
68081J	Transtage 5 debris	1.	D	440.
68081K	Transtage 5 debris	1.	D	480.
68081L	Transtage 5 debris	1.	D	477.
68081M	Transtage 5 debris	1.	D	433.
68081N	Transtage 5 debris	2.	U	2.
68081P	Transtage 5 debris	1.	D	467.
68116A	Intelsat III F-2	1.	D	2.
69013A	TACSAT 1	1.	D	412.
69013B	Titan IIIC stage 3 (Transtage)	1.	D	52.
69036A	OPS 3148 (CANYON 2)	2.	D1	41.
69036B	Atlas SLV-3A stage 2 (Agena D)	2.	D1	4.
69045A	Intelsat III F-4	1.	D	1.
69069A	ATS 5	1.	D	267.
69069C	JPL SR-28-3 (ATS 5 AKM)	1.	D	97.
69101A	Skynet 1A	1.	L2	6.
70003A	Intelsat III F-6	1.	D	204.
70021A	NATO I	1.	L2	9.
70032A	Intelsat III F-7	2.	L1	2.
70046A	OPS 5346 (Rhyolite 1)	2.	L1	8.
70055A	Intelsat III F-8	1.	D	483.
70069A	OPS 7329 (CANYON 3)	2.	L2	3.
70069B	Atlas SLV-3A stage 2 (Agena D)	2.	D1	10.
71006A	Intelsat IV F-2	1.	D	155.
71009A	NATO IIB	1.	L2	4.
71039A	OPS 3811 (DSP F2)	2.	D1	88.
71039B	Titan IIIC stage 3 (Transtage)	2.	D1	40.
71095A	OPS 9431 (DSCS II F-1)	1.	L2	10.
71095B	OPS 9432 (DSCS II F-2)	1.	L3	3.
71095C	Titan IIIC stage 3 (Transtage)	1.	D	40.
71116A	Intelsat IV F-3	1.	D	287.
72003A	Intelsat IV F-4	1.	D	321.
72010A	OPS 1570 (DSP F3)	2.	D1	50.
72010B	Titan IIIC stage 3 (Transtage)	2.	D1	29.
72041A	Intelsat IV F-5	1.	D	379.
72090A	Anik A1	1.	D	153.
72101A	OPS 9390 (CANYON 5)	2.	L1	3.
72101B	Atlas SLV-3A stage 2 (Agena D)	2.	D1	6.
73013A	OPS 6063 (Rhyolite 2)	2.	L1	7.
73023A	Anik A2	1.	D	315.
73040A	OPS 6157 (DSP F4)	2.	D1	48.
73040B	Titan IIIC stage 3 (Transtage)	2.	D1	58.
73058A	Intelsat IV F-7	1.	D	198.
73100A	OPS 9433 (DSCS II F-3)	1.	D	55.
73100B	OPS 9434 (DSCS II F-4)	1.	D	45.
73100D	Titan IIIC stage 3 (Transtage)	1.	D	9.
74017A	Cosmos 637	1.	D	434.

COSPAR	NAME	TABLE	STATUS	No
74017F	Proton-K fourth stage (Block DM)	1.	D	444.
74022A	Westar I	1.	D	338.
74033A	SMS 1	1.	D	127.
74039A	ATS 6	1.	D	479.
74039C	Titan IIIC stage 3 (Transtage)	1.	D	429.
74060A	Molniya 1-S	1.	L1	59.
74060F	Proton-K fourth stage (Block DM)	1.	L1	76.
74075A	Westar II	1.	D	329.
74093A	Intelsat IV F-8	1.	D	312.
74094A	Skynet 2B	1.	L1	96.
74101A	Symphonie A	1.	D	348.
75011A	SMS 2	1.	D	268.
75011F	Aerojet SVM-5 (SMS 2 AKM)	1.	D	124.
75038A	Anik A3	1.	D	370.
75042A	Intelsat IV F-1	1.	D	232.
75055A	OPS 4966 (CANYON 6)	2.	L1	4.
75055B	Atlas SLV-3A stage 2 (Agena D)	2.	D1	8.
75077A	Symphonie B	1.	D	351.
75091A	Intelsat IVA F-1	1.	D	342.
75097A	Cosmos 775	1.	L1	65.
75097F	Proton-K fourth stage (Block DM)	1.	D	378.
75100A	GOES 1	1.	L2	16.
75100F	Aerojet SVM-5 (GOES 1 AKM)	1.	D	478.
75117A	RCA Satcom I	1.	D	285.
75118A	OPS 3165 (DSP F5)	2.	D1	38.
75118C	Titan IIIC stage 3 (Transtage)	2.	D1	35.
75118D	OPS 3165 debris (Telescope aperture suncover)	2.	U	3.
75123A	Raduga 1	1.	L1	19.
75123F	Proton-K fourth stage (Block DM)	1.	D	418.
76004A	Hermes	1.	L2	21.
76010A	Intelsat IVA F-2	1.	D	297.
76017A	Marisat 1	1.	D	216.
76023A	LES 8 (RTGPP)	1.	L2	11.
76023B	LES 9 (RTGPP)	1.	L2	13.
76023F	Titan IIIC stage 3 (Transtage)	1.	D	101.
76023J	LES 8, LES 9 operational debris	1.	D	100.
76023K	LES 8, LES 9 operational debris	1.	D	463.
76029A	RCA Satcom II	1.	D	129.
76035A	NATO IIIA	1.	D	325.
76042A	Comstar 1A	1.	D	319.
76053A	Marisat 2	1.	D	22.
76059A	OPS 2112 (DSP F6)	2.	D1	62.
76059C	Titan IIIC stage 3 (Transtage)	2.	D1	36.
76059D	OPS 2112 debris (Telescope aperture suncover)	2.	U	4.
76066A	Palapa 1	1.	D	375.
76073A	Comstar 2	1.	D	354.
76092A	Raduga 2	1.	L1	21.
76092F	Proton-K fourth stage (Block DM)	1.	L1	36.

COSPAR	NAME	TABLE	STATUS	No
76101A	Marisat 3	1.	D	48.
76107A	Ekran 1	1.	L1	37.
76107F	Proton-K fourth stage (Block DM)	1.	D	469.
77005A	NATO IIIB	1.	D	15.
77007A	OPS 3151 (DSP F7)	2.	D1	90.
77007C	Titan IIIC stage 3 (Transtage)	2.	L2	2.
77007D	OPS 3151 debris (Telescope aperture suncover)	2.	D1	31.
77014A	Kiku-2	1.	D	360.
77018A	Palapa 2	1.	D	366.
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	5.
77038C	Atlas SLV-3A stage 2 (Agena D)	2.	D1	5.
77041A	Intelsat IVA F-4	1.	D	261.
77048A	GOES 2	1.	D	251.
77048G	Aerojet SVM-5 (GOES 2 AKM)	1.	D	423.
77065A	Himawari	1.	D	229.
77071A	Raduga 3	1.	L1	68.
77071F	Proton-K fourth stage (Block DM)	1.	D	64.
77080A	SIRIO 1	1.	L1	22.
77092A	Ekran 2	1.	L1	43.
77092G	Proton-K fourth stage (Block DM)	1.	D	459.
77092H	Ekran 2 fragmentation debris	1.	L1	85.
77092J	Ekran 2 fragmentation debris	1.	D	364.
77092K	Ekran 2 fragmentation debris	1.	D	387.
77092L	Ekran 2 debris	3.	Ind	1.
77108A	Meteosat 1	1.	L1	91.
77108D	Mage 1 (Meteosat 1 AKM)	1.	D	70.
77114A	OPS 4258 (AQUACADE 3)	2.	L2	5.
77118A	Sakura	1.	D	164.
78002A	Intelsat IVA F-3	1.	D	340.
78012A	IUE	4.	I	2.
78016A	OPS 6391 (FLTSATCOM F1)	2.	D1	73.
78035A	Intelsat IVA F-6	1.	L1	97.
78038A	OPS 8790 (AQUACADE 4)	2.	D1	37.
78039A	Yuri	1.	L1	60.
78044A	OTS 2	1.	D	196.
78058A	OPS 9454 (VORTEX 1) (CHALET 1)	2.	D1	45.
78058B	Titan IIIC stage 3 (Transtage)	2.	D1	54.
78062A	GOES 3	1.	L2	7.
78062D	Aerojet SVM-5 (GOES 3 AKM)	1.	D	266.
78068A	Comstar 3	1.	D	214.
78071A	ESA GEOS 2	1.	D	247.
78073A	Raduga 4	1.	L1	63.
78073F	Proton-K fourth stage (Block DM)	1.	D	46.
78106A	NATO IIIC	1.	D	116.
78113A	OPS 9441 (DSCS II F-11)	1.	D	6.

COSPAR	NAME	TABLE	STATUS	No
78113B	OPS 9442 (DSCS II F-12)	1.	D	111.
78113D	Titan IIIC stage 3 (Transtage)	1.	D	5.
78116A	Anik B1	1.	D	317.
79007A	Scatha	1.	D	472.
79007C	Scatha AKM	1.	D	474.
79015A	Ekran 3	1.	L1	44.
79015D	Proton-K fourth stage (Block DM)	1.	D	460.
79035A	Raduga 5	1.	L1	18.
79035E	Proton-K fourth stage (Block DM)	1.	D	396.
79038A	OPS 6392 (FLTSATCOM F2)	1.	D	120.
79053A	OPS 7484 (DSP F8)	2.	D1	81.
79053C	Titan IIIC stage 3 (Transtage)	2.	D1	64.
79053D	OPS 7484 debris (Telescope aperture suncover)	2.	U	5.
79062A	Gorizont 2	1.	L1	25.
79062D	Proton-K fourth stage (Block DM)	1.	D	58.
79072A	Westar III	1.	D	347.
79086A	OPS 1948 (VORTEX 2) (CHALET 2)	2.	D1	43.
79086C	Titan IIIC stage 3 (Transtage)	2.	D1	53.
79087A	Ekran 4	1.	L1	35.
79087C	Proton-K fourth stage (Block DM)	1.	D	416.
79098A	OPS 9443 (DSCS II F-13)	1.	D	20.
79098B	OPS 9444 (DSCS II F-14)	1.	D	107.
79098C	Titan IIIC stage 3 (Transtage)	1.	D	16.
79105A	Gorizont 3	1.	L1	62.
79105E	Proton-K fourth stage (Block DM)	1.	D	135.
80004A	OPS 6393 (FLTSATCOM F3)	1.	L2	36.
80016A	Raduga 6	1.	L1	57.
80016D	Proton-K fourth stage (Block DM)	1.	D	53.
80049A	Gorizont 4	1.	D	131.
80049F	Proton-K fourth stage (Block DM)	1.	D	78.
80060A	Ekran 5	2.	L3	1.
80060F	Proton-K fourth stage (Block DM)	1.	D	475.
80060G	EKRAN 5 debris	2.	D1	42.
80074A	GOES 4	1.	D	223.
80081A	Raduga 7	1.	L2	31.
80081F	Proton-K fourth stage (Block DM)	1.	D	350.
80087A	OPS 6394 (FLTSATCOM F4)	2.	D1	75.
80091A	SBS I	1.	D	318.
80098A	Intelsat V F-2	1.	D	158.
80104A	Ekran 6	1.	L1	39.
80104E	Proton-K fourth stage (Block DM)	1.	D	461.
81018A	Comstar 4	1.	L1	9.
81025A	OPS 7350 (DSP F9)	2.	D1	79.
81025C	Titan IIIC stage 3 (Transtage)	2.	D1	12.
81027A	Raduga 8	1.	D	409.
81027F	Proton-K fourth stage (Block DM)	1.	D	57.
81049A	GOES 5	1.	L2	20.

COSPAR	NAME	TABLE	STATUS	No
81050A	Intelsat V F-1	1.	D	156.
81057A	Meteosat 2	1.	D	139.
81057B	APPLE	1.	D	363.
81057F	Mage 1 (Meteosat 2 AKM)	1.	D	246.
81061A	Ekran 7	1.	L1	45.
81061F	Proton-K fourth stage (Block DM)	1.	D	446.
81069A	Raduga 9	1.	L1	69.
81069F	Proton-K fourth stage (Block DM)	1.	D	62.
81073A	FLTSATCOM F5	1.	D	125.
81076A	Himawari-2	1.	D	276.
81096A	SBS II	1.	D	391.
81102A	Raduga 10	1.	L1	17.
81102F	Proton-K fourth stage (Block DM)	1.	D	404.
81107A	OPS 4029 (VORTEX 3)	2.	L2	4.
81107C	Titan IIIC stage 3 (Transtage)	2.	D1	55.
81114A	RCA Satcom IIIR	1.	D	380.
81119A	Intelsat V F-3	1.	D	265.
81122A	Marecs A	1.	D	11.
82004A	RCA Satcom IV	1.	D	282.
82009A	Ekran 8	1.	D	345.
82009F	Proton-K fourth stage (Block DM)	1.	D	443.
82014A	Westar IV	1.	D	309.
82017A	Intelsat V F-4	1.	D	221.
82019A	OPS 8701 (DSP F10)	2.	D1	86.
82019B	Titan IIIC stage 3 (Transtage)	2.	D1	16.
82020A	Gorizont 5	1.	D	118.
82020F	Proton-K fourth stage (Block DM)	1.	D	133.
82031A	Insat-IA	1.	L1	77.
82044A	Cosmos 1366	1.	L1	14.
82044F	Proton-K fourth stage (Block DM)	1.	L3	2.
82058A	Westar V	1.	D	218.
82082A	Anik D1	1.	D	382.
82093A	Ekran 9	1.	L1	54.
82093F	Proton-K fourth stage (Block DM)	1.	D	456.
82097A	Intelsat V F-5	1.	D	109.
82103A	Gorizont 6	1.	L2	29.
82103E	Proton-K fourth stage (Block DM)	1.	D	408.
82105A	Aurora I	1.	L2	17.
82106A	DSCS II F-16	1.	D	12.
82106B	DSCS III A-01	2.	D1	89.
82106D	IUS stage 2	1.	D	248.
82110B	SBS III	1.	D	343.
82110C	Anik C3	1.	D	339.
82113A	Raduga 11	1.	D	63.
82113F	Proton-K fourth stage (Block DM)	1.	D	47.
83006A	Sakura 2A	1.	D	256.
83016A	Ekran 10	1.	D	10.
83016F	Proton-K fourth stage (Block DM)	1.	D	451.

COSPAR	NAME	TABLE	STATUS	No
83026B	TDRS-1	1.	D	141.
83028A	Raduga 12	1.	L1	16.
83028F	Proton-K fourth stage (Block DM)	1.	D	368.
83030A	RCA Satcom IR	1.	D	330.
83041A	GOES 6	1.	L2	18.
83047A	Intelsat V F-6	1.	D	205.
83058A	Eutelsat I F-1 (ECS 1)	1.	D	157.
83059B	Anik C2	1.	D	193.
83059C	Palapa Pacific System	1.	D	398.
83065A	Galaxy I	1.	D	386.
83066A	Gorizont 7	1.	D	106.
83066F	Proton-K fourth stage (Block DM)	1.	D	51.
83077A	Arabsat 1D-R	1.	D	269.
83081A	Sakura 2B	1.	D	151.
83088A	Raduga 13	1.	D	96.
83088F	Proton-K fourth stage (Block DM)	1.	D	50.
83089B	Insat-IB	1.	L1	87.
83094A	RCA Satcom IIR	1.	D	257.
83098A	Galaxy II	1.	D	402.
83100A	Ekran 11	1.	L1	48.
83100F	Proton-K fourth stage (Block DM)	1.	D	448.
83105A	Intelsat V F-7	1.	D	298.
83118A	Gorizont 8	1.	D	102.
83118F	Proton-K fourth stage (Block DM)	1.	L1	27.
84005A	Yuri 2A	1.	D	181.
84009A	OPS 0441 (VORTEX 4)	2.	C2	1.
84009C	Titan 34D stage 3 (Transtage)	2.	D1	63.
84016A	Raduga 14	1.	L1	20.
84016F	Proton-K fourth stage (Block DM)	1.	L1	42.
84022A	Cosmos 1540	1.	L1	7.
84022F	Proton-K fourth stage (Block DM)	1.	D	332.
84023A	Intelsat V F-8	1.	D	41.
84028A	Ekran 12	1.	D	27.
84028F	Proton-K fourth stage (Block DM)	1.	D	468.
84031A	Cosmos 1546	1.	L1	11.
84031F	Proton-K fourth stage (Block DM)	1.	D	258.
84035A	STW F-2	1.	L1	93.
84037A	OPS 7641 (DSP F11)	2.	D1	82.
84037B	Titan 34D stage 3 (Transtage)	2.	D1	22.
84041A	Gorizont 9	1.	L1	33.
84041D	Proton-K fourth stage (Block DM)	1.	D	130.
84049A	Chinasat 5 (Spacenet 1)	1.	D	355.
84063A	Raduga 15	1.	L1	83.
84063F	Proton-K fourth stage (Block DM)	1.	D	491.
84078A	Gorizont 10	1.	L2	26.
84078F	Proton-K fourth stage (Block DM)	1.	L1	72.
84080A	Himawari-3	1.	D	322.
84080E	Star 27 (Himawari-3 AKM)	1.	D	305.

COSPAR	NAME	TABLE	STATUS	No
84081A	Eutelsat I F-2 (ECS 2)	1.	D	148.
84081B	Telecom 1A	1.	D	108.
84090A	Ekran 13	1.	D	25.
84090F	Proton-K fourth stage (Block DM)	1.	D	458.
84093B	SBS IV	1.	D	143.
84093C	Leasat 2	1.	D	43.
84093D	Telstar 3C	1.	D	310.
84101A	Galaxy III	1.	D	324.
84113B	Arabsat 1D	1.	D	161.
84113C	Leasat 1	1.	D	121.
84114A	Spacenet 2	1.	D	306.
84114B	Marecs B2	1.	D	23.
84115A	NATO IIID	1.	D	8.
84129A	USA 7 (DSP F12)	2.	D1	77.
84129B	Titan 34D stage 3 (Transtage)	2.	D1	23.
85007A	Gorizont 11	1.	L3	10.
85007D	Proton-K fourth stage (Block DM)	1.	D	488.
85010B	USA 8 (MAGNUM 1)	2.	C2	15.
85010D	IUS stage 2	2.	D1	27.
85015A	Arabsat 1A	1.	D	411.
85015B	Brazilsat 1	1.	D	275.
85016A	Cosmos 1629	1.	L2	34.
85016F	Proton-K fourth stage (Block DM)	1.	D	253.
85024A	Ekran 14	1.	D	7.
85024D	Proton-K fourth stage (Block DM)	1.	D	455.
85025A	Intelsat VA F-10	1.	D	104.
85028B	Anik C1	1.	D	294.
85028C	Leasat 3	1.	D	35.
85035A	Gstar 1	1.	C2	62.
85035B	Telecom 1B	1.	L1	100.
85048B	Morelos 1	1.	D	263.
85048C	Arabsat 1B	1.	D	410.
85048D	Telstar 3D	1.	D	334.
85055A	Intelsat VA F-11	1.	D	376.
85070A	Raduga 16	1.	L2	30.
85070F	Proton-K fourth stage (Block DM)	1.	D	69.
85076B	Optus A1	1.	D	308.
85076C	ASC 1	1.	L2	15.
85076D	Leasat 4	1.	D	67.
85087A	Intelsat VA F-12	1.	D	189.
85092B	USA 11 (DSCS III B-04)	2.	D1	74.
85092C	USA 12 (DSCS III B-05)	2.	D1	66.
85092E	IUS stage 2	2.	D1	25.
85102A	Cosmos 1700	1.	L1	30.
85102D	Proton-K fourth stage (Block DM-2)	1.	D	426.
85107A	Raduga 17	1.	D	394.
85107F	Proton-K fourth stage (Block DM)	1.	D	44.
85109B	Morelos 2	1.	D	279.

COSPAR	NAME	TABLE	STATUS	No
85109C	Optus A2	1.	D	346.
85109D	Satcom Ku-2	1.	D	286.
86003B	Satcom Ku-1	1.	D	277.
86007A	Raduga 18	1.	D	152.
86007F	Proton-K fourth stage (Block DM)	1.	D	68.
86010A	STTW-1	1.	L1	49.
86016A	Yuri 2B	1.	D	238.
86026A	Gstar 2	1.	D	314.
86026B	Brazilsat 2	1.	D	289.
86027A	Cosmos 1738	1.	L3	14.
86027F	Proton-K fourth stage (Block DM)	1.	D	61.
86038A	Ekran 15	1.	D	30.
86038D	Proton-K fourth stage (Block DM)	1.	D	465.
86044A	Gorizont 12	1.	L1	61.
86044F	Proton-K fourth stage (Block DM)	1.	D	59.
86082A	Raduga 19	1.	D	114.
86082F	Proton-K fourth stage (Block DM)	1.	D	49.
86090A	Gorizont 13	1.	D	33.
86090D	Proton-K fourth stage (Block DM)	1.	L1	80.
86096A	USA 20 (FLTSATCOM F7)	2.	C2	19.
87022A	GOES 7	1.	C2	55.
87022F	Star 27 (GOES 7 AKM)	1.	D	146.
87028A	Raduga 20	1.	D	24.
87028D	Proton-K fourth stage (Block DM)	1.	D	333.
87029A	Agila 1	1.	D	341.
87040A	Gorizont 14	1.	D	56.
87040D	Proton-K fourth stage (Block DM)	1.	D	487.
87070A	Kiku-5	1.	D	243.
87073A	Ekran 16	1.	D	29.
87073D	Proton-K fourth stage (Block DM)	1.	D	466.
87078A	Optus A3	1.	D	160.
87078B	Eutelsat I F-4 (ECS 4)	1.	D	137.
87084A	Cosmos 1888	1.	L3	12.
87084D	Proton-K fourth stage (Block DM)	1.	D	367.
87091A	Cosmos 1894	1.	L2	35.
87091D	Proton-K fourth stage (Block DM)	1.	D	401.
87095A	TV-Sat 1	1.	D	165.
87096A	Cosmos 1897	1.	L1	34.
87096D	Proton-K fourth stage (Block DM)	1.	D	422.
87097A	USA 28 (DSP F13)	2.	D1	85.
87097B	Titan 34D stage 3 (Transtage)	2.	D1	18.
87100A	Raduga 21	1.	L2	23.
87100D	Proton-K fourth stage (Block DM)	1.	D	492.
87109A	Ekran 17	1.	D	21.
87109D	Proton-K fourth stage (Block DM)	1.	D	438.
88012A	Sakura 3A	1.	D	94.
88014A	STTW-2	1.	L1	24.

COSPAR	NAME	TABLE	STATUS	No
88018A	Spacenet 3R	1.	D	293.
88018B	Telecom 1C	1.	D	83.
88028A	Gorizont 15	1.	D	71.
88028D	Proton-K fourth stage (Block DM)	1.	D	66.
88034A	Cosmos 1940	1.	D	430.
88034D	Proton-K fourth stage (Block DM)	1.	D	377.
88036A	Ekran 18	1.	D	14.
88036E	Proton-K fourth stage (Block DM)	1.	D	452.
88040A	Intelsat VA F-13 (NSS 513)	1.	D	122.
88051A	Meteosat 3	1.	D	34.
88051C	PAS 1	1.	D	250.
88063A	Insat-IC	1.	L1	29.
88063B	Eutelsat I F-5 (ECS 5)	1.	D	95.
88066A	Cosmos 1961	1.	L1	6.
88066D	Proton-K fourth stage (Block DM-2)	1.	D	134.
88071A	Gorizont 16	1.	D	353.
88071D	Proton-K fourth stage (Block DM)	1.	D	421.
88081A	Gstar 3	1.	L2	3.
88081B	SBS V	1.	D	313.
88086A	Sakura 3B	1.	D	220.
88091B	TDRS-West	1.	C2	71.
88091D	IUS stage 2	1.	D	415.
88095A	Raduga 22	1.	L1	92.
88095F	Proton-K fourth stage (Block DM)	1.	D	79.
88098A	TDF 1	1.	D	213.
88108A	Ekran 19	1.	D	31.
88108D	Proton-K fourth stage (Block DM)	1.	D	470.
88109A	Skynet 4B	1.	D	296.
88109B	Astra 1A	1.	D	105.
88111A	STTW-3	1.	L1	64.
89004A	Gorizont 17	1.	D	183.
89004F	Proton-K fourth stage (Block DM)	1.	D	86.
89006A	Intelsat VA F-15	1.	D	188.
89020A	JC-Sat 1	1.	D	272.
89020B	Meteosat 4	1.	D	37.
89020E	Mage 1 (Meteosat 4 AKM)	1.	D	413.
89021B	TDRS 4	1.	D	115.
89021D	IUS stage 2	1.	D	425.
89027A	Tele-X	1.	D	209.
89030A	Raduga 23	1.	L1	75.
89030D	Proton-K fourth stage (Block DM)	1.	D	77.
89035A	USA 37 (VORTEX 6)	2.	C2	8.
89035C	Titan 34D stage 3 (Transtage)	2.	D1	65.
89041A	Superbird A	1.	D	304.
89041B	DFS-Kopernikus 1	1.	D	428.
89046A	USA 39 (DSP F14)	2.	D1	80.
89046D	IUS stage 2	2.	D1	13.
89046E	USA 39 debris (Telescope aperture suncover)	2.	U	6.

COSPAR	NAME	TABLE	STATUS	No
89048A	Raduga 1-1	1.	D	138.
89048D	Proton-K fourth stage (Block DM)	1.	D	76.
89052A	Gorizont 18	1.	D	252.
89052D	Proton-K fourth stage (Block DM)	1.	D	489.
89053A	Olympus 1	1.	D	464.
89062A	TV-Sat 2	1.	D	327.
89067A	Sirius 1	1.	D	211.
89069A	USA 43 (DSCS II F-15)	2.	D1	83.
89069B	USA 44 (DSCS III A-02)	2.	D1	70.
89069D	Titan 34D stage 3 (Transtage)	2.	D1	17.
89070A	Himawari-4	1.	D	42.
89070C	Star 27 (Himawari-4 AKM)	1.	D	145.
89077A	USA 46 (FLTSATCOM F8)	2.	C2	45.
89081A	Gorizont 19	1.	L1	66.
89081D	Proton-K fourth stage (Block DM)	1.	D	424.
89087A	Intelsat VI F-2	1.	C2	53.
89090B	USA 48 (MAGNUM 2)	2.	C2	16.
89090D	IUS stage 2	2.	D1	60.
89098A	Raduga 24	1.	L1	55.
89098D	Proton-K fourth stage (Block DM)	1.	D	74.
89101A	Cosmos 2054	1.	L2	37.
89101D	Proton-K fourth stage (Block DM)	1.	D	99.
89101G	Cosmos 2054 debris	1.	D	73.
90001A	Skynet 4A	1.	D	174.
90001B	JC-Sat 2	1.	D	119.
90002B	Leasat 5	1.	C2	25.
90011A	DFH-2A	1.	L1	38.
90016A	Raduga 25	1.	L2	27.
90016D	Proton-K fourth stage (Block DM)	1.	D	361.
90021A	Intelsat VI F-3	1.	C2	5.
90030A	AsiaSat 1	1.	D	227.
90034A	Palapa B-2R	1.	D	270.
90051A	Insat-ID	1.	L1	12.
90054A	Gorizont 20	1.	L1	32.
90054D	Proton-K fourth stage (Block DM)	1.	D	420.
90056A	Intelsat VI F-4	1.	D	110.
90061A	Cosmos 2085	1.	L1	4.
90061D	Proton-K fourth stage (Block DM-2)	1.	L1	78.
90063A	TDF 2	1.	D	126.
90063B	DFS-Kopernikus 2	1.	D	274.
90074A	Thor I	1.	D	217.
90077A	Yuri 3A	1.	D	150.
90079A	Skynet 4C	1.	C2	80.
90079B	Eutelsat II F-1	1.	D	244.
90091A	SBS VI	1.	D	173.
90091B	Galaxy VI	1.	D	307.
90093A	Inmarsat 2-F1	3.	Ind	2.
90094A	Gorizont 21	1.	L3	7.

COSPAR	NAME	TABLE	STATUS	No
90094D	Proton-K fourth stage (Block DM-2)	1.	D	439.
90095A	USA 65 (DSP F15)	2.	D1	84.
90095D	IUS stage 2	2.	D1	46.
90095E	USA 65 debris (Telescope aperture suncover)	2.	D1	67.
90097B	USA 67 (SDS 2 F2)(QUASAR 2)	2.	C2	14.
90097D	AKM ?	2.	U	7.
90100A	Satcom C-1	1.	D	210.
90100B	Gstar 4	1.	D	197.
90102A	Gorizont 22	1.	L1	95.
90102D	Proton-K fourth stage (Block DM-2)	1.	D	75.
90112A	Raduga 26	1.	L1	31.
90112D	Proton-K fourth stage (Block DM-2)	1.	D	362.
90116A	Raduga 1-2	1.	L1	47.
90116D	Proton-K fourth stage (Block DM-2)	1.	D	81.
91001A	NATO IVA	1.	D	103.
91003A	Italsat 1	1.	D	349.
91003B	Eutelsat II F-2	1.	D	166.
91010A	Cosmos 2133	1.	L1	8.
91010F	Proton-K fourth stage (Block DM-2)	1.	D	385.
91014A	Raduga 27	1.	L1	82.
91014D	Proton-K fourth stage (Block DM-2)	1.	D	493.
91015A	Astra 1B	1.	D	117.
91015B	Meteosat 5	1.	D	113.
91015E	Mage 1 (Meteosat 5 AKM)	1.	D	390.
91018A	Inmarsat 2-F2	1.	C2	58.
91026A	Anik E2	1.	D	194.
91028A	Spacenet 4	1.	D	280.
91037A	Aurora II	1.	D	176.
91046A	Gorizont 23	1.	D	162.
91046D	Proton-K fourth stage (Block DM-2)	1.	D	441.
91054B	TDRS 5	1.	C2	57.
91054D	IUS stage 2	1.	L3	4.
91055A	Intelsat VI F-5	1.	D	242.
91060A	Yuri 3B	1.	D	147.
91064A	Cosmos 2155	1.	L3	5.
91064B	Proton-K fourth stage (Block DM-2)	1.	D	337.
91067A	Anik E1	1.	D	206.
91074A	Gorizont 24	1.	D	112.
91074D	Proton-K fourth stage (Block DM-2)	1.	D	301.
91075A	Intelsat VI F-1	1.	D	284.
91079A	Cosmos 2172	1.	L3	11.
91079D	Proton-K fourth stage (Block DM-2)	1.	D	128.
91080B	USA 75 (DSP F16)	2.	C2	32.
91080D	IUS stage 2	2.	D1	14.
91083A	Eutelsat II F-3	1.	D	239.
91084A	Telecom 2A	1.	D	167.
91084B	Inmarsat 2-F3	1.	D	28.
91087A	Raduga 28	1.	L1	73.

COSPAR	NAME	TABLE	STATUS	No
91087D	Proton-K fourth stage (Block DM-2)	1.	D	88.
92006A	USA 78 (DSCS III B-14)	2.	D1	72.
92006C	IABS	2.	D1	1.
92010A	Superbird B1	1.	D	182.
92010B	Insat-IIDT (Arabsat 1C)	1.	D	136.
92013A	Galaxy V	1.	D	237.
92017A	Gorizont 25	1.	D	328.
92017D	Proton-K fourth stage (Block DM-2)	1.	D	450.
92021A	Telecom 2B	1.	D	271.
92021B	Inmarsat 2-F4	1.	C2	40.
92027A	Palapa B4	1.	D	344.
92032A	Intelsat K (NSS K)	1.	D	39.
92037A	USA 82 (DSCS III B-12)(DSCS III F6)	2.	C2	25.
92037C	IABS	2.	D1	11.
92041A	Insat-IIA	1.	D	403.
92041B	Eutelsat II F-4	1.	D	185.
92043A	Gorizont 26	1.	D	226.
92043D	Proton-K fourth stage (Block DM-2)	1.	D	72.
92054A	Optus B1	1.	D	215.
92057A	Satcom C-4	1.	D	177.
92059A	Cosmos 2209	1.	L2	33.
92059D	Proton-K fourth stage (Block DM-2)	1.	D	316.
92060A	Hispasat 1A	1.	D	241.
92060B	Satcom C-3	1.	D	36.
92066A	DFS-Kopernikus 3	1.	D	303.
92072A	Galaxy VII	1.	D	299.
92074A	Ekran 20	1.	L1	41.
92074D	Proton-K fourth stage (Block DM-2)	1.	D	453.
92082A	Gorizont 27	1.	D	400.
92082D	Proton-K fourth stage (Block DM-2)	1.	D	89.
92084A	Superbird A1	1.	D	190.
92088A	Cosmos 2224	1.	L1	99.
92088D	Proton-K fourth stage (Block DM-2)	1.	D	371.
93003B	TDRS 6	1.	C2	56.
93003D	IUS stage 2	1.	D	383.
93013A	Raduga 29	1.	L1	90.
93013D	Proton-K fourth stage (Block DM-2)	1.	D	87.
93015A	USA 98 (UFO F1)	1.	D	230.
93031A	Astra 1C	1.	C2	1.
93039A	Galaxy IV	1.	L1	2.
93046A	USA 93 (DSCS III B-09)(DSCS III F7)	2.	D1	71.
93046C	IABS	2.	D1	7.
93048A	Hispasat 1B	1.	D	302.
93048B	Insat-IIB	1.	D	352.
93056A	USA 95 (UFO F2)	2.	C2	4.
93058B	ACTS	1.	L2	2.
93062A	Raduga 30	1.	L1	15.
93062D	Proton-K fourth stage (Block DM-2)	1.	L1	98.

COSPAR	NAME	TABLE	STATUS	No
93066A	Intelsat VII F-1	3.	Ind	3.
93069A	Gorizont 28	1.	D	291.
93069D	Proton-K fourth stage (Block DM-2)	1.	D	417.
93072A	Gorizont 29	1.	D	392.
93072D	Proton-K fourth stage (Block DM-2)	1.	D	490.
93073A	Solidaridad 1	1.	L2	8.
93073B	Meteosat 6	1.	D	170.
93073E	Mage 1 (Meteosat 6 AKM)	1.	D	356.
93074A	USA 97 (DSCS III B-10)(DSCS III F8)	2.	C2	6.
93074B	IABS	2.	D1	68.
93076A	NATO IVB	1.	C2	14.
93077A	Telstar 4A	1.	L2	12.
93078A	DirecTV-1	1.	D	171.
93078B	Thaicom 1	1.	D	208.
94002A	Gals 1	1.	L1	71.
94002D	Proton-K fourth stage (Block DM-2M)	1.	D	264.
94008A	Raduga 1-3	1.	L1	46.
94008D	Proton-K fourth stage (Block DM-2)	1.	D	85.
94009A	USA 99 (Milstar DFS-1)	2.	C2	42.
94009B	Titan IVA stage 3 (Centaur)	2.	D1	30.
94012A	Raduga 31	1.	L1	56.
94012D	Proton-K fourth stage (Block DM-2)	1.	D	93.
94013A	Galaxy IR-A	1.	D	219.
94022A	GOES 8	1.	D	159.
94030A	Gorizont 30	1.	L3	15.
94030D	Proton-K fourth stage (Block DM-2)	1.	D	495.
94034A	Intelsat VII F-2	1.	C2	19.
94035A	USA 104 (UFO F3)	2.	L2	1.
94038A	Cosmos 2282	1.	L2	32.
94038D	Proton-K fourth stage (Block DM-2)	1.	D	259.
94040A	PAS 2	1.	D	212.
94040B	BS-3N	1.	D	201.
94043A	Apstar 1	1.	C2	45.
94047A	DirecTV-2	1.	D	132.
94049A	Brazilsat B1	1.	D	228.
94049B	Turksat 2	1.	D	180.
94054A	USA 105 (MERCURY 1)	2.	C2	41.
94054B	Titan IVA stage 3 (Centaur)	2.	D1	56.
94055A	Optus B3	1.	C2	52.
94060A	Cosmos 2291	1.	L2	39.
94060D	Proton-K fourth stage (Block DM-2)	1.	D	372.
94064A	Intelsat VII F-3 (NSS 703)	1.	C2	72.
94065A	Solidaridad 2	1.	C2	59.
94065B	Thaicom 2	1.	D	283.
94067A	Ekspress 1	1.	D	320.
94067D	Proton-K fourth stage (Block DM-2M)	1.	L3	9.
94069A	Elektro 1	1.	L1	13.
94069D	Proton-K fourth stage (Block DM-2)	1.	D	384.

COSPAR	NAME	TABLE	STATUS	No
94070A	Astra 1D	3.	Ind	4.
94079A	Orion 1	1.	D	123.
94080A	Zongxing 6 (A)	1.	D	442.
94082A	Luch 1	1.	L2	38.
94082D	Proton-K fourth stage (Block DM-2)	1.	D	436.
94084A	USA 107 (DSP F17)	2.	C2	40.
94084D	IUS stage 2	2.	D1	21.
94087A	Raduga 32	1.	L1	5.
94087D	Proton-K fourth stage (Block DM-2)	1.	D	373.
95001A	Intelsat VII F-4	1.	D	207.
95003A	USA 108 (UFO F4)	2.	C2	29.
95011B	Himawari-5	1.	D	255.
95011D	Star 27 (Himawari-5 AKM)	1.	D	457.
95013A	Intelsat VII F-5	1.	D	169.
95016A	Brazilsat B2	1.	C2	68.
95016B	Hot Bird 1	1.	D	240.
95019A	AMSC-1	1.	C2	63.
95022A	USA 110 (Advanced ORION 1)	2.	C2	22.
95022B	Titan IVA stage 3 (Centaur)	2.	D1	34.
95023A	Intelsat VIIA F-1	1.	C2	26.
95025A	GOES 9	1.	D	149.
95027A	USA 111 (UFO F5)	2.	C2	37.
95029A	DirecTV-3	1.	D	175.
95035B	TDRS 7	1.	C2	29.
95035D	IUS stage 2	1.	D	419.
95038A	USA 113 (DSCS III B-07)(DSCS III F9)	2.	C2	23.
95038C	IABS	2.	D1	15.
95040A	PAS 4	1.	D	38.
95041A	Mugunghwa 1 (Koreasat 1)	1.	D	295.
95043A	JC-Sat 3	1.	D	199.
95044A	N-Star 1	1.	D	195.
95045A	Cosmos 2319	1.	L3	13.
95045D	Proton-K fourth stage (Block DM-2)	1.	D	395.
95049A	Telstar 402R	1.	L2	14.
95054A	Luch 1-1	1.	L1	1.
95054D	Proton-K fourth stage (Block DM-2)	1.	L1	89.
95055A	Astra 1E	1.	C2	3.
95057A	USA 114 (UFO F6)	2.	C2	36.
95060A	USA 115 (Milstar DFS-2)	2.	C2	31.
95060B	Titan IVA stage 3 (Centaur)	2.	D1	32.
95063A	Gals 2	1.	D	335.
95063D	Proton-K fourth stage (Block DM-2M)	1.	L1	94.
95064A	AsiaSat 2	3.	Ind	5.
95067A	Telecom 2C	1.	D	80.
95067B	Insat-IIC	1.	D	311.
95069A	Galaxy IIIR	1.	L2	19.
95073A	EchoStar 1	1.	C1	219.
96002A	PAS 3R	1.	D	186.

COSPAR	NAME	TABLE	STATUS	No
96002B	MEASAT 1	1.	C2	18.
96003A	Mugunghwa 2 (Koreasat 2)	1.	C2	28.
96005A	Gorizont 31	1.	D	336.
96005D	Proton-K fourth stage (Block DM-2)	1.	D	60.
96006A	Palapa C1	1.	C1	46.
96007A	N-Star 2	1.	D	233.
96015A	Intelsat VIIA F-2	1.	C1	240.
96020A	Inmarsat 3-F1	1.	C1	66.
96021A	Astra 1F	1.	C1	58.
96022A	MSAT	1.	C2	61.
96026A	USA 118 (MERCURY 2)	2.	C2	2.
96026B	Titan IVA stage 3 (Centaur)	2.	D1	57.
96030A	Palapa C2	1.	C2	50.
96030B	AMOS 1	1.	C2	12.
96033A	Galaxy IX	1.	D	273.
96034A	Gorizont 32	3.	Ind	6.
96034D	Proton-K fourth stage (Block DM-2)	1.	D	82.
96035A	Intelsat VII F-6	1.	C1	73.
96039A	Apstar 1A	1.	C2	23.
96040A	Arabsat 2A	1.	D	222.
96040B	Turksat 3	1.	L1	84.
96042A	USA 127 (UFO F7)	2.	C2	44.
96044A	Italsat 2	1.	D	435.
96044B	Telecom 2D	1.	C2	77.
96053A	Inmarsat 3-F2	1.	C1	260.
96053D	Proton-K fourth stage (Block DM1)	1.	D	91.
96054A	GE 1	1.	C1	189.
96055A	EchoStar 2	1.	L2	22.
96058A	Ekspress 2	1.	L1	50.
96058D	Proton-K fourth stage (Block DM-2M)	1.	L1	70.
96063A	Arabsat 2B	3.	Ind	7.
96063B	MEASAT 2	1.	C2	48.
96067A	Hot Bird 2	1.	C2	20.
96070A	Inmarsat 3-F3	1.	C1	154.
97002A	GE 2	3.	Ind	8.
97002B	Nahuel 1A	1.	D	249.
97007A	JC-Sat 4	1.	C2	21.
97008A	USA 130 (DSP F18)	2.	C2	3.
97008D	IUS stage 2	2.	D1	61.
97008E	USA 130 debris (Telescope aperture suncover)	2.	D1	59.
97009A	Intelsat VIII F-1	1.	C2	75.
97011A	Tempo 2	1.	D	178.
97016A	Thaicom 3	1.	D	140.
97016B	BSAT-1a	1.	D	192.
97019A	GOES 10	1.	D	187.
97021A	Zhongxing 6 (B)	1.	L1	79.
97025A	Thor II	1.	C2	9.
97026A	Telstar 5	1.	C1	205.

COSPAR	NAME	TABLE	STATUS	No
97027A	Inmarsat 3-F4	1.	C2	70.
97027B	Insat-IID	1.	D	500.
97029A	FengYun 2A (FengYun 2-1R)	1.	D	26.
97029C	FengYun 2A AKM	1.	D	486.
97031A	Intelsat VIII F-2	1.	D	92.
97036A	Superbird C	1.	C2	51.
97040A	PAS 6	1.	D	4.
97041A	Cosmos 2345	1.	L3	6.
97041D	Proton-K fourth stage (Block DM-2)	1.	D	358.
97042A	Agila 2	1.	C2	78.
97046A	PAS 5	1.	C1	150.
97049A	Hot Bird 3	1.	D	484.
97049B	Meteosat 7	1.	C2	24.
97049E	Mage 1 (Meteosat 7 AKM)	1.	D	427.
97050A	GE 3	1.	C1	210.
97053A	Intelsat VIII F-3 (NSS 803)	1.	C1	257.
97059A	EchoStar 3	1.	C1	233.
97062A	Apstar 2R	1.	C1	78.
97065A	USA 134 (DSCS III B-13)(DSCS III F10)	2.	C2	35.
97065C	IABS	1.	D	449.
97070A	Kupon 1	1.	L1	28.
97070D	Proton-K fourth stage (Block DM-2)	1.	D	288.
97071A	Sirius 2	1.	D	254.
97071B	Cakrawatra 1	1.	C2	39.
97075A	JC-Sat 5	1.	C2	49.
97076A	Astra 1G	1.	C1	40.
97078A	Galaxy VIII-i	1.	D	300.
97083A	Intelsat 804	1.	L3	1.
97086A	HGS-1	1.	L2	25.
98002A	Skynet 4D	1.	D	203.
98006A	Brazilsat B-3A	1.	C1	222.
98006B	Inmarsat-3 F5	1.	C2	10.
98013A	Hot Bird 4	1.	C1	17.
98014A	Intelsat 806 (NSS 806)	1.	C1	244.
98016A	USA 138 (UFO F8)	2.	C2	27.
98024A	Nilesat 101	1.	C1	268.
98024B	BSAT-1b	1.	C1	110.
98025A	Cosmos 2350	1.	L1	10.
98025D	Proton-K fourth stage (Block DM-2)	1.	D	369.
98028A	EchoStar 4	1.	D	168.
98029A	USA 139 (Advanced ORION 2)	2.	C2	43.
98029B	Titan IVB stage 3 (Centaur)	2.	L1	6.
98033A	Zhongwei 1	1.	C1	91.
98035A	Thor III	1.	C2	79.
98037A	Intelsat 805	1.	C1	239.
98044A	Sinosat 1	1.	C2	41.
98049A	ST-1	1.	C2	31.
98050A	Astra 2A	1.	C1	33.

COSPAR	NAME	TABLE	STATUS	No
98052A	PAS 7	1.	C1	70.
98056A	Eutelsat W2	1.	D	234.
98056B	Sirius 3	1.	C2	22.
98057A	Hot Bird 5	1.	C1	29.
98058A	USA 140 (UFO F9)	2.	D1	87.
98063A	AfriStar 1	1.	C1	25.
98063B	GE 5	1.	C2	66.
98065A	PAS 8	1.	C1	149.
98068A	Bonum 1	1.	C1	61.
98070A	Satmex 5	1.	C1	173.
98075A	PAS 6B	1.	D	202.
99005A	Telstar 6	1.	C1	54.
99006A	JC-Sat 6	1.	C1	125.
99009A	Arabsat 3A	1.	D	393.
99009B	Skynet 4E	1.	C2	15.
99010A	Raduga 1-4	1.	L1	67.
99010D	Proton-K fourth stage (Block DM-2)	1.	D	90.
99013A	Asiasat 3S	1.	C1	105.
99016A	Insat 2E	1.	C1	86.
99018A	Eutelsat W3	1.	C1	26.
99027A	Nimiq	1.	C1	206.
99033A	Astra 1H	1.	C1	20.
99042A	Telkom 1	1.	C1	107.
99046A	Mugunghwa 3 (Koreasat 3)	1.	C1	119.
99047A	Yamal-100 No. 1	1.	D	331.
99047B	Yamal-100 No. 2	1.	D	357.
99047E	Proton-K fourth stage (Block DM-2M)	1.	D	389.
99050A	EchoStar 5	1.	D	142.
99052A	Telstar 7	1.	C1	51.
99053A	LMI 1	1.	C1	76.
99056A	DirecTV-1R	1.	C1	224.
99059A	Orion 2	1.	C1	261.
99060A	GE 4	1.	C1	228.
99063A	USA 146 (UFO F10)	2.	C2	13.
99071A	Galaxy 11	1.	C1	238.
00001A	USA 148 (DSCS III B-08)(DSCS III F11)	2.	C2	20.
00001C	IABS	2.	D1	20.
00002A	Galaxy 10R	1.	D	290.
00003A	Zhongxing-22 (FengHuo 1, FH-1)	1.	C2	34.
00007A	Hispasat 1C	1.	C1	250.
00011A	Garuda 1	1.	C2	43.
00012A	Superbird 4	1.	C1	148.
00013A	Ekspress 2A	1.	C2	36.
00013D	Proton-K fourth stage (Block DM-2M)	1.	D	432.
00016A	Asiastar	1.	C1	104.
00016B	Insat 3B	1.	D	292.
00019A	Sesat	1.	C1	18.
00019D	Proton-K fourth stage (Block DM-2M)	1.	D	278.

COSPAR	NAME	TABLE	STATUS	No
00020A	Galaxy IVR	1.	D	323.
00022A	GOES 11	1.	D	179.
00024A	USA 149 (DSP F20)	2.	C2	30.
00024D	IUS stage 2	2.	D1	52.
00024E	DSP F20 Aperture Cover	2.	D1	51.
00028A	Eutelsat W4	1.	C1	44.
00029A	Gorizont 33	1.	L3	8.
00029B	Proton-M fourth stage (Briz-M)	1.	D	406.
00031A	Ekspress 3A	1.	D	144.
00031D	Proton-K fourth stage (Block DM-2)	1.	D	260.
00032A	FengYun 2B	1.	D	374.
00032C	FengYun 2B AKM	1.	D	397.
00034A	TDRS 8	1.	C2	32.
00036A	Cosmos-2371	1.	L1	3.
00036D	Proton-K fourth stage (Block DM-2)	1.	D	399.
00038A	EchoStar 6	1.	C1	221.
00043A	PAS 9	1.	C1	237.
00046A	Brasilsat B4	1.	C1	215.
00046B	Nilesat 102	1.	C1	267.
00049A	Raduga 1-5	1.	L1	52.
00049D	Proton-K fourth stage (Block DM-2)	1.	D	98.
00052A	Eutelsat W1	1.	C2	2.
00054A	Astra 2B	1.	C1	35.
00054B	GE 7	1.	C1	158.
00059A	GE-1A	1.	C1	108.
00060A	N-SAT-110	1.	C1	114.
00065A	USA 153 (DSCS III B-11)(DSCS III F12)	2.	C2	9.
00065C	IABS	2.	D1	19.
00066A	Thuraya 1	1.	D	172.
00067A	GE 6	1.	C1	225.
00068A	Europe*Star F1	1.	C1	50.
00069A	Beidou	1.	D	163.
00072A	PAS 1R	1.	C1	241.
00076A	Anik F1	1.	C1	184.
00080A	USA 155 (SDS 3 F2)	2.	C2	17.
00081A	Astra 2D	1.	C1	34.
00081B	GE 8 (Aurora 3)	1.	C1	157.
00082A	Beidou 1B	1.	D	231.
01002A	Turksat 2A (Eurasiasat 1)	1.	C1	49.
01005A	Sicral	1.	C2	7.
01005B	Skynet 4F	1.	C2	74.
01009A	USA 157 (Milstar-2 F2)	2.	C2	24.
01009B	Titan IVB stage 3 (Centaur)	2.	D1	39.
01011A	Eurobird 1	1.	C1	37.
01011B	BSAT-2a	1.	D	191.
01012A	XM Radio 2 (Rock)	1.	C1	175.
01014A	Ekran 21 (Ekran-M)	1.	D	281.
01014C	Proton-M fourth stage (Briz-M)	1.	D	84.

COSPAR	NAME	TABLE	STATUS	No
01015A	GSAT-1	1.	D	494.
01018A	XM Radio 1 (Roll)	1.	C1	174.
01019A	PAS 10	1.	C1	69.
01020A	USA 158 (GeoLITE)	2.	D1	78.
01024A	Intelsat 901	1.	C1	258.
01025A	Astra 2C	1.	C1	23.
01029A	Artemis	1.	C2	8.
01031A	GOES 12	1.	C2	69.
01033A	USA 159 (DSP F21)	2.	C2	21.
01033D	IUS stage 2	2.	D1	47.
01033E	USA 159 debris (Telescope aperture suncover)	2.	U	8.
01037A	Cosmos-2379	1.	L1	88.
01037D	Proton-K fourth stage (Block DM-2)	1.	L1	74.
01039A	Intelsat 902	1.	C1	64.
01042A	Atlantic Bird 2	1.	C1	264.
01045A	Raduga 1-6	1.	D	65.
01045D	Proton-K fourth stage (Block DM-2)	1.	L1	51.
01046A	USA 162 (SDS 3 F3)	2.	C2	33.
01052A	DirecTV-4S	1.	C1	194.
02001A	USA 164 (Milstar-2 F3)	2.	C2	5.
02001B	Titan IVB stage 3 (Centaur)	2.	D1	44.
02002A	Insat 3C	1.	C1	74.
02006A	EchoStar 7	1.	C1	170.
02007A	Intelsat 904	1.	C1	63.
02011A	TDRS 9	1.	C2	73.
02015A	JC-Sat 8	1.	C1	143.
02015B	Astra 3A	1.	C1	28.
02016A	Intelsat 903	1.	C1	247.
02019A	NSS-7	1.	C1	256.
02023A	DirecTV-5	1.	C1	182.
02027A	Intelsat 905	1.	C1	255.
02029A	Ekspress A1R (Express 4A)	1.	C2	76.
02029D	Proton-K fourth stage (Block DM-2M)	1.	D	236.
02030A	Galaxy 3C	1.	C1	203.
02035A	Atlantic Bird 3	1.	C1	270.
02035B	N-Star 3 (N-Star c)	1.	C2	44.
02038A	Hot Bird 6	1.	C1	14.
02039A	EchoStar 8	1.	C1	220.
02040A	Atlantic Bird 1	1.	C1	262.
02040B	MSG 1	1.	C2	4.
02041A	Intelsat 906	1.	C1	67.
02042B	Kodama (DRTS)	1.	C2	33.
02043A	KALPANA-1 (METSAT-1)	1.	C2	27.
02044A	Hispasat 1D	1.	C1	252.
02051A	Eutelsat W5	1.	C1	72.
02055A	TDRS 10	1.	C2	54.
02057A	NSS 6	1.	C1	99.

COSPAR	NAME	TABLE	STATUS	No
02062A	Nimiq 2	1.	C1	207.
03007A	Intelsat 907	1.	C1	254.
03008A	USA 167 (DSCS III A-3)(DSCS III F13)	2.	C2	34.
03008C	IABS	2.	D1	24.
03012A	USA 169 (Milstar-2 F4)	2.	C2	38.
03012B	Titan IVB stage 3 (Centaur)	2.	D1	33.
03013A	Insat 3A	1.	C1	97.
03013B	Galaxy XII	1.	C1	161.
03014A	Asiasat 4	1.	C1	123.
03015A	Cosmos-2397	1.	D	414.
03015F	Proton-K fourth stage (Block DM-2)	1.	L1	86.
03018A	GSAT-2	1.	D	326.
03020A	Hellas Sat 2	1.	C1	47.
03021A	Beidou 3	1.	C2	42.
03024A	AMC-9 (GE-12)	1.	C1	216.
03026A	Thuraya 2	1.	C2	17.
03028A	BSAT-2c	1.	C1	112.
03028B	Optus C1 (Defense C1)	1.	C1	144.
03033A	Rainbow 1	1.	C1	231.
03034A	EchoStar 9 (Telstar 13)	1.	C1	168.
03040A	USA 170 (DSCS III B-6)(DSCS III F14)	2.	C1	4.
03040C	IABS	2.	D1	28.
03041A	USA 171 (Advanced ORION 3)	2.	C2	10.
03041B	Titan IVB stage 3 (Centaur)	2.	D1	26.
03043A	Eurobird 3	1.	C1	42.
03043E	Insat 3E	1.	C1	59.
03044A	Galaxy 13/Horizons-1	1.	C1	164.
03052A	Zhongxing-20 (ShenTong 1, ST-1)	1.	C1	101.
03053A	Yamal 200 N2 (Yamal 202)	1.	C1	53.
03053B	Yamal 200 N1 (Yamal 201)	1.	C1	93.
03053E	Proton-K fourth stage (Block DM-2M)	1.	D	365.
03057A	USA 174 (UFO F11)	2.	C2	12.
03059A	AMOS 2	1.	C1	271.
03060A	Ekspress AM-22	1.	C1	57.
03060D	Proton-K fourth stage (Block DM-2M)	1.	L1	40.
04001A	Estrela do Sul 1 (Telstar 14)	1.	D	154.
04003A	AMC-10 (GE 10)	1.	C1	159.
04004A	USA 176 (DSP F22)	2.	C2	11.
04004D	IUS stage 2	2.	D1	49.
04007A	MBSAT	1.	C1	140.
04008A	Eutelsat W3A	1.	C1	7.
04010A	Raduga-1	3.	Ind	9.
04010F	Proton-K fourth stage (Block DM-2)	1.	D	381.
04011A	Superbird A2 (Superbird 6)	1.	D	262.
04015A	Ekspress AM-11	1.	D	225.
04015D	Proton-K fourth stage (Block DM-2M)	1.	D	431.
04016A	DirecTV-7S	1.	C1	169.
04017A	AMC-11 (GE-11)	1.	C1	162.

COSPAR	NAME	TABLE	STATUS	No
04022A	Intelsat 10-02	1.	C1	273.
04024A	Telstar 18 (APstar 5)	1.	C1	134.
04027A	Anik F2	1.	C1	179.
04031A	Amazonas	1.	C1	234.
04036A	GSAT 3 (EDUSAT)	1.	D	235.
04041A	AMC-15	1.	C1	186.
04042A	FengYun 2C	1.	C1	124.
04042C	FengYun 2C AKM	1.	D	462.
04043A	Ekspress AM-1	1.	C2	16.
04043D	Proton-K fourth stage (Block DM-2M)	1.	D	388.
04048A	AMC 16	1.	C1	213.
05003A	AMC 12	1.	C1	246.
05005A	XTAR-EUR	1.	C1	38.
05006A	Himawari-6	1.	C1	137.
05008A	XM Radio 3 (Rhythm)	1.	C1	214.
05009A	Inmarsat 4 F1	1.	C2	46.
05010A	Ekspress AM-2	1.	C1	82.
05010F	Proton-K fourth stage (Block DM-2M)	1.	L1	53.
05012A	Apstar 6	1.	C1	133.
05015A	Spaceway 1	1.	C1	190.
05019A	DirectTV-8	1.	C1	197.
05022A	Intelsat Americas 8 (Telstar 8)	1.	C1	209.
05023A	Ekspress AM-3	1.	C1	136.
05023H	Proton-K fourth stage (Block DM-2)	1.	D	437.
05028A	Thaicom 4 (IPStar 1)	1.	C1	122.
05030A	Galaxy 14	1.	C1	165.
05036A	Anik F1R	1.	C1	185.
05041A	Galaxy 15	1.	C1	160.
05041B	Syracuse 3A	1.	C1	52.
05044A	Inmarsat 4 F2	1.	C2	11.
05046A	Telkom 2	1.	C1	121.
05046B	Spaceway 2	1.	C1	199.
05049A	Insat 4A	1.	C1	84.
05049B	MSG 2 (Meteosat 9)	1.	C1	1.
05049E	MSG-2 debris (SEVIRI Cooler Cover)	1.	D	454.
05049F	MSG-2 debris (entry baffle cover)	1.	D	482.
05052A	AMC 23	1.	C1	151.
06003A	Echostar 10	1.	C1	181.
06004A	MTSAT-2	1.	C1	141.
06007A	Spainsat	1.	C1	251.
06007B	Hot Bird 7A	1.	C1	8.
06010A	JCSAT 9	1.	C1	132.
06012A	Astra 1KR	1.	C1	21.
06018A	GOES N	1.	C2	67.
06020A	Satmex 6	1.	C1	178.
06020B	Thaicom 5	1.	C1	80.
06022A	KAZSAT	1.	D	224.
06022D	Proton-K fourth stage (Block DM3)	1.	D	445.

COSPAR	NAME	TABLE	STATUS	No
06023A	Galaxy 16	1.	C1	200.
06024A	USA 187 (MITEx OSC satellite)	2.	C4	26.
06024B	USA 188 (MITEx Lockheed satellite)	2.	D1	76.
06024C	USA 189 (NRL Upper Stage/Satellite)	2.	D1	3.
06032A	Hot Bird 8	1.	C1	13.
06033A	JCSAT 3A	1.	C1	127.
06033B	Syracuse 3B	1.	C1	269.
06034A	Mugunghwa 5	1.	C1	117.
06038A	Zhongxing-22A (FengHuo 1, FH-1)	1.	C2	37.
06043A	DirecTV 9S	1.	C1	195.
06043B	Optus D1	1.	C1	147.
06048A	Xinnuo 2	1.	D	3.
06049A	XM Radio 4 (Blues)	1.	C1	177.
06051A	Badr 4	1.	C1	31.
06053A	FengYun 2D	1.	C2	30.
06053C	FengYun 2D AKM (FG-36 AKM)	1.	D	245.
06053D	FengYun 2D debris	1.	L1	23.
06054A	WildBlue 1	1.	C1	180.
06054B	AMC 18	1.	C1	187.
06056A	Measat 3	1.	C1	94.
06059A	Kiku-8 (ETS VIII)	1.	C2	47.
07003A	Beidou 4	1.	D	200.
07007A	Insat 4B	1.	C1	98.
07007B	Skynet 5A	1.	C1	6.
07009A	Anik F3	1.	C1	172.
07016A	Astra 1L	1.	C1	22.
07016B	Galaxy 17	1.	C1	208.
07018A	Nigcomsat 1	1.	L1	58.
07021A	Xinnuo 3	1.	C1	4.
07031A	Zhongxing 6B	1.	C1	118.
07032A	DirecTV 10	1.	C1	191.
07036A	Spaceway 3	1.	C1	204.
07036B	BSAT-3A	1.	C1	111.
07037A	INSAT 4CR	1.	C1	75.
07044A	Optus D2	1.	C1	142.
07044B	Intelsat IS-11	1.	C1	243.
07046A	USA 195 (WGS F1)	2.	C1	3.
07054A	USA 197 (DSP F23)	2.	L1	1.
07054B	Delta 4 second stage	2.	D1	92.
07056A	Star One C1	1.	C1	229.
07056B	Skynet 5B	1.	C1	56.
07057A	Sirius 4	1.	C1	5.
07058A	Cosmos-2434 (Raduga-1M1)	1.	C1	71.
07058C	Proton-M fourth stage (Briz-M)	1.	D	499.
07063A	Rascom-QAF 1	1.	D	184.
07063B	Horizons 2	3.	Ind	10.
08001A	Thuraya 3	1.	C2	35.
08003A	Ekspress AM-33	1.	C1	100.

COSPAR	NAME	TABLE	STATUS	No
08003B	Proton-M fourth stage (Briz-M)	1.	D	496.
08006A	Thor 2R	1.	C1	275.
08006C	Proton-M fourth stage (Briz-M)	1.	D	13.
08007A	Kizuna	1.	C1	138.
08011A	AMC 14	1.	C2	13.
08013A	DirecTV 11	1.	C1	198.
08016A	ICO G1	1.	C2	65.
08018A	Vinasat	1.	C1	131.
08018B	Star One C2	1.	C1	226.
08019A	Tian Lian 1A	1.	C1	79.
08022A	Amos 3	1.	C1	272.
08022B	Zenith-3SLB third stage (Block DM-SLB)	1.	D	18.
08024A	Galaxy 18	1.	C1	167.
08028A	Zhongxing 9	1.	C1	96.
08030A	Skynet 5C	1.	C1	259.
08030B	Turksat 3A	1.	C1	48.
08033A	Cosmos-2440	3.	Ind	11.
08033D	Proton-K fourth stage (Block DM-2M)	1.	L1	26.
08034A	Protostar 1	1.	C1	249.
08034B	Badr 6	1.	C1	32.
08035A	Echostar 11	1.	C1	183.
08038A	Superbird C2	1.	C1	139.
08038B	AMC 21	1.	C1	166.
08039A	Inmarsat 4 F3	1.	C2	64.
08044A	Nimiq 4	1.	C1	217.
08045A	Galaxy 19	1.	C1	201.
08055A	Simon Bolivar	1.	C1	218.
08057A	Astra 1M	1.	C1	19.
08063A	Ciel 2	1.	C1	163.
08065A	Hot Bird 9	1.	C1	12.
08065B	Eutelsat W2M	3.	Ind	12.
08066A	Feng Yun 2E	1.	C2	38.
08066C	FengYun 2E AKM (FG-36 AKM)	1.	D	481.
09001A	USA 202	2.	C2	7.
09001B	Delta 4 second stage	2.	D1	91.
09007A	Ekspress AM-44	1.	C1	263.
09007B	Ekspress MD-1	1.	C1	83.
09007D	Proton-M fourth stage (Briz-M)	1.	D	54.
09008A	NSS 9	1.	C1	156.
09008B	Atlantic Bird 4A	1.	C1	3.
09009A	Telstar 11N	1.	C1	245.
09010A	Raduga-1	1.	C2	6.
09010B	Proton-K fourth stage (Block DM-2)	1.	D	359.
09016A	Eutelsat W2A	1.	C1	10.
09017A	USA 204 (WGS F2)	2.	C1	2.
09018A	Beidou DW 2 (Compass G2)	1.	L1	81.
09020A	SICRAL 1B	1.	C1	11.
09027A	Indostar II/Protostar II	1.	C1	106.

COSPAR	NAME	TABLE	STATUS	No
09032A	Measat 3A	1.	C1	95.
09033A	GOES 14	1.	C1	188.
09034A	Sirius FM5	1.	C1	202.
09035A	Terrestar 1	1.	C2	60.
09042A	Asiasat 5	1.	C1	102.
09044A	JCSAT 12 (JCSAT-RA)	1.	C1	128.
09044B	Optus D3	1.	C1	145.
09046A	Palapa D	1.	C1	116.
09047A	USA 207 (PAN)	2.	C1	1.
09050A	Nimiq 5	1.	C1	223.
09054A	Amazonas 2	1.	C1	235.
09054B	COMSATBw-1	1.	C1	65.
09058A	NSS 12	1.	C1	62.
09058B	Thor 6	1.	C1	274.
09064A	Intelsat IS-14	1.	C1	242.
09065A	Eutelsat W7	1.	C1	43.
09067A	Intelsat IS-15	1.	C1	89.
09068A	USA 211 (WGS F3)	2.	C1	5.
09075A	DirecTV 12	1.	C1	192.
10001A	Beidou DW 3	1.	C1	135.
10002A	Raduga-1M	1.	C1	88.
10002B	Proton-M fourth stage (Briz-M)	1.	D	497.
10005A	Solar Dynamics Observatory	4.	I	3.
10006A	Intelsat IS-16	1.	C1	236.
10008A	GOES 15	3.	Ind	13.
10010A	Echostar XIV	1.	C1	171.
10016A	SES-1	1.	C1	196.
10021A	Astra 3B	1.	C1	27.
10021B	COMSATBw-2	1.	C1	15.
10024A	Beidou DW 4	1.	C1	87.
10025A	Badr 5	1.	C1	30.
10032A	Chollian	1.	C1	129.
10032B	Arabsat 5A	1.	C1	39.
10034A	Echostar XV	1.	C1	232.
10036A	Beidou DW 5	4.	I	4.
10037A	Nilesat 201	1.	C1	266.
10037B	RASCOM-QAF 1R	1.	C1	2.
10039A	USA 214 (AEHF SV-1)	2.	C2	39.
10042A	Zhongxing 6A	1.	C1	126.
10045A	Michibiki	4.	I	5.
10053A	Sirius XM-5	1.	C1	212.
10056B	BSAT-3B	1.	C1	109.
10057A	Beidou DW 6	1.	C1	146.
10061A	SkyTerra 1	1.	C1	193.
10063A	USA 223 (NROL-32)	2.	C2	18.
10063B	Delta 4 second stage	2.	D1	2.
10064A	Zhongxing 20A	1.	C1	130.
10065A	Intelsat IS-17	1.	C1	248.

COSPAR	NAME	TABLE	STATUS	No
10065B	Hylas	1.	C1	68.
10068A	Beidou DW 7	4.	I	6.
10069A	KA-Sat	1.	C1	9.
10070A	Hispasat 1E	1.	C1	253.
10070B	Koreasat 6	1.	C1	120.
11001A	Elektro-L No. 1	1.	C1	77.
11001B	Fregat-SB No. 2001	1.	D	485.
11011A	USA 227 (NROL 27)	2.	C2	46.
11013A	Beidou DW 8	4.	I	7.
11016A	Yahsat 1A	1.	C1	41.
11016B	Intelsat New Dawn	1.	C1	55.
11019A	USA 230 (SBIRS-GEO 1)	2.	C2	28.
11021A	Estrela do Sul 2	1.	C1	230.
11022A	GSAT-8	1.	C1	60.
11022B	ST-2	1.	C1	92.
11026A	Zhongxing 10	1.	C1	115.
11032A	Tian Lian 1B	1.	C1	153.
11034A	GSAT-12	1.	C1	85.
11035A	SES-3	3.	Ind	14.
11035B	Kazsat-2	1.	C1	90.
11038A	Beidou DW 9	4.	I	8.
11041A	Astra 1N	1.	C1	36.
11041B	BSAT 3c	1.	C1	113.
11042A	Paksat 1R	1.	C1	45.
11047A	Zhongxing 1A	1.	C1	152.
11048A	Cosmos-2473	1.	C1	81.
11048B	Proton-M fourth stage (Briz-M)	1.	D	498.
11049A	SES-2	1.	C1	211.
11049B	Arabsat 5C	1.	C1	24.
11051A	Atlantic Bird 7	1.	C1	265.
11054A	QuetzSat-1	1.	C1	227.
11056A	Intelsat IS-18	1.	C1	155.
11057A	Eutelsat W3C	1.	C1	16.
11059A	ViaSat-1	1.	C1	176.
11069A	Asiasat 7	1.	C1	103.
11073A	Beidou DW 10	3.	Ind	15.
11074A	AMOS 5 (temp. name)	3.	Ind	16.
11074B	LUCH 5A (temp. name)	3.	Ind	17.
11077A	NIGCOMSAT 1R (temp. name)	3.	Ind	18.

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 275 objects identified.

For explanation of symbols, see the definitions at the beginning of Chapter 3 on page 32.

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)**					
	28-DEC-11	0.10				50	294
	22641.889884	42164.29115	0.0003437	0.3646	346.3054	177.5583	359.6193
C1 . 2	**10037B**	**RASCOM-QAF 1R**					
	29-DEC-11	2.90				51	74
	22642.087928	42164.86331	0.0004277	0.0205	68.1523	204.2552	2.8722
C1 . 3	**09008B**	**Atlantic Bird 4A**					
	29-DEC-11	3.11				52	152
	22642.081863	42164.91489	0.0003047	0.0684	344.4137	276.1490	3.0817
C1 . 4	**07021A**	**Xinnuo 3**					
	29-DEC-11	3.19				52	232
	22642.143056	42165.94938	0.0003700	0.0729	92.5858	182.7268	3.2161
C1 . 5	**07057A**	**Sirius 4**					
	28-DEC-11	4.82				52	210
	22641.872500	42164.39011	0.0002849	0.0115	332.4090	300.9319	4.8096
C1 . 6	**07007B**	**Skynet 5A**					
	29-DEC-11	6.00				51	242
	22642.971493	42165.23140	0.0003394	0.0680	353.2348	259.2566	5.9792
C1 . 7	**04008A**	**Eutelsat W3A**					
	29-DEC-11	7.00				51	385
	22642.106354	42164.16248	0.0003856	0.0618	352.1774	277.5969	7.0229
C1 . 8	**06007B**	**Hot Bird 7A**					
	30-DEC-11	9.01				52	280
	22643.034873	42164.79099	0.0004897	0.0523	69.2781	199.3029	8.9702
C1 . 9	**10069A**	**KA-Sat**					
	30-DEC-11	9.01				51	52
	22643.034873	42164.56419	0.0001173	0.0463	289.3910	217.2146	8.9502
C1 . 10	**09016A**	**Eutelsat W2A**					
	30-DEC-11	10.00				51	139
	22643.083600	42164.52747	0.0004560	0.0634	359.9498	269.4245	9.9700
C1 . 11	**09020A**	**SICRAL 1B**					
	29-DEC-11	11.78				50	139
	22642.970660	42165.33148	0.0001886	0.0641	99.4109	128.4207	11.6556

C1 .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$				N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
C1 . 12	**08065A**	**Hot Bird 9**					
	28-DEC-11	13.00				51	158
	22641.695162	42163.68733	0.0000423	0.0432	28.4994	300.9802	13.0347
C1 . 13	**06032A**	**Hot Bird 8**					
	28-DEC-11	13.01				51	264
	22641.837234	42164.09380	0.0003735	0.0686	11.4958	303.9465	13.0113
C1 . 14	**02038A**	**Hot Bird 6**					
	28-DEC-11	13.02				51	388
	22641.837234	42164.29816	0.0005771	0.0434	281.9016	351.3084	12.9887
C1 . 15	**10021B**	**COMSATBw-2**					
	28-DEC-11	13.21				52	84
	22641.837234	42165.54175	0.0001603	0.0645	98.8648	151.5797	13.1514
C1 . 16	**11057A**	**Eutelsat W3C**					
	28-DEC-11	15.45				13	13
	22641.838299	42166.47309	0.0001736	0.1860	73.3201	330.5741	14.6568
C1 . 17	**98013A**	**Hot Bird 4**					
	28-DEC-11	15.80				51	539
	22641.840208	42164.13781	0.0004546	0.2433	81.5285	195.7193	15.8092
C1 . 18	**00019A**	**Sesat**					
	28-DEC-11	16.02				51	592
	22641.866308	42163.89842	0.0003855	0.0376	331.5799	299.5802	16.0207
C1 . 19	**08057A**	**Astra 1M**					
	30-NOV-11	19.19				21	108
	22613.765579	42165.26785	0.0002063	0.0214	43.4545	232.0125	19.1894
C1 . 20	**99033A**	**Astra 1H**					
	22-JUL-11	19.20				21	480
	22482.369097	42164.65110	0.0005462	0.1082	97.9313	37.0152	19.1888
C1 . 21	**06012A**	**Astra 1KR**					
	29-DEC-11	19.20				22	210
	22642.605139	42164.94657	0.0004282	0.0142	254.7540	29.9595	19.1877
C1 . 22	**07016A**	**Astra 1L**					
	29-DEC-11	19.21				23	173
	22642.549479	42164.27209	0.0003275	0.0520	293.9447	286.2498	19.2731
C1 . 23	**01025A**	**Astra 2C**					
	29-DEC-11	19.21				22	410
	22642.673322	42163.72714	0.0001077	0.0434	338.1766	14.3552	19.2239
C1 . 24	**11049B**	**Arabsat 5C**					
	30-DEC-11	20.00				15	15
	22643.102870	42164.55662	0.0004550	0.0613	348.5248	256.6993	19.9649
C1 . 25	**98063A**	**AfriStar 1**					
	29-DEC-11	21.01				52	668
	22642.858808	42164.65502	0.0003958	0.0200	339.2210	290.6052	20.9829

C1 .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$				N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
C1 . 26	**99018A**	**Eutelsat W3**					
	29-DEC-11	21.60				51	641
	22642.863576	42164.55018	0.0003855	0.0649	352.7650	277.9509	21.5622
C1 . 27	**10021A**	**Astra 3B**					
	29-DEC-11	23.51				25	52
	22642.870174	42164.78201	0.0001022	0.0498	60.2488	211.3961	23.4666
C1 . 28	**02015B**	**Astra 3A**					
	28-DEC-11	23.51				27	439
	22641.009120	42164.10894	0.0004751	0.0393	289.4091	335.1405	23.4959
C1 . 29	**98057A**	**Hot Bird 5**					
	29-DEC-11	25.64				52	617
	22642.979676	42164.04923	0.0005280	0.0625	358.5572	277.0083	25.5164
C1 . 30	**10025A**	**Badr 5**					
	27-DEC-11	26.00				52	82
	22640.652894	42164.45711	0.0002708	0.0209	67.5784	172.6638	25.9718
C1 . 31	**06051A**	**Badr 4**					
	29-DEC-11	26.01				52	261
	22642.979676	42164.74221	0.0006160	0.0479	324.7349	331.1005	25.9751
C1 . 32	**08034B**	**Badr 6**					
	28-DEC-11	26.01				52	183
	22641.704838	42164.56335	0.0002310	0.0588	16.5798	301.1133	26.0215
C1 . 33	**98050A**	**Astra 2A**					
	29-DEC-11	28.17				29	568
	22642.176458	42164.56784	0.0002048	0.0088	208.5310	350.6479	28.2296
C1 . 34	**00081A**	**Astra 2D**					
	29-DEC-11	28.19				29	449
	22642.436412	42165.00685	0.0001661	0.0309	239.9362	352.1557	28.1914
C1 . 35	**00054A**	**Astra 2B**					
	30-DEC-11	28.20				32	448
	22643.103067	42164.38170	0.0003975	0.0637	359.0285	274.9544	28.4707
C1 . 36	**11041A**	**Astra 1N**					
	29-DEC-11	28.25				21	21
	22642.643600	42164.57092	0.0001056	0.0332	19.8793	1.3352	28.1755
C1 . 37	**01011A**	**Eurobird 1**					
	30-DEC-11	28.51				51	548
	22643.823299	42164.36824	0.0003966	0.0642	356.2834	277.8023	28.4687
C1 . 38	**05005A**	**XTAR-EUR**					
	29-DEC-11	29.01				51	338
	22642.837350	42164.78482	0.0001471	0.0159	292.5704	331.4663	28.9757
C1 . 39	**10032B**	**Arabsat 5A**					
	29-DEC-11	30.49				51	79
	22642.844537	42164.67044	0.0001672	0.0494	343.5325	256.9468	30.4873

C1 .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$				N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
C1 . 40	**97076A**	**Astra 1G**					
	29-DEC-11	31.50				31	539
	22642.837778	42165.12571	0.0000325	0.0474	37.4038	222.4014	31.4799
C1 . 41	**11016A**	**Yahsat 1A**					
	29-DEC-11	32.82				37	37
	22642.651065	42164.07586	0.0003121	0.0061	320.4191	320.2778	32.8448
C1 . 42	**03043A**	**Eurobird 3**					
	29-DEC-11	33.14				52	419
	22642.814306	42164.54569	0.0001712	0.0420	7.4544	129.4902	33.0777
C1 . 43	**09065A**	**Eutelsat W7**					
	29-DEC-11	35.92				52	106
	22642.710336	42164.86443	0.0003987	0.0629	355.2436	278.6787	35.8891
C1 . 44	**00028A**	**Eutelsat W4**					
	29-DEC-11	36.10				52	580
	22642.710336	42164.54457	0.0004155	0.0649	355.9762	276.8548	36.0763
C1 . 45	**11042A**	**Paksat 1R**					
	28-DEC-11	37.98				20	20
	22641.111030	42165.54623	0.0000963	0.0243	210.6666	52.2269	38.0028
C1 . 46	**96006A**	**Palapa C1**					
	30-DEC-11	38.02				51	796
	22643.053079	42164.69511	0.0001786	0.1405	95.8437	203.3362	38.1530
C1 . 47	**03020A**	**Hellas Sat 2**					
	29-DEC-11	39.00				51	434
	22642.837060	42164.72679	0.0003572	0.0184	280.7492	350.0986	38.9729
C1 . 48	**08030B**	**Turksat 3A**					
	28-DEC-11	42.00				51	186
	22641.751840	42164.76604	0.0002830	0.0213	83.5904	186.7052	42.0077
C1 . 49	**01002A**	**Turksat 2A (Eurasiasat 1)**					
	29-DEC-11	42.01				51	550
	22642.838611	42164.92330	0.0004806	0.0424	265.9468	7.0131	41.9719
C1 . 50	**00068A**	**Europe*Star F1**					
	30-DEC-11	45.01				52	554
	22643.834456	42164.45571	0.0002306	0.0022	359.0104	293.3734	44.9847
C1 . 51	**99052A**	**Telstar 7**					
	29-DEC-11	45.11				52	619
	22642.151875	42164.05371	0.0007688	0.0000	157.3792	105.8975	45.1310
C1 . 52	**05041B**	**Syracuse 3A**					
	29-DEC-11	47.00				52	312
	22642.874630	42164.55662	0.0002151	0.0223	74.6994	202.1937	46.9730
C1 . 53	**03053A**	**Yamal 200 N2 (Yamal 202)**					
	29-DEC-11	48.99				52	412
	22642.658438	42164.00998	0.0002519	0.0507	272.6865	11.7683	49.0137

C1 .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$				N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
C1 . 54	**99005A**	**Telstar 6**					
	28-DEC-11	50.62				51	643
	22641.810012	42164.39039	0.0002085	0.0077	330.5847	302.6841	49.9861
C1 . 55	**11016B**	**Intelsat New Dawn**					
	29-DEC-11	52.51				36	36
	22642.717037	42164.40468	0.0001054	0.0276	37.8191	153.4727	52.5054
C1 . 56	**07056B**	**Skynet 5B**					
	29-DEC-11	52.74				51	214
	22642.717025	42164.42038	0.0004197	0.0539	339.6563	224.2581	52.7680
C1 . 57	**03060A**	**Ekspress AM-22**					
	29-DEC-11	53.01				51	406
	22642.717025	42164.59111	0.0001463	0.0348	225.7532	54.9317	52.9867
C1 . 58	**96021A**	**Astra 1F**					
	28-DEC-11	54.92				40	629
	22641.641678	42164.53196	0.0002681	0.0332	325.8823	298.2783	54.8837
C1 . 59	**03043E**	**Insat 3E**					
	28-DEC-11	55.02				51	400
	22641.641678	42164.56083	0.0003853	0.0340	48.3878	222.6077	55.0233
C1 . 60	**11022A**	**GSAT-8**					
	28-DEC-11	55.05				33	33
	22641.641678	42164.40076	0.0007141	0.0711	64.8208	200.6952	55.0750
C1 . 61	**98068A**	**Bonum 1**					
	29-DEC-11	55.99				52	671
	22642.715035	42164.62138	0.0002377	0.2734	84.4786	150.8507	55.8647
C1 . 62	**09058A**	**NSS 12**					
	29-DEC-11	57.01				51	114
	22642.663113	42164.97769	0.0007498	0.0395	42.1066	262.5046	56.9486
C1 . 63	**02007A**	**Intelsat 904**					
	29-DEC-11	60.00				51	497
	22642.858495	42164.41954	0.0002752	0.0141	333.4838	298.2640	59.9935
C1 . 64	**01039A**	**Intelsat 902**					
	29-DEC-11	61.99				52	522
	22642.835139	42164.66259	0.0002737	0.0092	23.0745	247.8629	61.9790
C1 . 65	**09054B**	**COMSATBw-1**					
	29-DEC-11	63.01				50	117
	22642.848368	42164.75034	0.0001552	0.0721	113.3338	144.1045	62.9426
C1 . 66	**96020A**	**Inmarsat 3-F1**					
	28-DEC-11	64.11				51	762
	22641.735058	42164.30461	0.0005254	0.0987	293.7322	344.3332	64.4990
C1 . 67	**02041A**	**Intelsat 906**					
	29-DEC-11	64.16				51	472
	22642.846146	42164.79239	0.0002395	0.0162	335.7342	291.3335	64.1324

C1 .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$				N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
C1 . 68	**10065B**	**Hylas**					
	28-DEC-11	66.00				51	58
	22641.694282	42164.97152	0.0001699	0.0131	134.5999	123.1468	66.0463
C1 . 69	**01019A**	**PAS 10**					
	29-DEC-11	68.54				52	532
	22642.841285	42164.82743	0.0001355	0.0342	86.3939	258.4460	68.4506
C1 . 70	**98052A**	**PAS 7**					
	29-DEC-11	68.66				51	670
	22642.841285	42164.85126	0.0002498	0.0170	318.9368	299.5940	68.6407
C1 . 71	**07058A**	**Cosmos-2434 (Raduga-1M1)**					
	29-DEC-11	70.01				52	210
	22642.697894	42164.65726	0.0002986	0.0129	259.7115	26.3500	69.9772
C1 . 72	**02051A**	**Eutelsat W5**					
	29-DEC-11	70.50				51	455
	22642.495683	42165.23280	0.0001982	0.0251	321.5492	326.0229	70.4934
C1 . 73	**96035A**	**Intelsat VII F-6**					
	29-DEC-11	72.11				52	775
	22642.553808	42165.33905	0.0000937	0.0186	0.2832	231.7505	72.1099
C1 . 74	**02002A**	**Insat 3C**					
	29-DEC-11	74.00				51	506
	22642.695289	42164.61521	0.0001172	0.0170	265.1844	147.1807	73.9933
C1 . 75	**07037A**	**INSAT 4CR**					
	29-DEC-11	74.00				50	221
	22642.855278	42164.55158	0.0003660	0.0488	75.5494	224.3410	73.9741
C1 . 76	**99053A**	**LMI 1**					
	29-DEC-11	74.98				52	627
	22642.855278	42164.87312	0.0001327	0.0262	258.1703	18.5143	74.9610
C1 . 77	**11001A**	**Elektro-L No. 1**					
	29-DEC-11	76.01				50	50
	22642.695706	42164.85490	0.0000753	0.0564	241.1074	244.2806	76.0601
C1 . 78	**97062A**	**Apstar 2R**					
	29-DEC-11	76.50				52	731
	22642.695706	42164.88378	0.0004545	0.0240	204.9402	81.5868	76.4665
C1 . 79	**08019A**	**Tian Lian 1A**					
	29-DEC-11	77.01				52	194
	22642.638819	42164.98330	0.0005158	0.0178	356.4402	202.1724	77.0310
C1 . 80	**06020B**	**Thaicom 5**					
	29-DEC-11	78.50				52	283
	22642.394572	42165.68304	0.0005133	0.0185	239.9329	17.1304	78.4994
C1 . 81	**11048A**	**Cosmos-2473**					
	29-DEC-11	79.92				15	15
	22642.695324	42164.66792	0.0001287	0.0915	82.2174	269.3497	79.8979

C1 .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$				N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
C1 . 82	**05010A**	**Ekspress AM-2**					
	30-DEC-11	80.00				52	343
	22643.886319	42164.75959	0.0000580	0.0452	175.6855	181.4701	79.9977
C1 . 83	**09007B**	**Ekspress MD-1**					
	29-DEC-11	80.10				52	151
	22642.703079	42164.70576	0.0002363	0.0056	304.7393	323.0646	80.0916
C1 . 84	**05049A**	**Insat 4A**					
	29-DEC-11	83.00				51	304
	22642.831690	42164.92583	0.0006652	0.0856	80.3825	183.8847	82.9773
C1 . 85	**11034A**	**GSAT-12**					
	29-DEC-11	83.01				25	25
	22642.831690	42164.75342	0.0004326	0.0508	98.6896	11.7871	82.9856
C1 . 86	**99016A**	**Insat 2E**					
	29-DEC-11	83.02				52	634
	22642.831690	42165.37998	0.0003149	0.1946	76.8655	180.4746	83.0298
C1 . 87	**10024A**	**Beidou DW 4**					
	29-DEC-11	84.10				51	83
	22642.712326	42164.07306	0.0000346	1.1598	342.3119	322.0705	83.9925
C1 . 88	**10002A**	**Raduga-1M**					
	29-DEC-11	85.00				52	101
	22642.698831	42164.78566	0.0002152	0.0111	334.4536	334.5408	84.9862
C1 . 89	**09067A**	**Intelsat IS-15**					
	29-DEC-11	85.14				52	109
	22642.769745	42164.71586	0.0002328	0.0071	345.2443	298.0237	85.1494
C1 . 90	**11035B**	**Kazsat-2**					
	29-DEC-11	86.52				24	24
	22642.856690	42164.53420	0.0000218	0.0345	118.3419	343.7559	86.5254
C1 . 91	**98033A**	**Zhongwei 1**					
	29-DEC-11	87.51				52	699
	22642.819641	42164.64409	0.0002002	0.0431	244.1579	40.3649	87.5184
C1 . 92	**11022B**	**ST-2**					
	29-DEC-11	88.00				32	32
	22642.819641	42165.41335	0.0001635	0.0249	71.6115	225.1923	87.9498
C1 . 93	**03053B**	**Yamal 200 N1 (Yamal 201)**					
	29-DEC-11	90.00				52	405
	22642.794514	42165.38026	0.0002796	0.0311	280.6653	331.4038	89.9566
C1 . 94	**06056A**	**Measat 3**					
	27-DEC-11	91.49				51	260
	22640.870139	42165.26700	0.0000770	0.0172	57.2676	209.4776	91.4996
C1 . 95	**09032A**	**Measat 3A**					
	27-DEC-11	91.50				51	132
	22640.870139	42165.29224	0.0003001	0.0128	300.0542	347.5289	91.4898

C1 .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$				N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
C1 . 96	**08028A**	**Zhongxing 9**					
	30-DEC-11	92.20				52	186
	22643.268056	42164.96844	0.0005575	0.0210	76.1294	223.4995	92.1881
C1 . 97	**03013A**	**Insat 3A**					
	30-DEC-11	93.50				51	440
	22643.265428	42164.66091	0.0006906	0.0238	54.9229	223.8070	93.4919
C1 . 98	**07007A**	**Insat 4B**					
	26-DEC-11	93.50				51	247
	22639.794213	42165.20561	0.0001002	0.0706	85.2049	348.0369	93.4783
C1 . 99	**02057A**	**NSS 6**					
	28-DEC-11	95.00				37	438
	22641.584861	42165.14057	0.0002825	0.0246	283.5935	348.7011	94.9958
C1 . 100	**08003A**	**Ekspress AM-33**					
	28-DEC-11	96.49				52	203
	22641.851991	42165.83023	0.0001100	0.0189	215.2269	183.9162	96.4845
C1 . 101	**03052A**	**Zhongxing-20 (ShenTong 1, ST-1)**					
	30-DEC-11	98.11				52	412
	22643.260833	42165.59529	0.0004558	0.0138	353.9455	336.2177	98.0865
C1 . 102	**09042A**	**Asiasat 5**					
	29-DEC-11	100.54				52	124
	22642.821597	42165.16973	0.0000605	0.0163	331.4020	257.3868	100.5256
C1 . 103	**11069A**	**Asiasat 7**					
	29-DEC-11	101.50				5	5
	22642.855012	42165.96396	0.0001164	0.0227	260.3028	296.2185	101.4407
C1 . 104	**00016A**	**Asiastar**					
	29-DEC-11	105.00				52	601
	22642.711979	42165.52352	0.0003913	0.0192	333.8824	296.9295	104.9744
C1 . 105	**99013A**	**Asiasat 3S**					
	29-DEC-11	105.50				52	647
	22642.711979	42164.73716	0.0001415	0.0335	166.0873	98.6019	105.5052
C1 . 106	**09027A**	**Indostar II/Protostar II**					
	30-DEC-11	107.77				51	136
	22643.239491	42164.59167	0.0002699	0.0487	63.1017	202.9068	108.1568
C1 . 107	**99042A**	**Telkom 1**					
	29-DEC-11	107.98				52	630
	22642.842199	42165.43241	0.0002179	0.0194	63.2772	225.9318	107.9843
C1 . 108	**00059A**	**GE-1A**					
	29-DEC-11	108.20				52	571
	22642.842199	42164.89247	0.0001059	0.0266	291.2144	316.9909	108.1809
C1 . 109	**10056B**	**BSAT-3B**					
	29-DEC-11	109.81				51	62
	22642.492153	42167.12047	0.0001849	0.0552	27.3723	315.9676	109.7578

C1 .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$				N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
C1 . 110	**98024B**	**BSAT-1b**					
	29-DEC-11	109.84				51	678
	22642.854178	42165.06964	0.0004458	0.0708	308.6474	350.4652	109.8414
C1 . 111	**07036B**	**BSAT-3A**					
	28-DEC-11	109.87				49	219
	22641.752789	42167.28281	0.0001572	0.0285	166.8802	343.6820	109.7942
C1 . 112	**03028A**	**BSAT-2c**					
	29-DEC-11	109.87				51	416
	22642.348553	42166.82608	0.0003855	0.0148	244.8568	9.5888	109.8008
C1 . 113	**11041B**	**BSAT 3c**					
	29-DEC-11	109.95				19	19
	22642.854178	42165.56642	0.0000422	0.0341	291.8667	107.8134	109.9142
C1 . 114	**00060A**	**N-SAT-110**					
	29-DEC-11	110.06				52	566
	22642.854178	42164.84061	0.0000609	0.0408	232.9395	255.2814	110.0664
C1 . 115	**11026A**	**Zhongxing 10**					
	28-DEC-11	110.53				27	27
	22641.742720	42165.87789	0.0006177	0.0107	279.8921	342.6321	110.5009
C1 . 116	**09046A**	**Palapa D**					
	29-DEC-11	112.96				52	122
	22642.827859	42165.16131	0.0001821	0.0072	16.3409	295.1756	112.9510
C1 . 117	**06034A**	**Mugunghwa 5**					
	29-DEC-11	113.04				52	272
	22642.827870	42165.24037	0.0000647	0.0193	50.0740	262.9478	113.0323
C1 . 118	**07031A**	**Zhongxing 6B**					
	29-DEC-11	115.55				52	233
	22642.704086	42165.70491	0.0002482	0.0103	41.8638	238.8497	115.5098
C1 . 119	**99046A**	**Mugunghwa 3 (Koreasat 3)**					
	30-DEC-11	116.00				52	613
	22643.233148	42165.52212	0.0001547	0.0347	228.4728	170.4535	115.8695
C1 . 120	**10070B**	**Koreasat 6**					
	28-DEC-11	116.00				52	53
	22641.637442	42166.40160	0.0002518	0.0202	168.1301	145.4755	115.9945
C1 . 121	**05046A**	**Telkom 2**					
	28-DEC-11	118.00				51	310
	22641.276238	42164.91489	0.0001385	0.0454	192.6533	88.3417	118.0130
C1 . 122	**05028A**	**Thaicom 4 (IPStar 1)**					
	30-DEC-11	119.47				52	323
	22643.518380	42165.03852	0.0001846	0.0036	315.9269	264.8865	119.5416
C1 . 123	**03014A**	**Asiasat 4**					
	29-DEC-11	122.16				52	444
	22642.704514	42166.03321	0.0000433	0.0015	289.8935	114.4203	122.0519

C1 .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$				N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
C1 . 124	**04042A**	**FengYun 2C**					
	29-DEC-11	123.50				52	366
	22642.705347	42165.58576	0.0002591	3.5940	67.9149	308.6321	123.7690
C1 . 125	**99006A**	**JC-Sat 6**					
	29-DEC-11	123.95				52	649
	22642.787975	42165.51539	0.0001959	0.0082	228.9313	4.8611	123.9839
C1 . 126	**10042A**	**Zhongxing 6A**					
	29-DEC-11	125.03				52	68
	22642.707315	42165.06011	0.0001671	0.0372	93.3945	272.4988	125.0099
C1 . 127	**06033A**	**JCSAT 3A**					
	30-DEC-11	127.75				52	271
	22643.227419	42165.15739	0.0001754	0.0332	289.7512	348.0343	127.9874
C1 . 128	**09044A**	**JCSAT 12 (JCSAT-RA)**					
	30-DEC-11	127.93				51	123
	22643.228819	42165.11898	0.0000789	0.0463	47.0537	230.5595	127.9139
C1 . 129	**10032A**	**Chollian**					
	30-DEC-11	128.21				51	78
	22643.226146	42165.33457	0.0000847	0.0343	72.1179	251.3962	128.2431
C1 . 130	**10064A**	**Zhongxing 20A**					
	29-DEC-11	130.02				52	58
	22642.774676	42164.99311	0.0002983	0.0150	2.8307	35.4709	130.0438
C1 . 131	**08018A**	**Vinasat**					
	28-DEC-11	131.94				52	192
	22641.640868	42165.31663	0.0001004	0.0134	338.0120	317.0236	131.9238
C1 . 132	**06010A**	**JCSAT 9**					
	28-DEC-11	132.02				52	292
	22641.640868	42165.64491	0.0000559	0.0216	309.8554	256.4154	132.0257
C1 . 133	**05012A**	**Apstar 6**					
	29-DEC-11	134.00				52	342
	22642.791042	42164.86527	0.0001688	0.0131	44.5974	238.2356	134.0117
C1 . 134	**04024A**	**Telstar 18 (APstar 5)**					
	28-DEC-11	138.01				52	380
	22641.526759	42165.33513	0.0001759	0.0319	267.9566	357.6033	137.9875
C1 . 135	**10001A**	**Beidou DW 3**					
	30-DEC-11	140.00				52	102
	22643.211007	42163.89113	0.0003256	1.5302	4.6289	201.5775	139.9214
C1 . 136	**05023A**	**Ekspress AM-3**					
	29-DEC-11	140.05				52	331
	22642.528137	42165.81313	0.0002816	0.0551	161.2547	154.2072	139.9350
C1 . 137	**05006A**	**Himawari-6**					
	28-DEC-11	140.24				52	346
	22641.275220	42164.23172	0.0001565	0.0581	187.7345	258.0092	140.0508

C1 .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$				N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
C1 . 138	**08007A**	**Kizuna**					
	30-DEC-11	142.97				52	196
	22643.207072	42165.25944	0.0003078	0.0858	280.5443	359.7465	142.9800
C1 . 139	**08038A**	**Superbird C2**					
	30-DEC-11	143.89				52	178
	22643.204120	42165.29924	0.0001020	0.0193	338.4542	299.2846	143.9248
C1 . 140	**04007A**	**MBSAT**					
	30-DEC-11	144.06				52	394
	22643.203194	42165.18991	0.0001610	0.0114	313.4343	314.8740	144.0424
C1 . 141	**06004A**	**MTSAT-2**					
	30-DEC-11	145.01				51	297
	22643.595741	42164.68670	0.0001608	0.0305	337.1408	341.6812	145.0237
C1 . 142	**07044A**	**Optus D2**					
	30-DEC-11	152.01				51	218
	22643.595995	42164.92218	0.0002805	0.0358	245.1182	29.4087	152.0051
C1 . 143	**02015A**	**JC-Sat 8**					
	29-DEC-11	154.00				51	495
	22642.351644	42166.19946	0.0002521	0.0247	18.8767	254.0407	153.9456
C1 . 144	**03028B**	**Optus C1 (Defense C1)**					
	23-DEC-11	156.01				50	431
	22636.532477	42164.95639	0.0003323	0.0495	203.5771	49.0189	156.0012
C1 . 145	**09044B**	**Optus D3**					
	30-DEC-11	156.01				51	123
	22643.191470	42165.08058	0.0003626	0.0314	1.9057	287.5997	156.0002
C1 . 146	**10057A**	**Beidou DW 6**					
	29-DEC-11	160.00				52	61
	22642.684213	42165.15010	0.0002932	0.9653	296.7980	173.8354	160.0393
C1 . 147	**06043B**	**Optus D1**					
	30-DEC-11	160.01				52	262
	22643.188588	42165.01610	0.0002758	0.0088	359.4581	268.3472	159.9750
C1 . 148	**00012A**	**Superbird 4**					
	30-DEC-11	162.02				52	604
	22643.278993	42164.77332	0.0001488	0.0224	244.1099	6.6626	162.0048
C1 . 149	**98065A**	**PAS 8**					
	30-DEC-11	166.01				52	650
	22643.519653	42164.71221	0.0002622	0.0031	54.0238	199.7056	166.0017
C1 . 150	**97046A**	**PAS 5**					
	25-DEC-11	169.00				52	703
	22638.595231	42164.55606	0.0020081	0.0400	91.3278	274.7378	168.7821
C1 . 151	**05052A**	**AMC 23**					
	29-DEC-11	172.01				52	306
	22642.536678	42164.60989	0.0002958	0.0118	293.5618	341.9335	171.9886

C1 .nn	COSPAR	NAME					
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	MJD	a	e	i	Ω	ω	λ
C1 . 152	**11047A**	**Zhongxing 1A**					
	29-DEC-11	176.80				15	15
	22642.774676	42164.71922	0.0002082	0.3591	276.6893	119.3368	129.8579
C1 . 153	**11032A**	**Tian Lian 1B**					
	30-DEC-11	176.80				25	25
	22643.236771	42165.09067	0.0004754	0.6939	266.5736	28.0830	176.7522
C1 . 154	**96070A**	**Inmarsat 3-F3**					
	29-DEC-11	178.07				51	767
	22642.227326	42164.96648	0.0005489	0.0744	3.4689	288.7902	178.0855
C1 . 155	**11056A**	**Intelsat IS-18**					
	23-DEC-11	180.02				12	12
	22636.448947	42164.54177	0.0000725	0.0149	296.1882	347.6588	180.0080
C1 . 156	**09008A**	**NSS 9**					
	30-DEC-11	183.04				39	139
	22643.218137	42164.89219	0.0001825	0.0146	355.4004	277.8087	182.9604
C1 . 157	**00081B**	**GE 8 (Aurora 3)**					
	29-DEC-11	221.03				52	560
	22642.441586	42164.75342	0.0002177	0.0156	331.7375	309.8877	220.9737
C1 . 158	**00054B**	**GE 7**					
	27-DEC-11	223.01				51	572
	22640.120914	42164.42795	0.0002592	0.0107	315.9273	306.9305	222.9907
C1 . 159	**04003A**	**AMC-10 (GE 10)**					
	29-DEC-11	225.01				51	400
	22642.493229	42164.27265	0.0002566	0.0155	350.5517	291.1138	224.9968
C1 . 160	**05041A**	**Galaxy 15**					
	29-DEC-11	226.94				52	315
	22642.519850	42164.81818	0.0002439	0.0094	21.6512	243.1762	226.9894
C1 . 161	**03013B**	**Galaxy XII**					
	29-DEC-11	227.11				51	441
	22642.466030	42151.16173	0.0002338	0.0262	180.8812	93.3240	231.0081
C1 . 162	**04017A**	**AMC-11 (GE-11)**					
	29-DEC-11	229.01				52	385
	22642.481458	42163.73050	0.0003058	0.0253	310.4364	342.2970	228.9895
C1 . 163	**08063A**	**Ciel 2**					
	29-DEC-11	231.16				51	158
	22642.622338	42164.46552	0.0002656	0.0122	293.3895	349.1706	231.1390
C1 . 164	**03044A**	**Galaxy 13/Horizons-1**					
	28-DEC-11	233.01				51	413
	22641.097176	42164.61718	0.0000118	0.0108	22.2218	104.3342	232.9791
C1 . 165	**05030A**	**Galaxy 14**					
	30-DEC-11	235.01				51	325
	22643.521759	42164.48598	0.0002050	0.0118	350.6966	274.0192	234.9979

C1 .nn	COSPAR	NAME					
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	MJD	a	e	i	Ω	ω	λ
C1 . 166	**08038B**	**AMC 21**					
	30-DEC-11	235.11				52	179
	22643.521759	42164.91293	0.0001822	0.0235	313.5630	308.1964	235.0861
C1 . 167	**08024A**	**Galaxy 18**					
	30-DEC-11	237.00				51	190
	22643.589745	42164.93788	0.0002930	0.0298	138.6729	131.1431	236.9853
C1 . 168	**03034A**	**EchoStar 9 (Telstar 13)**					
	29-DEC-11	239.01				51	427
	22642.463553	42164.62867	0.0002471	0.0192	26.0659	245.3016	238.9951
C1 . 169	**04016A**	**DirecTV-7S**					
	29-DEC-11	240.90				51	385
	22642.535556	42164.72090	0.0002342	0.0081	32.4064	243.8307	240.9101
C1 . 170	**02006A**	**EchoStar 7**					
	30-DEC-11	241.02				51	500
	22643.530556	42164.74501	0.0001184	0.0241	300.2532	31.1933	241.1753
C1 . 171	**10010A**	**Echostar XIV**					
	30-DEC-11	241.11				52	93
	22643.219132	42164.52579	0.0003105	0.0056	345.8719	295.2079	241.0983
C1 . 172	**07009A**	**Anik F3**					
	30-DEC-11	241.30				52	242
	22643.530405	42164.80416	0.0002171	0.0064	31.5203	225.3216	241.2737
C1 . 173	**98070A**	**Satmex 5**					
	29-DEC-11	243.21				52	664
	22642.599965	42164.70436	0.0001969	0.0216	63.8668	206.6211	243.1794
C1 . 174	**01018A**	**XM Radio 1 (Roll)**					
	29-DEC-11	244.76				52	538
	22642.423924	42164.86387	0.0003729	0.0739	222.2762	1.2782	244.7440
C1 . 175	**01012A**	**XM Radio 2 (Rock)**					
	29-DEC-11	244.76				52	550
	22642.423924	42164.78398	0.0003348	0.0441	282.9518	34.2825	244.7446
C1 . 176	**11059A**	**ViaSat-1**					
	30-DEC-11	244.90				11	11
	22643.390220	42164.25022	0.0002440	0.0342	137.3310	96.6624	244.8937
C1 . 177	**06049A**	**XM Radio 4 (Blues)**					
	24-DEC-11	244.95				52	264
	22637.231366	42164.94097	0.0000496	0.0265	211.7608	195.7000	244.7141
C1 . 178	**06020A**	**Satmex 6**					
	28-DEC-11	246.98				51	285
	22641.386262	42164.93620	0.0002091	0.0262	227.2703	46.1860	246.9742
C1 . 179	**04027A**	**Anik F2**					
	29-DEC-11	248.85				51	374
	22642.060451	42165.15459	0.0000279	0.0268	0.6442	89.5867	248.9532

C1 .nn	COSPAR	NAME					
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	MJD	a	e	i	Ω	ω	λ
C1 . 180	**06054A**	**WildBlue 1**					
	21-DEC-11	248.94				50	258
	22634.348032	42164.77248	0.0002048	0.0465	109.9606	170.2439	248.8382
C1 . 181	**06003A**	**Echostar 10**					
	30-DEC-11	249.80				52	301
	22643.513704	42164.72819	0.0002110	0.0125	342.8755	280.9188	249.7810
C1 . 182	**02023A**	**DirecTV-5**					
	30-DEC-11	249.95				51	491
	22643.513704	42164.76099	0.0003119	0.0046	55.6925	218.1149	249.8740
C1 . 183	**08035A**	**Echostar 11**					
	30-DEC-11	250.01				52	183
	22643.513704	42164.85350	0.0002685	0.0171	348.8726	282.2034	249.9761
C1 . 184	**00076A**	**Anik F1**					
	27-DEC-11	252.62				51	565
	22640.366701	42164.79463	0.0001127	0.0243	302.8530	358.4042	252.6923
C1 . 185	**05036A**	**Anik F1R**					
	27-DEC-11	252.70				51	320
	22640.362882	42165.05394	0.0001805	0.0201	46.7096	243.5954	252.7012
C1 . 186	**04041A**	**AMC-15**					
	29-DEC-11	254.97				51	364
	22642.284595	42164.90817	0.0001889	0.0048	320.6594	305.8620	254.9321
C1 . 187	**06054B**	**AMC 18**					
	29-DEC-11	255.06				52	259
	22642.362072	42164.78846	0.0002459	0.0171	323.3042	319.5119	255.0500
C1 . 188	**09033A**	**GOES 14**					
	30-DEC-11	255.28				51	131
	22643.244491	42165.02367	0.0003159	0.1797	254.2522	193.5908	254.5767
C1 . 189	**96054A**	**GE 1**					
	29-DEC-11	256.99				51	767
	22642.441424	42164.74445	0.0002712	0.0084	330.3141	309.7194	256.9797
C1 . 190	**05015A**	**Spaceway 1**					
	30-DEC-11	257.13				51	339
	22643.186458	42164.97629	0.0000602	0.0316	169.9129	216.1516	257.0585
C1 . 191	**07032A**	**DirecTV 10**					
	29-DEC-11	257.23				51	232
	22642.441424	42165.12992	0.0000537	0.0046	262.9061	121.3797	257.1755
C1 . 192	**09075A**	**DirecTV 12**					
	28-DEC-11	257.24				51	105
	22641.175035	42165.00292	0.0000244	0.0093	87.9058	123.6479	257.2228
C1 . 193	**10061A**	**SkyTerra 1**					
	29-DEC-11	258.70				51	59
	22642.531748	42164.72707	0.0002371	5.5745	320.7153	184.4942	258.6912

C1 .nn	COSPAR	NAME					
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	MJD	a	e	i	Ω	ω	λ
C1 . 194	**01052A**	**DirecTV-4S**					
	30-DEC-11	258.85				52	512
	22643.484954	42164.73520	0.0001176	0.0054	283.2058	354.0225	258.8511
C1 . 195	**06043A**	**DirecTV 9S**					
	30-DEC-11	258.90				52	265
	22643.484954	42164.78594	0.0002405	0.0205	56.3669	231.2481	258.8884
C1 . 196	**10016A**	**SES-1**					
	29-DEC-11	259.01				52	88
	22642.472975	42164.95106	0.0001876	0.0115	310.0537	319.1132	258.9907
C1 . 197	**05019A**	**DirectTV-8**					
	30-DEC-11	259.17				52	334
	22643.491065	42164.96508	0.0002341	0.0132	350.6108	294.6899	259.1254
C1 . 198	**08013A**	**DirecTV 11**					
	29-DEC-11	260.73				51	197
	22642.472951	42164.83892	0.0000078	0.0252	179.8102	152.4562	260.7756
C1 . 199	**05046B**	**Spaceway 2**					
	29-DEC-11	260.86				51	314
	22642.482130	42164.70072	0.0000182	0.0240	181.6245	257.7457	260.8743
C1 . 200	**06023A**	**Galaxy 16**					
	29-DEC-11	261.00				51	283
	22642.472951	42164.77388	0.0002254	0.0194	57.8060	220.0744	260.9881
C1 . 201	**08045A**	**Galaxy 19**					
	28-DEC-11	262.93				51	172
	22641.231829	42164.86499	0.0002694	0.0115	278.2769	0.2109	262.9320
C1 . 202	**09034A**	**Sirius FM5**					
	29-DEC-11	264.01				51	131
	22642.479016	42165.00937	0.0000314	0.0032	12.1097	187.3768	264.0035
C1 . 203	**02030A**	**Galaxy 3C**					
	30-DEC-11	264.95				51	482
	22643.129190	42164.47112	0.0000436	0.0286	201.4779	154.3108	264.9453
C1 . 204	**07036A**	**Spaceway 3**					
	30-DEC-11	265.05				52	227
	22643.484132	42164.65390	0.0000481	0.0255	182.3376	294.5103	265.0460
C1 . 205	**97026A**	**Telstar 5**					
	29-DEC-11	266.90				51	738
	22642.382685	42164.85070	0.0002377	0.0127	68.7676	214.0608	266.8907
C1 . 206	**99027A**	**Nimiq**					
	30-DEC-11	268.88				51	637
	22643.479178	42165.30401	0.0005148	0.0169	225.0948	59.8840	268.8644
C1 . 207	**02062A**	**Nimiq 2**					
	28-DEC-11	268.88				51	457
	22641.552049	42164.95022	0.0003303	0.0133	306.2472	10.3416	268.8839

C1 .nn	COSPAR	NAME					
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C1 . 208	**07016B**	**Galaxy 17**					
	28-DEC-11	269.00				52	236
	22641.552060	42165.18851	0.0002041	0.0253	29.0479	236.1552	268.9881
C1 . 209	**05022A**	**Intelsat Americas 8 (Telstar 8)**					
	29-DEC-11	271.00				52	332
	22642.398785	42165.04497	0.0002094	0.0335	67.6573	82.4327	270.9738
C1 . 210	**97050A**	**GE 3**					
	30-DEC-11	272.96				51	723
	22643.061782	42164.95246	0.0002344	0.0215	321.1726	306.8925	273.0939
C1 . 211	**11049A**	**SES-2**					
	29-DEC-11	273.02				14	14
	22642.516493	42164.81481	0.0000803	0.0182	348.4739	269.4845	273.0051
C1 . 212	**10053A**	**Sirius XM-5**					
	29-DEC-11	274.79				52	64
	22642.378623	42165.35027	0.0003071	0.0079	9.5122	145.5534	274.7492
C1 . 213	**04048A**	**AMC 16**					
	30-DEC-11	274.90				52	356
	22643.234444	42165.25131	0.0001738	0.0159	302.0827	325.6616	274.9800
C1 . 214	**05008A**	**XM Radio 3 (Rhythm)**					
	29-DEC-11	274.91				52	344
	22642.395660	42164.83388	0.0000809	0.0377	170.6839	298.8279	274.9004
C1 . 215	**00046A**	**Brasilsat B4**					
	28-DEC-11	275.99				51	578
	22641.387025	42165.72173	0.0002139	0.0481	184.1261	87.6388	275.9455
C1 . 216	**03024A**	**AMC-9 (GE-12)**					
	28-DEC-11	276.61				52	433
	22641.387049	42165.15347	0.0002871	0.0111	17.3534	273.7615	276.9767
C1 . 217	**08044A**	**Nimiq 4**					
	30-DEC-11	278.00				51	172
	22643.063044	42164.74669	0.0002214	0.0037	67.6954	189.6104	278.0100
C1 . 218	**08055A**	**Simon Bolivar**					
	30-DEC-11	282.01				52	166
	22643.192558	42165.28915	0.0000938	0.0385	184.2857	128.9070	281.9875
C1 . 219	**95073A**	**EchoStar 1**					
	29-DEC-11	282.85				52	780
	22642.147697	42165.37606	0.0002172	0.0106	290.2900	335.9147	282.8445
C1 . 220	**02039A**	**EchoStar 8**					
	30-DEC-11	282.98				51	477
	22643.415891	42165.19383	0.0002793	0.0188	52.4625	231.3426	282.9248
C1 . 221	**00038A**	**EchoStar 6**					
	30-DEC-11	283.05				52	582
	22643.131007	42165.00769	0.0002632	0.0936	78.4183	192.9735	283.0327

C1 .nn	COSPAR	NAME					
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C1 . 222	**98006A**	**Brazilsat B-3A**					
	30-DEC-11	285.00				51	695
	22643.137350	42165.20084	0.0005178	0.0549	208.8212	48.9865	285.0136
C1 . 223	**09050A**	**Nimiq 5**					
	30-DEC-11	287.30				51	120
	22643.139815	42165.09263	0.0002173	0.0069	45.6017	242.3090	287.2827
C1 . 224	**99056A**	**DirecTV-1R**					
	29-DEC-11	287.49				52	621
	22642.464132	42165.16384	0.0001521	0.0880	81.2640	220.1987	287.4663
C1 . 225	**00067A**	**GE 6**					
	29-DEC-11	288.00				52	566
	22642.464144	42164.91153	0.0002379	0.0173	337.0423	302.3115	287.9907
C1 . 226	**08018B**	**Star One C2**					
	30-DEC-11	290.05				51	193
	22643.145255	42165.50474	0.0002570	0.0726	77.9367	216.4716	289.9803
C1 . 227	**11054A**	**QuetzSat-1**					
	30-DEC-11	292.92				14	14
	22643.151100	42165.23280	0.0002441	0.0141	10.1183	277.6120	292.8766
C1 . 228	**99060A**	**GE 4**					
	30-DEC-11	293.00				51	614
	22643.151100	42165.26532	0.0002186	0.0301	295.1916	338.7915	292.9756
C1 . 229	**07056A**	**Star One C1**					
	28-DEC-11	295.01				51	212
	22641.387477	42165.66089	0.0001920	0.0702	81.9131	210.3209	294.9671
C1 . 230	**11021A**	**Estrela do Sul 2**					
	27-DEC-11	296.89				33	33
	22640.058345	42165.10861	0.0001621	0.0095	337.3622	301.2257	297.0054
C1 . 231	**03033A**	**Rainbow 1**					
	30-DEC-11	298.42				52	429
	22643.198623	42165.46072	0.0001269	0.0223	295.9597	14.3352	298.6377
C1 . 232	**10034A**	**Echostar XV**					
	30-DEC-11	298.45				52	77
	22643.198623	42165.15739	0.0001423	0.0207	323.7849	318.7566	298.4639
C1 . 233	**97059A**	**EchoStar 3**					
	30-DEC-11	298.52				52	718
	22643.198623	42164.98134	0.0001719	0.0216	313.7804	306.1757	298.5567
C1 . 234	**04031A**	**Amazonas**					
	29-DEC-11	298.99				52	374
	22642.031840	42167.01897	0.0002155	0.0743	56.0594	215.8927	298.9672
C1 . 235	**09054A**	**Amazonas 2**					
	29-DEC-11	299.01				52	118
	22642.178553	42166.71617	0.0003014	0.0530	124.1961	93.1368	298.9679

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C1 . 236	**10006A**	**Intelsat IS-16**					
	28-DEC-11	301.90				51	98
	22641.393056	42165.45540	0.0002416	0.0058	346.0510	289.2762	301.8773
C1 . 237	**00043A**	**PAS 9**					
	29-DEC-11	302.00				51	581
	22642.060336	42165.38251	0.0001645	0.0389	220.0376	67.9654	301.9566
C1 . 238	**99071A**	**Galaxy 11**					
	30-DEC-11	304.48				51	612
	22643.400532	42164.63063	0.0001588	0.0449	218.1275	151.4182	304.4518
C1 . 239	**98037A**	**Intelsat 805**					
	30-DEC-11	304.51				51	680
	22643.400532	42165.11141	0.0002666	0.0351	58.9760	215.1180	304.5024
C1 . 240	**96015A**	**Intelsat VIIA F-2**					
	29-DEC-11	307.00				51	786
	22642.252986	42165.50025	0.0003098	0.0170	8.1466	278.8028	306.9821
C1 . 241	**00072A**	**PAS 1R**					
	28-DEC-11	309.98				51	544
	22641.463356	42165.66790	0.0000362	0.0303	179.8421	249.9253	309.9848
C1 . 242	**09064A**	**Intelsat IS-14**					
	30-DEC-11	314.99				50	109
	22643.051377	42165.22776	0.0001853	0.0072	321.2913	316.3699	315.0100
C1 . 243	**07044B**	**Intelsat IS-11**					
	29-DEC-11	316.95				48	216
	22642.105104	42165.63622	0.0003032	0.0164	245.9988	31.5948	316.9732
C1 . 244	**98014A**	**Intelsat 806 (NSS 806)**					
	29-DEC-11	319.41				36	673
	22642.008576	42164.82715	0.0002849	0.0160	354.3688	292.3215	319.4932
C1 . 245	**09009A**	**Telstar 11N**					
	29-DEC-11	322.44				51	148
	22642.201343	42165.10188	0.0001879	0.0093	31.2878	256.1770	322.4292
C1 . 246	**05003A**	**AMC 12**					
	29-DEC-11	322.59				51	330
	22642.206019	42165.07413	0.0002743	0.0232	9.0725	273.2206	322.5780
C1 . 247	**02016A**	**Intelsat 903**					
	28-DEC-11	325.49				51	482
	22641.109294	42164.95779	0.0003483	0.0076	336.0424	244.5916	325.5253
C1 . 248	**10065A**	**Intelsat IS-17**					
	29-DEC-11	326.51				51	57
	22642.105359	42164.44561	0.0001276	0.0215	346.9023	298.2745	326.4853
C1 . 249	**08034A**	**Protostar 1**					
	29-DEC-11	328.50				51	182
	22642.105405	42165.18907	0.0002145	0.0182	335.7166	311.2653	328.4506

C1 .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$				N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
C1 . 250	**00007A**	**Hispasat 1C**					
	28-DEC-11	329.97				50	590
	22641.246400	42164.45346	0.0003393	0.0218	7.5561	307.7981	329.9901
C1 . 251	**06007A**	**Spainsat**					
	28-DEC-11	330.00				50	279
	22641.299988	42164.74753	0.0006377	0.0260	233.5680	16.4150	330.0027
C1 . 252	**02044A**	**Hispasat 1D**					
	28-DEC-11	330.00				50	454
	22641.246331	42164.52439	0.0005358	0.0332	325.5509	320.4854	329.9888
C1 . 253	**10070A**	**Hispasat 1E**					
	28-DEC-11	330.29				51	52
	22641.246262	42164.42571	0.0002017	0.0404	169.9060	62.6043	330.0302
C1 . 254	**03007A**	**Intelsat 907**					
	27-DEC-11	332.52				52	436
	22640.584676	42165.52689	0.0002585	0.0233	16.2059	219.3187	332.4760
C1 . 255	**02027A**	**Intelsat 905**					
	27-DEC-11	335.49				52	463
	22640.040938	42164.85406	0.0002390	0.0126	350.6949	264.5378	335.4973
C1 . 256	**02019A**	**NSS-7**					
	30-DEC-11	338.02				35	474
	22643.000336	42164.86584	0.0002586	0.0162	321.7662	322.0601	337.9938
C1 . 257	**97053A**	**Intelsat VIII F-3 (NSS 803)**					
	29-DEC-11	340.00				36	698
	22642.105706	42165.21150	0.0001885	0.0134	356.9485	281.0925	339.9686
C1 . 258	**01024A**	**Intelsat 901**					
	29-DEC-11	342.00				52	536
	22642.999421	42164.94685	0.0002602	0.0096	20.3454	249.2137	342.0040
C1 . 259	**08030A**	**Skynet 5C**					
	28-DEC-11	342.22				51	186
	22641.185440	42164.89527	0.0003374	0.0645	346.1249	269.2076	342.1889
C1 . 260	**96053A**	**Inmarsat 3-F2**					
	30-DEC-11	344.51				52	775
	22643.030405	42164.90536	0.0005902	0.0709	340.5499	293.0620	344.4980
C1 . 261	**99059A**	**Orion 2**					
	29-DEC-11	345.00				51	621
	22642.207708	42164.98638	0.0003065	0.0060	94.8318	170.9824	344.9873
C1 . 262	**02040A**	**Atlantic Bird 1**					
	28-DEC-11	347.51				52	469
	22641.951181	42164.68530	0.0002919	0.0720	356.3238	323.3097	347.5310
C1 . 263	**09007A**	**Ekspress AM-44**					
	30-DEC-11	349.01				52	151
	22643.148738	42164.90648	0.0001499	0.0090	268.6823	70.6203	348.9846

C1 .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$				N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
C1 . 264	**01042A**	**Atlantic Bird 2**					
	28-DEC-11	351.92				52	518
	22641.952037	42164.82799	0.0004416	0.0476	344.9976	284.7221	351.9012
C1 . 265	**11051A**	**Atlantic Bird 7**					
	30-DEC-11	352.72				14	14
	22643.047465	42164.08231	0.0002806	0.0619	341.6794	207.7112	352.7299
C1 . 266	**10037A**	**Nilesat 201**					
	27-DEC-11	353.00				51	73
	22640.993137	42165.08927	0.0004773	0.0520	181.1969	70.8426	352.9645
C1 . 267	**00046B**	**Nilesat 102**					
	28-DEC-11	353.01				51	576
	22641.099444	42164.59447	0.0005825	0.0360	294.3571	348.7451	353.0135
C1 . 268	**98024A**	**Nilesat 101**					
	28-DEC-11	353.01				51	687
	22641.077720	42164.89611	0.0003934	0.0407	50.6462	236.7597	352.9943
C1 . 269	**06033B**	**Syracuse 3B**					
	29-DEC-11	354.81				52	273
	22642.259745	42164.71586	0.0003047	0.0147	42.7805	212.1370	354.7877
C1 . 270	**02035A**	**Atlantic Bird 3**					
	28-DEC-11	355.00				51	476
	22641.464954	42164.65586	0.0004557	0.0363	351.7970	274.5535	354.9959
C1 . 271	**03059A**	**AMOS 2**					
	30-DEC-11	356.01				51	399
	22643.825139	42164.49159	0.0003175	0.0259	303.0441	332.5062	355.9652
C1 . 272	**08022A**	**Amos 3**					
	21-DEC-11	356.06				50	192
	22634.058449	42164.75034	0.0001405	0.0109	309.7121	266.1312	355.9986
C1 . 273	**04022A**	**Intelsat 10-02**					
	28-DEC-11	359.05				52	378
	22641.890035	42164.91882	0.0000389	0.0132	72.3925	138.2569	359.0086
C1 . 274	**09058B**	**Thor 6**					
	30-DEC-11	359.21				52	114
	22643.039468	42164.46271	0.0001794	0.0053	107.6892	155.1091	359.1538
C1 . 275	**08006A**	**Thor 2R**					
	28-DEC-11	359.25				51	197
	22641.890035	42164.51457	0.0002014	0.0377	210.2063	54.2263	359.2440

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

In the case where the satellite is only under longitude control, there are 80 objects identified.

For explanation of symbols, see the definitions at the beginning of Chapter 3 on page 32.

C2 .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$				N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
C2 . 1	**93031A**	**Astra 1C**					
	29-DEC-11	2.00				51	742
	22642.972338	42164.21266	0.0004633	4.7833	66.1172	199.0363	2.0053
C2 . 2	**00052A**	**Eutelsat W1**					
	30-DEC-11	4.02				51	569
	22643.830683	42164.61521	0.0006566	0.3442	69.8095	208.3432	3.9907
C2 . 3	**95055A**	**Astra 1E**					
	29-DEC-11	4.85				42	620
	22642.106308	42166.04302	0.0004623	1.4321	77.2775	194.7307	4.7503
C2 . 4	**02040B**	**MSG 1**					
	28-DEC-11	9.36				51	458
	22641.871076	42166.51655	0.0041380	0.9768	55.2433	284.1098	8.8207
C2 . 5	**90021A**	**Intelsat VI F-3**					
	30-DEC-11	11.50				52	1039
	22643.828947	42164.28695	0.0000651	8.5171	56.1103	205.7749	11.4975
C2 . 6	**09010A**	**Raduga-1**					
	30-DEC-11	12.00				52	148
	22643.828947	42165.15431	0.0000766	1.6346	108.1474	133.0624	11.9558
C2 . 7	**01005A**	**Sicral**					
	28-DEC-11	16.20				51	546
	22641.110532	42163.48747	0.0002836	3.5604	68.4907	224.3472	16.2706
C2 . 8	**01029A**	**Artemis**					
	29-DEC-11	21.41				51	531
	22642.845000	42164.93985	0.0002738	9.5646	56.6457	255.7154	21.3437
C2 . 9	**97025A**	**Thor II**					
	29-DEC-11	23.31				51	716
	22642.870174	42163.99625	0.0000380	3.2825	69.6851	215.0858	23.3041
C2 . 10	**98006B**	**Inmarsat-3 F5**					
	29-DEC-11	24.95				52	708
	22642.716331	42163.93794	0.0004476	0.4163	345.4454	288.4802	24.7212
C2 . 11	**05044A**	**Inmarsat 4 F2**					
	29-DEC-11	25.09				52	312
	22642.979028	42164.30152	0.0002894	2.2146	336.7018	301.8817	25.0808
C2 . 12	**96030B**	**AMOS 1**					
	29-DEC-11	31.01				51	791
	22642.837778	42163.34030	0.0002431	3.1145	71.0435	197.0647	31.0136
C2 . 13	**08011A**	**AMC 14**					
	28-DEC-11	34.48				51	194
	22641.848090	42164.63063	0.0045099	15.1496	97.9306	358.9844	34.3879

C2 .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$				N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
C2 . 14	**93076A**	**NATO IVB**					
	29-DEC-11	34.91				51	835
	22642.844120	42165.72790	0.0003671	9.6888	43.4974	235.8422	34.5946
C2 . 15	**99009B**	**Skynet 4E**					
	29-DEC-11	35.43				52	625
	22642.642303	42165.43605	0.0003085	7.3327	45.6547	226.5264	35.3974
C2 . 16	**04043A**	**Ekspress AM-1**					
	29-DEC-11	40.01				52	363
	22642.640370	42164.18743	0.0002811	1.4433	74.5096	209.9285	39.9916
C2 . 17	**03026A**	**Thuraya 2**					
	29-DEC-11	44.04				52	435
	22642.859097	42164.25583	0.0004941	3.0747	9.9625	259.5769	44.0224
C2 . 18	**96002B**	**MEASAT 1**					
	29-DEC-11	46.00				51	794
	22642.789086	42164.67633	0.0000053	3.8071	68.1620	183.1951	46.0089
C2 . 19	**94034A**	**Intelsat VII F-2**					
	29-DEC-11	47.52				51	854
	22642.874630	42164.41590	0.0002477	0.4530	80.4266	200.3794	47.4864
C2 . 20	**96067A**	**Hot Bird 2**					
	28-DEC-11	48.24				51	569
	22641.869178	42163.97382	0.0005183	2.4850	72.0236	193.8636	48.2386
C2 . 21	**97007A**	**JC-Sat 4**					
	29-DEC-11	50.28				51	744
	22642.800613	42164.57737	0.0002850	3.7237	68.3262	217.4730	50.2592
C2 . 22	**98056B**	**Sirius 3**					
	29-DEC-11	51.21				51	659
	22642.814688	42164.61493	0.0000660	2.6539	71.6381	226.0904	51.1680
C2 . 23	**96039A**	**Apstar 1A**					
	29-DEC-11	51.50				52	800
	22642.724734	42164.20677	0.0001251	5.8736	62.6056	213.4252	51.4600
C2 . 24	**97049B**	**Meteosat 7**					
	29-DEC-11	57.47				51	725
	22642.881933	42165.47558	0.0000129	7.3383	58.3955	186.9108	57.3980
C2 . 25	**90002B**	**Leasat 5**					
	29-DEC-11	72.01				51	1024
	22642.861238	42164.91237	0.0000569	9.8301	28.9929	290.6848	72.0145
C2 . 26	**95023A**	**Intelsat VIIA F-1**					
	29-DEC-11	72.09				52	821
	22642.699572	42164.77641	0.0002884	0.3872	78.9716	213.9515	71.9931
C2 . 27	**02043A**	**KALPANA-1 (METSAT-1)**					
	30-DEC-11	74.00				51	467
	22643.849444	42164.83219	0.0006932	2.4824	72.1514	198.7634	73.9665

C2 .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$				N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
C2 . 28	**96003A**	**Mugunghwa 2 (Koreasat 2)**					
	29-DEC-11	74.82				52	760
	22642.695509	42164.80781	0.0000714	4.5563	66.2843	2.6072	74.7818
C2 . 29	**95035B**	**TDRS 7**					
	29-DEC-11	84.77				52	829
	22642.812373	42165.56922	0.0030585	12.8380	37.7396	333.6334	84.7877
C2 . 30	**06053A**	**FengYun 2D**					
	29-DEC-11	86.44				51	260
	22642.877500	42166.05535	0.0002213	1.9774	77.4806	285.1712	86.1537
C2 . 31	**98049A**	**ST-1**					
	29-DEC-11	88.01				52	673
	22642.819641	42164.60148	0.0003801	0.3668	78.3886	197.3937	88.1484
C2 . 32	**00034A**	**TDRS 8**					
	29-DEC-11	89.09				51	584
	22642.857106	42165.57062	0.0003981	3.5609	80.0057	165.3985	89.1831
C2 . 33	**02042B**	**Kodama (DRTS)**					
	29-DEC-11	90.74				51	470
	22642.847766	42165.09011	0.0001860	1.0327	77.0888	204.9740	90.7252
C2 . 34	**00003A**	**Zhongxing-22 (FengHuo 1, FH-1)**					
	30-DEC-11	97.96				52	613
	22643.263889	42166.26086	0.0003044	3.3045	68.9314	249.0512	97.7930
C2 . 35	**08001A**	**Thuraya 3**					
	30-DEC-11	98.63				52	202
	22643.259572	42164.69399	0.0004936	4.9502	337.5224	292.6389	98.6305
C2 . 36	**00013A**	**Ekspress 2A**					
	29-DEC-11	102.79				52	604
	22642.856725	42164.67380	0.0009127	5.4191	64.1163	92.4791	102.7777
C2 . 37	**06038A**	**Zhongxing-22A (FengHuo 1, FH-1)**					
	29-DEC-11	103.27				52	272
	22642.854595	42165.16804	0.0002732	1.8671	73.6400	257.0795	103.2822
C2 . 38	**08066A**	**Feng Yun 2E**					
	29-DEC-11	104.34				52	158
	22642.855428	42167.56151	0.0003081	0.5934	347.8959	32.7163	104.1717
C2 . 39	**97071B**	**Cakrawatra 1**					
	29-DEC-11	107.62				52	698
	22642.828623	42166.40384	0.0003379	5.7346	62.9682	241.6702	107.6147
C2 . 40	**92021B**	**Inmarsat 2-F4**					
	29-DEC-11	108.99				52	949
	22642.870810	42164.71081	0.0002524	6.4347	45.8051	288.4083	108.6622
C2 . 41	**98044A**	**Sinosat 1**					
	29-DEC-11	110.50				51	691
	22642.854178	42165.68641	0.0003699	0.3164	76.6615	206.3601	110.3444

C2 .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$				N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
C2 . 42	**03021A**	**Beidou 3**					
	29-DEC-11	110.51				51	438
	22642.828299	42166.16357	0.0006795	1.1529	82.2923	8.0483	110.4821
C2 . 43	**00011A**	**Garuda 1**					
	29-DEC-11	123.02				51	595
	22642.042731	42165.77696	0.0003246	1.0922	234.8232	99.5675	123.0869
C2 . 44	**02035B**	**N-Star 3 (N-Star c)**					
	30-DEC-11	135.97				52	474
	22643.518819	42165.30037	0.0001327	0.5489	82.7999	187.7251	135.9891
C2 . 45	**94043A**	**Apstar 1**					
	30-DEC-11	142.02				52	902
	22643.135822	42164.99731	0.0000756	6.5315	60.9611	229.6086	141.9993
C2 . 46	**05009A**	**Inmarsat 4 F1**					
	30-DEC-11	143.50				52	345
	22643.652164	42165.26336	0.0002664	2.4873	341.5554	287.2872	143.4881
C2 . 47	**06059A**	**Kiku-8 (ETS VIII)**					
	27-DEC-11	145.93				52	255
	22640.602917	42165.35868	0.0004696	1.5889	74.7955	211.6478	145.7365
C2 . 48	**96063B**	**MEASAT 2**					
	30-DEC-11	148.03				52	764
	22643.655266	42164.29508	0.0002792	3.7693	68.1817	213.2188	147.9924
C2 . 49	**97075A**	**JC-Sat 5**					
	30-DEC-11	150.00				52	704
	22643.570440	42164.82519	0.0004161	1.6134	74.5149	205.7860	149.9959
C2 . 50	**96030A**	**Palapa C2**					
	30-DEC-11	150.50				52	762
	22643.570440	42165.06151	0.0001890	1.5875	74.5148	189.7291	150.4929
C2 . 51	**97036A**	**Superbird C**					
	30-DEC-11	158.01				52	720
	22643.566146	42164.90312	0.0003896	2.8308	70.9087	170.8726	158.0156
C2 . 52	**94055A**	**Optus B3**					
	30-DEC-11	164.00				52	860
	22643.279421	42164.82042	0.0001724	3.6560	68.6014	210.6869	163.9704
C2 . 53	**89087A**	**Intelsat VI F-2**					
	29-DEC-11	177.84				51	989
	22642.511019	42164.38590	0.0000939	9.0135	54.5677	230.6885	177.8293
C2 . 54	**02055A**	**TDRS 10**					
	30-DEC-11	186.16				51	446
	22643.211366	42167.76170	0.0014599	1.1661	62.2215	191.8054	186.1957
C2 . 55	**87022A**	**GOES 7**					
	30-DEC-11	187.50				52	1089
	22643.349201	42158.73230	0.0005587	13.6405	27.6360	65.2376	188.4799

C2 .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$				N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
C2 . 56	**93003B**	**TDRS 6**					
	30-DEC-11	189.00				51	931
	22643.570521	42167.42608	0.0007729	11.2132	47.3405	348.8828	189.0040
C2 . 57	**91054B**	**TDRS 5**					
	30-DEC-11	192.50				51	1017
	22643.191933	42164.87312	0.0012634	11.8127	44.4851	322.7717	192.2657
C2 . 58	**91018A**	**Inmarsat 2-F2**					
	29-DEC-11	216.18				51	980
	22642.255961	42164.47337	0.0000726	7.8855	47.5617	291.7264	218.0212
C2 . 59	**94065A**	**Solidaridad 2**					
	28-DEC-11	246.40				52	866
	22641.056042	42165.07132	0.0003606	3.4457	69.2817	210.7818	245.0865
C2 . 60	**09035A**	**Terrestar 1**					
	30-DEC-11	249.00				51	131
	22643.566366	42164.60765	0.0003058	4.7851	322.6099	313.5785	249.0116
C2 . 61	**96022A**	**MSAT**					
	29-DEC-11	253.51				52	801
	22642.438831	42164.74193	0.0005569	4.0617	67.3863	204.6423	253.4490
C2 . 62	**85035A**	**Gstar 1**					
	30-DEC-11	255.48				51	1109
	22643.130613	42164.50056	0.0007984	12.5435	40.1126	310.6088	254.8067
C2 . 63	**95019A**	**AMSC-1**					
	29-DEC-11	258.83				51	839
	22642.450150	42164.74893	0.0002516	6.6727	60.9589	256.0306	256.6930
C2 . 64	**08039A**	**Inmarsat 4 F3**					
	29-DEC-11	262.37				51	178
	22642.436042	42165.06684	0.0002918	3.0048	341.5755	285.6266	262.3484
C2 . 65	**08016A**	**ICO G1**					
	28-DEC-11	267.15				52	194
	22641.922315	42166.16890	0.0003002	4.7549	336.0891	296.0947	267.1199
C2 . 66	**98063B**	**GE 5**					
	30-DEC-11	280.99				52	653
	22643.259630	42168.83618	0.0005843	1.3825	75.9029	197.3931	279.6357
C2 . 67	**06018A**	**GOES N**					
	28-DEC-11	285.16				52	289
	22641.072870	42162.84416	0.0001107	0.3302	81.4257	334.2449	285.0208
C2 . 68	**95016A**	**Brazilsat B2**					
	30-DEC-11	292.02				51	818
	22643.147824	42164.46916	0.0001444	3.5002	69.6398	197.3837	291.9881
C2 . 69	**01031A**	**GOES 12**					
	30-DEC-11	300.14				51	529
	22643.067697	42166.33095	0.0002716	1.8752	74.8310	251.3667	300.2807

C2 .nn	COSPAR	NAME					
	Date	$\overline{\lambda}$				N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
C2 . 70	**97027A**	**Inmarsat 3-F4**					
	29-DEC-11	306.01				51	735
	22642.104826	42165.97713	0.0004916	1.8477	72.1515	197.8707	305.9542
C2 . 71	**88091B**	**TDRS-West**					
	29-DEC-11	311.08				51	1031
	22642.561296	42166.26254	0.0012332	13.4371	30.1107	342.0669	311.2966
C2 . 72	**94064A**	**Intelsat VII F-3 (NSS 703)**					
	29-DEC-11	312.96				37	782
	22642.105012	42164.95639	0.0003489	2.0984	73.1682	195.1800	312.9644
C2 . 73	**02011A**	**TDRS 9**					
	29-DEC-11	319.17				51	494
	22642.105174	42164.35675	0.0014075	1.4727	150.2648	220.7380	319.1174
C2 . 74	**01005B**	**Skynet 4F**					
	30-DEC-11	326.02				51	540
	22643.047546	42164.36320	0.0003635	5.7310	52.7686	232.3456	325.9458
C2 . 75	**97009A**	**Intelsat VIII F-1**					
	28-DEC-11	328.79				52	707
	22641.109421	42164.80977	0.0003255	2.9413	70.9275	249.9368	330.4862
C2 . 76	**02029A**	**Ekspress A1R (Express 4A)**					
	30-DEC-11	346.01				51	488
	22643.159236	42164.78734	0.0001355	2.1704	73.2615	263.6409	346.0435
C2 . 77	**96044B**	**Telecom 2D**					
	29-DEC-11	352.20				51	754
	22642.058808	42164.72258	0.0002599	5.0928	64.7398	237.2107	352.2040
C2 . 78	**97042A**	**Agila 2**					
	30-DEC-11	356.94				52	718
	22643.162292	42164.46243	0.0003585	0.8467	79.6820	201.1133	356.9460
C2 . 79	**98035A**	**Thor III**					
	29-DEC-11	358.75				51	673
	22642.130984	42164.99143	0.0001594	1.5409	74.5330	193.9159	355.6831
C2 . 80	**90079A**	**Skynet 4C**					
	28-DEC-11	358.80				52	1003
	22641.876563	42164.44842	0.0002686	11.6404	37.6224	242.6335	358.7697

3.3 Objects in a drift orbit

In the case where the object is in a drift orbit, there are 533 objects identified.

For explanation of symbols, see the definitions at the beginning of Chapter 3 on page 32.

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**					
	29-DEC-11	-36.83	3135.879	3007.637	3264.121	50	174
	22642.787153	45300.00540	0.0025909	14.7316	331.0149	323.4492	309.6022
D . 2	**68116A**	**Intelsat III F-2**					
	27-DEC-11	-36.29	3085.642	2619.478	3551.806	51	170
	22640.003854	45250.21264	0.0101081	14.4662	333.6686	328.4788	236.4878
D . 3	**06048A**	**Xinnuo 2**					
	29-DEC-11	-26.69	2215.043	2030.155	2399.930	51	262
	22642.229907	44379.30944	0.0041285	2.8241	161.6113	99.9999	341.6482
D . 4	**97040A**	**PAS 6**					
	28-DEC-11	-23.67	1950.013	-1114.522	5014.547	46	358
	22641.645359	44114.30397	0.0691560	13.7655	1.5616	126.8124	39.0688
D . 5	**78113D**	**Titan IIIC stage 3 (Transtage)**					
	29-DEC-11	-23.46	1931.717	726.012	3137.422	51	865
	22642.817269	44095.89580	0.0271383	17.9682	356.6605	292.6662	321.6737
D . 6	**78113A**	**OPS 9441 (DSCS II F-11)**					
	30-DEC-11	-22.47	1845.504	1731.197	1959.812	51	991
	22643.029988	44009.92576	0.0029210	16.7505	1.3846	62.3963	252.7685
D . 7	**85024A**	**Ekran 14**					
	28-DEC-11	-19.72	1608.710	1531.838	1685.582	49	976
	22641.476285	43773.03682	0.0016238	16.5713	8.1615	237.4854	99.9637
D . 8	**84115A**	**NATO IIID**					
	29-DEC-11	-19.15	1560.190	1134.708	1985.671	50	1007
	22642.518495	43725.51145	0.0102298	11.9942	35.6135	1.9752	111.3930
D . 9	**73100D**	**Titan IIIC stage 3 (Transtage)**					
	29-DEC-11	-18.99	1546.964	362.947	2730.980	51	890
	22642.166609	43711.19713	0.0268012	16.2062	340.7516	346.1342	182.7705
D . 10	**83016A**	**Ekran 10**					
	30-DEC-11	-18.88	1537.294	1386.525	1688.064	50	970
	22643.294815	43701.16737	0.0031036	16.8562	359.6328	258.1191	154.7881
D . 11	**81122A**	**Marecs A**					
	29-DEC-11	-18.84	1534.078	1017.577	2050.579	51	997
	22642.125741	43698.47369	0.0113123	15.0478	11.8433	130.6924	230.3509
D . 12	**82106A**	**DSCS II F-16**					
	29-DEC-11	-18.66	1518.635	1501.918	1535.352	51	1038
	22642.300718	43683.90799	0.0004764	15.7311	11.9983	47.3373	166.3946
D . 13	**08006C**	**Proton-M fourth stage (Briz-M)**					
	29-DEC-11	-18.55	1509.208	371.482	2646.934	39	39
	22642.685139	43673.53880	0.0261449	4.3105	46.4300	195.4740	61.0144

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**					
	29-DEC-11	-18.45	1500.561	1445.965	1555.157	51	963
	22642.925938	43663.50003	0.0014996	15.6701	18.5024	340.0612	307.0996
D . 15	**77005A**	**NATO IIIB**					
	23-DEC-11	-18.01	1463.804	1269.890	1657.717	52	972
	22636.119745	43628.23112	0.0044380	15.1670	354.7016	280.9245	219.7512
D . 16	**79098C**	**Titan IIIC stage 3 (Transtage)**					
	28-DEC-11	-17.84	1448.891	68.804	2828.978	51	965
	22641.978611	43613.21719	0.0313554	17.2060	357.4095	296.9501	264.8426
D . 17	**77034B**	**OPS 9438 (DSCS II F-8)**					
	22-DEC-11	-17.45	1416.006	1264.225	1567.786	49	947
	22635.449433	43580.15640	0.0037052	16.7150	351.8041	17.2106	99.4852
D . 18	**08022B**	**Zenith-3SLB third stage (Block DM-SLB)**					
	30-DEC-11	-17.06	1383.327	-801.829	3568.483	52	183
	22643.225324	43547.69121	0.0504565	4.0733	74.6687	284.6743	249.5012
D . 19	**77034C**	**Titan IIIC stage 3 (Transtage)**					
	28-DEC-11	-16.97	1375.303	65.006	2685.600	50	974
	22641.932604	43541.11380	0.0300802	17.0875	349.8124	322.6729	274.9688
D . 20	**79098A**	**OPS 9443 (DSCS II F-13)**					
	29-DEC-11	-16.83	1363.552	1322.345	1404.758	51	1006
	22642.876516	43527.78188	0.0011832	16.3066	1.1547	3.3400	307.6533
D . 21	**87109A**	**Ekran 17**					
	29-DEC-11	-15.81	1277.510	1095.668	1459.352	51	952
	22642.494329	43441.95454	0.0040732	15.2016	21.1951	97.2286	106.1514
D . 22	**76053A**	**Marisat 2**					
	29-DEC-11	-15.75	1272.538	729.860	1815.215	51	974
	22642.900637	43436.85728	0.0122025	15.7056	350.4198	194.2698	287.8548
D . 23	**84114B**	**Marecs B2**					
	25-DEC-11	-15.64	1263.980	753.635	1774.325	49	1045
	22638.226111	43428.19948	0.0116185	15.5518	20.1066	277.8762	204.0075
D . 24	**87028A**	**Raduga 20**					
	30-DEC-11	-15.52	1253.476	1133.086	1373.866	50	918
	22643.486829	43418.01573	0.0030229	16.1944	16.9052	29.5756	103.2606
D . 25	**84090A**	**Ekran 13**					
	29-DEC-11	-15.30	1235.388	1170.539	1300.236	51	995
	22642.419282	43400.65479	0.0018699	16.1698	4.9442	62.4998	116.6875
D . 26	**97029A**	**FengYun 2A (FengYun 2-1R)**					
	27-DEC-11	-15.20	1226.826	812.574	1641.078	50	729
	22640.537650	43390.94404	0.0095417	10.5426	52.0947	98.0297	123.9363
D . 27	**84028A**	**Ekran 12**					
	28-DEC-11	-15.17	1224.030	1182.812	1265.249	51	969
	22641.846979	43387.95915	0.0011328	16.2928	1.7076	12.0684	319.8729

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**					
	30-DEC-11	-15.16	1223.277	1175.070	1271.484	49	927
	22643.267072	43387.69177	0.0013151	8.0878	52.4586	319.9102	217.8268
D . 29	**87073A**	**Ekran 16**					
	30-DEC-11	-13.64	1096.832	1078.657	1115.007	51	890
	22643.089676	43261.31233	0.0003771	15.4319	14.7459	52.8022	244.3301
D . 30	**86038A**	**Ekran 15**					
	29-DEC-11	-13.42	1078.351	1021.625	1135.078	50	939
	22642.354537	43242.46433	0.0008889	15.7132	9.8358	266.6025	144.6719
D . 31	**88108A**	**Ekran 19**					
	29-DEC-11	-13.03	1046.545	924.306	1168.784	51	1036
	22642.924317	43211.01777	0.0028327	14.8516	23.5820	71.3064	313.1286
D . 32	**77034A**	**OPS 9437 (DSCS II F-7)**					
	28-DEC-11	-12.96	1040.322	963.871	1116.773	52	929
	22641.974167	43204.79616	0.0014998	16.5613	348.7448	227.7171	260.8357
D . 33	**86090A**	**Gorizont 13**					
	27-DEC-11	-12.77	1025.025	957.334	1092.716	50	947
	22640.715613	43189.11440	0.0014049	15.2343	15.6088	240.2636	22.0208
D . 34	**88051A**	**Meteosat 3**					
	29-DEC-11	-11.97	958.913	933.056	984.771	52	1007
	22642.539387	43123.39698	0.0005811	14.3473	29.7135	286.4956	97.8438
D . 35	**85028C**	**Leasat 3**					
	29-DEC-11	-11.92	954.418	625.011	1283.825	51	1065
	22642.278113	43118.51805	0.0072689	17.5544	2.0467	158.2376	164.8716
D . 36	**92060B**	**Satcom C-3**					
	28-DEC-11	-11.75	940.167	831.998	1048.335	51	967
	22641.671574	43104.67479	0.0024324	6.5798	61.4818	244.0928	82.5876
D . 37	**89020B**	**Meteosat 4**					
	29-DEC-11	-11.39	910.947	828.161	993.733	50	976
	22642.265856	43075.13334	0.0018886	13.8525	34.6288	42.5997	201.7098
D . 38	**95040A**	**PAS 4**					
	29-DEC-11	-11.33	905.970	809.908	1002.032	51	776
	22642.959931	43069.87072	0.0023934	1.6771	75.2314	117.1556	351.2150
D . 39	**92032A**	**Intelsat K (NSS K)**					
	29-DEC-11	-11.14	890.310	498.550	1282.070	51	944
	22642.622905	43054.58369	0.0089439	8.7140	58.3065	221.9890	95.6026
D . 40	**71095C**	**Titan IIIC stage 3 (Transtage)**					
	27-DEC-11	-11.11	887.587	207.686	1567.487	51	953
	22640.335301	43051.90821	0.0156893	13.6406	332.8606	36.9445	117.7669
D . 41	**84023A**	**Intelsat V F-8**					
	27-DEC-11	-10.74	857.536	769.358	945.713	51	1064
	22640.761921	43021.46061	0.0017694	14.5462	25.5210	67.9197	15.5443

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 . 42	**89070A**	**Himawari-4**					
	29-DEC-11	-10.30	821.848	627.664	1016.033	50	1026
	22642.242188	42986.09457	0.0048337	13.6482	35.2524	9.2811	210.8232
D . 43	**84093C**	**Leasat 2**					
	30-DEC-11	-10.14	808.795	678.313	939.277	49	1046
	22643.032326	42973.37326	0.0028962	16.4588	4.3392	132.4579	254.8552
D . 44	**85107F**	**Proton-K fourth stage (Block DM)**					
	29-DEC-11	-10.00	797.102	712.703	881.502	51	937
	22642.384792	42961.11786	0.0020033	15.1851	10.4237	346.9196	134.3697
D . 45	**73100B**	**OPS 9434 (DSCS II F-4)**					
	29-DEC-11	-9.92	790.361	489.848	1090.875	47	979
	22642.805972	42954.59025	0.0070761	14.3847	338.5014	299.9259	309.7496
D . 46	**78073F**	**Proton-K fourth stage (Block DM)**					
	28-DEC-11	-9.74	775.637	709.151	842.122	51	961
	22641.642697	42939.85623	0.0017472	15.4648	344.3665	28.6954	16.3412
D . 47	**82113F**	**Proton-K fourth stage (Block DM)**					
	29-DEC-11	-9.73	774.714	679.687	869.740	50	955
	22642.381053	42938.96403	0.0020349	15.4760	0.1414	137.8256	125.6438
D . 48	**76101A**	**Marisat 3**					
	20-DEC-11	-9.66	769.268	347.180	1191.355	50	1029
	22633.555104	42933.69128	0.0099656	13.2945	349.6035	221.6577	60.2339
D . 49	**86082F**	**Proton-K fourth stage (Block DM)**					
	29-DEC-11	-9.63	766.705	649.558	883.853	51	882
	22642.296424	42931.05067	0.0030669	15.0275	13.7562	30.5494	169.8733
D . 50	**83088F**	**Proton-K fourth stage (Block DM)**					
	29-DEC-11	-9.57	761.897	692.448	831.347	51	958
	22642.509444	42926.72728	0.0017583	15.5585	2.8285	4.7212	81.8433
D . 51	**83066F**	**Proton-K fourth stage (Block DM)**					
	27-DEC-11	-9.56	761.176	716.389	805.964	50	954
	22640.694213	42925.54377	0.0012540	15.5079	2.5396	46.2046	16.8778
D . 52	**69013B**	**Titan IIIC stage 3 (Transtage)**					
	29-DEC-11	-9.55	760.728	202.505	1318.951	52	896
	22642.325822	42925.09819	0.0129227	9.9367	319.3828	66.4658	106.0737
D . 53	**80016D**	**Proton-K fourth stage (Block DM)**					
	27-DEC-11	-9.54	759.898	697.333	822.463	50	981
	22640.668079	42924.16513	0.0013533	15.6594	348.7207	141.3455	12.4935
D . 54	**09007D**	**Proton-M fourth stage (Briz-M)**					
	29-DEC-11	-9.51	757.548	-57.266	1572.363	51	149
	22642.579132	42921.54650	0.0191844	2.5925	76.4678	290.6597	127.9514
D . 55	**73100A**	**OPS 9433 (DSCS II F-3)**					
	29-DEC-11	-9.43	750.365	626.505	874.224	49	881
	22642.024606	42914.86076	0.0031529	14.9754	337.8700	84.5572	232.2502

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 . 56	**87040A**	**Gorizont 14**					
	29-DEC-11	-9.42	749.646	626.964	872.327	50	991
	22642.841690	42913.55211	0.0031207	15.3646	8.1432	68.2104	327.5382
D . 57	**81027F**	**Proton-K fourth stage (Block DM)**					
	29-DEC-11	-9.40	748.111	675.387	820.835	50	956
	22642.785926	42912.12727	0.0019751	15.9635	351.6379	67.4449	331.0369
D . 58	**79062D**	**Proton-K fourth stage (Block DM)**					
	29-DEC-11	-9.37	746.170	727.557	764.783	51	921
	22642.230822	42910.20872	0.0004967	15.6986	348.2909	78.9702	167.9141
D . 59	**86044F**	**Proton-K fourth stage (Block DM)**					
	29-DEC-11	-9.37	745.855	704.025	787.684	51	973
	22642.333912	42910.03005	0.0011648	15.0237	12.6661	51.4825	155.1394
D . 60	**96005D**	**Proton-K fourth stage (Block DM-2)**					
	29-DEC-11	-9.36	744.593	692.064	797.122	52	739
	22642.687373	42909.35847	0.0014545	11.8977	45.9145	34.5921	60.7677
D . 61	**86027F**	**Proton-K fourth stage (Block DM)**					
	30-DEC-11	-9.30	740.136	585.299	894.972	51	960
	22643.229919	42904.56766	0.0038150	15.6437	12.2465	6.0018	191.2158
D . 62	**81069F**	**Proton-K fourth stage (Block DM)**					
	29-DEC-11	-9.27	737.360	645.449	829.271	50	959
	22642.246968	42901.38381	0.0023036	15.7829	352.9993	45.3958	166.9294
D . 63	**82113A**	**Raduga 11**					
	27-DEC-11	-9.24	734.990	558.023	911.957	51	899
	22640.557292	42899.51329	0.0039003	15.3462	0.4221	145.0017	64.3722
D . 64	**77071F**	**Proton-K fourth stage (Block DM)**					
	30-DEC-11	-9.13	725.894	676.202	775.585	50	937
	22643.033646	42890.66228	0.0012765	15.0857	341.2565	5.2011	231.0393
D . 65	**01045A**	**Raduga 1-6**					
	22-DEC-11	-9.10	724.171	653.603	794.740	50	516
	22635.800544	42888.52001	0.0016673	7.9486	60.4605	60.2429	41.3037
D . 66	**88028D**	**Proton-K fourth stage (Block DM)**					
	29-DEC-11	-8.96	712.793	621.387	804.199	51	974
	22642.380822	42876.34839	0.0023511	15.0410	19.4904	350.6596	144.8722
D . 67	**85076D**	**Leasat 4**					
	23-DEC-11	-8.91	708.257	680.702	735.812	51	948
	22636.259387	42872.17143	0.0005345	13.3477	11.4283	264.2909	186.5396
D . 68	**86007F**	**Proton-K fourth stage (Block DM)**					
	22-DEC-11	-8.91	708.044	576.134	839.955	52	957
	22635.658310	42872.97541	0.0034567	15.1567	10.7012	34.4974	43.0496
D . 69	**85070F**	**Proton-K fourth stage (Block DM)**					
	29-DEC-11	-8.89	706.497	657.412	755.582	50	963
	22642.311424	42870.37920	0.0013610	15.1821	9.2012	37.7964	159.7788

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 . 70	**77108D**	**Mage 1 (Meteosat 1 AKM)**					
	29-DEC-11	-8.89	706.478	324.209	1088.748	49	555
	22642.255556	42871.90198	0.0091318	15.7082	342.1751	359.1777	152.8074
D . 71	**88028A**	**Gorizont 15**					
	30-DEC-11	-8.81	700.048	553.748	846.348	51	1001
	22643.120289	42864.53389	0.0038614	14.9849	19.6983	46.0506	238.5203
D . 72	**92043D**	**Proton-K fourth stage (Block DM-2)**					
	23-DEC-11	-8.79	698.372	592.452	804.291	52	847
	22636.798206	42862.51259	0.0026556	13.5085	35.3136	46.2088	16.1921
D . 73	**89101G**	**Cosmos 2054 debris**					
	29-DEC-11	-8.72	693.296	557.963	828.629	48	594
	22642.192789	42857.58855	0.0027448	14.2854	25.8327	192.4440	219.0991
D . 74	**89098D**	**Proton-K fourth stage (Block DM)**					
	30-DEC-11	-8.71	691.964	615.753	768.175	51	927
	22643.118125	42856.99377	0.0020443	14.5309	26.1072	39.7880	245.5393
D . 75	**90102D**	**Proton-K fourth stage (Block DM-2)**					
	30-DEC-11	-8.66	688.012	608.489	767.536	49	888
	22643.817512	42851.99922	0.0019712	14.0635	29.1279	58.1100	356.1308
D . 76	**89048D**	**Proton-K fourth stage (Block DM)**					
	29-DEC-11	-8.57	681.117	587.224	775.011	52	896
	22642.326435	42846.10007	0.0025318	14.4041	23.9357	4.8502	169.0355
D . 77	**89030D**	**Proton-K fourth stage (Block DM)**					
	30-DEC-11	-8.46	671.530	597.900	745.159	51	963
	22643.246319	42836.12402	0.0018848	14.3780	23.0469	54.5072	196.2287
D . 78	**80049F**	**Proton-K fourth stage (Block DM)**					
	29-DEC-11	-8.41	667.686	543.441	791.932	51	973
	22642.356829	42833.28437	0.0031987	15.6860	350.7101	68.2037	125.1443
D . 79	**88095F**	**Proton-K fourth stage (Block DM)**					
	29-DEC-11	-8.40	667.298	607.931	726.665	51	954
	22642.122130	42831.79183	0.0012613	14.5190	21.4717	110.5345	240.4298
D . 80	**95067A**	**Telecom 2C**					
	30-DEC-11	-8.40	666.876	601.695	732.056	51	809
	22643.471470	42830.60203	0.0015759	7.3650	59.7845	177.3007	151.4348
D . 81	**90116D**	**Proton-K fourth stage (Block DM-2)**					
	30-DEC-11	-8.38	665.612	518.695	812.529	51	947
	22643.083044	42830.61602	0.0034794	14.0234	29.5735	319.9928	261.2612
D . 82	**96034D**	**Proton-K fourth stage (Block DM-2)**					
	30-DEC-11	-8.37	664.925	529.325	800.526	52	751
	22643.029444	42829.33302	0.0032231	11.7256	46.8025	321.8957	297.8500
D . 83	**88018B**	**Telecom 1C**					
	29-DEC-11	-8.34	662.247	244.351	1080.143	51	934
	22642.378854	42826.08732	0.0100551	13.2875	38.9460	11.8476	165.3277

D .nn	COSPAR	NAME					
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	MJD	a	e	i	Ω	ω	λ
D . 84	**01014C**	**Proton-M fourth stage (Briz-M)**					
	23-DEC-11	-8.31	659.476	-88.546	1407.497	52	528
	22636.883356	42823.56290	0.0164246	8.4493	63.8687	90.2355	15.5516
D . 85	**94008D**	**Proton-K fourth stage (Block DM-2)**					
	30-DEC-11	-8.30	658.879	563.907	753.850	51	814
	22643.177396	42823.72667	0.0021964	12.9309	40.5212	290.6116	238.1625
D . 86	**89004F**	**Proton-K fourth stage (Block DM)**					
	29-DEC-11	-8.20	650.867	549.702	752.033	50	966
	22642.109664	42815.83717	0.0024691	14.4216	22.3186	351.0538	245.5973
D . 87	**93013D**	**Proton-K fourth stage (Block DM-2)**					
	23-DEC-11	-8.14	645.774	576.060	715.489	48	795
	22636.261053	42809.81651	0.0022531	13.2935	37.6483	343.2160	212.1265
D . 88	**91087D**	**Proton-K fourth stage (Block DM-2)**					
	30-DEC-11	-8.11	643.703	565.066	722.341	52	847
	22643.288588	42808.16005	0.0018369	13.7556	33.1180	300.5105	190.7060
D . 89	**92082D**	**Proton-K fourth stage (Block DM-2)**					
	29-DEC-11	-8.10	642.483	598.430	686.537	51	841
	22642.243183	42806.76461	0.0010837	13.4165	36.2275	329.2895	211.2834
D . 90	**99010D**	**Proton-K fourth stage (Block DM-2)**					
	27-DEC-11	-8.02	636.284	547.787	724.781	51	610
	22640.947407	42800.21515	0.0019374	11.2385	57.2220	200.1914	339.9827
D . 91	**96053D**	**Proton-K fourth stage (Block DM1)**					
	29-DEC-11	-7.85	622.719	406.991	838.448	52	665
	22642.497454	42786.39472	0.0051622	10.5743	51.5012	177.9589	134.8238
D . 92	**97031A**	**Intelsat VIII F-2**					
	30-DEC-11	-7.79	617.911	509.007	726.815	51	725
	22643.628229	42782.19167	0.0027935	0.9219	73.2384	172.3479	34.8220
D . 93	**94012D**	**Proton-K fourth stage (Block DM-2)**					
	29-DEC-11	-7.79	617.865	472.430	763.299	50	790
	22642.679502	42782.48761	0.0036390	12.8740	40.3759	342.9156	57.8641
D . 94	**88012A**	**Sakura 3A**					
	29-DEC-11	-7.69	609.882	574.661	645.104	51	954
	22642.121100	42774.60081	0.0007199	12.8907	41.6130	214.1591	260.7495
D . 95	**88063B**	**Eutelsat I F-5 (ECS 5)**					
	29-DEC-11	-7.59	601.684	550.058	653.311	51	923
	22642.099329	42766.25119	0.0012400	13.5295	35.1814	13.7676	262.2650
D . 96	**83088A**	**Raduga 13**					
	27-DEC-11	-7.56	599.172	525.281	673.062	51	881
	22640.420706	42763.40017	0.0016936	15.3310	2.4313	305.4832	115.2781
D . 97	**69069C**	**JPL SR-28-3 (ATS 5 AKM)**					
	29-DEC-11	-7.54	597.390	41.285	1153.495	50	731
	22642.343264	42762.58505	0.0130326	11.3639	325.6531	157.2333	105.2637

D .nn	COSPAR	NAME					
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	MJD	a	e	i	Ω	ω	λ
D . 98	**00049D**	**Proton-K fourth stage (Block DM-2)**					
	27-DEC-11	-7.50	594.481	519.320	669.643	51	554
	22640.798854	42758.45664	0.0016232	8.8047	56.5130	248.7621	32.7816
D . 99	**89101D**	**Proton-K fourth stage (Block DM)**					
	30-DEC-11	-7.28	576.966	534.439	619.494	51	917
	22643.071551	42741.88830	0.0009799	14.1760	25.7041	70.2833	261.9033
D . 100	**76023J**	**LES 8, LES 9 operational debris**					
	30-DEC-11	-7.25	573.907	-25.810	1173.624	50	740
	22643.349005	42738.54547	0.0156010	11.1082	130.5651	291.2168	264.6835
D . 101	**76023F**	**Titan IIIC stage 3 (Transtage)**					
	28-DEC-11	-7.24	573.515	-18.772	1165.802	51	941
	22641.118588	42736.98231	0.0154528	11.1031	130.6149	292.2982	349.8851
D . 102	**83118A**	**Gorizont 8**					
	29-DEC-11	-7.22	571.506	462.115	680.898	52	888
	22642.287512	42735.09719	0.0029570	15.1210	3.5647	43.5819	162.9246
D . 103	**91001A**	**NATO IVA**					
	28-DEC-11	-7.16	567.180	544.112	590.248	51	997
	22641.461366	42731.09077	0.0003814	10.8529	36.3401	83.3548	133.7188
D . 104	**85025A**	**Intelsat VA F-10**					
	27-DEC-11	-7.15	566.236	427.391	705.081	49	1047
	22640.941551	42730.49718	0.0031969	13.9805	29.1898	239.5322	313.8642
D . 105	**88109B**	**Astra 1A**					
	28-DEC-11	-6.97	551.859	485.853	617.864	52	933
	22641.789583	42716.89281	0.0014421	9.7282	53.2985	352.6043	32.1058
D . 106	**83066A**	**Gorizont 7**					
	28-DEC-11	-6.94	548.850	499.962	597.738	51	903
	22641.997211	42713.44455	0.0008144	15.1754	2.0577	211.1295	265.9175
D . 107	**79098B**	**OPS 9444 (DSCS II F-14)**					
	29-DEC-11	-6.92	547.729	525.792	569.667	51	984
	22642.285972	42711.42393	0.0005692	15.3351	357.0095	350.8309	156.6682
D . 108	**84081B**	**Telecom 1A**					
	27-DEC-11	-6.73	532.749	376.156	689.341	51	942
	22640.615069	42697.85296	0.0037130	14.4255	22.4289	266.8200	64.8503
D . 109	**82097A**	**Intelsat V F-5**					
	29-DEC-11	-6.71	530.856	423.560	638.152	52	1011
	22642.977801	42695.47436	0.0025865	14.4396	19.1407	278.1556	288.7821
D . 110	**90056A**	**Intelsat VI F-4**					
	28-DEC-11	-6.62	523.593	494.008	553.178	52	943
	22641.936956	42687.36104	0.0005538	8.8341	56.8495	205.0722	342.4331
D . 111	**78113B**	**OPS 9442 (DSCS II F-12)**					
	27-DEC-11	-6.59	521.421	495.179	547.664	49	956
	22640.464838	42686.21623	0.0007448	15.3988	355.4906	31.6019	92.6052

D .nn	COSPAR	NAME					
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	MJD	a	e	i	Ω	ω	λ
D . 112	**91074A**	**Gorizont 24**					
	23-DEC-11	-6.59	521.142	442.835	599.449	50	980
	22636.334132	42684.87984	0.0017212	13.5662	32.3900	116.0210	180.7450
D . 113	**91015B**	**Meteosat 5**					
	22-DEC-11	-6.56	518.645	497.036	540.254	51	1002
	22635.821424	42682.53455	0.0004985	12.7705	39.1146	139.7490	12.3988
D . 114	**86082A**	**Raduga 19**					
	27-DEC-11	-6.53	516.112	469.120	563.104	51	982
	22640.704491	42680.29102	0.0013332	14.6907	13.2609	39.6981	23.9258
D . 115	**89021B**	**TDRS 4**					
	29-DEC-11	-6.44	510.000	457.000	562.000	52	1059
	22642.776701	42673.58356	0.0012325	10.6557	35.9601	200.3171	125.2703
D . 116	**78106A**	**NATO IIIC**					
	23-DEC-11	-6.43	508.624	487.348	529.901	50	969
	22636.708785	42673.13322	0.0002023	14.6650	2.9752	252.7085	15.9039
D . 117	**91015A**	**Astra 1B**					
	30-DEC-11	-6.35	501.663	477.320	526.007	52	818
	22643.096250	42666.14618	0.0006265	5.6895	64.1066	206.3482	291.1468
D . 118	**82020A**	**Gorizont 5**					
	29-DEC-11	-6.27	495.718	355.513	635.923	50	910
	22642.022454	42660.30327	0.0034348	15.6471	355.0245	99.1483	250.2106
D . 119	**90001B**	**JC-Sat 2**					
	29-DEC-11	-6.25	493.773	239.089	748.458	51	990
	22642.675313	42659.33807	0.0063895	9.5396	64.1884	180.2699	83.2515
D . 120	**79038A**	**OPS 6392 (FLTSATCOM F2)**					
	29-DEC-11	-6.23	492.285	420.005	564.565	51	1062
	22642.113785	42656.60583	0.0018270	15.0457	354.0226	311.9237	215.6927
D . 121	**84113C**	**Leasat 1**					
	29-DEC-11	-6.23	491.840	365.014	618.666	50	949
	22642.384757	42655.72221	0.0025936	12.8393	20.6567	161.6739	144.7663
D . 122	**88040A**	**Intelsat VA F-13 (NSS 513)**					
	29-DEC-11	-6.11	482.628	427.684	537.572	52	1099
	22642.760741	42646.87727	0.0014064	13.0058	38.3986	324.8409	26.5794
D . 123	**94079A**	**Orion 1**					
	29-DEC-11	-6.09	481.043	396.373	565.713	52	806
	22642.505035	42644.76012	0.0017180	7.0051	60.5994	257.9319	140.9075
D . 124	**75011F**	**Aerojet SVM-5 (SMS 2 AKM)**					
	28-DEC-11	-6.07	479.399	54.698	904.099	50	759
	22641.935440	42644.34687	0.0099551	13.7901	335.3459	345.5202	261.2704
D . 125	**81073A**	**FLTSATCOM F5**					
	29-DEC-11	-6.00	473.793	432.359	515.227	50	966
	22642.921053	42638.32750	0.0011196	19.3039	9.0885	3.8654	299.5158

D .nn	COSPAR	NAME					
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D . 126	**90063A**	**TDF 2**					
	30-DEC-11	-5.99	472.789	274.119	671.459	51	951
	22643.274734	42636.04654	0.0049739	11.4999	48.1721	186.7997	210.8270
D . 127	**74033A**	**SMS 1**					
	29-DEC-11	-5.98	472.234	406.670	537.798	50	887
	22642.463958	42637.00062	0.0016443	14.7844	329.0740	292.4483	64.3253
D . 128	**91079D**	**Proton-K fourth stage (Block DM-2)**					
	23-DEC-11	-5.95	469.955	444.966	494.944	51	845
	22636.771863	42634.05379	0.0004929	13.6571	32.2734	338.5354	22.4226
D . 129	**76029A**	**RCA Satcom II**					
	29-DEC-11	-5.94	468.693	222.682	714.704	50	912
	22642.018611	42633.63821	0.0055579	15.2393	359.8028	91.3184	256.6225
D . 130	**84041D**	**Proton-K fourth stage (Block DM)**					
	28-DEC-11	-5.93	468.092	404.663	531.521	52	971
	22641.857072	42632.39815	0.0017233	14.9982	4.2276	72.3258	318.8838
D . 131	**80049A**	**Gorizont 4**					
	28-DEC-11	-5.92	467.618	447.783	487.454	51	890
	22641.958634	42632.17279	0.0001466	15.2653	350.0897	308.4442	267.9093
D . 132	**94047A**	**DirecTV-2**					
	27-DEC-11	-5.90	465.660	416.555	514.765	51	886
	22640.895081	42629.41724	0.0011217	4.6179	66.6528	216.1853	8.1488
D . 133	**82020F**	**Proton-K fourth stage (Block DM)**					
	27-DEC-11	-5.89	465.285	351.113	579.457	52	963
	22640.443183	42629.98889	0.0030248	15.7057	354.6096	57.8136	99.7912
D . 134	**88066D**	**Proton-K fourth stage (Block DM-2)**					
	30-DEC-11	-5.81	458.750	317.133	600.367	51	957
	22643.463275	42622.82451	0.0035599	14.3382	19.9382	1.9596	114.6371
D . 135	**79105E**	**Proton-K fourth stage (Block DM)**					
	29-DEC-11	-5.72	451.501	382.802	520.200	52	936
	22642.050000	42616.42809	0.0016076	15.2485	348.2055	145.2607	233.1623
D . 136	**92010B**	**Insat-IIDT (Arabsat 1C)**					
	30-DEC-11	-5.72	451.232	349.554	552.910	50	897
	22643.289213	42615.65019	0.0024514	8.3105	57.9566	140.3909	215.5950
D . 137	**87078B**	**Eutelsat I F-4 (ECS 4)**					
	30-DEC-11	-5.71	450.216	415.135	485.297	51	987
	22643.267188	42614.09536	0.0008541	13.6674	31.1738	280.5026	196.5470
D . 138	**89048A**	**Raduga 1-1**					
	27-DEC-11	-5.64	444.645	365.610	523.679	51	1056
	22640.697315	42608.99946	0.0021518	14.1334	23.5613	11.9796	36.7710
D . 139	**81057A**	**Meteosat 2**					
	29-DEC-11	-5.58	439.882	313.364	566.400	51	968
	22642.263067	42603.58892	0.0029208	14.8910	8.1897	249.5830	175.8155

D .nn	COSPAR	NAME					
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D . 140	**97016A**	**Thaicom 3**					
	29-DEC-11	-5.52	435.129	66.923	803.334	51	724
	22642.074537	42596.16503	0.0086024	4.9129	66.1031	273.3078	300.9643
D . 141	**83026B**	**TDRS-1**					
	29-DEC-11	-5.50	434.203	348.137	520.270	51	1099
	22642.527789	42599.13178	0.0019875	13.7121	3.8138	121.3059	76.3791
D . 142	**99050A**	**EchoStar 5**					
	27-DEC-11	-5.50	433.630	413.223	454.036	52	624
	22640.687789	42598.50192	0.0005472	2.3547	72.4966	191.9402	88.6203
D . 143	**84093B**	**SBS IV**					
	27-DEC-11	-5.44	428.874	387.364	470.383	49	1107
	22640.605394	42593.97596	0.0012179	13.5268	30.3103	331.2378	76.5505
D . 144	**00031A**	**Ekspress 3A**					
	29-DEC-11	-5.43	428.508	417.632	439.384	51	585
	22642.760752	42594.42451	0.0000861	3.2221	69.8117	96.9090	57.8406
D . 145	**89070C**	**Star 27 (Himawari-4 AKM)**					
	30-DEC-11	-5.43	428.198	-639.096	1495.492	48	576
	22643.225972	42592.47773	0.0244848	13.6994	24.4814	279.9739	202.0649
D . 146	**87022F**	**Star 27 (GOES 7 AKM)**					
	27-DEC-11	-5.41	426.754	-4184.774	5038.282	51	321
	22640.446875	42591.27746	0.1067402	14.8740	9.2684	302.2382	102.8346
D . 147	**91060A**	**Yuri 3B**					
	23-DEC-11	-5.34	421.185	399.413	442.956	50	890
	22636.377431	42584.63739	0.0004773	10.5531	40.5429	18.3524	173.0828
D . 148	**84081A**	**Eutelsat I F-2 (ECS 2)**					
	28-DEC-11	-5.32	419.049	387.124	450.974	51	974
	22641.523843	42583.73335	0.0007935	14.3464	21.6668	56.3927	96.5373
D . 149	**95025A**	**GOES 9**					
	27-DEC-11	-5.31	418.256	400.373	436.140	51	839
	22640.850336	42581.96019	0.0004143	7.4852	59.3869	350.6742	17.2178
D . 150	**90077A**	**Yuri 3A**					
	27-DEC-11	-5.27	415.318	376.152	454.484	51	959
	22640.726597	42579.98870	0.0009348	11.9492	49.0937	139.2930	51.7226
D . 151	**83081A**	**Sakura 2B**					
	30-DEC-11	-5.26	414.691	391.898	437.485	50	921
	22643.366921	42578.34606	0.0004679	14.7154	13.0938	307.5133	142.5257
D . 152	**86007A**	**Raduga 18**					
	29-DEC-11	-5.26	414.546	115.611	713.480	51	956
	22642.313507	42578.09298	0.0074551	14.7918	9.8754	58.1192	160.3343
D . 153	**72090A**	**Anik A1**					
	27-DEC-11	-5.20	410.110	351.254	468.965	50	855
	22640.324387	42573.85732	0.0015139	14.6688	347.0069	46.5644	134.9047

D .nn	COSPAR	NAME					
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D . 154	**04001A**	**Estrela do Sul 1 (Telstar 14)**					
	30-DEC-11	-5.19	409.135	384.151	434.120	52	397
	22643.828090	42573.22409	0.0006252	0.4813	72.4773	228.1728	19.2489
D . 155	**71006A**	**Intelsat IV F-2**					
	23-DEC-11	-5.17	407.324	345.733	468.915	51	905
	22636.598206	42571.74692	0.0013445	14.1246	337.6400	315.2101	30.3948
D . 156	**81050A**	**Intelsat V F-1**					
	29-DEC-11	-5.10	401.960	380.102	423.818	50	1039
	22642.586181	42568.31208	0.0001493	14.5968	12.9240	149.7132	64.2406
D . 157	**83058A**	**Eutelsat I F-1 (ECS 1)**					
	27-DEC-11	-5.05	398.003	356.812	439.194	51	1002
	22640.682928	42562.51179	0.0009622	14.4008	18.1004	59.1046	36.5489
D . 158	**80098A**	**Intelsat V F-2**					
	29-DEC-11	-4.99	393.460	336.632	450.288	51	1034
	22642.309363	42556.48855	0.0010545	14.4634	15.0647	187.5890	166.2817
D . 159	**94022A**	**GOES 8**					
	29-DEC-11	-4.92	387.919	361.303	414.535	51	890
	22642.625023	42552.73927	0.0006042	7.9459	61.2178	203.5872	98.4022
D . 160	**87078A**	**Optus A3**					
	30-DEC-11	-4.92	387.642	355.552	419.733	51	969
	22643.427431	42551.14198	0.0006027	12.2973	39.9630	256.0734	147.5152
D . 161	**84113B**	**Arabsat 1D**					
	26-DEC-11	-4.92	387.552	268.959	506.144	50	1019
	22639.817951	42551.42793	0.0026478	13.5454	30.5463	252.0037	0.8526
D . 162	**91046A**	**Gorizont 23**					
	27-DEC-11	-4.92	387.266	360.412	414.120	51	898
	22640.741609	42551.42191	0.0003388	13.6810	30.8671	213.7402	28.0044
D . 163	**00069A**	**Beidou**					
	30-DEC-11	-4.91	387.000	308.000	465.000	52	571
	22643.509398	42550.92946	0.0018534	3.2417	71.2680	245.0819	231.6592
D . 164	**77118A**	**Sakura**					
	19-DEC-11	-4.89	385.453	367.176	403.730	50	923
	22632.702130	42549.16459	0.0002999	15.2119	351.6250	344.8395	10.9091
D . 165	**87095A**	**TV-Sat 1**					
	29-DEC-11	-4.88	384.436	131.591	637.282	50	749
	22642.007778	42549.10236	0.0062480	14.2770	15.5186	351.4263	275.5105
D . 166	**91003B**	**Eutelsat II F-2**					
	30-DEC-11	-4.80	378.046	356.665	399.426	50	928
	22643.174063	42542.90613	0.0004925	10.6076	50.7205	355.9608	249.7783
D . 167	**91084A**	**Telecom 2A**					
	28-DEC-11	-4.76	374.795	359.408	390.182	51	971
	22641.728484	42540.78150	0.0001857	9.4539	54.2941	286.2556	55.1529

D .nn	COSPAR	NAME					
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	MJD	a	e	i	Ω	ω	λ
D . 168	**98028A**	**EchoStar 4**					
	30-DEC-11	-4.74	373.292	329.335	417.248	52	686
	22643.293113	42537.67502	0.0013464	3.1567	59.7884	178.1425	215.6832
D . 169	**95013A**	**Intelsat VII F-5**					
	30-DEC-11	-4.68	368.373	286.559	450.187	52	837
	22643.404722	42532.06478	0.0015730	1.9368	72.8346	332.1595	188.1005
D . 170	**93073B**	**Meteosat 6**					
	30-DEC-11	-4.64	365.331	346.964	383.697	51	863
	22643.042859	42529.84211	0.0001874	10.3903	48.9030	54.3855	295.3437
D . 171	**93078A**	**DirecTV-1**					
	29-DEC-11	-4.64	364.896	326.590	403.201	51	921
	22642.660243	42529.69345	0.0007929	2.8165	71.4476	64.8468	95.7259
D . 172	**00066A**	**Thuraya 1**					
	30-DEC-11	-4.63	364.767	331.930	397.604	51	557
	22643.294468	42528.29223	0.0008132	4.5655	27.6400	258.4734	183.1132
D . 173	**90091A**	**SBS VI**					
	30-DEC-11	-4.61	363.052	330.995	395.109	51	1018
	22643.504664	42526.46355	0.0006933	4.0190	68.8306	347.3909	148.3494
D . 174	**90001A**	**Skynet 4A**					
	30-DEC-11	-4.60	361.672	309.989	413.355	51	985
	22643.372546	42525.02823	0.0011796	11.3955	32.0903	186.7767	159.4924
D . 175	**95029A**	**DirecTV-3**					
	29-DEC-11	-4.58	360.499	345.342	375.657	51	812
	22642.083681	42524.57035	0.0002046	2.5263	72.3191	239.1138	304.6198
D . 176	**91037A**	**Aurora II**					
	29-DEC-11	-4.54	357.168	341.071	373.265	50	998
	22642.975278	42520.13184	0.0003715	9.7503	53.6379	137.2005	324.4791
D . 177	**92057A**	**Satcom C-4**					
	29-DEC-11	-4.52	356.027	344.497	367.558	51	886
	22642.381157	42519.56988	0.0001400	7.0193	60.5926	154.9581	185.8232
D . 178	**97011A**	**Tempo 2**					
	27-DEC-11	-4.47	351.720	228.597	474.843	52	737
	22640.528322	42515.26776	0.0030325	5.4071	64.4901	183.3724	138.4699
D . 179	**00022A**	**GOES 11**					
	30-DEC-11	-4.42	348.000	340.000	355.000	52	597
	22643.528600	42512.01828	0.0001801	0.9350	139.5300	342.7234	161.8673
D . 180	**94049B**	**Turksat 2**					
	30-DEC-11	-4.41	347.333	282.236	412.430	51	821
	22643.046296	42511.49779	0.0016269	6.9304	60.7447	329.7038	305.7747
D . 181	**84005A**	**Yuri 2A**					
	27-DEC-11	-4.39	345.593	296.121	395.064	51	937
	22640.593796	42510.89091	0.0008513	14.6172	13.4469	93.4961	64.0717

D .nn	COSPAR	NAME					
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D . 182	**92010A**	**Superbird B1**					
	30-DEC-11	-4.39	345.345	277.260	413.431	51	979
	22643.821204	42509.22116	0.0014528	9.4571	54.2176	337.0623	19.5939
D . 183	**89004A**	**Gorizont 17**					
	30-DEC-11	-4.35	342.047	256.212	427.883	51	1084
	22643.391123	42505.56266	0.0022710	14.0803	21.6285	23.4098	142.4640
D . 184	**07063A**	**Rascom-QAF 1**					
	29-DEC-11	-4.35	341.915	301.385	382.446	51	205
	22642.443611	42505.19396	0.0009463	1.1053	77.9010	295.8452	179.6565
D . 185	**92041B**	**Eutelsat II F-4**					
	28-DEC-11	-4.30	338.325	313.534	363.116	50	861
	22641.481655	42501.92353	0.0003496	9.7340	54.1238	131.0845	144.1344
D . 186	**96002A**	**PAS 3R**					
	29-DEC-11	-4.27	335.951	286.753	385.150	51	783
	22642.190891	42500.83715	0.0013004	2.1163	71.7516	159.0343	265.3568
D . 187	**97019A**	**GOES 10**					
	30-DEC-11	-4.22	332.241	286.897	377.586	52	741
	22643.138206	42496.94373	0.0008392	5.7177	62.4610	125.1883	274.4543
D . 188	**89006A**	**Intelsat VA F-15**					
	28-DEC-11	-4.20	330.531	241.475	419.586	52	1054
	22641.901701	42494.05276	0.0022387	12.0433	44.4547	336.7511	342.7224
D . 189	**85087A**	**Intelsat VA F-12**					
	30-DEC-11	-4.17	327.742	307.712	347.773	50	1048
	22643.074606	42492.91114	0.0003925	13.4822	33.8333	206.4810	268.8009
D . 190	**92084A**	**Superbird A1**					
	30-DEC-11	-4.16	326.983	267.017	386.949	51	938
	22643.246690	42491.81047	0.0013125	5.1721	59.3710	21.6905	232.1763
D . 191	**01011B**	**BSAT-2a**					
	29-DEC-11	-4.15	326.695	313.280	340.111	50	536
	22642.874340	42490.86363	0.0003011	0.7464	110.1796	122.3605	307.2381
D . 192	**97016B**	**BSAT-1a**					
	29-DEC-11	-4.15	326.316	313.234	339.398	50	721
	22642.558495	42491.30346	0.0002534	1.1327	63.2116	206.7582	123.7672
D . 193	**83059B**	**Anik C2**					
	27-DEC-11	-4.14	325.623	164.680	486.565	51	1068
	22640.766505	42489.40874	0.0038291	14.0082	25.3640	338.6248	13.3776
D . 194	**91026A**	**Anik E2**					
	27-DEC-11	-4.12	324.221	290.625	357.816	51	1016
	22640.599711	42488.47146	0.0007700	7.9419	58.4046	250.1237	106.6347
D . 195	**95044A**	**N-Star 1**					
	26-DEC-11	-4.12	324.209	281.622	366.797	51	789
	22639.869213	42487.94626	0.0010996	5.7102	63.5150	246.6509	15.3313

D .nn	COSPAR	NAME					
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D . 196	**78044A**	**OTS 2**					
	27-DEC-11	-4.08	320.700	289.194	352.206	49	865
	22640.477650	42485.88878	0.0004805	15.0032	356.0391	230.4343	88.4426
D . 197	**90100B**	**Gstar 4**					
	23-DEC-11	-4.07	320.017	304.419	335.614	51	1047
	22636.856539	42483.74270	0.0003469	8.5042	57.0403	199.9282	16.5316
D . 198	**73058A**	**Intelsat IV F-7**					
	27-DEC-11	-4.06	319.246	294.914	343.577	51	917
	22640.416597	42483.91039	0.0006794	15.0787	351.3872	50.0689	105.9338
D . 199	**95043A**	**JC-Sat 3**					
	30-DEC-11	-4.05	318.360	253.373	383.347	52	789
	22643.455336	42481.57404	0.0015830	6.2902	56.8373	296.6482	154.1410
D . 200	**07003A**	**Beidou 4**					
	22-DEC-11	-4.04	317.811	65.338	570.284	51	247
	22635.485301	42481.26756	0.0060710	2.0470	264.9668	335.8965	0.0233
D . 201	**94040B**	**BS-3N**					
	27-DEC-11	-4.04	317.604	305.370	329.838	50	811
	22640.846319	42481.56718	0.0005355	6.0682	63.0813	268.0809	22.2454
D . 202	**98075A**	**PAS 6B**					
	29-DEC-11	-4.03	316.984	241.425	392.543	51	643
	22642.553889	42480.70745	0.0016557	3.4807	69.2080	29.3162	132.0040
D . 203	**98002A**	**Skynet 4D**					
	30-DEC-11	-4.03	316.832	294.296	339.368	52	665
	22643.012060	42481.01421	0.0004970	7.5360	49.3246	357.0629	306.8441
D . 204	**70003A**	**Intelsat III F-6**					
	30-DEC-11	-4.02	315.986	272.720	359.253	49	502
	22643.191123	42479.31312	0.0010814	9.9793	320.0252	325.4931	152.9504
D . 205	**83047A**	**Intelsat V F-6**					
	23-DEC-11	-3.99	313.807	266.190	361.424	49	1001
	22636.358565	42477.31751	0.0022082	14.1328	22.5915	179.6719	161.9627
D . 206	**91067A**	**Anik E1**					
	29-DEC-11	-3.97	312.225	291.686	332.763	51	996
	22642.141412	42477.16216	0.0005759	7.9311	58.9326	202.0638	270.6974
D . 207	**95001A**	**Intelsat VII F-4**					
	29-DEC-11	-3.93	309.068	294.143	323.992	51	826
	22642.083762	42473.21735	0.0001196	2.3634	71.7314	133.8379	304.0111
D . 208	**93078B**	**Thaicom 1**					
	30-DEC-11	-3.93	308.582	291.770	325.394	51	846
	22643.300787	42473.13855	0.0002898	2.5511	70.7411	42.1759	223.7045
D . 209	**89027A**	**Tele-X**					
	29-DEC-11	-3.93	308.451	282.260	334.642	52	962
	22642.335301	42471.97864	0.0001448	12.3841	42.9931	97.2556	184.8670

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D . 210	**90100A**	**Satcom C-1**					
	27-DEC-11	-3.92	308.291	283.724	332.858	51	1047
	22640.559826	42472.34062	0.0006485	6.9877	58.1383	264.7004	120.7492
D . 211	**89067A**	**Sirius 1**					
	30-DEC-11	-3.91	307.423	276.419	338.426	51	970
	22643.049421	42471.92726	0.0007910	10.7787	49.8120	271.5255	293.7782
D . 212	**94040A**	**PAS 2**					
	30-DEC-11	-3.89	305.343	273.569	337.117	52	883
	22643.164549	42470.30644	0.0004237	2.7490	75.9756	274.1334	278.1046
D . 213	**88098A**	**TDF 1**					
	28-DEC-11	-3.88	305.042	281.154	328.931	51	970
	22641.835995	42468.48455	0.0007364	12.6536	40.8788	109.6554	3.0566
D . 214	**78068A**	**Comstar 3**					
	28-DEC-11	-3.87	304.424	218.625	390.223	51	950
	22641.556435	42469.53262	0.0018455	14.8162	4.8314	174.1768	67.8770
D . 215	**92054A**	**Optus B1**					
	29-DEC-11	-3.84	302.018	263.629	340.407	51	946
	22642.553727	42465.83584	0.0007571	5.0347	65.2855	344.7429	128.1285
D . 216	**76017A**	**Marisat 1**					
	29-DEC-11	-3.84	301.720	258.937	344.503	50	996
	22642.341771	42466.72679	0.0011692	14.1718	347.0288	57.0362	126.6736
D . 217	**90074A**	**Thor I**					
	28-DEC-11	-3.83	300.760	287.480	314.039	50	945
	22641.687211	42466.22423	0.0000576	9.3720	54.9134	315.0751	70.6854
D . 218	**82058A**	**Westar V**					
	28-DEC-11	-3.81	299.237	232.259	366.215	52	916
	22641.973692	42463.57445	0.0012779	13.9748	26.7644	129.7489	299.2916
D . 219	**94013A**	**Galaxy IR-A**					
	29-DEC-11	-3.79	297.351	284.154	310.549	51	897
	22642.577708	42462.40407	0.0002224	5.3327	62.8668	155.8182	117.1121
D . 220	**88086A**	**Sakura 3B**					
	27-DEC-11	-3.78	296.627	273.790	319.463	51	941
	22640.731146	42461.41493	0.0003755	12.1141	44.2502	218.9596	45.1395
D . 221	**82017A**	**Intelsat V F-4**					
	29-DEC-11	-3.76	295.248	169.165	421.332	51	998
	22642.117639	42460.32086	0.0035709	14.3625	16.0914	80.2803	236.9382
D . 222	**96040A**	**Arabsat 2A**					
	29-DEC-11	-3.76	295.219	252.585	337.853	51	767
	22642.642130	42460.45409	0.0009664	8.7009	55.9371	272.4786	86.8855
D . 223	**80074A**	**GOES 4**					
	29-DEC-11	-3.76	295.052	145.491	444.612	50	864
	22642.890069	42459.48674	0.0034549	15.0654	355.6962	323.5571	297.0595

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D . 224	**06022A**	**KAZSAT**					
	27-DEC-11	-3.74	294.062	280.981	307.142	51	282
	22640.686400	42459.19207	0.0002730	2.3042	72.9045	33.7083	89.5448
D . 225	**04015A**	**Ekspress AM-11**					
	29-DEC-11	-3.73	293.135	269.559	316.710	52	382
	22642.290532	42457.75672	0.0004492	5.2115	64.7123	183.6845	222.5930
D . 226	**92043A**	**Gorizont 26**					
	30-DEC-11	-3.71	291.411	165.958	416.864	52	976
	22643.089907	42456.45611	0.0028775	13.0897	33.9855	124.3152	263.7207
D . 227	**90030A**	**AsiaSat 1**					
	27-DEC-11	-3.71	291.249	276.967	305.531	51	991
	22640.835451	42454.93002	0.0001971	11.0929	49.0801	233.7253	12.3243
D . 228	**94049A**	**Brazilsat B1**					
	27-DEC-11	-3.69	289.746	269.340	310.153	51	851
	22640.111898	42454.15918	0.0004753	4.4206	66.9844	39.0031	291.2824
D . 229	**77065A**	**Himawari**					
	23-DEC-11	-3.69	289.542	222.201	356.883	50	888
	22636.297222	42452.56914	0.0017303	14.8580	348.1933	90.6459	149.9175
D . 230	**93015A**	**USA 98 (UFO F1)**					
	28-DEC-11	-3.68	288.917	259.491	318.343	51	827
	22641.828704	42452.25434	0.0008427	17.0868	174.5002	87.7372	139.2680
D . 231	**00082A**	**Beidou 1B**					
	29-DEC-11	-3.65	287.000	141.000	433.000	51	561
	22642.147257	42451.02286	0.0032348	4.2444	66.7800	290.0057	309.4599
D . 232	**75042A**	**Intelsat IV F-1**					
	30-DEC-11	-3.65	286.347	235.404	337.289	51	947
	22643.215023	42449.73303	0.0010814	14.9392	357.6819	119.0252	182.0870
D . 233	**96007A**	**N-Star 2**					
	30-DEC-11	-3.65	286.282	259.716	312.848	51	766
	22643.495428	42449.54373	0.0006512	4.6264	66.4643	170.0009	149.3864
D . 234	**98056A**	**Eutelsat W2**					
	27-DEC-11	-3.64	285.915	270.387	301.443	48	660
	22640.542211	42449.32649	0.0000733	1.8010	74.8618	342.2320	143.3634
D . 235	**04036A**	**GSAT 3 (EDUSAT)**					
	29-DEC-11	-3.62	284.632	271.648	297.617	51	366
	22642.317014	42449.20533	0.0001275	1.1282	76.8385	0.2807	224.4006
D . 236	**02029D**	**Proton-K fourth stage (Block DM-2M)**					
	27-DEC-11	-3.62	284.281	225.933	342.629	51	471
	22640.647106	42449.21873	0.0012055	8.4481	56.7655	248.8304	87.8517
D . 237	**92013A**	**Galaxy V**					
	29-DEC-11	-3.55	278.450	217.716	339.184	48	998
	22642.153380	42443.47630	0.0016175	6.4254	62.1150	315.4524	269.4228

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D . 238	**86016A**	**Yuri 2B**					
	27-DEC-11	-3.54	277.675	201.811	353.538	51	966
	22640.778414	42441.25065	0.0018070	14.2058	21.4150	77.3037	5.4959
D . 239	**91083A**	**Eutelsat II F-3**					
	24-DEC-11	-3.52	276.033	262.943	289.124	51	928
	22637.735081	42441.07398	0.0000592	10.4799	51.1545	226.9921	53.5692
D . 240	**95016B**	**Hot Bird 1**					
	29-DEC-11	-3.45	270.749	258.176	283.321	52	623
	22642.129826	42435.59296	0.0002524	5.3778	64.9726	77.0874	280.8980
D . 241	**92060A**	**Hispasat 1A**					
	29-DEC-11	-3.44	270.201	248.322	292.080	51	876
	22642.413657	42433.37319	0.0005469	8.4137	57.1343	196.9942	170.6386
D . 242	**91055A**	**Intelsat VI F-5**					
	29-DEC-11	-3.41	267.983	257.369	278.597	52	998
	22642.587963	42432.38773	0.0000952	6.6313	61.8502	266.8208	112.4317
D . 243	**87070A**	**Kiku-5**					
	29-DEC-11	-3.38	265.452	228.972	301.933	51	1024
	22642.398333	42428.77449	0.0008583	14.0515	24.7659	287.5225	143.7800
D . 244	**90079B**	**Eutelsat II F-1**					
	30-DEC-11	-3.34	261.873	240.632	283.113	49	891
	22643.095023	42426.62964	0.0002417	11.2750	48.1738	193.4556	275.7680
D . 245	**06053C**	**FengYun 2D AKM (FG-36 AKM)**					
	23-DEC-11	-3.30	259.194	-177.325	695.714	50	250
	22636.528449	42422.21749	0.0101202	1.9397	78.0373	271.7714	154.1664
D . 246	**81057F**	**Mage 1 (Meteosat 2 AKM)**					
	30-DEC-11	-3.24	254.280	-57.536	566.096	49	723
	22643.127778	42419.35629	0.0075979	15.1573	353.0791	62.7323	209.6439
D . 247	**78071A**	**ESA GEOS 2**					
	29-DEC-11	-3.22	253.023	229.810	276.236	50	889
	22642.906956	42417.89358	0.0001194	14.4975	343.9823	357.9571	279.4874
D . 248	**82106D**	**IUS stage 2**					
	22-DEC-11	-3.21	251.737	59.330	444.145	50	914
	22635.721991	42415.30652	0.0045668	15.2737	2.5260	288.5211	11.1849
D . 249	**97002B**	**Nahuel 1A**					
	27-DEC-11	-3.20	250.668	227.418	273.917	51	746
	22640.921644	42413.89053	0.0002198	3.9774	67.9990	45.7801	359.9624
D . 250	**88051C**	**PAS 1**					
	29-DEC-11	-3.17	248.965	228.690	269.240	51	1007
	22642.636887	42414.39495	0.0004284	9.7397	53.2952	233.2678	86.2212
D . 251	**77048A**	**GOES 2**					
	27-DEC-11	-3.15	247.378	180.861	313.894	52	1057
	22640.059514	42412.24139	0.0014040	14.6903	348.3896	281.0628	231.5889

D .nn	COSPAR	NAME					
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	MJD	a	e	i	Ω	ω	λ
D . 252	**89052A**	**Gorizont 18**					
	29-DEC-11	-3.14	246.589	101.154	392.024	51	996
	22642.353229	42409.55138	0.0034210	13.9116	23.1922	210.7129	158.3889
D . 253	**85016F**	**Proton-K fourth stage (Block DM)**					
	29-DEC-11	-3.13	245.481	139.380	351.581	50	976
	22642.505602	42412.29771	0.0025909	14.7286	5.9574	100.2741	86.6448
D . 254	**97071A**	**Sirius 2**					
	29-DEC-11	-3.13	245.114	228.947	261.280	51	701
	22642.487951	42408.20441	0.0001962	2.7349	71.6855	277.2913	158.0540
D . 255	**95011B**	**Himawari-5**					
	14-DEC-11	-3.12	245.083	215.617	274.548	48	768
	22627.863808	42408.79057	0.0009030	9.5746	52.1021	356.1439	17.9030
D . 256	**83006A**	**Sakura 2A**					
	29-DEC-11	-3.12	244.910	204.024	285.796	49	912
	22642.042650	42410.27383	0.0006542	14.6204	9.7024	190.8890	257.1989
D . 257	**83094A**	**RCA Satcom IIR**					
	27-DEC-11	-3.10	242.818	172.609	313.028	51	1047
	22640.783704	42406.84502	0.0016344	13.1760	36.6178	290.9729	18.3753
D . 258	**84031F**	**Proton-K fourth stage (Block DM)**					
	16-DEC-11	-3.06	239.697	174.129	305.266	46	950
	22629.289317	42402.90798	0.0015047	14.7709	2.9235	96.0374	174.3776
D . 259	**94038D**	**Proton-K fourth stage (Block DM-2)**					
	29-DEC-11	-3.04	238.030	134.450	341.610	52	790
	22642.565486	42403.74644	0.0026554	11.5755	42.4910	4.4269	101.2808
D . 260	**00031D**	**Proton-K fourth stage (Block DM-2)**					
	27-DEC-11	-3.00	235.610	178.723	292.496	51	568
	22640.629201	42400.78232	0.0014213	10.0135	52.3517	330.4677	89.9782
D . 261	**77041A**	**Intelsat IVA F-4**					
	29-DEC-11	-2.99	234.577	182.080	287.074	50	959
	22642.635440	42399.02075	0.0012519	14.8219	1.6991	109.2013	35.3543
D . 262	**04011A**	**Superbird A2 (Superbird 6)**					
	28-DEC-11	-2.92	228.963	189.437	268.489	52	384
	22641.364803	42392.71136	0.0029069	6.5311	61.5193	261.3394	193.2896
D . 263	**85048B**	**Morelos 1**					
	23-DEC-11	-2.90	227.180	211.249	243.111	51	981
	22636.403414	42390.07218	0.0005549	13.4525	33.5080	338.7513	156.6596
D . 264	**94002D**	**Proton-K fourth stage (Block DM-2M)**					
	26-DEC-11	-2.90	227.129	61.511	392.747	50	813
	22639.170475	42392.11382	0.0047339	13.2427	34.2360	0.4061	238.5925
D . 265	**81119A**	**Intelsat V F-3**					
	29-DEC-11	-2.89	226.580	128.441	324.719	50	1015
	22642.131366	42391.82600	0.0021383	14.3147	15.8800	87.8178	231.6108

D .nn	COSPAR	NAME					
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	MJD	a	e	i	Ω	ω	λ
D . 266	**78062D**	**Aerojet SVM-5 (GOES 3 AKM)**					
	28-DEC-11	-2.87	224.716	-253.654	703.085	49	806
	22641.989213	42390.26054	0.0113556	15.2978	345.5579	298.6778	251.2077
D . 267	**69069A**	**ATS 5**					
	29-DEC-11	-2.81	220.615	200.154	241.076	50	847
	22642.017014	42385.33098	0.0002172	10.7789	323.1928	195.0251	219.9691
D . 268	**75011A**	**SMS 2**					
	29-DEC-11	-2.75	215.323	159.743	270.903	51	836
	22642.792940	42378.93811	0.0012596	14.5802	342.8929	107.7382	319.6603
D . 269	**83077A**	**Arabsat 1D-R**					
	29-DEC-11	-2.70	211.250	104.820	317.679	51	1022
	22642.378715	42374.03625	0.0026872	13.5231	32.3608	22.9365	158.6783
D . 270	**90034A**	**Palapa B-2R**					
	30-DEC-11	-2.68	210.107	167.765	252.450	50	976
	22643.477662	42373.18479	0.0011323	10.1877	52.6129	346.5867	142.0456
D . 271	**92021A**	**Telecom 2B**					
	30-DEC-11	-2.67	209.435	179.694	239.175	52	939
	22643.098403	42374.76485	0.0012924	9.8943	52.5741	331.4259	278.8672
D . 272	**89020A**	**JC-Sat 1**					
	29-DEC-11	-2.66	208.376	190.681	226.071	50	983
	22642.610498	42374.93488	0.0002660	12.1381	44.1339	16.4891	86.6598
D . 273	**96033A**	**Galaxy IX**					
	30-DEC-11	-2.64	206.840	166.983	246.697	50	775
	22643.354132	42370.74643	0.0008864	3.0307	70.3400	17.5127	204.1665
D . 274	**90063B**	**DFS-Kopernikus 2**					
	22-DEC-11	-2.61	204.447	189.262	219.632	50	955
	22635.900174	42367.65387	0.0002373	9.9084	52.7432	265.1259	357.4751
D . 275	**85015B**	**Brazilsat 1**					
	30-DEC-11	-2.61	204.278	185.933	222.623	49	1070
	22643.122789	42369.72290	0.0003865	13.2107	35.4563	251.8501	253.0069
D . 276	**81076A**	**Himawari-2**					
	27-DEC-11	-2.60	203.333	158.571	248.096	50	886
	22640.780475	42366.42881	0.0007224	14.8890	356.5536	172.2462	339.6981
D . 277	**86003B**	**Satcom Ku-1**					
	30-DEC-11	-2.59	202.973	186.334	219.611	50	1050
	22643.101458	42368.16912	0.0003874	12.4313	42.0071	326.6844	267.2680
D . 278	**00019D**	**Proton-K fourth stage (Block DM-2M)**					
	30-DEC-11	-2.58	201.954	143.533	260.376	51	572
	22643.140856	42367.23709	0.0012624	10.3694	51.6345	191.2275	262.6517
D . 279	**85109B**	**Morelos 2**					
	29-DEC-11	-2.55	200.069	178.002	222.136	52	1106
	22642.698935	42365.70964	0.0007603	11.3992	47.0198	345.1243	57.5829

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D . 280	**91028A**	**Spacenet 4**					
	30-DEC-11	-2.53	198.538	185.367	211.709	52	1015
	22643.132500	42363.79542	0.0002702	7.4261	59.2960	241.3542	273.2850
D . 281	**01014A**	**Ekran 21 (Ekran-M)**					
	30-DEC-11	-2.47	193.359	64.155	322.563	51	547
	22643.459769	42355.93740	0.0034035	8.1308	63.3329	288.0861	158.8454
D . 282	**82004A**	**RCA Satcom IV**					
	30-DEC-11	-2.46	193.000	173.894	212.105	51	959
	22643.078843	42358.46776	0.0003559	13.9580	25.3282	0.7375	258.7948
D . 283	**94065B**	**Thaicom 2**					
	28-DEC-11	-2.46	192.454	180.885	204.022	51	791
	22641.658681	42357.86264	0.0001046	1.6442	72.8555	34.7550	98.3408
D . 284	**91075A**	**Intelsat VI F-1**					
	30-DEC-11	-2.46	192.499	176.747	208.250	50	954
	22643.494896	42358.06737	0.0003637	6.6179	60.6014	244.1006	237.7491
D . 285	**75117A**	**RCA Satcom I**					
	28-DEC-11	-2.43	190.083	94.390	285.775	48	904
	22641.874410	42353.47828	0.0018437	14.8416	356.8036	121.9369	305.2243
D . 286	**85109D**	**Satcom Ku-2**					
	29-DEC-11	-2.40	188.132	154.274	221.990	51	1091
	22642.976528	42351.72332	0.0006381	12.1945	43.2639	150.7950	313.7047
D . 287	**71116A**	**Intelsat IV F-3**					
	28-DEC-11	-2.35	183.736	129.735	237.738	51	938
	22641.963461	42349.22910	0.0013746	14.8121	347.7143	344.9665	263.7550
D . 288	**97070D**	**Proton-K fourth stage (Block DM-2)**					
	29-DEC-11	-2.30	180.342	116.463	244.221	52	670
	22642.532870	42344.37040	0.0016914	11.8453	44.9555	8.9908	115.5205
D . 289	**86026B**	**Brazilsat 2**					
	30-DEC-11	-2.28	178.195	162.087	194.302	50	1096
	22643.024792	42342.83623	0.0003559	12.4438	41.1312	268.5690	294.0545
D . 290	**00002A**	**Galaxy 10R**					
	29-DEC-11	-2.28	178.159	164.715	191.603	51	611
	22642.422940	42340.86425	0.0002396	3.2933	69.7948	336.8822	179.7520
D . 291	**93069A**	**Gorizont 28**					
	28-DEC-11	-2.24	175.010	32.587	317.433	52	935
	22641.067500	42340.21500	0.0034409	12.6048	38.0000	23.4643	277.6759
D . 292	**00016B**	**Insat 3B**					
	29-DEC-11	-2.22	174.061	151.172	196.951	51	592
	22642.355579	42338.24502	0.0006154	1.2892	75.6129	138.8469	209.4280
D . 293	**88018A**	**Spacenet 3R**					
	30-DEC-11	-2.20	172.254	157.770	186.738	51	1006
	22643.149005	42338.06291	0.0001408	10.7657	49.6616	14.4028	257.7759

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D . 294	**85028B**	**Anik C1**					
	29-DEC-11	-2.20	171.841	110.377	233.304	52	1035
	22642.263715	42336.15605	0.0016264	12.2709	43.3289	357.1428	211.0186
D . 295	**95041A**	**Mugunghwa 1 (Koreasat 1)**					
	30-DEC-11	-2.18	170.426	154.890	185.962	50	760
	22643.035926	42334.85964	0.0000417	10.9863	48.7787	51.4182	297.7101
D . 296	**88109A**	**Skynet 4B**					
	30-DEC-11	-2.12	165.911	148.706	183.117	50	992
	22643.801574	42329.47285	0.0002357	13.9320	27.2096	175.5026	359.7776
D . 297	**76010A**	**Intelsat IVA F-2**					
	25-DEC-11	-2.11	165.146	142.424	187.869	52	928
	22638.334583	42327.84832	0.0004063	14.8284	356.4157	133.3714	142.5130
D . 298	**83105A**	**Intelsat V F-7**					
	29-DEC-11	-2.08	162.760	134.149	191.371	51	994
	22642.158067	42328.17667	0.0007953	14.1210	20.4945	320.3102	226.2857
D . 299	**92072A**	**Galaxy VII**					
	29-DEC-11	-2.07	161.977	130.271	193.682	52	928
	22642.332106	42325.36413	0.0008067	9.9339	52.3949	267.5499	195.2890
D . 300	**97078A**	**Galaxy VIII-i**					
	30-DEC-11	-2.06	161.463	132.770	190.156	52	704
	22643.023171	42325.25007	0.0008855	8.3550	56.9104	270.2011	310.3061
D . 301	**91074D**	**Proton-K fourth stage (Block DM-2)**					
	30-DEC-11	-2.04	159.854	146.880	172.828	52	834
	22643.291632	42322.83502	0.0003738	13.3762	31.2252	8.0978	187.8766
D . 302	**93048A**	**Hispasat 1B**					
	30-DEC-11	-1.98	154.630	128.067	181.193	50	830
	22643.080706	42319.49091	0.0010391	7.5356	58.6521	184.9421	291.3581
D . 303	**92066A**	**DFS-Kopernikus 3**					
	30-DEC-11	-1.95	152.824	135.333	170.315	51	885
	22643.300370	42316.84048	0.0003242	9.0230	54.9894	333.3118	208.4195
D . 304	**89041A**	**Superbird A**					
	27-DEC-11	-1.89	148.201	121.581	174.822	51	915
	22640.442917	42311.65115	0.0007184	14.0597	21.8686	253.7689	126.7858
D . 305	**84080E**	**Star 27 (Himawari-3 AKM)**					
	29-DEC-11	-1.89	147.854	-435.466	731.174	50	538
	22642.402465	42313.89661	0.0137922	14.5892	5.9957	324.5286	122.7056
D . 306	**84114A**	**Spacenet 2**					
	29-DEC-11	-1.86	145.497	105.268	185.726	50	1029
	22642.073565	42310.86983	0.0007613	12.2110	43.0926	308.2411	279.3621
D . 307	**90091B**	**Galaxy VI**					
	27-DEC-11	-1.84	143.974	128.397	159.551	50	986
	22640.784479	42308.85295	0.0003323	8.3073	57.0808	59.0541	38.7379

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D . 308	**85076B**	**Optus A1**					
	29-DEC-11	-1.84	143.760	124.195	163.324	52	889
	22642.473993	42307.83116	0.0003694	13.7063	29.1838	278.8227	120.9458
D . 309	**82014A**	**Westar IV**					
	29-DEC-11	-1.81	141.380	124.267	158.492	51	975
	22642.912025	42304.74696	0.0001203	13.9300	24.8071	162.0767	318.4884
D . 310	**84093D**	**Telstar 3C**					
	23-DEC-11	-1.78	138.957	120.245	157.670	51	1049
	22636.817431	42301.97589	0.0004805	13.0882	36.3312	358.2386	10.0448
D . 311	**95067B**	**Insat-IIC**					
	28-DEC-11	-1.77	138.291	118.285	158.298	50	757
	22641.937269	42300.79542	0.0003740	8.8226	56.6657	214.2343	342.1439
D . 312	**74093A**	**Intelsat IV F-8**					
	29-DEC-11	-1.75	136.981	114.792	159.171	49	932
	22642.416678	42303.11066	0.0006821	14.7960	356.9469	30.7385	109.4783
D . 313	**88081B**	**SBS V**					
	23-DEC-11	-1.73	135.638	110.720	160.555	51	1046
	22636.885775	42298.16769	0.0005534	10.4312	50.7920	204.6271	359.7660
D . 314	**86026A**	**Gstar 2**					
	30-DEC-11	-1.72	134.738	116.692	152.785	51	1033
	22643.197130	42299.73032	0.0005247	13.0533	36.8608	312.5677	227.5717
D . 315	**73023A**	**Anik A2**					
	27-DEC-11	-1.71	133.771	75.371	192.171	50	876
	22640.612234	42298.45478	0.0013243	14.8068	351.0329	287.1062	34.7644
D . 316	**92059D**	**Proton-K fourth stage (Block DM-2)**					
	29-DEC-11	-1.71	133.549	83.321	183.778	50	838
	22642.183762	42299.52234	0.0009481	13.2308	33.9855	199.5742	230.5189
D . 317	**78116A**	**Anik B1**					
	27-DEC-11	-1.65	128.769	95.906	161.632	49	950
	22640.808056	42291.62573	0.0015284	14.5790	6.0260	202.5918	339.1641
D . 318	**80091A**	**SBS I**					
	27-DEC-11	-1.62	126.901	98.249	155.553	50	1004
	22640.383206	42289.82775	0.0008000	14.6957	8.2036	24.3718	134.7872
D . 319	**76042A**	**Comstar 1A**					
	27-DEC-11	-1.62	126.827	108.676	144.977	51	932
	22640.520625	42293.47955	0.0001427	14.7797	357.0449	276.7751	73.9580
D . 320	**94067A**	**Ekspress 1**					
	29-DEC-11	-1.61	125.941	107.882	144.000	51	865
	22642.433657	42287.64817	0.0003670	10.1700	51.4707	86.3924	157.8470
D . 321	**72003A**	**Intelsat IV F-4**					
	28-DEC-11	-1.60	124.742	105.156	144.328	49	947
	22641.909016	42290.23500	0.0006571	14.7787	350.0465	11.5917	285.8071

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D . 322	**84080A**	**Himawari-3**					
	29-DEC-11	-1.59	123.996	94.120	153.873	48	890
	22642.944757	42288.76475	0.0007903	14.3248	12.8299	351.0881	294.6856
D . 323	**00020A**	**Galaxy IVR**					
	30-DEC-11	-1.58	123.148	110.376	135.920	52	597
	22643.470451	42284.78024	0.0000999	4.8907	65.4358	84.1885	157.3946
D . 324	**84101A**	**Galaxy III**					
	27-DEC-11	-1.56	122.334	90.910	153.757	50	1063
	22640.783102	42285.81221	0.0006841	13.1117	36.1030	274.3351	18.2117
D . 325	**76035A**	**NATO IIIA**					
	28-DEC-11	-1.55	120.850	17.585	224.115	49	948
	22641.822488	42284.38272	0.0022885	13.2407	346.0526	180.8005	313.0373
D . 326	**03018A**	**GSAT-2**					
	29-DEC-11	-1.53	119.275	103.316	135.234	51	437
	22642.818611	42285.36723	0.0005973	0.9586	76.0049	200.1592	42.3512
D . 327	**89062A**	**TV-Sat 2**					
	28-DEC-11	-1.52	119.181	87.384	150.978	51	944
	22641.866389	42281.53877	0.0002567	11.4885	46.5481	86.1077	357.6976
D . 328	**92017A**	**Gorizont 25**					
	29-DEC-11	-1.52	119.087	5.213	232.961	50	1021
	22642.344225	42281.66721	0.0026675	13.1727	32.5567	333.4302	171.0698
D . 329	**74075A**	**Westar II**					
	29-DEC-11	-1.51	117.963	98.650	137.275	51	843
	22642.077639	42283.52982	0.0004560	14.7183	353.3120	45.2495	228.2244
D . 330	**83030A**	**RCA Satcom IR**					
	27-DEC-11	-1.49	116.642	74.403	158.881	48	968
	22640.869606	42279.70375	0.0010199	13.6891	28.8868	2.1588	339.8354
D . 331	**99047A**	**Yamal-100 No. 1**					
	22-DEC-11	-1.47	114.722	-270.440	499.884	50	590
	22635.869259	42277.16425	0.0087289	10.7030	49.6892	277.5234	4.6480
D . 332	**84022F**	**Proton-K fourth stage (Block DM)**					
	27-DEC-11	-1.46	113.770	13.979	213.562	51	949
	22640.464086	42279.67158	0.0025486	15.8474	0.9704	0.6683	98.3177
D . 333	**87028D**	**Proton-K fourth stage (Block DM)**					
	29-DEC-11	-1.45	113.407	-2.913	229.728	51	955
	22642.876262	42276.30325	0.0027910	15.0770	12.8181	330.6614	319.2500
D . 334	**85048D**	**Telstar 3D**					
	27-DEC-11	-1.43	111.637	99.527	123.748	52	1054
	22640.788681	42274.81559	0.0002498	12.9561	37.3478	37.2382	17.5332
D . 335	**95063A**	**Gals 2**					
	30-DEC-11	-1.39	108.723	79.796	137.649	52	825
	22643.456192	42270.44676	0.0006883	10.0274	51.9936	216.6148	149.1596

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 . 336	**96005A**	**Gorizont 31**					
	30-DEC-11	-1.38	107.542	22.225	192.860	50	814
	22643.327766	42269.93786	0.0019903	11.5212	44.5901	88.4952	188.4047
D . 337	**91064B**	**Proton-K fourth stage (Block DM-2)**					
	29-DEC-11	-1.36	106.311	88.071	124.551	52	842
	22642.743194	42271.48857	0.0003739	13.5140	30.2196	305.6223	24.8129
D . 338	**74022A**	**Westar I**					
	29-DEC-11	-1.35	105.407	76.557	134.258	51	867
	22642.015810	42271.89821	0.0004638	14.7459	352.3397	292.2148	249.4848
D . 339	**82110C**	**Anik C3**					
	29-DEC-11	-1.32	103.287	87.071	119.503	50	1050
	22642.536331	42269.95761	0.0004141	13.9259	24.0876	328.7244	93.3622
D . 340	**78002A**	**Intelsat IVA F-3**					
	28-DEC-11	-1.31	102.369	85.795	118.944	48	925
	22641.849907	42266.20455	0.0003571	14.6310	3.1951	317.5306	320.2568
D . 341	**87029A**	**Agila 1**					
	24-DEC-11	-1.30	101.807	80.919	122.696	51	1040
	22637.797951	42265.00598	0.0003078	12.7068	39.4241	298.0734	19.1552
D . 342	**75091A**	**Intelsat IVA F-1**					
	28-DEC-11	-1.24	96.740	73.774	119.706	50	942
	22641.664907	42260.11727	0.0005406	14.7222	356.7660	60.6865	20.6777
D . 343	**82110B**	**SBS III**					
	29-DEC-11	-1.22	95.257	59.063	131.452	52	1072
	22642.430729	42260.00309	0.0013775	13.9082	24.3122	318.5921	131.6329
D . 344	**92027A**	**Palapa B4**					
	29-DEC-11	-1.20	93.746	74.774	112.718	52	905
	22642.262859	42259.74344	0.0004043	6.4253	60.9683	259.9690	228.8455
D . 345	**82009A**	**Ekran 8**					
	29-DEC-11	-1.19	93.366	-23.360	210.092	52	982
	22642.288009	42254.94221	0.0024964	14.8360	351.6974	195.5942	150.5614
D . 346	**85109C**	**Optus A2**					
	29-DEC-11	-1.18	92.499	76.952	108.046	52	1070
	22642.236331	42256.67814	0.0002042	13.4954	30.5488	215.2006	208.1307
D . 347	**79072A**	**Westar III**					
	29-DEC-11	-1.17	91.719	74.095	109.342	51	893
	22642.028495	42258.70630	0.0001607	14.4064	10.6972	317.5905	263.3029
D . 348	**74101A**	**Symphonie A**					
	30-DEC-11	-1.13	88.331	69.919	106.742	52	852
	22643.033507	42256.13922	0.0000426	14.0873	339.4282	9.4831	229.2532
D . 349	**91003A**	**Italsat 1**					
	28-DEC-11	-1.11	86.419	23.755	149.083	49	903
	22641.997350	42250.63318	0.0015735	12.2005	42.6871	273.3299	306.3614

D .nn	COSPAR	NAME					
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	MJD	a	e	i	Ω	ω	λ
D . 350	**80081F**	**Proton-K fourth stage (Block DM)**					
	25-DEC-11	-1.10	86.325	61.398	111.251	52	948
	22638.319433	42248.31215	0.0003412	14.6162	347.3838	306.9544	138.8828
D . 351	**75077A**	**Symphonie B**					
	29-DEC-11	-1.09	85.023	61.602	108.443	50	888
	22642.502535	42252.16380	0.0004251	13.7421	337.5379	268.0597	58.9923
D . 352	**93048B**	**Insat-IIB**					
	30-DEC-11	-1.09	85.045	20.920	149.169	50	838
	22643.329248	42247.41599	0.0013667	9.9957	52.0531	68.9532	195.2356
D . 353	**88071A**	**Gorizont 16**					
	29-DEC-11	-1.07	83.794	22.097	145.491	51	979
	22642.457928	42249.34330	0.0014878	13.9855	18.8872	309.8571	116.3624
D . 354	**76073A**	**Comstar 2**					
	29-DEC-11	-1.06	82.946	67.670	98.223	51	1043
	22642.290880	42243.46290	0.0002968	14.6664	357.2820	31.2234	155.1962
D . 355	**84049A**	**Chinasat 5 (Spacenet 1)**					
	30-DEC-11	-1.04	80.888	61.729	100.047	51	1067
	22643.168519	42248.02197	0.0002306	12.6674	39.5488	154.9293	240.6394
D . 356	**93073E**	**Mage 1 (Meteosat 6 AKM)**					
	27-DEC-11	-1.03	80.708	-202.253	363.669	48	632
	22640.776296	42243.86763	0.0066826	12.7889	38.1944	324.1689	22.3913
D . 357	**99047B**	**Yamal-100 No. 2**					
	29-DEC-11	-1.03	80.274	69.901	90.647	52	631
	22642.116192	42246.72525	0.0002878	7.5610	58.7084	247.6237	279.5679
D . 358	**97041D**	**Proton-K fourth stage (Block DM-2)**					
	28-DEC-11	-0.97	75.692	-1385.251	1536.635	51	687
	22641.915995	42236.48654	0.0352324	10.8693	48.3699	158.9751	343.0471
D . 359	**09010B**	**Proton-K fourth stage (Block DM-2)**					
	28-DEC-11	-0.95	74.789	62.005	87.573	50	139
	22641.507697	42236.08621	0.0001454	1.6336	109.0567	159.9580	188.8777
D . 360	**77014A**	**Kiku-2**					
	29-DEC-11	-0.95	74.266	55.812	92.719	47	809
	22642.541690	42242.39183	0.0001928	14.3378	342.9383	6.9542	50.3057
D . 361	**90016D**	**Proton-K fourth stage (Block DM)**					
	26-DEC-11	-0.88	69.153	-99.603	237.909	51	873
	22639.070579	42237.18560	0.0040311	13.7217	24.8776	91.9546	265.7084
D . 362	**90112D**	**Proton-K fourth stage (Block DM-2)**					
	29-DEC-11	-0.88	69.084	-42.136	180.304	51	900
	22642.290278	42230.44682	0.0028861	13.5261	27.9427	32.2779	186.2418
D . 363	**81057B**	**APPLE**					
	23-DEC-11	-0.85	66.586	-31.863	165.035	49	897
	22636.740336	42227.24558	0.0034192	14.7646	351.9571	75.0155	353.8367

D .nn	COSPAR	NAME					
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	MJD	a	e	i	Ω	ω	λ
D . 364	**77092J**	**Ekran 2 fragmentation debris**					
	23-DEC-11	-0.83	65.187	3.382	126.992	47	384
	22636.703090	42225.40154	0.0010188	13.9433	338.3733	113.6236	353.4864
D . 365	**03053E**	**Proton-K fourth stage (Block DM-2M)**					
	30-DEC-11	-0.83	64.979	-838.977	968.934	51	393
	22643.436354	42224.07083	0.0224265	7.4187	59.5049	164.4867	164.5219
D . 366	**77018A**	**Palapa 2**					
	27-DEC-11	-0.83	64.949	41.469	88.429	49	873
	22640.573299	42233.29344	0.0006822	14.6340	1.4989	339.3317	59.3840
D . 367	**87084D**	**Proton-K fourth stage (Block DM)**					
	27-DEC-11	-0.81	63.673	-56.250	183.596	51	964
	22640.458206	42228.91479	0.0028367	14.0620	15.6287	94.3586	115.4253
D . 368	**83028F**	**Proton-K fourth stage (Block DM)**					
	29-DEC-11	-0.81	63.478	-40.524	167.481	51	954
	22642.973646	42231.49209	0.0027882	14.7469	358.6836	68.8898	270.3534
D . 369	**98025D**	**Proton-K fourth stage (Block DM-2)**					
	28-DEC-11	-0.81	63.251	-69.624	196.127	49	660
	22641.760648	42230.03707	0.0034123	9.4251	51.4404	351.2558	40.6574
D . 370	**75038A**	**Anik A3**					
	30-DEC-11	-0.80	62.948	43.709	82.188	52	890
	22643.002176	42231.09159	0.0003809	14.7219	355.8560	343.9952	256.9766
D . 371	**92088D**	**Proton-K fourth stage (Block DM-2)**					
	28-DEC-11	-0.75	58.578	16.556	100.599	51	845
	22641.969387	42222.00519	0.0011681	12.2194	37.7960	5.2315	311.7597
D . 372	**94060D**	**Proton-K fourth stage (Block DM-2)**					
	28-DEC-11	-0.71	55.540	22.459	88.620	50	757
	22641.959977	42217.93627	0.0009833	12.2510	40.7978	354.8279	318.1307
D . 373	**94087D**	**Proton-K fourth stage (Block DM-2)**					
	27-DEC-11	-0.70	54.728	10.022	99.434	51	770
	22640.570174	42222.65808	0.0012340	12.1260	41.7768	350.2866	100.7914
D . 374	**00032A**	**FengYun 2B**					
	29-DEC-11	-0.67	52.246	35.897	68.595	51	583
	22642.229815	42221.10565	0.0002254	6.5026	61.1454	210.0383	240.9835
D . 375	**76066A**	**Palapa 1**					
	30-DEC-11	-0.65	51.020	33.128	68.912	51	845
	22643.048079	42220.03291	0.0004083	14.6340	357.3053	55.1626	241.9035
D . 376	**85055A**	**Intelsat VA F-11**					
	29-DEC-11	-0.63	49.188	-4.595	102.971	52	1030
	22642.169282	42217.29679	0.0014494	13.6001	29.4083	311.2973	231.0821
D . 377	**88034D**	**Proton-K fourth stage (Block DM)**					
	29-DEC-11	-0.60	47.374	-55.957	150.705	50	955
	22642.248993	42208.89180	0.0026152	14.1293	17.1115	40.9205	190.3342

D .nn	COSPAR	NAME					
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	MJD	a	e	i	Ω	ω	λ
D . 378	**75097F**	**Proton-K fourth stage (Block DM)**					
	28-DEC-11	-0.58	45.607	-49.607	140.821	52	926
	22641.708762	42204.58747	0.0024470	12.6532	331.0525	63.1216	339.3498
D . 379	**72041A**	**Intelsat IV F-5**					
	23-DEC-11	-0.58	45.491	27.961	63.021	50	923
	22636.730579	42204.33064	0.0003064	14.4733	345.3393	73.2975	350.4373
D . 380	**81114A**	**RCA Satcom IIIR**					
	12-DEC-11	-0.56	44.056	26.090	62.022	48	906
	22625.915324	42203.91308	0.0001960	13.9824	22.1134	266.8976	331.3506
D . 381	**04010F**	**Proton-K fourth stage (Block DM-2)**					
	30-DEC-11	-0.56	43.719	-84.117	171.556	51	379
	22643.029965	42205.36979	0.0026795	6.0234	69.8384	228.3802	320.5845
D . 382	**82082A**	**Anik D1**					
	30-DEC-11	-0.56	43.697	17.702	69.692	50	961
	22643.347824	42200.89582	0.0003871	13.9165	22.8877	222.4221	159.2238
D . 383	**93003D**	**IUS stage 2**					
	27-DEC-11	-0.55	43.231	-245.130	331.591	50	817
	22640.823981	42202.11064	0.0069356	11.7370	28.4643	346.8058	355.7085
D . 384	**94069D**	**Proton-K fourth stage (Block DM-2)**					
	29-DEC-11	-0.55	43.138	-53.211	139.487	51	758
	22642.090509	42212.99256	0.0026220	12.5381	41.0144	2.0352	271.2532
D . 385	**91010F**	**Proton-K fourth stage (Block DM-2)**					
	29-DEC-11	-0.52	41.101	-26.255	108.457	51	891
	22642.627627	42213.04991	0.0016994	12.9252	31.7025	76.4957	68.2279
D . 386	**83065A**	**Galaxy I**					
	27-DEC-11	-0.52	40.467	26.301	54.632	52	1026
	22640.463356	42202.35367	0.0000233	13.3470	32.6565	205.4834	130.2504
D . 387	**77092K**	**Ekran 2 fragmentation debris**					
	26-DEC-11	-0.51	40.381	-30.191	110.952	48	278
	22639.719826	42198.54847	0.0019151	13.8072	337.8956	175.4773	343.9304
D . 388	**04043D**	**Proton-K fourth stage (Block DM-2M)**					
	29-DEC-11	-0.50	39.734	10.623	68.845	51	357
	22642.288993	42206.73837	0.0008842	6.5467	60.3802	358.5004	218.8709
D . 389	**99047E**	**Proton-K fourth stage (Block DM-2M)**					
	29-DEC-11	-0.49	38.460	-411.749	488.670	50	586
	22642.693738	42210.57915	0.0101107	10.6743	49.5356	276.3856	60.8369
D . 390	**91015E**	**Mage 1 (Meteosat 5 AKM)**					
	29-DEC-11	-0.49	38.485	-638.019	714.990	50	623
	22642.289919	42196.58566	0.0157613	13.0342	26.3486	89.3822	186.4120
D . 391	**81096A**	**SBS II**					
	29-DEC-11	-0.48	37.961	14.862	61.060	51	1053
	22642.425880	42202.61047	0.0004418	14.3270	11.1327	58.0651	120.3407

D .nn	COSPAR	NAME					
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D . 392	**93072A**	**Gorizont 29**					
	27-DEC-11	-0.48	37.461	-14.161	89.084	51	918
	22640.685995	42208.72878	0.0010693	12.5724	37.9702	237.9288	55.1012
D . 393	**99009A**	**Arabsat 3A**					
	27-DEC-11	-0.45	35.130	13.153	57.107	51	631
	22640.895498	42195.97788	0.0007101	2.9072	71.0821	231.3120	12.2883
D . 394	**85107A**	**Raduga 17**					
	28-DEC-11	-0.41	32.224	-15.522	79.970	51	966
	22641.482569	42204.45596	0.0012447	14.2900	7.8307	63.6002	97.6513
D . 395	**95045D**	**Proton-K fourth stage (Block DM-2)**					
	29-DEC-11	-0.40	32.247	-57.930	122.424	49	740
	22642.337454	42190.42010	0.0019968	11.7832	43.8635	275.7234	184.7120
D . 396	**79035E**	**Proton-K fourth stage (Block DM)**					
	29-DEC-11	-0.38	30.158	-94.097	154.413	51	927
	22642.043889	42201.68443	0.0030050	14.3318	342.6374	94.2339	230.0417
D . 397	**00032C**	**FengYun 2B AKM**					
	04-NOV-11	-0.37	30.161	-78.157	138.478	43	491
	22587.062882	42186.48930	0.0024175	9.1322	56.7529	257.4592	350.8416
D . 398	**83059C**	**Palapa Pacific System**					
	26-DEC-11	-0.33	26.486	4.842	48.130	49	971
	22639.838102	42183.22735	0.0005486	14.0289	19.2661	331.8342	342.5199
D . 399	**00036D**	**Proton-K fourth stage (Block DM-2)**					
	30-DEC-11	-0.30	25.056	-58.566	108.677	52	554
	22643.301030	42192.21988	0.0019732	8.7259	55.0706	296.6908	208.0756
D . 400	**92082A**	**Gorizont 27**					
	29-DEC-11	-0.30	24.662	-32.755	82.079	51	964
	22642.286910	42186.68046	0.0012615	12.9976	34.7555	258.1095	193.9465
D . 401	**87091D**	**Proton-K fourth stage (Block DM)**					
	28-DEC-11	-0.29	4.652	-81.157	90.461	51	963
	22641.961157	42193.03392	0.0018990	14.0546	14.9566	106.7379	292.0946
D . 402	**83098A**	**Galaxy II**					
	29-DEC-11	-0.27	22.207	-4.972	49.386	51	1063
	22642.033900	42196.47613	0.0007593	13.2877	33.0549	319.6230	283.6661
D . 403	**92041A**	**Insat-IIA**					
	29-DEC-11	-0.25	21.200	3.923	38.477	50	911
	22642.303889	42185.76764	0.0002261	12.0589	43.2715	137.6391	196.4853
D . 404	**81102F**	**Proton-K fourth stage (Block DM)**					
	29-DEC-11	-0.24	19.970	-28.954	68.895	51	937
	22642.291273	42175.59836	0.0012943	14.5996	350.1653	59.3451	148.0475
D . 405	**67001A**	**Intelsat II F-2**					
	29-DEC-11	-0.21	18.099	-48.616	84.814	14	615
	22642.905197	42198.68695	0.0011073	7.9639	312.8752	244.8910	248.9878

D .nn	COSPAR	NAME					
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D . 406	**00029B**	**Proton-M fourth stage (Briz-M)**					
	29-DEC-11	0.24	-21.253	-1127.106	1084.600	52	561
	22642.424977	42155.61860	0.0274382	8.5400	52.9405	196.2292	161.4798
D . 407	**66110A**	**ATS 1**					
	21-DEC-11	0.26	-17.455	-48.231	13.321	47	869
	22634.643808	42152.60576	0.0005463	6.3764	306.5031	191.2932	344.7978
D . 408	**82103E**	**Proton-K fourth stage (Block DM)**					
	29-DEC-11	0.30	-24.792	-78.348	28.764	49	939
	22642.958889	42129.51019	0.0014907	14.4655	354.8129	44.5566	271.7172
D . 409	**81027A**	**Raduga 8**					
	27-DEC-11	0.37	-29.541	-389.623	330.541	50	950
	22640.656007	42136.79985	0.0087070	14.6889	347.8806	116.7474	16.8402
D . 410	**85048C**	**Arabsat 1B**					
	22-DEC-11	0.50	-39.076	-101.394	23.243	51	974
	22635.896424	42129.93542	0.0016384	13.7728	24.6502	246.8101	330.6515
D . 411	**85015A**	**Arabsat 1A**					
	27-DEC-11	0.53	-41.703	-66.031	-17.376	50	881
	22640.892975	42125.79634	0.0001209	13.8956	21.2486	310.4583	323.7685
D . 412	**69013A**	**TACSAT 1**					
	22-DEC-11	0.54	-41.971	-119.868	35.925	49	749
	22635.651759	42128.02282	0.0018859	8.1811	315.6624	188.3959	350.2119
D . 413	**89020E**	**Mage 1 (Meteosat 4 AKM)**					
	28-NOV-11	0.61	-47.916	-606.651	510.818	45	591
	22611.965648	42118.84945	0.0130370	13.2775	19.0339	107.3042	325.3063
D . 414	**03015A**	**Cosmos-2397**					
	29-DEC-11	0.71	-55.383	-242.995	132.229	51	435
	22642.556725	42109.50671	0.0042259	5.5532	61.7288	227.9437	123.1833
D . 415	**88091D**	**IUS stage 2**					
	29-DEC-11	0.71	-55.582	-135.317	24.153	51	961
	22642.297025	42113.48639	0.0014083	14.1678	22.3301	158.9880	178.0749
D . 416	**79087C**	**Proton-K fourth stage (Block DM)**					
	27-DEC-11	0.73	-56.675	-223.922	110.572	52	922
	22640.562106	42104.10026	0.0037280	14.2965	343.6668	204.4252	45.4525
D . 417	**93069D**	**Proton-K fourth stage (Block DM-2)**					
	29-DEC-11	0.76	-59.529	-86.381	-32.678	51	793
	22642.366204	42109.87164	0.0003780	12.5551	37.6630	295.6861	168.3315
D . 418	**75123F**	**Proton-K fourth stage (Block DM)**					
	28-DEC-11	0.80	-62.013	-125.559	1.533	51	953
	22641.850880	42100.09068	0.0016988	12.7041	332.2662	55.3958	289.1705
D . 419	**95035D**	**IUS stage 2**					
	28-DEC-11	0.80	-62.349	-106.310	-18.388	52	737
	22641.849676	42105.93723	0.0013018	14.7852	38.8160	12.6425	356.0203

D .nn	COSPAR	NAME					
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	MJD	a	e	i	Ω	ω	λ
D . 420	**90054D**	**Proton-K fourth stage (Block DM)**					
	30-DEC-11	0.84	-65.173	-132.538	2.192	52	907
	22643.150856	42096.30793	0.0016987	13.6353	25.9595	322.5995	233.3060
D . 421	**88071D**	**Proton-K fourth stage (Block DM)**					
	29-DEC-11	0.99	-77.046	-156.311	2.218	50	977
	22642.914525	42088.28673	0.0019474	13.8140	18.5087	80.4193	311.4942
D . 422	**87096D**	**Proton-K fourth stage (Block DM)**					
	29-DEC-11	1.07	-82.980	-174.573	8.612	50	984
	22642.292963	42085.24545	0.0024090	13.9515	15.7213	92.3550	173.1454
D . 423	**77048G**	**Aerojet SVM-5 (GOES 2 AKM)**					
	29-DEC-11	1.08	-84.269	-1013.887	845.349	51	644
	22642.523681	42078.40591	0.0225234	13.6627	338.5736	308.3427	50.3768
D . 424	**89081D**	**Proton-K fourth stage (Block DM)**					
	28-DEC-11	1.21	-94.299	-215.069	26.470	51	906
	22641.047037	42067.71558	0.0028944	13.6140	22.6450	341.0034	269.4515
D . 425	**89021D**	**IUS stage 2**					
	29-DEC-11	1.21	-94.362	-198.114	9.389	52	931
	22642.026250	42067.37470	0.0027297	13.3582	6.4918	49.9388	260.1622
D . 426	**85102D**	**Proton-K fourth stage (Block DM-2)**					
	29-DEC-11	1.27	-98.947	-187.345	-10.549	50	936
	22642.530405	42062.41922	0.0022459	14.1435	7.8136	12.5109	79.3059
D . 427	**97049E**	**Mage 1 (Meteosat 7 AKM)**					
	30-DEC-11	1.34	-104.230	-417.956	209.496	52	567
	22643.327118	42061.36934	0.0077246	10.3736	49.2637	191.5303	192.8932
D . 428	**89041B**	**DFS-Kopernikus 1**					
	22-DEC-11	1.40	-108.717	-159.641	-57.793	50	899
	22635.906678	42057.84236	0.0010471	12.6317	38.3589	174.7445	340.8468
D . 429	**74039C**	**Titan IIIC stage 3 (Transtage)**					
	29-DEC-11	1.41	-109.602	-212.623	-6.581	52	937
	22642.890451	42052.91753	0.0021275	12.9357	332.0268	194.7346	273.4396
D . 430	**88034A**	**Cosmos 1940**					
	30-DEC-11	1.41	-109.901	-195.070	-24.732	50	903
	22643.076979	42052.75963	0.0017478	13.9750	16.5100	141.8906	250.7710
D . 431	**04015D**	**Proton-K fourth stage (Block DM-2M)**					
	30-DEC-11	1.58	-122.646	-201.196	-44.096	51	383
	22643.274919	42040.52104	0.0017721	6.9527	60.1731	198.4784	222.7061
D . 432	**00013D**	**Proton-K fourth stage (Block DM-2M)**					
	28-DEC-11	1.76	-136.240	-170.764	-101.716	51	566
	22641.517002	42028.96708	0.0008579	10.1608	51.5630	301.9815	128.7080
D . 433	**68081M**	**Transtage 5 debris**					
	28-DEC-11	1.80	-139.603	-754.993	475.787	39	116
	22641.951227	42023.03296	0.0154376	8.8732	327.1285	292.8945	246.0692

D .nn	COSPAR	NAME					
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	MJD	a	e	i	Ω	ω	λ
D . 434	**74017A**	**Cosmos 637**					
	28-DEC-11	1.82	-141.233	-307.740	25.273	52	953
	22641.420729	42020.79031	0.0036813	11.2868	327.2441	273.5448	78.8732
D . 435	**96044A**	**Italsat 2**					
	29-DEC-11	1.84	-142.799	-248.278	-37.320	50	711
	22642.137616	42019.86838	0.0025966	8.6650	55.0178	1.2249	268.2061
D . 436	**94082D**	**Proton-K fourth stage (Block DM-2)**					
	28-DEC-11	1.89	-146.427	-264.920	-27.934	50	773
	22641.867118	42019.55404	0.0030739	11.6080	46.5155	350.8935	357.3176
D . 437	**05023H**	**Proton-K fourth stage (Block DM-2)**					
	29-DEC-11	1.94	-150.184	-211.186	-89.182	51	323
	22642.800093	42014.30866	0.0012235	5.8581	62.8589	199.2187	36.7866
D . 438	**87109D**	**Proton-K fourth stage (Block DM)**					
	29-DEC-11	2.02	-156.730	-428.625	115.165	51	966
	22642.129363	42007.98587	0.0062728	13.8792	16.5702	128.2300	233.3524
D . 439	**90094D**	**Proton-K fourth stage (Block DM-2)**					
	28-DEC-11	2.12	-164.136	-312.009	-16.262	50	928
	22641.984815	41999.84373	0.0037027	13.4605	26.7956	6.7038	295.2329
D . 440	**68081J**	**Transtage 5 debris**					
	29-DEC-11	2.26	-175.359	-731.286	380.569	45	204
	22642.879861	41987.28630	0.0142634	8.6408	326.1906	293.5528	269.9769
D . 441	**91046D**	**Proton-K fourth stage (Block DM-2)**					
	29-DEC-11	2.37	-183.413	-252.129	-114.698	50	898
	22642.197141	41981.51912	0.0016681	13.2372	29.5147	95.8904	221.4512
D . 442	**94080A**	**Zongxing 6 (A)**					
	29-DEC-11	2.49	-193.163	-590.465	204.139	51	803
	22642.342060	41972.77199	0.0097462	12.7499	36.3699	236.4617	174.8531
D . 443	**82009F**	**Proton-K fourth stage (Block DM)**					
	28-DEC-11	2.55	-197.469	-356.603	-38.335	51	944
	22641.876875	41966.49502	0.0040323	14.3872	350.4332	48.4154	298.1270
D . 444	**74017F**	**Proton-K fourth stage (Block DM)**					
	26-DEC-11	2.62	-202.960	-397.227	-8.693	51	950
	22639.783241	41961.49856	0.0045356	11.1479	326.9150	285.0022	309.5717
D . 445	**06022D**	**Proton-K fourth stage (Block DM3)**					
	29-DEC-11	2.64	-204.054	-425.988	17.879	51	282
	22642.812870	41959.84928	0.0050573	4.9503	64.8770	260.8956	33.6322
D . 446	**81061F**	**Proton-K fourth stage (Block DM)**					
	29-DEC-11	2.64	-204.612	-222.985	-186.239	51	975
	22642.420903	41958.84512	0.0003363	14.2612	348.2310	344.5037	99.1830
D . 447	**68081G**	**LES 6 operational debris**					
	28-DEC-11	2.74	-211.694	-698.256	274.867	50	652
	22641.895637	41951.38775	0.0117481	8.6256	326.0185	273.9822	265.3133

D .nn	COSPAR	NAME					
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	MJD	a	e	i	Ω	ω	λ
D . 448	**83100F**	**Proton-K fourth stage (Block DM)**					
	29-DEC-11	2.80	-216.796	-300.761	-132.830	51	963
	22642.996887	41946.63100	0.0021624	14.2258	355.7483	12.8594	258.8429
D . 449	**97065C**	**IABS**					
	29-DEC-11	2.84	-219.548	-318.752	-120.345	50	668
	22642.368912	41946.41211	0.0039460	11.6698	44.0012	1.7448	173.7364
D . 450	**92017D**	**Proton-K fourth stage (Block DM-2)**					
	29-DEC-11	2.94	-227.107	-323.842	-130.372	51	862
	22642.626308	41937.16801	0.0023442	13.0264	31.8638	288.9938	68.4303
D . 451	**83016F**	**Proton-K fourth stage (Block DM)**					
	29-DEC-11	2.97	-229.587	-287.881	-171.294	51	932
	22642.545463	41933.34432	0.0011537	14.2428	351.9530	165.5287	57.9849
D . 452	**88036E**	**Proton-K fourth stage (Block DM)**					
	27-DEC-11	3.04	-235.099	-328.892	-141.305	51	953
	22640.446921	41929.65697	0.0025087	13.9079	12.8103	35.8645	116.5240
D . 453	**92074D**	**Proton-K fourth stage (Block DM-2)**					
	30-DEC-11	3.13	-242.368	-332.438	-152.299	51	825
	22643.487465	41922.04152	0.0024403	12.7577	34.0991	0.1603	120.0475
D . 454	**05049E**	**MSG-2 debris (SEVIRI Cooler Cover)**					
	29-DEC-11	3.23	-249.661	-284.663	-214.660	36	188
	22642.366806	41915.25344	0.0009493	4.0230	79.9953	127.0996	210.3245
D . 455	**85024D**	**Proton-K fourth stage (Block DM)**					
	29-DEC-11	3.44	-265.424	-323.717	-207.131	51	962
	22642.991759	41897.76866	0.0014734	14.2263	0.9686	88.6055	266.0305
D . 456	**82093F**	**Proton-K fourth stage (Block DM)**					
	27-DEC-11	3.53	-272.820	-297.205	-248.436	52	968
	22640.387292	41891.61070	0.0004338	14.1098	351.7611	130.8062	116.8636
D . 457	**95011D**	**Star 27 (Himawari-5 AKM)**					
	30-DEC-11	3.53	-272.865	-1238.183	692.452	51	593
	22643.275903	41891.28165	0.0230115	11.9873	39.4158	226.7793	199.7752
D . 458	**84090F**	**Proton-K fourth stage (Block DM)**					
	28-DEC-11	3.57	-275.533	-346.493	-204.573	51	973
	22641.371678	41889.35686	0.0019009	14.1726	358.9333	20.6016	128.7283
D . 459	**77092G**	**Proton-K fourth stage (Block DM)**					
	29-DEC-11	3.63	-280.688	-326.699	-234.678	51	986
	22642.762396	41884.29290	0.0012537	13.2802	336.3582	28.4972	324.1205
D . 460	**79015D**	**Proton-K fourth stage (Block DM)**					
	30-DEC-11	3.84	-296.240	-333.520	-258.959	50	940
	22643.193032	41868.75569	0.0008539	13.6864	340.3703	149.2417	172.6724
D . 461	**80104E**	**Proton-K fourth stage (Block DM)**					
	27-DEC-11	3.85	-296.805	-428.990	-164.619	51	971
	22640.332188	41868.10153	0.0033291	14.0571	346.1420	43.6420	131.3863

D .nn	COSPAR	NAME					
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D . 462	**04042C**	**FengYun 2C AKM**					
	28-DEC-11	3.85	-296.995	-395.296	-198.694	50	349
	22641.489421	41868.36705	0.0022568	5.5954	61.1655	201.0423	148.1638
D . 463	**76023K**	**LES 8, LES 9 operational debris**					
	29-DEC-11	3.85	-297.461	-314.597	-280.324	52	942
	22642.210752	41868.12825	0.0002013	13.8765	342.4759	333.5264	169.2845
D . 464	**89053A**	**Olympus 1**					
	30-DEC-11	3.95	-304.593	-370.073	-239.113	52	1011
	22643.192303	41859.35637	0.0013890	13.5513	25.5774	210.7813	217.9966
D . 465	**86038D**	**Proton-K fourth stage (Block DM)**					
	29-DEC-11	3.96	-305.375	-392.438	-218.311	52	902
	22642.528009	41858.24452	0.0022961	14.0424	4.8242	30.5617	77.2584
D . 466	**87073D**	**Proton-K fourth stage (Block DM)**					
	28-DEC-11	4.00	-308.365	-384.223	-232.507	51	975
	22641.759051	41856.97640	0.0018803	13.8761	10.0285	11.0713	359.9549
D . 467	**68081P**	**Transtage 5 debris**					
	15-DEC-11	4.04	-311.587	-682.985	59.812	36	118
	22628.796991	41852.98990	0.0089338	8.4481	324.9050	277.9820	312.9776
D . 468	**84028F**	**Proton-K fourth stage (Block DM)**					
	29-DEC-11	4.15	-320.419	-405.294	-235.545	52	961
	22642.195880	41844.29939	0.0018413	14.1061	354.9565	274.5602	186.9308
D . 469	**76107F**	**Proton-K fourth stage (Block DM)**					
	25-DEC-11	4.27	-329.222	-375.995	-282.450	52	970
	22638.803125	41835.56115	0.0012718	12.7887	333.1846	39.2251	310.2111
D . 470	**88108D**	**Proton-K fourth stage (Block DM)**					
	26-DEC-11	4.47	-344.688	-406.055	-283.320	51	981
	22639.839688	41820.74115	0.0017462	13.7507	19.1151	47.1389	342.0028
D . 471	**68081E**	**Titan IIIC stage 3 (Transtage)**					
	24-DEC-11	4.48	-345.464	-744.822	53.895	51	940
	22637.769688	41819.23090	0.0095192	8.5013	324.9184	269.4485	313.8700
D . 472	**79007A**	**Scatha**					
	24-DEC-11	4.52	-348.284	-7916.530	7219.962	51	980
	22637.803345	41816.40576	0.1799977	18.3182	354.2449	322.5806	320.6872
D . 473	**68081A**	**OV2 5**					
	21-DEC-11	4.62	-356.261	-701.843	-10.678	47	732
	22634.788819	41808.21669	0.0082475	8.4565	324.9254	276.1605	310.0571
D . 474	**79007C**	**Scatha AKM**					
	29-DEC-11	4.74	-364.892	-7838.184	7108.401	51	272
	22642.565752	41799.18787	0.1781134	18.2504	354.2180	322.5540	41.5936
D . 475	**80060F**	**Proton-K fourth stage (Block DM)**					
	29-DEC-11	4.80	-369.463	-442.396	-296.531	51	934
	22642.118275	41795.10980	0.0017771	13.9183	344.2977	127.3117	204.6670

D .nn	COSPAR	NAME					
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D . 476	**68081H**	**LES 6 operational debris**					
	28-DEC-11	5.16	-397.319	-703.856	-90.782	48	452
	22641.832836	41768.09392	0.0075984	8.4055	324.3445	329.6508	287.2160
D . 477	**68081L**	**Transtage 5 debris**					
	28-DEC-11	5.57	-428.661	-744.603	-112.720	32	97
	22641.469884	41735.23259	0.0079012	8.3879	324.1794	299.9490	57.7329
D . 478	**75100F**	**Aerojet SVM-5 (GOES 1 AKM)**					
	28-DEC-11	5.97	-458.678	-1638.344	720.987	50	767
	22641.981019	41705.18774	0.0288104	12.4802	331.1052	280.9859	237.6346
D . 479	**74039A**	**ATS 6**					
	27-DEC-11	6.15	-472.037	-597.879	-346.196	51	995
	22640.751065	41692.88888	0.0028520	12.1716	329.7299	160.8523	323.6052
D . 480	**68081K**	**Transtage 5 debris**					
	29-DEC-11	6.39	-490.113	-705.858	-274.368	43	132
	22642.419699	41671.90031	0.0065344	8.5243	324.3379	356.9591	75.6793
D . 481	**08066C**	**FengYun 2E AKM (FG-36 AKM)**					
	24-DEC-11	6.55	-502.711	-658.702	-346.719	48	154
	22637.464421	41661.00923	0.0037857	0.6014	337.0805	292.6825	99.7312
D . 482	**05049F**	**MSG-2 debris (entry baffle cover)**					
	26-DEC-11	7.05	-540.020	-786.484	-293.556	39	164
	22639.182674	41623.96316	0.0051740	3.9763	80.1458	265.5974	279.1522
D . 483	**70055A**	**Intelsat III F-8**					
	28-DEC-11	7.16	-548.633	-1943.077	845.811	51	940
	22641.915451	41614.96891	0.0349168	5.7946	303.5200	141.2412	239.6728
D . 484	**97049A**	**Hot Bird 3**					
	27-DEC-11	7.94	-607.322	-704.982	-509.661	52	558
	22640.777257	41556.44833	0.0025086	2.5340	71.6903	263.0266	55.2989
D . 485	**11001B**	**Fregat-SB No. 2001**					
	26-DEC-11	9.08	-692.922	-1299.181	-86.663	50	50
	22639.024051	41471.06822	0.0146964	0.3731	42.0997	334.6759	257.6420
D . 486	**97029C**	**FengYun 2A AKM**					
	29-DEC-11	9.38	-714.616	-1653.272	224.040	52	576
	22642.054884	41449.53245	0.0215764	10.9687	47.4948	285.7757	288.2007
D . 487	**87040D**	**Proton-K fourth stage (Block DM)**					
	29-DEC-11	9.88	-752.291	-814.859	-689.722	51	959
	22642.377338	41413.21545	0.0012793	13.6107	1.7222	163.1842	128.4603
D . 488	**85007D**	**Proton-K fourth stage (Block DM)**					
	28-DEC-11	9.90	-753.940	-819.222	-688.659	51	987
	22641.602535	41410.74591	0.0014835	13.3744	2.8634	138.2796	49.3629
D . 489	**89052D**	**Proton-K fourth stage (Block DM)**					
	29-DEC-11	10.04	-764.144	-891.813	-636.475	50	948
	22642.368218	41400.84893	0.0029108	13.0336	20.2337	116.1424	150.5164

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 . 490	**93072D**	**Proton-K fourth stage (Block DM-2)**					
	29-DEC-11	10.41	-791.731	-868.069	-715.394	51	804
	22642.155174	41372.29755	0.0020774	12.0382	36.1808	15.1981	243.1293
D . 491	**84063F**	**Proton-K fourth stage (Block DM)**					
	29-DEC-11	10.86	-825.131	-894.139	-756.123	49	979
	22642.037963	41339.23109	0.0018134	13.3676	359.3337	98.1962	248.7412
D . 492	**87100D**	**Proton-K fourth stage (Block DM)**					
	29-DEC-11	11.26	-854.634	-918.533	-790.735	52	973
	22642.555174	41309.79735	0.0015689	13.5967	13.4110	103.0885	76.0818
D . 493	**91014D**	**Proton-K fourth stage (Block DM-2)**					
	28-DEC-11	11.38	-863.198	-968.800	-757.595	52	934
	22641.972523	41301.53431	0.0027548	13.3331	26.3318	353.7585	299.1248
D . 494	**01015A**	**GSAT-1**					
	29-DEC-11	12.78	-966.640	-1900.711	-32.570	51	545
	22642.696898	41197.41764	0.0229512	8.2429	54.1070	145.7928	66.8831
D . 495	**94030D**	**Proton-K fourth stage (Block DM-2)**					
	29-DEC-11	12.84	-971.325	-1155.148	-787.503	51	802
	22642.001250	41193.03701	0.0048098	11.8271	36.9459	35.3923	299.7150
D . 496	**08003B**	**Proton-M fourth stage (Briz-M)**					
	30-DEC-11	13.43	-1014.123	-1764.214	-264.032	51	181
	22643.328275	41150.00558	0.0180411	3.2831	68.7301	94.4412	213.9658
D . 497	**10002B**	**Proton-M fourth stage (Briz-M)**					
	30-DEC-11	13.57	-1024.377	-1829.305	-219.449	51	100
	22643.376563	41139.69449	0.0198382	1.4971	82.9994	109.5130	210.4615
D . 498	**11048B**	**Proton-M fourth stage (Briz-M)**					
	28-DEC-11	14.36	-1082.517	-2022.047	-142.987	14	14
	22641.659907	41081.57393	0.0228835	0.0571	325.4838	63.4949	26.9067
D . 499	**07058C**	**Proton-M fourth stage (Briz-M)**					
	30-DEC-11	14.96	-1126.042	-2125.524	-126.559	51	205
	22643.163090	41037.96297	0.0236562	3.5325	67.7178	68.3323	273.0409
D . 500	**97027B**	**Insat-IID**					
	29-DEC-11	16.26	-1220.663	-2554.595	113.268	51	700
	22642.680035	40943.20190	0.0324297	11.3105	40.9402	333.3397	56.7269
D . 501	**68050J**	**Titan IIIC stage 3 (Transtage)**					
	29-DEC-11	19.16	-1429.243	-2128.951	-729.534	51	931
	22642.426794	40735.92577	0.0171449	2.7095	298.8895	12.2906	48.5003
D . 502	**66053J**	**Titan IIIC stage 3 (Transtage)**					
	28-DEC-11	23.21	-1715.567	-2376.907	-1054.227	52	949
	22641.906748	40448.48489	0.0169390	1.6234	295.8624	170.7288	233.3131
D . 503	**68050H**	**OPS 9348 (IDSCS 27)**					
	29-DEC-11	23.38	-1727.344	-2041.274	-1413.413	48	392
	22642.792963	40436.72463	0.0081950	3.3256	302.1036	138.5318	279.6805

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 . 504	**66053H**	**IDCSP 7**					
	22-DEC-11	23.74	-1753.174	-2089.087	-1417.262	50	365
	22635.907859	40410.80601	0.0081996	1.5218	298.3914	171.0850	241.1974
D . 505	**68050G**	**OPS 9347 (IDSCS 26)**					
	30-DEC-11	24.34	-1794.733	-2054.786	-1534.680	48	387
	22643.101169	40369.41452	0.0064715	3.2114	302.3812	139.1791	168.5442
D . 506	**66053G**	**IDCSP 6**					
	28-DEC-11	24.78	-1825.337	-2092.802	-1557.872	52	372
	22641.804769	40338.69748	0.0064776	1.3979	299.8199	174.8813	274.0084
D . 507	**67003H**	**IDCSP 15**					
	27-DEC-11	25.04	-1843.809	-2133.913	-1553.704	51	446
	22640.738333	40320.41160	0.0068846	1.8632	300.8620	37.3895	300.2402
D . 508	**68050F**	**OPS 9346 (IDSCS 25)**					
	30-DEC-11	25.24	-1857.962	-2044.753	-1671.171	50	406
	22643.011123	40306.03003	0.0049525	3.0500	302.0314	141.6875	200.6269
D . 509	**66053F**	**IDCSP 5**					
	23-DEC-11	25.64	-1885.740	-2102.839	-1668.640	48	349
	22636.899444	40278.01812	0.0051611	1.2483	301.2470	181.1743	246.2382
D . 510	**68050E**	**OPS 9345 (IDSCS 24)**					
	28-DEC-11	25.93	-1905.692	-2058.562	-1752.822	50	399
	22641.772778	40258.22264	0.0037839	2.9835	301.8138	142.0107	287.3033
D . 511	**67003G**	**IDCSP 14**					
	22-DEC-11	26.05	-1913.914	-2145.460	-1682.368	51	409
	22635.926678	40249.94825	0.0053324	1.7126	301.2060	49.5589	237.3215
D . 512	**66053E**	**IDCSP 4**					
	25-DEC-11	26.32	-1932.515	-2100.013	-1765.018	47	316
	22638.783264	40231.55234	0.0041708	1.1878	303.3324	187.3589	288.0621
D . 513	**68050D**	**OPS 9344 (IDSCS 23)**					
	29-DEC-11	26.51	-1946.034	-2048.265	-1843.803	51	396
	22642.932639	40217.79659	0.0026689	2.8695	301.6099	144.8396	228.2470
D . 514	**67003F**	**IDCSP 13**					
	21-DEC-11	26.91	-1973.153	-2156.543	-1789.763	50	354
	22634.965336	40190.74381	0.0044423	1.6163	302.6541	61.2505	225.9070
D . 515	**66053D**	**IDCSP 3**					
	27-DEC-11	26.93	-1974.529	-2117.620	-1831.438	50	415
	22640.454271	40189.34734	0.0033299	1.0657	304.3663	197.7275	45.9742
D . 516	**68050C**	**OPS 9343 (IDSCS 22)**					
	27-DEC-11	26.94	-1975.312	-2051.573	-1899.050	52	426
	22640.462685	40188.62529	0.0019977	2.8096	301.5203	145.4546	39.7970
D . 517	**68050B**	**OPS 9342 (IDSCS 21)**					
	25-DEC-11	27.16	-1990.813	-2051.995	-1929.631	50	381
	22638.804167	40173.32083	0.0016039	2.7812	301.3989	146.1027	278.4547

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 . 518	**66053C**	**IDCSP 2**					
	27-DEC-11	27.27	-1998.417	-2128.498	-1868.335	49	411
	22640.462801	40165.57985	0.0028763	1.0204	306.0316	204.5482	43.3948
D . 519	**68050A**	**OPS 9341 (IDSCS 20)**					
	29-DEC-11	27.29	-1999.516	-2055.250	-1943.783	51	531
	22642.908461	40164.56292	0.0014549	2.7880	302.0044	143.6656	237.3894
D . 520	**66053B**	**IDCSP 1**					
	26-DEC-11	27.49	-2013.253	-2128.509	-1897.997	52	569
	22639.903924	40150.95811	0.0026567	0.9953	305.9528	211.3831	299.6596
D . 521	**67003E**	**IDCSP 12**					
	23-DEC-11	27.61	-2021.356	-2216.107	-1826.605	48	372
	22636.014641	40142.66708	0.0038004	1.4957	302.0318	78.7393	206.2510
D . 522	**66053A**	**GGTS 1**					
	30-DEC-11	27.75	-2031.034	-2137.781	-1924.287	52	425
	22643.032257	40134.74979	0.0024576	0.9879	307.8384	225.7076	250.2523
D . 523	**67003D**	**IDCSP 11**					
	29-DEC-11	28.19	-2061.714	-2202.882	-1920.546	48	299
	22642.867257	40102.31587	0.0036715	1.4290	305.2435	91.1382	256.1489
D . 524	**67003C**	**IDCSP 10**					
	28-DEC-11	28.61	-2090.398	-2231.644	-1949.152	49	300
	22641.781528	40073.57780	0.0037161	1.3702	306.4089	101.7105	289.2847
D . 525	**67003B**	**IDCSP 9**					
	28-DEC-11	28.83	-2105.403	-2242.832	-1967.974	49	383
	22641.940150	40058.73948	0.0037209	1.3450	305.5954	109.7491	231.2620
D . 526	**67003A**	**IDCSP 8**					
	29-DEC-11	28.96	-2114.025	-2255.458	-1972.593	51	407
	22642.164826	40050.32242	0.0037750	1.3051	304.5755	113.4961	148.8655
D . 527	**67066G**	**Titan IIIC stage 3 (Transtage)**					
	29-DEC-11	31.08	-2258.741	-2571.156	-1946.326	51	975
	22642.935069	39905.32197	0.0074429	8.2874	317.8910	204.9508	242.9584
D . 528	**67066F**	**DODGE 1**					
	29-DEC-11	32.02	-2322.460	-2527.670	-2117.250	52	953
	22642.087222	39841.84789	0.0049156	8.2114	317.1055	226.3026	188.1890
D . 529	**67066E**	**LES 5**					
	29-DEC-11	32.92	-2383.485	-2594.421	-2172.549	51	966
	22642.207731	39780.78893	0.0051624	8.0903	316.5010	247.7854	143.9414
D . 530	**67066D**	**IDCSP 19**					
	29-DEC-11	33.66	-2433.060	-2653.355	-2212.764	51	607
	22642.822546	39731.10320	0.0052956	8.0029	316.0082	260.6876	281.4633
D . 531	**67066C**	**IDCSP 18**					
	26-DEC-11	34.24	-2472.041	-2707.227	-2236.856	50	585
	22639.854745	39692.05449	0.0058336	7.9735	315.6565	271.3198	272.3820

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	**67066B**	**IDCSP 17**					
	26-DEC-11	34.64	-2498.793	-2749.064	-2248.522	51	435
	22639.810914	39665.37142	0.0062317	7.8868	315.3726	277.6842	287.8839
D . 533	**67066A**	**IDCSP 16**					
	30-DEC-11	34.85	-2512.820	-2770.420	-2255.220	51	637
	22643.022303	39651.37246	0.0064544	7.8965	315.2201	279.6471	208.4344

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 101 objects identified.

For explanation of symbols, see the definitions at the beginning of Chapter 3 on page 32.

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	**95054A**	**Luch 1-1**					
	27-DEC-11	740	5.0	72.5	77.5	50	806
	22640.670093	42166.17395	0.0007992	11.0293	51.4114	351.7129	74.3499
L1 . 2	**93039A**	**Galaxy IV**					
	28-DEC-11	741	6.3	71.9	78.2	49	895
	22641.650475	42167.42160	0.0007439	11.4986	46.0425	178.4094	75.1105
L1 . 3	**00036A**	**Cosmos-2371**					
	29-DEC-11	742	10.1	70.0	80.1	51	587
	22642.685486	42166.66711	0.0003330	8.7353	55.1033	11.2063	70.5205
L1 . 4	**90061A**	**Cosmos 2085**					
	29-DEC-11	742	10.2	69.9	80.2	50	936
	22642.604884	42166.26310	0.0003215	13.6327	26.3654	1.0450	70.9185
L1 . 5	**94087A**	**Raduga 32**					
	27-DEC-11	742	10.3	69.9	80.2	51	851
	22640.627697	42165.34522	0.0003881	12.1154	41.7233	128.4293	80.0305
L1 . 6	**88066A**	**Cosmos 1961**					
	22-DEC-11	742	10.4	69.9	80.3	50	1042
	22635.578194	42165.77780	0.0004017	13.9207	18.8753	16.0367	79.9564
L1 . 7	**84022A**	**Cosmos 1540**					
	23-DEC-11	742	10.8	69.6	80.5	51	845
	22636.537708	42160.87653	0.0004900	15.7274	0.7513	77.9303	75.5156
L1 . 8	**91010A**	**Cosmos 2133**					
	29-DEC-11	742	11.1	69.5	80.6	51	1005
	22642.595741	42166.00209	0.0005735	12.9217	32.1968	24.1315	80.0642
L1 . 9	**81018A**	**Comstar 4**					
	23-DEC-11	742	11.3	69.4	80.7	51	1011
	22636.557199	42165.49605	0.0001577	14.5380	2.0599	313.5382	69.7144
L1 . 10	**98025A**	**Cosmos 2350**					
	29-DEC-11	743	12.2	69.0	81.1	51	672
	22642.661343	42161.53490	0.0006784	9.4200	51.3869	22.0465	75.5542
L1 . 11	**84031A**	**Cosmos 1546**					
	27-DEC-11	743	12.7	68.7	81.4	51	857
	22640.538079	42168.30201	0.0019672	14.4939	2.0653	242.5478	72.4866
L1 . 12	**90051A**	**Insat-ID**					
	28-DEC-11	744	13.9	68.1	82.0	50	977
	22641.630926	42164.74221	0.0015420	11.7535	45.1870	43.6183	81.4276

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	**94069A**	**Elektro 1**					
	29-DEC-11	744	14.6	67.8	82.3	51	836
	22642.620891	42161.02704	0.0005909	12.5540	40.9152	94.2895	79.7452
L1 . 14	**82044A**	**Cosmos 1366**					
	27-DEC-11	744	14.6	67.8	82.3	51	860
	22640.496736	42161.53939	0.0007620	15.6630	355.2297	351.7540	80.7768
L1 . 15	**93062A**	**Raduga 30**					
	27-DEC-11	745	17.3	66.4	83.7	50	941
	22640.615255	42166.15684	0.0001424	12.6363	37.8082	243.2614	80.5640
L1 . 16	**83028A**	**Raduga 12**					
	27-DEC-11	747	20.0	65.0	85.0	51	931
	22640.546979	42167.24552	0.0003459	14.7113	358.6394	9.2536	66.0603
L1 . 17	**81102A**	**Raduga 10**					
	29-DEC-11	748	20.9	64.6	85.5	51	839
	22642.495706	42157.69014	0.0007255	14.6520	350.3960	69.4877	74.4342
L1 . 18	**79035A**	**Raduga 5**					
	28-DEC-11	748	21.2	64.4	85.6	51	921
	22641.453275	42159.84404	0.0002072	14.3680	342.8089	108.2428	83.0933
L1 . 19	**75123A**	**Raduga 1**					
	27-DEC-11	748	21.6	64.2	85.8	51	871
	22640.459074	42171.25063	0.0009040	12.9179	332.9346	90.3262	72.1869
L1 . 20	**84016A**	**Raduga 14**					
	28-DEC-11	750	23.2	63.4	86.6	51	831
	22641.506574	42158.64235	0.0005302	14.4928	1.4861	34.6174	82.5411
L1 . 21	**76092A**	**Raduga 2**					
	29-DEC-11	750	23.4	63.3	86.7	51	919
	22642.477106	42160.28152	0.0023438	13.4069	335.1316	242.7561	65.5728
L1 . 22	**77080A**	**SIRIO 1**					
	27-DEC-11	750	1.5	74.4	75.9	50	759
	22640.505625	42164.83584	0.0008201	14.6818	353.2872	27.0355	75.6762
L1 . 23	**06053D**	**FengYun 2D debris**					
	27-DEC-11	751	24.1	62.9	87.1	40	129
	22640.770370	42165.63706	0.0081815	1.9674	77.6814	207.2987	63.4498
L1 . 24	**88014A**	**STTW-2**					
	29-DEC-11	753	27.2	61.4	88.6	50	998
	22642.570613	42159.92307	0.0006875	13.4798	30.2137	21.7699	87.1230
L1 . 25	**79062A**	**Gorizont 2**					
	29-DEC-11	757	30.6	59.7	90.3	51	953
	22642.517847	42169.28427	0.0001355	14.5209	344.9676	164.7694	60.9427
L1 . 26	**08033D**	**Proton-K fourth stage (Block DM-2M)**					
	28-DEC-11	758	31.8	59.1	90.8	51	184
	22641.544630	42156.00722	0.0032909	0.9215	40.1016	241.9154	66.8979
L1 . 27	**83118F**	**Proton-K fourth stage (Block DM)**					
	28-DEC-11	761	33.8	58.0	91.8	51	891
	22641.573877	42165.23841	0.0042306	14.4492	1.4871	198.1077	58.0577

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	**97070A**	**Kupon 1**					
	28-DEC-11	766	38.0	55.9	93.9	51	676
	22641.644248	42175.82502	0.0001882	11.5839	45.5804	209.4820	76.8823
L1 . 29	**88063A**	**Insat-IC**					
	27-DEC-11	766	38.2	55.8	94.0	50	861
	22640.625787	42167.41711	0.0006242	14.1262	17.3993	10.1740	56.3830
L1 . 30	**85102A**	**Cosmos 1700**					
	29-DEC-11	768	39.1	55.3	94.5	51	942
	22642.489468	42167.12439	0.0006223	14.3025	8.2505	63.7844	94.5335
L1 . 31	**90112A**	**Raduga 26**					
	29-DEC-11	773	42.8	53.5	96.2	52	1000
	22642.607211	42151.81860	0.0007428	13.4996	27.7861	342.4691	71.4773
L1 . 32	**90054A**	**Gorizont 20**					
	28-DEC-11	775	44.0	52.9	96.8	51	1048
	22641.538600	42169.21725	0.0007192	13.7070	26.1784	61.8108	95.7178
L1 . 33	**84041A**	**Gorizont 9**					
	29-DEC-11	776	44.4	52.6	97.0	50	849
	22642.514248	42178.23038	0.0005767	14.4400	2.6422	99.4787	79.9763
L1 . 34	**87096A**	**Cosmos 1897**					
	27-DEC-11	776	44.6	52.6	97.1	50	916
	22640.532882	42175.79669	0.0005456	14.0567	16.0585	0.4712	88.5746
L1 . 35	**79087A**	**Ekran 4**					
	29-DEC-11	777	44.7	52.5	97.2	50	862
	22642.486933	42179.62090	0.0009657	14.4720	344.2816	17.0936	71.4445
L1 . 36	**76092F**	**Proton-K fourth stage (Block DM)**					
	29-DEC-11	777	45.1	52.3	97.4	51	901
	22642.512813	42162.17228	0.0018075	13.3763	335.2466	41.8205	53.1799
L1 . 37	**76107A**	**Ekran 1**					
	30-DEC-11	778	45.4	52.1	97.5	50	934
	22643.514039	42165.79967	0.0065956	13.4640	335.4867	27.0974	52.1903
L1 . 38	**90011A**	**DFH-2A**					
	29-DEC-11	780	46.4	51.6	98.0	50	1027
	22642.639977	42178.73315	0.0006000	12.8670	37.7321	6.2379	69.6483
L1 . 39	**80104A**	**Ekran 6**					
	27-DEC-11	780	46.8	51.4	98.2	50	943
	22640.464583	42151.29394	0.0006151	14.6060	347.8211	311.9562	84.9317
L1 . 40	**03060D**	**Proton-K fourth stage (Block DM-2M)**					
	29-DEC-11	783	48.1	50.7	98.9	51	390
	22642.638935	42155.07617	0.0014263	7.2811	59.4644	80.7271	91.8121
L1 . 41	**92074A**	**Ekran 20**					
	29-DEC-11	785	49.1	50.2	99.3	50	951
	22642.549097	42164.21546	0.0004781	12.9363	34.7227	57.6023	99.4570
L1 . 42	**84016F**	**Proton-K fourth stage (Block DM)**					
	27-DEC-11	785	49.2	50.2	99.4	49	925
	22640.465498	42168.25603	0.0040025	14.4820	1.5720	80.4582	98.8545

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	**77092A**	**Ekran 2**					
	29-DEC-11	785	49.4	50.1	99.5	49	912
	22642.520764	42172.51857	0.0032548	13.8626	338.1644	223.6004	52.8292
L1 . 44	**79015A**	**Ekran 3**					
	27-DEC-11	786	50.0	49.8	99.8	50	939
	22640.432546	42176.58413	0.0034884	14.2693	342.1977	216.8525	90.6844
L1 . 45	**81061A**	**Ekran 7**					
	29-DEC-11	788	51.0	49.3	100.2	52	952
	22642.562546	42165.37606	0.0003060	14.6482	349.3536	357.9784	49.1846
L1 . 46	**94008A**	**Raduga 1-3**					
	29-DEC-11	790	51.8	48.8	100.7	51	895
	22642.616065	42180.72756	0.0003776	12.5391	39.1503	346.7018	79.6434
L1 . 47	**90116A**	**Raduga 1-2**					
	29-DEC-11	790	51.9	48.8	100.7	52	1031
	22642.648785	42153.23468	0.0007688	13.5219	27.9552	357.6548	56.6564
L1 . 48	**83100A**	**Ekran 11**					
	29-DEC-11	795	54.3	47.5	101.9	52	849
	22642.581377	42171.13313	0.0001309	14.5796	356.8085	61.8613	49.8555
L1 . 49	**86010A**	**STTW-1**					
	29-DEC-11	800	56.6	46.4	103.0	50	896
	22642.590023	42149.77272	0.0002956	14.2684	13.1464	51.0259	63.0940
L1 . 50	**96058A**	**Ekspress 2**					
	29-DEC-11	801	57.1	46.1	103.2	50	766
	22642.707477	42175.63680	0.0005097	11.6456	45.4396	206.4031	52.9158
L1 . 51	**01045D**	**Proton-K fourth stage (Block DM-2)**					
	29-DEC-11	803	57.7	45.8	103.5	51	498
	22642.652014	42148.26255	0.0027082	7.7963	59.5481	251.5325	86.7211
L1 . 52	**00049A**	**Raduga 1-5**					
	29-DEC-11	804	58.5	45.4	103.9	52	581
	22642.876435	42145.58705	0.0003016	8.6150	55.6632	324.7529	76.5168
L1 . 53	**05010F**	**Proton-K fourth stage (Block DM-2M)**					
	29-DEC-11	805	58.8	45.3	104.0	51	341
	22642.623912	42156.48524	0.0018416	6.1374	62.0952	134.7901	99.8251
L1 . 54	**82093A**	**Ekran 9**					
	23-DEC-11	809	60.3	44.5	104.7	50	852
	22636.555347	42148.04831	0.0022513	14.5340	353.2143	225.6769	61.3674
L1 . 55	**89098A**	**Raduga 24**					
	30-DEC-11	809	60.6	44.3	104.9	51	952
	22643.662755	42157.19303	0.0002947	13.9687	24.2900	3.1662	46.9684
L1 . 56	**94012A**	**Raduga 31**					
	30-DEC-11	810	60.8	44.2	105.0	51	829
	22643.548576	42157.30596	0.0004215	12.5143	39.0732	346.4335	102.9722
L1 . 57	**80016A**	**Raduga 6**					
	27-DEC-11	822	65.4	41.8	107.2	51	863
	22640.394028	42165.15375	0.0002953	14.4571	345.2153	87.8673	107.8810

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	**07018A**	**Nigcomsat 1**					
	23-DEC-11	824	66.3	41.3	107.7	52	239
	22636.688507	42146.59094	0.0005420	2.8017	70.7430	1.8890	90.5159
L1 . 59	**74060A**	**Molniya 1-S**					
	29-DEC-11	826	66.9	41.0	108.0	51	938
	22642.513796	42155.53427	0.0011615	11.8813	327.6259	93.3774	45.1704
L1 . 60	**78039A**	**Yuri**					
	29-DEC-11	828	67.6	40.7	108.3	51	886
	22642.389745	42173.04361	0.0014008	14.4205	343.7705	155.1846	106.0529
L1 . 61	**86044A**	**Gorizont 12**					
	27-DEC-11	834	69.9	39.5	109.4	49	902
	22640.602500	42146.39604	0.0000452	14.2210	10.3847	93.7702	57.7686
L1 . 62	**79105A**	**Gorizont 3**					
	29-DEC-11	835	70.0	39.4	109.4	51	883
	22642.393206	42172.03646	0.0013623	14.5471	346.1119	101.7980	107.2216
L1 . 63	**78073A**	**Raduga 4**					
	23-DEC-11	846	73.6	37.5	111.2	48	924
	22636.383935	42160.04498	0.0008218	14.1486	340.6104	248.4629	110.7331
L1 . 64	**88111A**	**STTW-3**					
	27-DEC-11	846	73.7	37.5	111.2	51	1082
	22640.638472	42187.86310	0.0001907	12.9435	36.8564	213.8914	71.2572
L1 . 65	**75097A**	**Cosmos 775**					
	29-DEC-11	863	78.6	35.0	113.5	51	943
	22642.501065	42184.55288	0.0012519	12.6405	331.0109	27.1909	53.1189
L1 . 66	**89081A**	**Gorizont 19**					
	29-DEC-11	864	78.9	34.8	113.7	49	1035
	22642.572315	42187.71909	0.0001488	13.7222	22.8872	138.3570	79.2213
L1 . 67	**99010A**	**Raduga 1-4**					
	29-DEC-11	864	79.0	34.7	113.7	50	655
	22642.595116	42180.45032	0.0002305	10.9926	56.0128	116.9880	104.0845
L1 . 68	**77071A**	**Raduga 3**					
	29-DEC-11	866	79.5	34.5	114.0	49	929
	22642.525313	42146.32015	0.0010708	13.8069	337.6286	120.7674	51.0119
L1 . 69	**81069A**	**Raduga 9**					
	27-DEC-11	866	79.6	34.4	114.0	50	864
	22640.484630	42187.89931	0.0004756	14.6535	349.7558	35.2015	79.7097
L1 . 70	**96058D**	**Proton-K fourth stage (Block DM-2M)**					
	27-DEC-11	872	81.1	33.6	114.7	51	678
	22640.748900	42156.51185	0.0013116	12.1339	42.1556	333.8010	36.6121
L1 . 71	**94002A**	**Gals 1**					
	30-DEC-11	873	81.5	33.4	114.9	50	904
	22643.663912	42140.97326	0.0007897	11.7142	44.9385	52.9791	67.2577
L1 . 72	**84078F**	**Proton-K fourth stage (Block DM)**					
	29-DEC-11	890	85.3	31.5	116.8	50	864
	22642.422951	42173.09297	0.0024210	14.4219	3.9549	62.7609	114.4315

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	**91087A**	**Raduga 28**					
	28-DEC-11	891	86.1	31.0	117.1	50	992
	22641.520301	42148.96440	0.0008066	13.2916	31.5811	8.3938	107.6642
L1 . 74	**01037D**	**Proton-K fourth stage (Block DM-2)**					
	28-DEC-11	902	88.6	29.7	118.3	51	506
	22641.796111	42174.36778	0.0022439	6.9437	58.5930	302.3820	34.8025
L1 . 75	**89030A**	**Raduga 23**					
	27-DEC-11	911	90.6	28.6	119.2	51	1041
	22640.700475	42174.77310	0.0020042	13.7804	21.2617	48.5188	33.4561
L1 . 76	**74060F**	**Proton-K fourth stage (Block DM)**					
	29-DEC-11	932	95.1	26.2	121.3	51	826
	22642.514456	42184.32245	0.0020471	11.8747	327.4499	57.8968	44.8601
L1 . 77	**82031A**	**Insat-IA**					
	29-DEC-11	940	94.1	27.2	121.3	51	524
	22642.500625	42192.21090	0.0019794	14.6613	352.8903	285.7561	74.8584
L1 . 78	**90061D**	**Proton-K fourth stage (Block DM-2)**					
	28-DEC-11	942	97.0	25.2	122.2	51	917
	22641.735995	42164.84201	0.0034084	13.6111	26.3689	63.8181	24.9319
L1 . 79	**97021A**	**Zhongxing 6 (B)**					
	29-DEC-11	984	104.7	21.0	125.7	51	746
	22642.623634	42140.04500	0.0009903	7.2215	59.4401	339.3819	97.1095
L1 . 80	**86090D**	**Proton-K fourth stage (Block DM)**					
	27-DEC-11	1007	108.3	19.1	127.4	52	955
	22640.458368	42145.02562	0.0012010	14.1882	12.1058	29.4957	111.5773
L1 . 81	**09018A**	**Beidou DW 2 (Compass G2)**					
	29-DEC-11	1019	110.1	18.1	128.2	52	141
	22642.840868	42193.97662	0.0052747	1.3914	72.1075	159.5783	69.6997
L1 . 82	**91014A**	**Raduga 27**					
	29-DEC-11	1024	110.9	17.6	128.5	50	1014
	22642.567373	42136.65795	0.0004322	14.0090	28.7825	354.9066	86.8766
L1 . 83	**84063A**	**Raduga 15**					
	28-DEC-11	1032	112.1	17.0	129.0	49	858
	22641.509132	42194.09148	0.0006174	14.4742	2.5336	50.5889	82.6884
L1 . 84	**96040B**	**Turksat 3**					
	29-DEC-11	1038	112.8	16.6	129.4	52	761
	22642.662998	42136.26250	0.0003592	3.3847	68.8002	14.6342	92.1401
L1 . 85	**77092H**	**Ekran 2 fragmentation debris**					
	27-DEC-11	1048	114.3	15.8	130.0	51	610
	22640.538183	42138.90434	0.0007866	13.8014	337.9135	127.8067	48.5860
L1 . 86	**03015F**	**Proton-K fourth stage (Block DM-2)**					
	29-DEC-11	1075	117.7	13.8	131.5	52	424
	22642.618264	42190.95861	0.0012261	5.5417	61.8567	269.9841	101.3236
L1 . 87	**83089B**	**Insat-IB**					
	28-DEC-11	1079	118.1	13.6	131.7	50	931
	22641.709271	42178.64141	0.0008356	14.1176	16.7366	89.8339	24.6885

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	**01037A**	**Cosmos-2379**					
	29-DEC-11	1101	120.8	12.1	132.9	50	528
	22642.694479	42197.02157	0.0002785	6.9815	58.4637	43.2552	70.6192
L1 . 89	**95054D**	**Proton-K fourth stage (Block DM-2)**					
	28-DEC-11	1107	121.5	11.7	133.1	52	672
	22641.836759	42159.67645	0.0020878	11.0173	51.4141	317.8828	13.0633
L1 . 90	**93013A**	**Raduga 29**					
	29-DEC-11	1112	122.0	11.4	133.4	51	965
	22642.689699	42192.27913	0.0006087	12.8670	36.0064	351.4894	49.9386
L1 . 91	**77108A**	**Meteosat 1**					
	23-DEC-11	1126	123.4	10.5	134.0	49	941
	22636.321771	42162.92320	0.0014668	14.2474	342.1516	325.9774	134.6599
L1 . 92	**88095A**	**Raduga 22**					
	27-DEC-11	1134	124.3	10.0	134.3	50	1066
	22640.605035	42133.10538	0.0006112	13.8972	19.5685	37.0752	66.0800
L1 . 93	**84035A**	**STW F-2**					
	27-DEC-11	1141	125.1	9.6	134.7	50	840
	22640.722882	42158.94192	0.0013071	14.2318	7.3158	26.1089	11.2887
L1 . 94	**95063D**	**Proton-K fourth stage (Block DM-2M)**					
	28-DEC-11	1173	128.1	7.8	135.9	50	680
	22641.623623	42196.77525	0.0044071	12.5125	39.2993	43.5901	78.4140
L1 . 95	**90102A**	**Gorizont 22**					
	22-DEC-11	1318	138.9	1.1	140.0	49	1019
	22635.471458	42180.77021	0.0002137	13.5011	27.3606	284.5111	126.9301
L1 . 96	**74094A**	**Skynet 2B**					
	30-DEC-11	1367	141.5	359.3	140.8	49	737
	22643.271944	42165.38195	0.0003258	13.0784	338.0347	26.2576	141.8086
L1 . 97	**78035A**	**Intelsat IVA F-6**					
	28-DEC-11	1432	144.4	357.3	141.7	49	882
	22641.730625	42171.31906	0.0003360	14.5060	2.6916	148.0700	2.8577
L1 . 98	**93062D**	**Proton-K fourth stage (Block DM-2)**					
	28-DEC-11	1588	149.2	353.6	142.8	50	713
	22641.852616	42166.08675	0.0012568	12.6126	37.7415	315.6033	353.7455
L1 . 99	**92088A**	**Cosmos 2224**					
	16-DEC-11	1626	150.0	353.0	143.0	48	946
	22629.487118	42154.61081	0.0005575	12.1795	37.6636	114.9645	137.5612
L1 . 100	**85035B**	**Telecom 1B**					
	27-DEC-11	1675	150.9	352.3	143.1	49	941
	22640.745231	42154.27909	0.0013100	14.2856	10.7390	327.2090	6.5080
L1 . 101	**67026A**	**Intelsat II F-3**					
	16-NOV-11	1700	153.5	351.3	144.8	30	448
	22599.729722	42161.56405	0.0022290	7.0392	312.6569	239.1801	354.2729

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 39 objects identified.

For explanation of symbols, see the definitions at the beginning of Chapter 3 on page 32.

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**					
	29-DEC-11	10	90.7	210.9	301.6	51	966
	22642.047836	42159.88440	0.0007985	9.1106	326.1168	292.3775	211.7241
L2 . 2	**93058B**	**ACTS**					
	29-DEC-11	890	1.2	254.1	255.3	51	920
	22642.152095	42164.20593	0.0012115	11.4093	46.5966	352.9075	254.5664
L2 . 3	**88081A**	**Gstar 3**					
	29-DEC-11	900	0.3	254.5	254.8	52	1001
	22642.450544	42164.59251	0.0008654	15.3251	11.8670	19.1210	254.5901
L2 . 4	**71009A**	**NATO IIB**					
	28-DEC-11	900	0.9	254.2	255.1	51	913
	22641.930313	42164.73660	0.0005444	11.6937	326.8364	65.0091	254.9760
L2 . 5	**67111A**	**ATS 3**					
	28-DEC-11	900	0.3	254.6	254.9	51	1061
	22641.892269	42164.57541	0.0017208	8.0668	312.8141	71.8750	254.8856
L2 . 6	**69101A**	**Skynet 1A**					
	29-DEC-11	910	4.1	252.6	256.7	51	829
	22642.920961	42165.67828	0.0022447	10.2434	323.6272	168.6847	254.1776
L2 . 7	**78062A**	**GOES 3**					
	29-DEC-11	911	8.0	250.7	258.8	51	1106
	22642.993808	42166.36627	0.0004944	14.5618	352.0311	41.7009	256.2201
L2 . 8	**93073A**	**Solidaridad 1**					
	29-DEC-11	911	8.1	250.7	258.8	51	906
	22642.156563	42165.27878	0.0003160	9.9669	52.0131	105.7292	258.4014
L2 . 9	**70021A**	**NATO I**					
	28-DEC-11	912	10.5	249.5	260.0	51	836
	22641.918831	42164.07474	0.0003616	10.6789	327.4241	86.3359	259.7068
L2 . 10	**71095A**	**OPS 9431 (DSCS II F-1)**					
	28-DEC-11	913	13.1	248.2	261.3	51	1036
	22641.939919	42167.91003	0.0002593	12.0439	328.4531	135.2012	253.0846
L2 . 11	**76023A**	**LES 8 (RTGPP)**					
	30-DEC-11	913	14.5	247.5	262.0	51	1089
	22643.370069	42164.64381	0.0012020	12.1099	123.7034	355.0920	251.8776
L2 . 12	**93077A**	**Telstar 4A**					
	29-DEC-11	914	16.5	246.5	263.1	51	925
	22642.117350	42163.54886	0.0008502	12.2247	42.2497	2.3162	262.7886

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	**76023B**	**LES 9 (RTGPP)**					
	30-DEC-11	920	5.0	252.5	257.5	51	1099
	22643.385995	42166.17338	0.0022719	12.0699	123.7118	1.1707	254.1248
L2 . 14	**95049A**	**Telstar 402R**					
	29-DEC-11	925	32.3	238.8	271.1	51	817
	22642.190475	42173.07222	0.0002744	7.4840	58.5865	246.8782	252.6328
L2 . 15	**85076C**	**ASC 1**					
	28-DEC-11	940	45.6	232.3	277.9	50	1043
	22641.105590	42176.28256	0.0006995	13.1755	34.5285	292.1633	260.2375
L2 . 16	**75100A**	**GOES 1**					
	29-DEC-11	943	48.4	231.0	279.4	51	1066
	22642.908345	42157.28522	0.0001466	14.0473	339.8490	345.1643	274.8485
L2 . 17	**82105A**	**Aurora I**					
	29-DEC-11	950	0.7	254.4	255.1	51	1098
	22642.083646	42164.46636	0.0005125	13.8992	22.3949	291.0242	255.0522
L2 . 18	**83041A**	**GOES 6**					
	29-DEC-11	962	60.0	225.4	285.4	52	1098
	22642.971366	42159.18881	0.0003526	14.2987	10.8868	39.1445	283.1687
L2 . 19	**95069A**	**Galaxy IIIR**					
	30-DEC-11	965	61.4	224.7	286.1	51	811
	22643.193160	42180.48652	0.0002025	6.6331	60.7840	279.2392	252.8646
L2 . 20	**81049A**	**GOES 5**					
	28-DEC-11	995	75.3	218.1	293.4	52	1037
	22641.933380	42167.33748	0.0000716	14.4510	5.9653	93.1187	292.9277
L2 . 21	**76004A**	**Hermes**					
	28-DEC-11	1006	79.5	216.1	295.7	51	1033
	22641.862882	42174.39864	0.0014417	13.6983	336.8911	115.7048	289.4400
L2 . 22	**96055A**	**EchoStar 2**					
	29-DEC-11	1032	88.2	212.1	300.3	51	756
	22642.219329	42142.83721	0.0002893	3.0889	70.0507	300.4091	253.4723
L2 . 23	**87100A**	**Raduga 21**					
	28-DEC-11	1098	105.8	203.9	309.7	51	1105
	22641.917697	42168.46661	0.0004248	14.4699	16.1964	10.7983	308.8247
L2 . 24	**65028A**	**Intelsat I F-1**					
	29-DEC-11	1125	111.4	201.3	312.7	52	405
	22642.961840	42150.98274	0.0004352	4.3397	295.0368	163.1316	210.9845
L2 . 25	**97086A**	**HGS-1**					
	29-DEC-11	1283	135.2	190.9	326.1	51	669
	22642.101863	42150.19930	0.0045990	3.7899	86.4638	254.0726	311.7991
L2 . 26	**84078A**	**Gorizont 10**					
	29-DEC-11	1307	137.8	189.8	327.6	51	980
	22642.206736	42171.81237	0.0001608	14.3952	3.7283	347.6031	192.0003
L2 . 27	**90016A**	**Raduga 25**					
	29-DEC-11	1323	139.6	189.1	328.6	51	1055
	22642.144063	42192.92329	0.0004698	13.6672	24.5499	39.8033	235.4874

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	**67094A**	**Intelsat II F-4**					
	28-DEC-11	1324	139.6	189.1	328.7	51	726
	22641.814560	42137.16396	0.0018657	7.2350	309.6399	192.9858	279.5452
L2 . 29	**82103A**	**Gorizont 6**					
	29-DEC-11	1340	141.1	188.4	329.6	51	937
	22642.115556	42141.63113	0.0003419	14.5026	354.8477	59.6692	216.0717
L2 . 30	**85070A**	**Raduga 16**					
	28-DEC-11	1350	142.1	188.1	330.2	51	933
	22641.100289	42136.11249	0.0002312	14.3386	6.7361	27.7180	234.4375
L2 . 31	**80081A**	**Raduga 7**					
	28-DEC-11	1453	150.1	185.0	335.2	50	918
	22641.983866	42195.51560	0.0004730	14.4529	346.8082	166.8640	255.5485
L2 . 32	**94038A**	**Cosmos 2282**					
	23-DEC-11	1485	152.1	184.4	336.5	51	885
	22636.927257	42162.91003	0.0012026	11.4546	41.9855	335.6340	335.9782
L2 . 33	**92059A**	**Cosmos 2209**					
	29-DEC-11	1497	152.7	184.2	336.9	52	940
	22642.106759	42133.18456	0.0000725	13.1419	33.5529	25.5458	257.9230
L2 . 34	**85016A**	**Cosmos 1629**					
	29-DEC-11	1498	152.8	184.1	336.9	48	937
	22642.827998	42173.23574	0.0007087	14.4238	4.8803	37.2908	328.9341
L2 . 35	**87091A**	**Cosmos 1894**					
	28-DEC-11	1508	153.4	184.0	337.3	52	1049
	22641.858102	42154.85399	0.0002304	14.0515	14.8325	119.2517	328.9869
L2 . 36	**80004A**	**OPS 6393 (FLTSATCOM F3)**					
	29-DEC-11	1541	155.0	183.4	338.5	50	1016
	22642.804109	42153.44199	0.0026708	13.2890	352.8281	100.1343	325.7190
L2 . 37	**89101A**	**Cosmos 2054**					
	30-DEC-11	1665	159.9	182.1	342.0	50	1030
	22643.119965	42195.64479	0.0003876	13.6862	24.0455	343.6026	242.6495
L2 . 38	**94082A**	**Luch 1**					
	28-DEC-11	1894	164.4	181.2	345.7	51	856
	22641.104282	42134.05816	0.0005149	11.6963	46.6266	4.9651	272.8243
L2 . 39	**94060A**	**Cosmos 2291**					
	22-DEC-11	2112	166.2	181.1	347.3	49	857
	22635.931516	42172.58167	0.0005891	12.2184	40.5811	39.6739	334.1289

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 15 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 32.

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	**97083A**	**Intelsat 804**					
	30-DEC-11	2936	334.8	174.6	149.5	50	701
	22643.188032	42198.04904	0.0006279	6.2794	61.7270	275.5077	255.6011
L3 . 2	**82044F**	**Proton-K fourth stage (Block DM)**					
	23-DEC-11	2936	334.9	174.6	149.5	47	864
	22636.763079	42162.78053	0.0019042	15.6159	354.9822	46.1351	348.4793
L3 . 3	**71095B**	**OPS 9432 (DSCS II F-2)**					
	23-DEC-11	2937	335.3	174.4	149.7	48	926
	22636.738380	42177.55256	0.0002365	11.9881	328.7558	180.8186	331.0504
L3 . 4	**91054D**	**IUS stage 2**					
	28-DEC-11	2938	333.9	175.1	149.0	51	798
	22641.399815	42158.26179	0.0032742	14.9581	27.4278	206.6390	146.8239
L3 . 5	**91064A**	**Cosmos 2155**					
	28-DEC-11	2941	333.0	175.6	148.6	51	999
	22641.938264	42145.24179	0.0004510	13.4280	29.8593	339.0875	315.0320
L3 . 6	**97041A**	**Cosmos 2345**					
	22-DEC-11	3033	327.7	178.3	146.0	51	708
	22635.955139	42179.13016	0.0171834	10.8333	48.2535	156.5389	333.9851
L3 . 7	**90094A**	**Gorizont 21**					
	30-DEC-11	3075	326.7	178.8	145.5	51	1051
	22643.097257	42197.01764	0.0003370	13.5935	27.1055	120.2754	253.9471
L3 . 8	**00029A**	**Gorizont 33**					
	29-DEC-11	3082	326.6	178.9	145.5	52	585
	22642.350833	42177.59492	0.0002653	8.7733	54.3166	343.5272	190.5225
L3 . 9	**94067D**	**Proton-K fourth stage (Block DM-2M)**					
	28-DEC-11	3506	323.2	180.6	143.8	50	763
	22641.842419	42159.72045	0.0009524	12.9222	36.0189	352.5162	355.7886
L3 . 10	**85007A**	**Gorizont 11**					
	28-DEC-11	3573	323.0	180.7	143.8	51	955
	22641.774248	42161.66804	0.0004104	14.3174	5.4466	27.7407	349.8682
L3 . 11	**91079A**	**Cosmos 2172**					
	23-DEC-11	3642	322.9	180.8	143.7	48	955
	22636.829745	42157.51808	0.0004795	13.3107	31.0213	274.0479	0.2365

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	**87084A**	**Cosmos 1888**					
	22-DEC-11	3785	322.7	180.9	143.6	49	1069
	22635.826748	42165.49184	0.0007085	13.9958	15.3096	88.0396	346.7587
L3 . 13	**95045A**	**Cosmos 2319**					
	27-DEC-11	3855	322.6	181.0	143.5	49	818
	22640.891829	42164.54765	0.0004532	11.7771	43.6959	47.3338	346.6467
L3 . 14	**86027A**	**Cosmos 1738**					
	29-DEC-11	3894	322.5	181.0	143.5	51	993
	22642.782789	42163.55699	0.0017455	14.7895	9.5763	345.9227	349.8730
L3 . 15	**94030A**	**Gorizont 30**					
	29-DEC-11	3981	322.5	181.0	143.5	50	897
	22642.587963	42132.84767	0.0001055	12.4481	39.0935	4.4953	89.7519

The longitude histories of objects in this category are given in Fig 3.1 to 3.15.

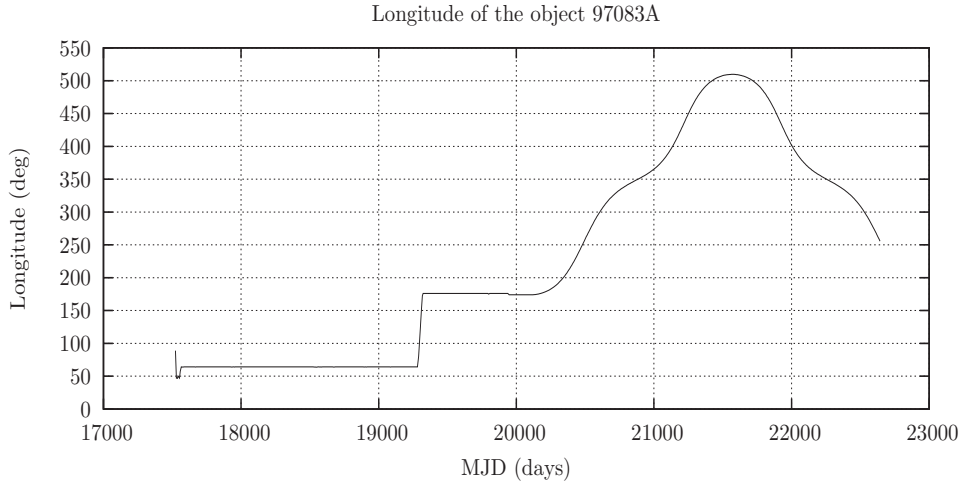

Figure 3.1: Longitude history of 97083A

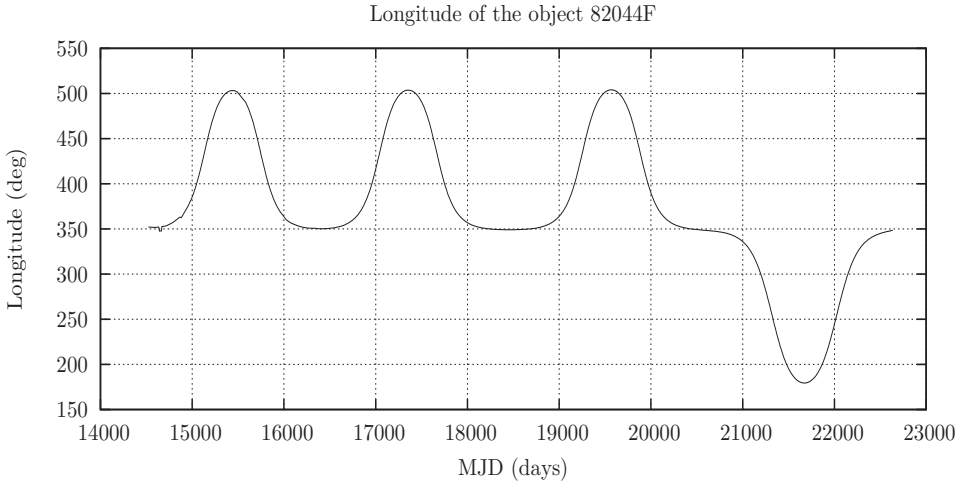

Figure 3.2: Longitude history of 82044F

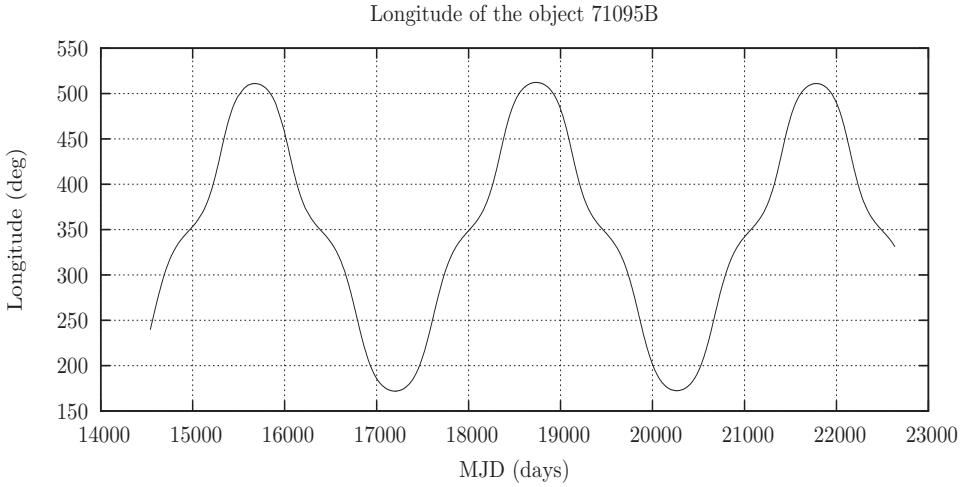

Figure 3.3: Longitude history of 71095B

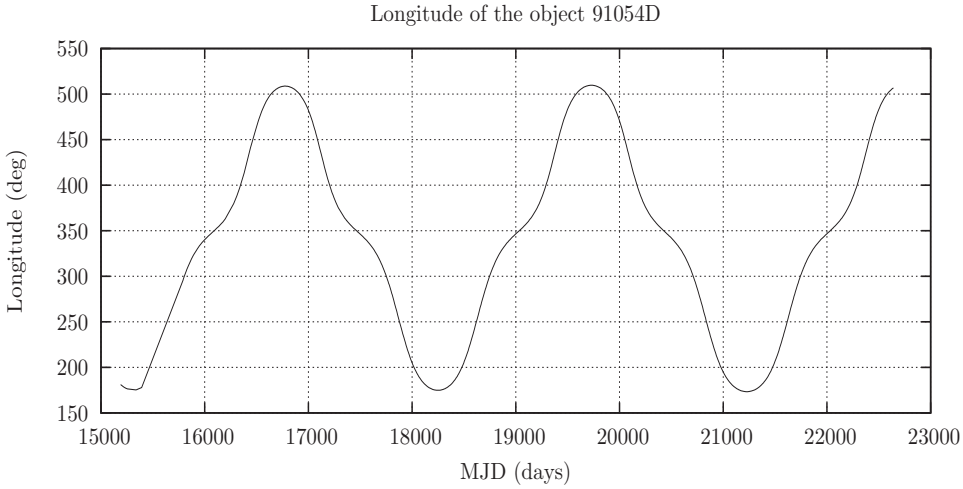

Figure 3.4: Longitude history of 91054D

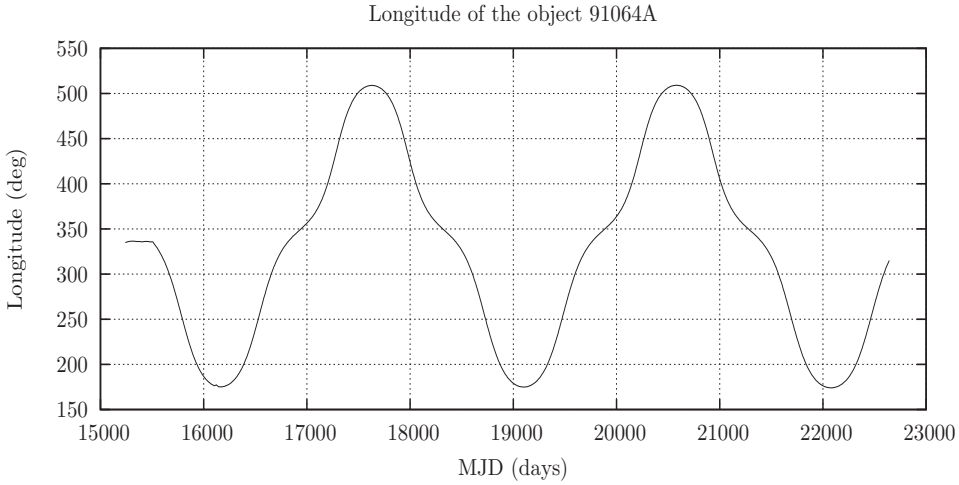

Figure 3.5: Longitude history of 91064A

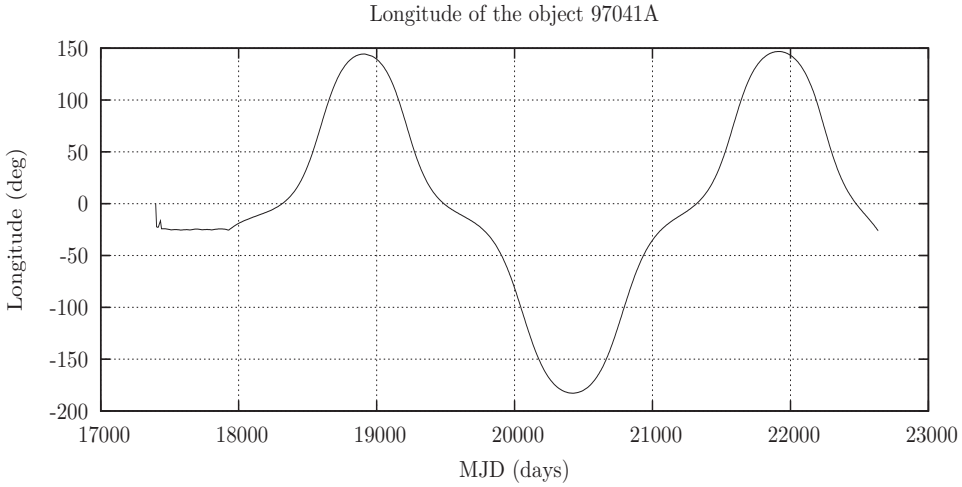

Figure 3.6: Longitude history of 97041A

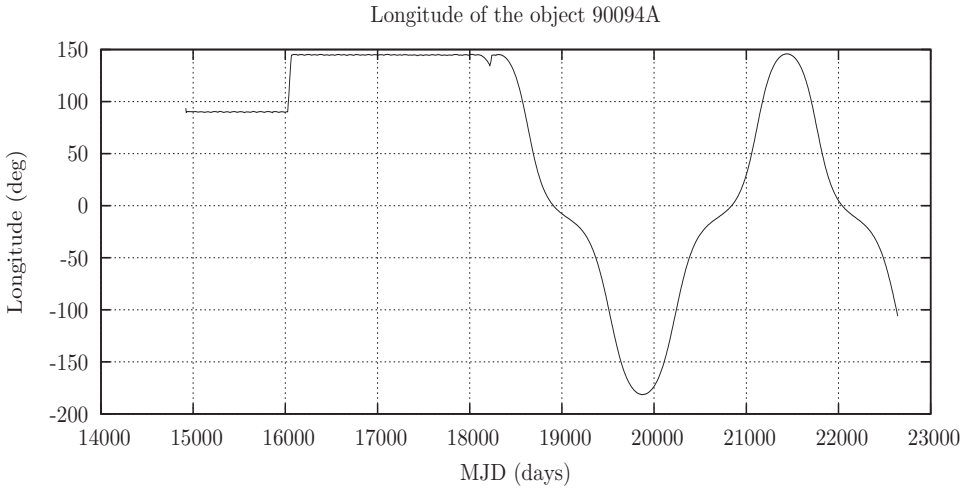

Figure 3.7: Longitude history of 90094A

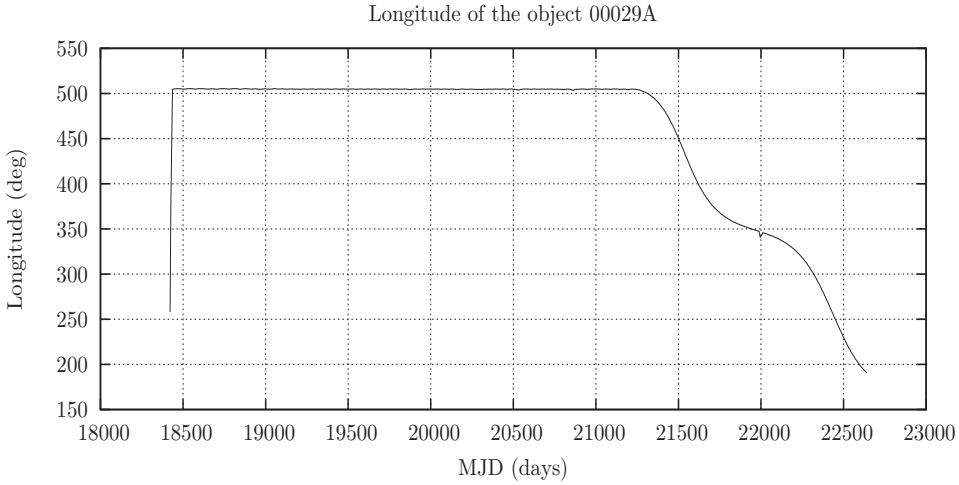

Figure 3.8: Longitude history of 00029A

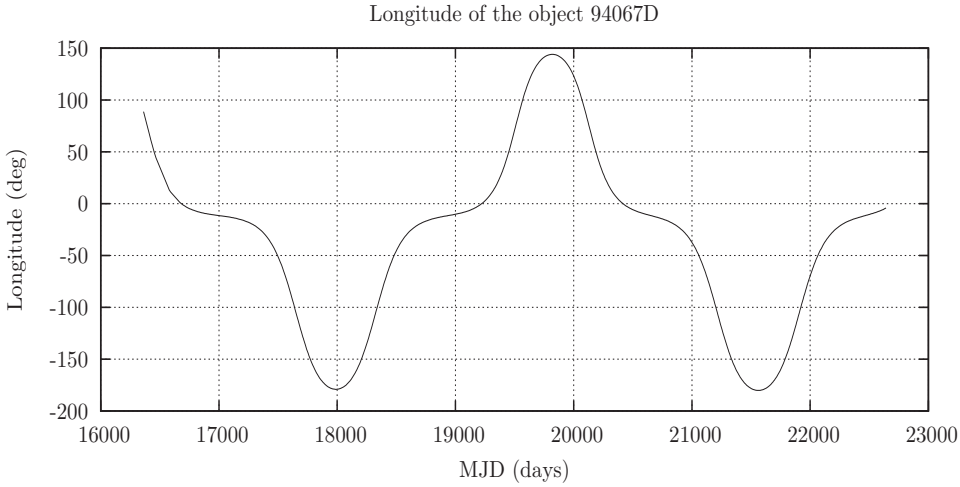

Figure 3.9: Longitude history of 94067D

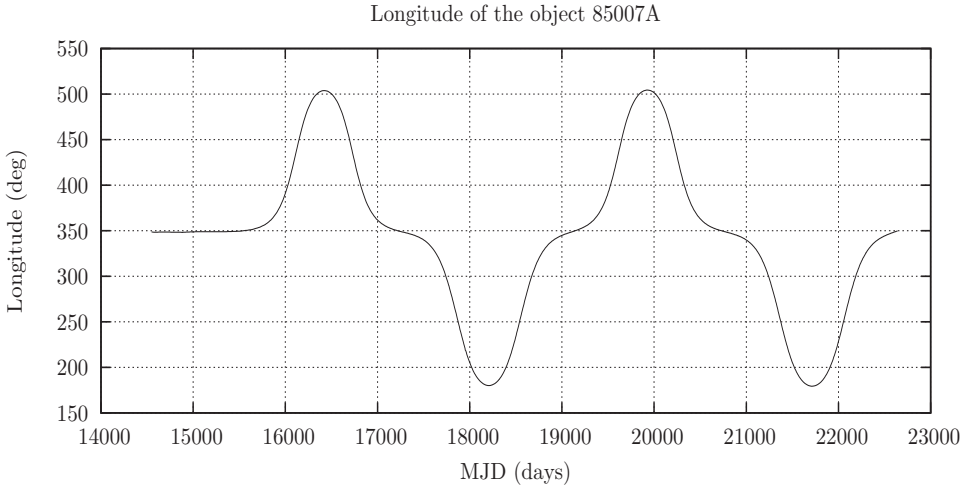

Figure 3.10: Longitude history of 85007A

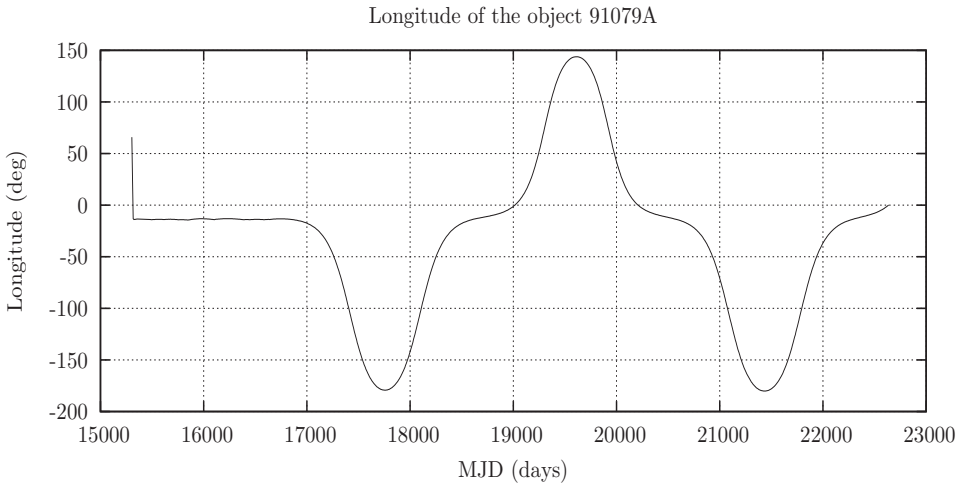

Figure 3.11: Longitude history of 91079A

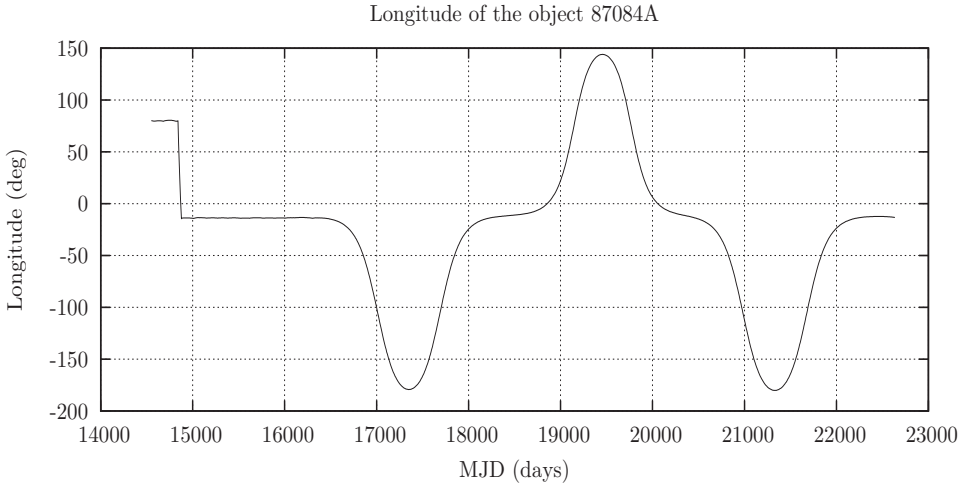

Figure 3.12: Longitude history of 87084A

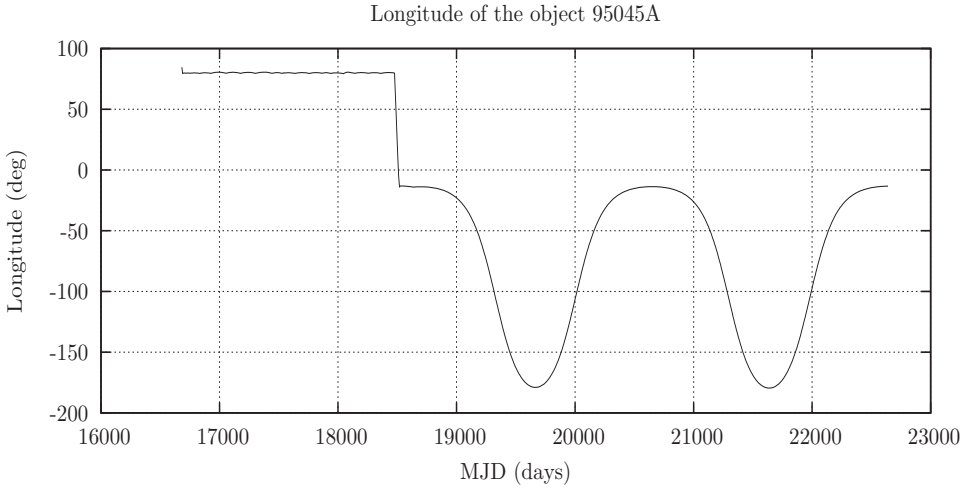

Figure 3.13: Longitude history of 95045A

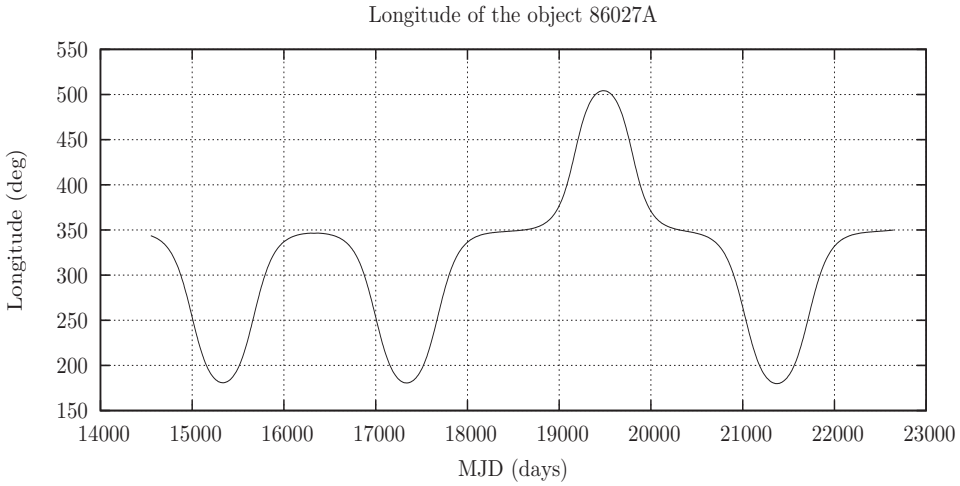

Figure 3.14: Longitude history of 86027A

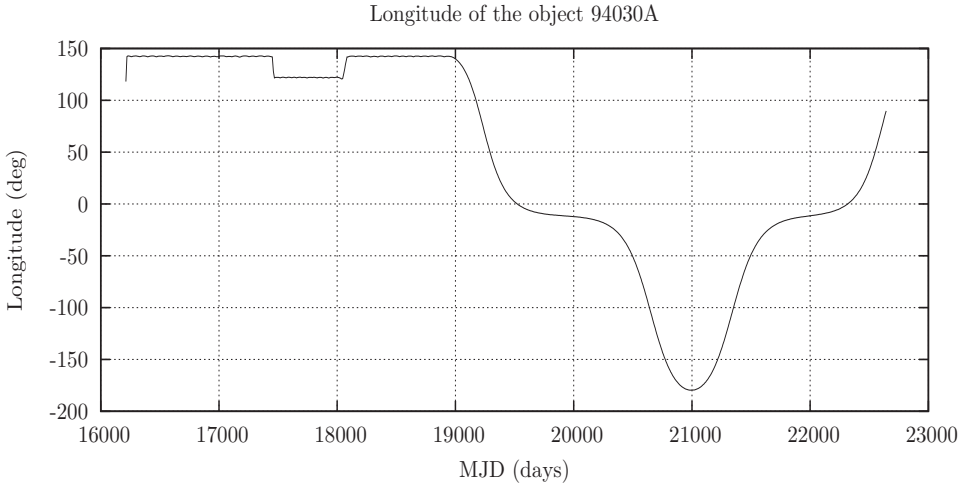

Figure 3.15: Longitude history of 94030A

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 UI (unidentified objects), then according to their UI number.
9. Status U (uncontrolled objects), then according to the COSPAR identifier.
10. Status UU (uncontrolled uncatalogued objects), then according to the COSPAR identifier.

The objects listed in chapter 4.1, 4.2 and 4.4 to 4.8 were observed repeatedly by ground based telescopes. They were listed in the previous issues as 'Unidentified objects'. During the year 2011 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, 2012 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 2011. 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:

- Crimean Astrophysical Observatory (Nauchny and Simeiz facilities, Ukraine),
- Ussuriysk Astrophysical Observatory of the Far East branch of the RAS (Gornotayozhnoye, Russia),
- Terskol observatory of the Institute for Astronomy of the RAS (INASAN) (North Caucasus, Russia),
- Ulugbek Astronomical Observatory (Kitab facilitiy, Uzbekistan),
- Observation facilities operated by "ASC "Proekt-tekhnika", JSC
  * Blagoveshchensk (Amur region, Russia),
  * Milkovo (Kamchatka peninsula, Russia),
  * Artem (Primorsky region, Russia),
  * Lesosibirsk (Krasnoyarsk region, Russia) - jointly with Lesosibirsk pedagogical institute,
- Andrushivka Observatory (Ukraine),
- National observatory of Bolivia (Tarija),
- Observation facility of the PGU (Tiraspol),
- Observatories of the Institute for Astrophysics of the Academy of Sciences of Tajikistan (Gissar and Sanglok),
- Odessa State University Astronomical Observatory (Mayaki, 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 (Kharkov region, Ukraine)

- Astronomical Institute of the University of Bern, partner of ISON, operating the Zimmerwald observatory (Switzerland) and, for space debris observation, the ESA 1 m telescope at the optical ground station (OGS), Izaña, Tenerife, Spain,
- Joint Italian-Russian telescope FIRST at Collepardo observation facility (Italy),
- Telescope Fabra ROA Montsec (TFRM) operated by the Reial Academia de Ciencies 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
- 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
- M - mean anomaly, 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 5 objects identified.

For explanation of symbols, see the definitions at the beginning of Chapter 4 on page 116.

C1.nn	**COSPAR**	**NAME**				
UInnn	YYYYMMDD	HH:MM:SS.SS	t_{osc}	H_p	H_a	λ
	i	Ω	ω	a	e	M
C1. 1	**09047A**	**USA 207 (PAN)**				
UI158	20120101	00:00:00.0	1432.5046	35712.3	35720.2	049.510
	00.1420	063.4601	133.2455	42094.388	0.0000930	312.9311
C1. 2	**09017A**	**USA 204 (WGS F2)**				
UI156	20120101	00:00:00.0	1436.1465	35785.9	35789.3	060.197
	00.0758	090.8581	143.7194	42165.703	0.0000406	285.5236
C1. 3	**07046A**	**USA 195 (WGS F1)**				
UI152	20120101	00:00:00.0	1436.1078	35779.6	35794.1	174.982
	00.0727	091.5501	089.9225	42164.946	0.0001719	093.4285
C1. 4	**03040A**	**USA 170 (DSCS III B-6)(DSCS III F14)**				
UI107	20120101	00:00:00.0	1436.2412	35784.4	35794.4	307.696
	00.0994	077.7316	210.6197	42167.557	0.0001186	119.2028
C1. 5	**09068A**	**USA 211 (WGS F3)**				
UI159	20120101	00:00:00.0	1436.1032	35783.2	35790.2	348.043
	00.0760	090.4864	257.8980	42164.855	0.0000832	099.5454

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

In the case where the satellite is only under longitude control, there are 46 objects identified.

For explanation of symbols, see the definitions at the beginning of Chapter 4 on page 116.

C2.nn	**COSPAR**	**NAME**				
UInnn	YYYYMMDD	HH:MM:SS.SS	t_{osc}	H_p	H_a	λ
	i	Ω	ω	a	e	M
C2. 1	**84009A**	**OPS 0441 (VORTEX 4)**				
UI026	20120101	00:00:00.0	1436.0631	31337.1	40234.8	002.544
	07.8613	356.6499	304.2107	42164.070	0.1055127	152.0294
C2. 2	**96026A**	**USA 118 (MERCURY 2)**				
UI073	20120101	00:00:00.0	1436.3074	33592.3	37989.1	012.801
	08.7470	012.7399	199.9090	42168.853	0.0521329	257.9289
C2. 3	**97008A**	**USA 130 (DSP F18)**				
UI125	20120101	00:00:00.0	1436.0827	35783.5	35789.1	020.320
	09.8800	052.8548	157.5065	42164.453	0.0000666	269.8661
C2. 4	**93056A**	**USA 95 (UFO F2)**				
UI069	20120101	00:00:00.0	1435.9712	35760.6	35807.7	029.258
	08.3424	040.5890	255.2479	42162.272	0.0005587	193.2700
C2. 5	**02001A**	**USA 164 (Milstar-2 F3)**				
UI063	20120101	00:00:00.0	1436.1910	35779.1	35797.7	029.974
	04.6008	047.9020	185.4495	42166.574	0.0002205	256.5173
C2. 6	**93074A**	**USA 97 (DSCS III B-10)(DSCS III F8)**				
UI066	20120101	00:00:00.0	1438.6314	35829.1	35843.3	031.300
	07.3474	059.5331	267.9847	42214.326	0.0001675	163.5404
C2. 7	**09001A**	**USA 202**				
UI155	20120101	00:00:00.0	1436.1305	35764.0	35810.5	044.008
	03.0395	010.2606	024.2693	42165.390	0.0005520	109.4033
C2. 8	**89035A**	**USA 37 (VORTEX 6)**				
UI018	20120101	00:00:00.0	1436.3519	31680.2	39903.0	045.903
	06.8938	014.6632	235.9735	42169.723	0.0974972	245.5028
C2. 9	**00065A**	**USA 153 (DSCS III B-11)(DSCS III F12)**				
UI105	20120101	00:00:00.0	1436.2010	35787.8	35789.5	056.708
	02.3066	072.5622	061.8488	42166.769	0.0000205	022.1958
C2. 10	**03041A**	**USA 171 (Advanced ORION 3)**				
UI118	20120101	00:00:00.0	1436.8702	35560.7	36042.8	068.722
	05.3138	102.1570	173.2617	42179.867	0.0057149	253.2478
C2. 11	**04004A**	**USA 176 (DSP F22)**				
UI108	20120101	00:00:00.0	1436.0900	35776.0	35796.9	069.680
	04.2358	062.2686	222.7368	42164.597	0.0002470	244.5589
C2. 12	**03057A**	**USA 174 (UFO F11)**				
UI117	20120101	00:00:00.0	1436.1696	35773.3	35802.7	071.239
	02.7932	024.5917	274.0729	42166.155	0.0003482	232.4285
C2. 13	**99063A**	**USA 146 (UFO F10)**				
UI065	20120101	00:00:00.0	1436.1297	35778.2	35796.3	072.704
	03.9983	046.0251	240.9487	42165.373	0.0002151	245.6083

C2.nn	COSPAR	NAME				
UInnn	YYYYMMDD	HH:MM:SS.SS	t_{osc}	H_p	H_a	λ
	i	Ω	ω	a	e	M
C2. 14	**90097B**	**USA 67 (SDS 2 F2)(QUASAR 2)**				
UI092	20120101	00:00:00.0	1436.1480	35259.6	36315.6	074.779
	15.2168	026.4255	167.5555	42165.731	0.0125223	341.0070
C2. 15	**85010B**	**USA 8 (MAGNUM 1)**				
UI097	20120101	00:00:00.0	1436.1497	35573.0	36002.2	080.860
	17.2825	012.2735	272.6897	42165.766	0.0050891	255.2092
C2. 16	**89090B**	**USA 48 (MAGNUM 2)**				
UI136	20120101	00:00:00.0	1436.1726	34636.5	36939.7	090.324
	15.9324	041.1784	316.7761	42166.214	0.0273109	190.1518
C2. 17	**00080A**	**USA 155 (SDS 3 F2)**				
UI007	20120101	00:00:00.0	1436.1325	35773.8	35800.8	092.116
	04.9841	048.3711	229.8313	42165.429	0.0003211	273.7837
C2. 18	**10063A**	**USA 223 (NROL-32)**				
UI160	20120101	00:00:00.0	1436.1500	35591.8	35983.4	095.890
	06.0445	260.4476	354.9941	42165.771	0.0046437	300.2904
C2. 19	**86096A**	**USA 20 (FLTSATCOM F7)**				
UI134	20120101	00:00:00.0	1435.8983	35677.2	35888.2	099.412
	13.2850	028.0187	087.9168	42160.845	0.0025021	083.6884
C2. 20	**00001A**	**USA 148 (DSCS III B-08)(DSCS III F11)**				
UI104	20120101	00:00:00.0	1436.1285	35778.9	35795.5	103.828
	02.9824	071.0043	172.2564	42165.350	0.0001962	320.4698
C2. 21	**01033A**	**USA 159 (DSP F21)**				
UI001	20120101	00:00:00.0	1436.1211	35763.7	35810.5	103.875
	06.4090	057.9147	253.9392	42165.205	0.0005549	251.8592
C2. 22	**95022A**	**USA 110 (Advanced ORION 1)**				
UI128	20120101	00:00:00.0	1436.1109	35367.6	36206.1	126.068
	10.4399	066.0436	021.4420	42165.005	0.0099435	138.8957
C2. 23	**95038A**	**USA 113 (DSCS III B-07)(DSCS III F9)**				
UI115	20120101	00:00:00.0	1436.1628	35783.0	35792.7	149.628
	07.0117	060.1690	235.9317	42166.022	0.0001153	313.4090
C2. 24	**01009A**	**USA 157 (Milstar-2 F2)**				
UI112	20120101	00:00:00.0	1436.1288	35777.5	35797.0	152.129
	05.2282	049.8478	219.2921	42165.357	0.0002314	342.8687
C2. 25	**92037A**	**USA 82 (DSCS III B-12)(DSCS III F6)**				
UI123	20120101	00:00:00.0	1440.7873	35863.6	35893.1	163.921
	08.7017	055.9100	327.5936	42256.492	0.0003480	239.6200
C4. 26	**06024A**	**USA 187 (MITEx OSC satellite)**				
UI149	20120101	00:00:00.0	1433.6139	35728.6	35747.4	168.290
	00.3133	120.6828	185.9050	42116.116	0.0002227	321.8570
C2. 27	**98016A**	**USA 138 (UFO F8)**				
UI111	20120101	00:00:00.0	1435.9911	35765.9	35803.2	172.084
	04.6978	048.8635	201.7612	42162.662	0.0004423	021.3575
C2. 28	**11019A**	**USA 230 (SBIRS-GEO 1)**				
	20120101	00:00:00.0	1439.6752	35849.9	35863.3	172.944
	06.1661	320.4907	288.0921	42234.745	0.0001593	023.4663

C2.nn	COSPAR	NAME				
UInnn	YYYYMMDD	HH:MM:SS.SS	t_{osc}	H_p	H_a	λ
	i	Ω	ω	a	e	M
C2. 29	**95003A**	**USA 108 (UFO F4)**				
UI121	20120101	00:00:00.0	1436.1583	35770.7	35804.9	182.974
	07.0111	043.0838	203.5654	42165.934	0.0004052	036.1957
C2. 30	**00024A**	**USA 149 (DSP F20)**				
UI004	20120101	00:00:00.0	1436.0243	35783.2	35787.2	194.551
	07.4143	055.5457	095.3661	42163.310	0.0000477	143.5567
C2. 31	**95060A**	**USA 115 (Milstar DFS-2)**				
UI124	20111201	00:00:00.0	1436.1694	35781.0	35795.1	209.985
	09.4736	052.4421	209.3787	42166.151	0.0001670	017.4893
C2. 32	**91080B**	**USA 75 (DSP F16)**				
UI133	20120101	00:00:00.0	1436.1377	35782.5	35792.3	214.593
	13.1370	035.6288	200.1955	42165.531	0.0001161	078.6553
C2. 33	**01046A**	**USA 162 (SDS 3 F3)**				
UI151	20111101	00:00:00.0	1435.9827	35768.4	35800.3	219.222
	05.1729	083.3851	262.8390	42162.496	0.0003788	272.7478
C2. 34	**03008A**	**USA 167 (DSCS III A-3)(DSCS III F13)**				
UI106	20111101	00:00:00.0	1436.0940	35771.8	35801.3	224.679
	00.4785	082.2749	201.7860	42164.676	0.0003497	340.3825
C2. 35	**97065A**	**USA 134 (DSCS III B-13)(DSCS III F10)**				
UI110	20120101	00:00:00.0	1436.0171	35781.7	35788.4	230.423
	05.4016	063.7772	234.9561	42163.170	0.0000796	031.5966
C2. 36	**95057A**	**USA 114 (UFO F6)**				
UI119	20120101	00:00:00.0	1436.1623	35775.1	35800.7	254.621
	06.3534	043.7236	322.7796	42166.012	0.0003034	347.9812
C2. 37	**95027A**	**USA 111 (UFO F5)**				
UI122	20120101	00:00:00.0	1436.1274	35773.6	35800.8	260.297
	07.3809	043.0452	310.5292	42165.330	0.0003220	006.5859
C2. 38	**03012A**	**USA 169 (Milstar-2 F4)**				
UI109	20120101	00:00:00.0	1436.2155	35769.6	35808.3	269.974
	03.6616	072.7898	172.0109	42167.053	0.0004589	125.0549
C2. 39	**10039A**	**USA 214 (AEHF SV-1)**				
	20120101	00:00:00.0	1436.2347	35776.3	35802.3	290.973
	04.1750	278.3739	298.1066	42167.429	0.0003089	174.3527
C2. 40	**94084A**	**USA 107 (DSP F17)**				
UI131	20120101	00:00:00.0	1436.1239	35783.5	35790.7	310.501
	11.6296	045.5694	041.7241	42165.260	0.0000851	323.1189
C2. 41	**94054A**	**USA 105 (MERCURY 1)**				
UI008	20120101	00:00:00.0	1436.1979	35605.1	35972.1	319.955
	07.8676	055.2410	221.0970	42166.709	0.0043522	143.1925
C2. 42	**94009A**	**USA 99 (Milstar DFS-1)**				
UI142	20120101	00:00:00.0	1436.1821	35772.3	35804.2	321.043
	08.2656	100.0202	261.2952	42166.400	0.0003784	059.5641
C2. 43	**98029A**	**USA 139 (Advanced ORION 2)**				
UI074	20120101	00:00:00.0	1436.2237	35704.5	35873.7	333.639
	08.6215	008.4827	227.7381	42167.214	0.0020066	197.1451

C2.nn	COSPAR	NAME				
UInnn	YYYYMMDD	HH:MM:SS.SS	t_{osc}	H_p	H_a	λ
	i	Ω	ω	a	e	M
C2. 44	**96042A**	**USA 127 (UFO F7)**				
UI116	20120101	00:00:00.0	1436.1814	35773.4	35803.1	337.213
	05.7241	044.0906	247.3201	42166.385	0.0003518	145.6673
C2. 45	**89077A**	**USA 46 (FLTSATCOM F8)**				
UI130	20120101	00:00:00.0	1436.0869	35773.7	35799.1	344.564
	10.9361	035.2295	320.1949	42164.536	0.0003016	089.0214
C2. 46	**11011A**	**USA 227 (NROL 27)**				
	20120101	00:00:00.0	1436.1186	35772.5	35801.5	349.940
	04.8536	347.0915	325.2917	42165.157	0.0003444	137.4358

4.3 Objects in a drift orbit

In the case where the object is in a drift orbit, there are 92 objects identified.

For explanation of symbols, see the definitions at the beginning of Chapter 4 on page 116.

D1.nn	**COSPAR**	**NAME**				
UInnn	YYYYMMDD	HH:MM:SS.SS	t_{osc}	H_p	H_a	λ
	i	Ω	ω	a	e	M
D1. 1	**92006C**	**IABS**				
UI132	20120101	00:00:00.0	1299.9015	30535.1	35618.3	292.114
	10.6447	018.1967	291.1028	39454.857	0.0644185	077.4025
D1. 2	**10063B**	**Delta 4 second stage**				
UI161	20120101	00:00:00.0	1384.1319	33837.7	35688.7	180.257
	06.1108	259.6982	154.4509	41141.346	0.0224952	227.9089
D1. 3	**06024C**	**USA 189 (NRL Upper Stage/Satellite)**				
UI140	20120101	00:00:00.0	1384.4609	34755.9	34783.6	280.101
	04.5772	064.3480	011.5440	41147.866	0.0003363	315.8882
D1. 4	**69036B**	**Atlas SLV-3A stage 2 (Agena D)**				
UI012	20120101	00:00:00.0	1386.5525	30771.3	38851.0	335.089
	05.3396	098.4609	077.2176	41189.297	0.0980802	282.1012
D1. 5	**77038C**	**Atlas SLV-3A stage 2 (Agena D)**				
UI082	20120101	00:00:00.0	1407.1933	29018.3	41419.5	229.780
	10.9049	003.8501	046.3683	41597.065	0.1490639	297.6006
D1. 6	**72101B**	**Atlas SLV-3A stage 2 (Agena D)**				
UI059	20120101	00:00:00.0	1407.4145	29894.0	40552.6	329.391
	18.7960	325.6223	348.0753	41601.423	0.1281037	114.9393
D1. 7	**93046C**	**IABS**				
UI028	20120101	00:00:00.0	1410.0510	34917.7	35632.7	065.388
	13.1263	029.4607	349.5698	41653.362	0.0085830	148.5915
D1. 8	**75055B**	**Atlas SLV-3A stage 2 (Agena D)**				
UI103	20120101	00:00:00.0	1410.5408	29769.2	40800.5	279.677
	19.8496	331.0151	315.2346	41663.007	0.1323869	084.2516
D1. 9	**68063B**	**Atlas SLV-3A stage 2 (Agena D)**				
UI055	20120101	00:00:00.0	1414.9398	30790.5	39952.4	151.050
	14.2393	339.3483	097.4768	41749.585	0.1097243	190.7619
D1. 10	**70069B**	**Atlas SLV-3A stage 2 (Agena D)**				
UI145	20120101	00:00:00.0	1415.8671	29990.2	40789.2	258.707
	15.3349	276.3759	330.7649	41767.823	0.1292740	105.9841
D1. 11	**92037C**	**IABS**				
UI085	20120101	00:00:00.0	1416.7165	35309.8	35503.0	199.897
	13.4044	025.5891	300.1266	41784.526	0.0023118	337.6023
D1. 12	**81025C**	**Titan IIIC stage 3 (Transtage)**				
UI040	20120101	00:00:00.0	1421.0728	35280.9	35703.1	298.899
	14.0889	353.2047	169.9532	41870.138	0.0050421	236.2276
D1. 13	**89046D**	**IUS stage 2**				
UI080	20120101	00:00:00.0	1421.4956	35318.9	35681.7	060.801
	12.8374	027.9739	229.6842	41878.442	0.0043314	264.0296

D1.nn	COSPAR	NAME				
UInnn	YYYYMMDD	HH:MM:SS.SS	t_{osc}	H_p	H_a	λ
	i	Ω	ω	a	e	M
D1. 14	**91080D**	**IUS stage 2**				
UI078	20120101	00:00:00.0	1421.8834	35425.0	35590.9	170.917
	12.9587	035.0305	212.3676	41886.059	0.0019801	025.6546
D1. 15	**95038C**	**IABS**				
UI022	20120101	00:00:00.0	1422.0243	35456.0	35565.4	198.725
	12.6582	037.6427	173.1934	41888.827	0.0013061	090.3892
D1. 16	**82019B**	**Titan IIIC stage 3 (Transtage)**				
UI039	20120101	00:00:00.0	1422.1539	35450.1	35576.3	251.141
	14.4782	356.4920	004.5581	41891.370	0.0015065	353.4779
D1. 17	**89069D**	**Titan 34D stage 3 (Transtage)**				
UI088	20120101	00:00:00.0	1422.3775	35238.5	35796.8	147.849
	13.8056	018.2962	203.6353	41895.763	0.0066633	027.7228
D1. 18	**87097B**	**Titan 34D stage 3 (Transtage)**				
UI029	20120101	00:00:00.0	1422.4292	35490.4	35546.8	299.883
	12.7282	020.6228	093.9194	41896.777	0.0006730	285.5066
D1. 19	**00065C**	**IABS**				
UI011	20120101	00:00:00.0	1423.2165	35310.0	35758.2	295.473
	09.7907	051.7188	136.9631	41912.235	0.0053458	210.2181
D1. 20	**00001C**	**IABS**				
UI015	20120101	00:00:00.0	1423.2241	35474.7	35593.8	116.035
	10.2776	050.4566	218.4673	41912.385	0.0014202	308.4076
D1. 21	**94084D**	**IUS stage 2**				
UI019	20120101	00:00:00.0	1423.2485	35515.6	35553.8	126.313
	11.5005	045.1608	349.4037	41912.863	0.0004554	193.2742
D1. 22	**84037B**	**Titan 34D stage 3 (Transtage)**				
UI095	20120101	00:00:00.0	1423.4363	35414.2	35662.7	065.675
	14.4381	003.6876	174.4465	41916.552	0.0029642	348.9151
D1. 23	**84129B**	**Titan 34D stage 3 (Transtage)**				
UI032	20120101	00:00:00.0	1423.6102	35516.8	35566.9	127.657
	14.9316	010.0392	072.2104	41919.965	0.0005981	147.2807
D1. 24	**03008C**	**IABS**				
UI006	20120101	00:00:00.0	1424.1076	35522.9	35580.2	325.737
	07.8458	057.7662	117.8063	41929.728	0.0006832	250.2046
D1. 25	**85092E**	**IUS stage 2**				
UI033	20120101	00:00:00.0	1424.5869	35309.4	35812.6	306.660
	14.9101	008.7232	035.2583	41939.136	0.0059980	003.2837
D1. 26	**03041B**	**Titan IVB stage 3 (Centaur)**				
UI072	20120101	00:00:00.0	1427.8996	35458.9	35793.1	315.333
	05.4395	118.1388	300.3338	42004.127	0.0039782	358.0718
D1. 27	**85010D**	**IUS stage 2**				
UI047	20120101	00:00:00.0	1428.4203	35531.7	35740.7	319.779
	17.3507	013.1103	141.7750	42014.337	0.0024867	265.2246
D1. 28	**03040C**	**IABS**				
UI002	20120101	00:00:00.0	1429.4714	35591.5	35722.1	007.145
	07.4311	058.5805	161.8262	42034.945	0.0015542	246.9225

D1.nn	COSPAR	NAME				
UInnn	YYYYMMDD	HH:MM:SS.SS	t_{osc}	H_p	H_a	λ
	i	Ω	ω	a	e	M
D1. 29	**72010B**	**Titan IIIC stage 3 (Transtage)**				
UI038	20120101	00:00:00.0	1430.4414	35412.8	35938.8	216.868
	09.8771	321.6536	009.1732	42053.959	0.0062539	347.4567
D1. 30	**94009B**	**Titan IVA stage 3 (Centaur)**				
UI014	20120101	00:00:00.0	1431.4408	35655.3	35735.5	257.242
	08.2304	089.6003	073.7527	42073.544	0.0009525	194.7633
D1. 31	**77007D**	**OPS 3151 debris (Telescope aperture suncover)**				
UI100	20120101	00:00:00.0	1431.4483	34545.1	36846.0	059.456
	13.2264	332.4263	343.7183	42073.692	0.0273428	202.9579
D1. 32	**95060B**	**Titan IVA stage 3 (Centaur)**				
UI016	20120101	00:00:00.0	1431.4503	35556.2	35835.0	241.986
	10.6727	049.6988	069.2071	42073.732	0.0033124	224.2821
D1. 33	**03012B**	**Titan IVB stage 3 (Centaur)**				
UI064	20120101	00:00:00.0	1431.6755	35615.6	35784.5	116.524
	04.3632	049.6699	160.3123	42078.143	0.0020070	007.0359
D1. 34	**95022B**	**Titan IVA stage 3 (Centaur)**				
UI021	20120101	00:00:00.0	1431.9617	35665.8	35745.5	082.436
	12.2709	069.6635	216.4043	42083.751	0.0009467	256.5310
D1. 35	**75118C**	**Titan IIIC stage 3 (Transtage)**				
UI050	20120101	00:00:00.0	1432.0942	35646.9	35769.5	069.952
	12.5316	330.8669	053.6428	42086.347	0.0014564	146.0339
D1. 36	**76059C**	**Titan IIIC stage 3 (Transtage)**				
UI054	20120101	00:00:00.0	1432.1992	35649.9	35770.6	184.793
	12.8872	332.3466	089.3450	42088.404	0.0014346	224.0145
D1. 37	**78038A**	**OPS 8790 (AQUACADE 4)**				
UI091	20120101	00:00:00.0	1432.9058	35663.9	35784.3	058.115
	10.7756	345.1719	171.3913	42102.247	0.0014295	001.8625
D1. 38	**75118A**	**OPS 3165 (DSP F5)**				
UI052	20120101	00:00:00.0	1433.4359	35624.2	35844.8	179.735
	12.5669	330.7968	220.9427	42112.630	0.0026193	088.2707
D1. 39	**01009B**	**Titan IVB stage 3 (Centaur)**				
UI003	20120101	00:00:00.0	1433.4688	35664.2	35806.1	125.581
	07.0725	052.9121	000.4224	42113.275	0.0016853	172.4652
D1. 40	**71039B**	**Titan IIIC stage 3 (Transtage)**				
UI093	20120101	00:00:00.0	1433.8535	35600.1	35885.2	219.140
	09.2472	318.8625	337.3339	42120.809	0.0033838	022.6999
D1. 41	**69036A**	**OPS 3148 (CANYON 2)**				
UI070	20120101	00:00:00.0	1434.0792	31845.5	39648.7	231.801
	03.0750	115.5298	016.2842	42125.228	0.0926183	202.9795
D1. 42	**80060G**	**EKRAN 5 debris**				
UI137	20120101	00:00:00.0	1435.0996	35708.8	35825.4	326.160
	14.2973	343.8181	184.7016	42145.209	0.0013833	257.5874
D1. 43	**79086A**	**OPS 1948 (VORTEX 2) (CHALET 2)**				
UI023	20120101	00:00:00.0	1436.8189	30656.3	40945.2	347.659
	06.7999	355.8513	351.7533	42178.863	0.1219674	098.0744

D1.nn	COSPAR	NAME				
UInnn	YYYYMMDD	HH:MM:SS.SS	t_{osc}	H_p	H_a	λ
	i	Ω	ω	a	e	M
D1. 44	**02001B**	**Titan IVB stage 3 (Centaur)**				
UI013	20120101	00:00:00.0	1437.1996	35572.1	36044.2	320.738
	03.0557	036.0664	030.5798	42186.314	0.0055954	354.3027
D1. 45	**78058A**	**OPS 9454 (VORTEX 1) (CHALET 1)**				
UI009	20120101	00:00:00.0	1438.4675	29897.8	41768.2	311.519
	05.0622	037.3894	303.7050	42211.120	0.1406078	057.6767
D1. 46	**90095D**	**IUS stage 2**				
UI081	20120101	00:00:00.0	1441.2665	35558.7	36216.7	256.606
	13.4984	033.2198	314.6152	42265.859	0.0077844	006.8769
D1. 47	**01033D**	**IUS stage 2**				
UI061	20120101	00:00:00.0	1441.3678	35865.4	35914.0	165.752
	06.4416	057.9605	263.6070	42267.840	0.0005748	303.2601
D1. 48	**73040A**	**OPS 6157 (DSP F4)**				
UI048	20120101	00:00:00.0	1442.6279	35901.6	35927.0	305.038
	11.5270	324.3622	249.3794	42292.471	0.0003004	190.8030
D1. 49	**04004D**	**IUS stage 2**				
UI062	20120101	00:00:00.0	1442.7015	35893.1	35938.4	285.271
	04.2698	062.6019	291.4325	42293.909	0.0005360	029.6009
D1. 50	**72010A**	**OPS 1570 (DSP F3)**				
UI144	20120101	00:00:00.0	1443.4185	35905.3	35954.2	249.288
	10.3857	323.1042	232.6608	42307.922	0.0005781	153.2426
D1. 51	**00024E**	**DSP F20 Aperture Cover**				
UI005	20120101	00:00:00.0	1444.1035	34932.3	36954.0	316.690
	07.7639	055.5040	222.0441	42321.305	0.0238848	135.1800
D1. 52	**00024D**	**IUS stage 2**				
UI067	20120101	00:00:00.0	1444.3693	35908.3	35988.5	271.412
	07.4749	055.7305	013.0148	42326.499	0.0009475	300.7822
D1. 53	**79086C**	**Titan IIIC stage 3 (Transtage)**				
UI024	20120101	00:00:00.0	1444.6145	30386.0	41520.3	121.745
	07.0604	353.8574	047.9521	42331.290	0.1315140	188.9681
D1. 54	**78058B**	**Titan IIIC stage 3 (Transtage)**				
UI010	20120101	00:00:00.0	1445.5078	29630.6	42310.6	250.573
	04.7905	031.8941	021.3506	42348.737	0.1497091	300.7963
D1. 55	**81107C**	**Titan IIIC stage 3 (Transtage)**				
UI076	20120101	00:00:00.0	1445.8484	31853.3	40101.2	092.890
	07.7331	351.7732	034.9863	42355.389	0.0973664	170.7059
D1. 56	**94054B**	**Titan IVA stage 3 (Centaur)**				
UI017	20120101	00:00:00.0	1446.0263	35472.0	36489.5	205.774
	10.3308	035.2453	219.5674	42358.864	0.0120103	048.1206
D1. 57	**96026B**	**Titan IVA stage 3 (Centaur)**				
UI075	20120101	00:00:00.0	1446.3144	34009.3	37963.4	211.440
	09.1530	004.2853	282.8349	42364.490	0.0466683	016.8766
D1. 58	**73040B**	**Titan IIIC stage 3 (Transtage)**				
UI049	20120101	00:00:00.0	1446.3983	35870.0	36106.0	026.847
	11.7094	324.8836	274.6021	42366.129	0.0027855	245.7919

D1.nn	COSPAR	NAME				
UInnn	YYYYMMDD	HH:MM:SS.SS	t_{osc}	H_p	H_a	λ
	i	Ω	ω	a	e	M
D1. 59	**97008E**	**USA 130 debris (Telescope aperture suncover)**				
UI164	20110101	00:00:00.0	1446.9346	33556.2	38440.8	351.007
	09.1567	056.4483	281.5678	42376.600	0.0576332	106.4772
D1. 60	**89090D**	**IUS stage 2**				
UI090	20120101	00:00:00.0	1447.0252	34620.6	37379.9	231.170
	16.0402	041.6110	313.3171	42378.369	0.0325549	331.2856
D1. 61	**97008D**	**IUS stage 2**				
UI071	20120101	00:00:00.0	1447.2495	35897.4	36111.8	315.509
	09.9811	053.1609	040.2764	42382.748	0.0025299	322.1458
D1. 62	**76059A**	**OPS 2112 (DSP F6)**				
UI056	20120101	00:00:00.0	1447.6998	35982.4	36044.4	042.645
	13.4200	334.2155	065.5042	42391.539	0.0007320	101.5535
D1. 63	**84009C**	**Titan 34D stage 3 (Transtage)**				
UI025	20120101	00:00:00.0	1448.1240	31875.2	40168.2	070.093
	08.0312	358.4104	008.7926	42399.820	0.0977948	162.9628
D1. 64	**79053C**	**Titan IIIC stage 3 (Transtage)**				
UI051	20120101	00:00:00.0	1448.1611	35773.6	36271.2	087.056
	14.9278	350.0538	149.0948	42400.544	0.0058675	046.5150
D1. 65	**89035C**	**Titan 34D stage 3 (Transtage)**				
UI020	20120101	00:00:00.0	1448.2716	31731.7	40317.5	213.864
	07.2181	014.0966	304.2376	42402.702	0.1012411	343.7236
D1. 66	**85092C**	**USA 12 (DSCS III B-05)**				
UI077	20120101	00:00:00.0	1449.7863	36040.2	36068.0	133.405
	13.0064	037.8099	359.4722	42432.261	0.0003279	194.1772
D1. 67	**90095E**	**USA 65 debris (Telescope aperture suncover)**				
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
D1. 68	**93074B**	**IABS**				
UI084	20120101	00:00:00.0	1450.8959	36045.5	36106.0	104.141
	13.6346	032.2863	286.1173	42453.909	0.0007131	243.8081
D1. 69	**68063A**	**OPS 2222 (CANYON 1)**				
UI102	20120101	00:00:00.0	1451.0954	32121.2	40038.2	251.142
	15.2025	344.4305	079.6218	42457.801	0.0932335	297.2891
D1. 70	**89069B**	**USA 44 (DSCS III A-02)**				
UI126	20120101	00:00:00.0	1452.8364	36090.3	36137.0	303.656
	10.0620	052.8022	244.1682	42491.753	0.0005498	102.4850
D1. 71	**93046A**	**USA 93 (DSCS III B-09)(DSCS III F7)**				
UI120	20120101	00:00:00.0	1453.7857	36114.0	36150.3	000.921
	07.5869	059.2802	323.8542	42510.261	0.0004269	077.1561
D1. 72	**92006A**	**USA 78 (DSCS III B-14)**				
UI127	20120101	00:00:00.0	1454.0558	36117.7	36157.1	068.948
	10.4111	051.7342	225.0369	42515.527	0.0004642	250.5949
D1. 73	**78016A**	**OPS 6391 (FLTSATCOM F1)**				
UI101	20120101	00:00:00.0	1454.5425	36125.9	36167.9	115.474
	15.4368	348.9944	137.2927	42525.012	0.0004941	086.2542

D1.nn	COSPAR	NAME				
UInnn	YYYYMMDD	HH:MM:SS.SS	t_{osc}	H_p	H_a	λ
	i	Ω	ω	a	e	M
D1. 74	**85092B**	**USA 11 (DSCS III B-04)**				
UI079	20120101	00:00:00.0	1454.7610	36125.8	36176.4	050.124
	13.2155	036.1294	329.3856	42529.271	0.0005949	143.0158
D1. 75	**80087A**	**OPS 6394 (FLTSATCOM F4)**				
UI096	20120101	00:00:00.0	1455.2240	36147.4	36172.9	151.304
	14.9791	356.0352	356.9765	42538.295	0.0002994	254.8366
D1. 76	**06024B**	**USA 188 (MITEx Lockheed satellite)**				
UI148	20120101	00:00:00.0	1456.4088	36146.9	36219.6	285.394
	02.0180	073.4685	002.0743	42561.382	0.0008540	305.4044
D1. 77	**84129A**	**USA 7 (DSP F12)**				
UI034	20120101	00:00:00.0	1456.7325	36176.2	36202.9	290.740
	15.5306	012.4620	024.9207	42567.687	0.0003127	353.0188
D1. 78	**01020A**	**USA 158 (GeoLITE)**				
UI114	20120101	00:00:00.0	1456.9891	36112.4	36276.7	264.483
	02.8820	052.8040	356.7848	42572.685	0.0019288	310.3130
D1. 79	**81025A**	**OPS 7350 (DSP F9)**				
UI045	20120101	00:00:00.0	1457.0835	36124.3	36268.5	316.106
	15.0287	356.3832	131.2815	42574.525	0.0016928	287.6320
D1. 80	**89046A**	**USA 39 (DSP F14)**				
UI150	20120101	00:00:00.0	1457.2603	36187.6	36212.1	296.709
	13.1662	028.3204	005.4437	42577.968	0.0002877	002.7322
D1. 81	**79053A**	**OPS 7484 (DSP F8)**				
UI053	20120101	00:00:00.0	1458.2799	36186.6	36252.8	005.236
	15.1344	350.9571	126.2732	42597.827	0.0007776	346.2435
D1. 82	**84037A**	**OPS 7641 (DSP F11)**				
UI037	20120101	00:00:00.0	1459.3220	36209.6	36270.4	049.153
	15.3190	006.3838	110.6017	42618.118	0.0007130	029.8751
D1. 83	**89069A**	**USA 43 (DSCS II F-15)**				
UI087	20120101	00:00:00.0	1460.3294	36195.7	36323.5	125.015
	14.0962	024.7922	115.4851	42637.729	0.0014996	081.4732
D1. 84	**90095A**	**USA 65 (DSP F15)**				
UI083	20120101	00:00:00.0	1463.4753	36287.7	36353.9	316.299
	13.5324	032.6251	318.9679	42698.941	0.0007750	064.1109
D1. 85	**87097A**	**USA 28 (DSP F13)**				
UI030	20120101	00:00:00.0	1463.5960	36231.2	36415.1	000.424
	13.2660	022.8860	134.4471	42701.289	0.0021529	301.7151
D1. 86	**82019A**	**OPS 8701 (DSP F10)**				
UI046	20120101	00:00:00.0	1466.6008	36371.7	36391.5	040.065
	15.5675	000.4077	093.2572	42759.714	0.0002313	043.4258
D1. 87	**98058A**	**USA 140 (UFO F9)**				
UI113	20120101	00:00:00.0	1466.7282	36326.4	36441.7	156.212
	05.0942	042.7645	284.0651	42762.191	0.0013492	284.6773
D1. 88	**71039A**	**OPS 3811 (DSP F2)**				
UI042	20120101	00:00:00.0	1467.1442	36329.0	36455.2	260.673
	10.5375	323.8538	248.9292	42770.275	0.0014754	146.8591

D1.nn	**COSPAR**	**NAME**				
UInnn	YYYYMMDD	HH:MM:SS.SS	t_{osc}	H_p	H_a	λ
	i	Ω	ω	a	e	M
D1. 89	**82106B**	**DSCS III A-01**				
UI135	20120101	00:00:00.0	1471.9992	36409.8	36563.1	124.435
	14.3522	020.5623	056.9290	42864.580	0.0017888	142.0455
D1. 90	**77007A**	**OPS 3151 (DSP F7)**				
UI057	20120101	00:00:00.0	1476.4594	36243.8	36902.2	356.587
	14.2781	339.4122	258.9133	42951.122	0.0076651	214.1006
D1. 91	**09001B**	**Delta 4 second stage**				
UI154	20120101	00:00:00.0	1499.1061	35934.0	38088.1	315.708
	03.0073	010.7609	358.9626	43389.212	0.0248229	043.9524
D1. 92	**07054B**	**Delta 4 second stage**				
UI147	20120101	00:00:00.0	1502.1098	35918.3	38219.8	084.855
	00.5486	211.8624	245.2804	43447.150	0.0264859	070.2009

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 8 objects.

For explanation symbols, see definition at the beginning of Chapter 4 on page 116.

L1.nn	**COSPAR**	**NAME**				
UInnn	YYYYMMDD	HH:MM:SS.SS	t_{osc}	H_p	H_a	λ
	i	Ω	ω	a	e	M
L1. 1	**07054A**	**USA 197 (DSP F23)**				
UI141	20120101	00:00:00.0	1435.9282	35781.0	35785.6	009.001
	00.3295	196.1818	208.3593	42161.429	0.0000548	064.3885
L1. 2	**70032A**	**Intelsat III F-7**				
UI036	20120101	00:00:00.0	1437.2254	35808.2	35809.2	027.879
	08.8488	314.7695	298.7863	42186.818	0.0000122	234.0877
L1. 3	**72101A**	**OPS 9390 (CANYON 5)**				
UI138	20120101	00:00:00.0	1435.2845	30169.3	41372.1	035.598
	19.7690	329.9084	293.7140	42148.828	0.1328956	218.6000
L1. 4	**75055A**	**OPS 4966 (CANYON 6)**				
UI060	20120101	00:00:00.0	1436.9035	30328.7	41276.1	036.964
	20.6912	335.1002	256.2163	42180.518	0.1297684	250.7140
L1. 5	**77038A**	**OPS 9751 (CANYON 7)**				
UI086	20120101	00:00:00.0	1436.4231	30599.0	40986.9	059.153
	11.3918	005.4647	358.5219	42171.117	0.1231637	154.6998
L1. 6	**98029B**	**Titan IVB stage 3 (Centaur)**				
UI027	20120101	00:00:00.0	1434.4642	35540.6	35968.6	071.508
	10.1899	008.3522	052.9164	42132.767	0.0050793	110.7893
L1. 7	**73013A**	**OPS 6063 (Rhyolite 2)**				
UI043	20120101	00:00:00.0	1436.1139	35688.5	35885.3	075.961
	10.9331	325.3612	122.4477	42165.065	0.0023337	088.2759
L1. 8	**70046A**	**OPS 5346 (Rhyolite 1)**				
UI035	20120101	00:00:00.0	1435.9100	35746.6	35819.3	081.916
	08.8506	316.1243	081.0701	42161.074	0.0008629	144.7487

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 116.

L2.nn	**COSPAR**	**NAME**				
UInnn	YYYYMMDD	HH:MM:SS.SS	t_{osc}	H_p	H_a	λ
	i	Ω	ω	a	e	M
L2. 1	**94035A**	**USA 104 (UFO F3)**				
UI068	20120101	00:00:00.0	1435.3890	35763.5	35782.0	013.620
	08.1944	045.2228	289.2376	42150.875	0.0002194	139.0730
L2. 2	**77007C**	**Titan IIIC stage 3 (Transtage)**				
UI162	20120101	00:00:00.0	1436.5931	35746.8	35845.8	221.546
	13.3529	334.8179	257.3580	42174.444	0.0011745	089.0168
L2. 3	**70069A**	**OPS 7329 (CANYON 3)**				
UI157	20120101	00:00:00.0	1437.7211	32223.6	39413.2	252.295
	16.9573	287.1556	256.2313	42196.518	0.0851918	159.1216
L2. 4	**81107A**	**OPS 4029 (VORTEX 3)**				
UI129	20120101	00:00:00.0	1437.3024	31899.6	39720.8	295.294
	07.6526	359.6792	285.1044	42188.325	0.0926930	100.3258
L2. 5	**77114A**	**OPS 4258 (AQUACADE 3)**				
UI146	20120101	00:00:00.0	1436.5890	35727.5	35864.9	328.747
	18.9939	347.8419	224.2942	42174.363	0.0016291	216.3555

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 1 objects identified.

For explanation of symbols, see the definitions at the beginning of Chapter 4 on page 116.

L3.nn	**COSPAR**	**NAME**				
UInnn	YYYYMMDD	HH:MM:SS.SS	t_{osc}	H_p	H_a	λ
	i	Ω	ω	a	e	M
L3. 1	**80060A**	**Ekran 5**				
UI098	20120101	00:00:00.0	1434.5160	35697.1	35814.2	056.204
	14.3781	344.0081	050.9337	42133.782	0.0013893	121.4770

4.7 Unidentified objects

In this list there are 7 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 116.

UInnn	YYYYMMDD	HH:MM:SS.SS	t_{osc}	H_p	H_a	λ
TYPE	i	Ω	ω	a	e	M
UI031	20120101	00:00:00.0	1413.1292	34423.0	36248.6	336.812
D1	06.8348	317.5498	230.5508	41713.962	0.0218820	248.5940
UI041	20120101	00:00:00.0	1437.2419	35611.8	36006.2	082.357
L1	14.3063	353.4267	241.3553	42187.140	0.0046752	306.8544
UI044	20120101	00:00:00.0	1435.4423	35575.3	35972.3	091.816
L1	14.5928	353.1820	321.2465	42151.917	0.0047097	237.0423
UI058	20120101	00:00:00.0	1526.5964	37396.8	37683.0	143.300
D1	17.3340	354.1558	298.2273	43918.046	0.0032588	295.7244
UI089	20120101	00:00:00.0	1429.9281	34875.2	36456.3	023.628
D1	08.1515	325.0677	252.7649	42043.898	0.0188022	264.3140
UI139	20120101	00:00:00.0	1435.8282	35604.5	35958.2	225.453
L2	13.7086	027.9076	138.2839	42159.472	0.0041944	159.5367
UI168	20120101	00:00:00.0	1437.0158	35283.3	36325.8	171.146
D1	13.5499	018.9990	340.4173	42182.716	0.0123566	270.9978

4.8 Uncontrolled objects

In this list there are 8 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	64047A	Syncom 3	Payload
U . 2	68081N	Transtage 5 debris	Debris
U . 3	75118D	OPS 3165 debris (Telescope aperture suncover)	Debris
U . 4	76059D	OPS 2112 debris (Telescope aperture suncover)	Debris
U . 5	79053D	OPS 7484 debris (Telescope aperture suncover)	Debris
U . 6	89046E	USA 39 debris (Telescope aperture suncover)	Debris
U . 7	90097D	AKM ?	Rocket Body
U . 8	01033E	USA 159 debris (Telescope aperture suncover)	Debris

For the following objects several years old TLEs are available, for explanation, see definition at the beginning of Chapter 3 on page 32:

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.	**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

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.	**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

4.9 Uncontrolled uncatalogued objects

In this list there are 66 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	97049	Meteosat 7 debris (MVIRI cover)	Debris
UU. 62	97049	Meteosat 7 debris (MVIRI cooler cover)	Debris
UU. 63	02040	Meteosat 8 debris (cooler cover)	Debris
UU. 64	02040	Meteosat 8 debris (entry baffle cover)	Debris
UU. 65	04004	USA 176 debris (Telescope aperture suncover)	Debris
UU. 66	07054	USA 197 debris (Telescope aperture suncover)	Debris

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 8 objects are ordered according to their COSPAR designation.

I .nn	**COSPAR**	**NAME**					
	Date					N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
I . 1	**63031A**	**Syncom 2**					
	27-DEC-11					46	188
	22640.531493	42163.72265	0.0005745	35.2096	13.2755	71.3329	86.3635
I . 2	**78012A**	**IUE**					
	29-DEC-11					51	965
	22642.399086	42221.72278	0.1489931	43.7895	3.1119	171.1219	124.9269
I . 3	**10005A**	**Solar Dynamics Observatory**					
	30-DEC-11					51	99
	22643.246412	42164.67829	0.0001937	27.8499	177.1775	328.9512	258.3309
I . 4	**10036A**	**Beidou DW 5**					
	29-DEC-11					52	74
	22642.352234	42159.38583	0.0025738	54.8026	213.3303	187.0112	120.0972
I . 5	**10045A**	**Michibiki**					
	28-DEC-11					50	67
	22641.190625	42161.77847	0.0750129	40.7669	188.3460	270.0727	135.7601
I . 6	**10068A**	**Beidou DW 7**					
	29-DEC-11					52	54
	22642.814525	42158.29066	0.0022156	55.0292	334.1629	187.0908	117.1461
I . 7	**11013A**	**Beidou DW 8**					
	29-DEC-11					38	38
	22642.702060	42169.80500	0.0025369	55.5563	93.8541	186.1132	118.9727
I . 8	**11038A**	**Beidou DW 9**					
	29-DEC-11					23	23
	22642.305903	42162.06184	0.0019675	55.1316	215.4200	168.7990	96.3853

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 18 objects are ordered according to their COSPAR designation.

Ind.nn	**COSPAR**	**NAME**					
	Date					N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
Ind. 1	**77092L**	**Ekran 2 debris**					
	18-AUG-11					1	14
	22509.528553	42175.31308	0.0119978	14.0356	338.7072	287.2586	181.2810
Ind. 2	**90093A**	**Inmarsat 2-F1**					
	30-DEC-11					51	950
	22643.277940	42289.10110	0.0003074	8.5723	46.4997	233.3982	117.6283
Ind. 3	**93066A**	**Intelsat VII F-1**					
	30-DEC-11					52	883
	22643.529421	42164.92246	0.0003436	0.1147	76.4321	206.6974	156.9873
Ind. 4	**94070A**	**Astra 1D**					
	29-DEC-11					46	757
	22642.904005	42228.74651	0.0001403	3.8573	67.6173	187.0841	3.9817
Ind. 5	**95064A**	**AsiaSat 2**					
	29-DEC-11					52	799
	22642.612963	42101.72277	0.0004121	1.0542	75.8253	236.8243	116.4988
Ind. 6	**96034A**	**Gorizont 32**					
	29-DEC-11					52	802
	22642.697002	42201.21441	0.0008630	11.3857	45.4751	243.6569	56.6708
Ind. 7	**96063A**	**Arabsat 2B**					
	30-DEC-11					51	718
	22643.103044	42098.70950	0.0002811	0.2932	80.1562	215.3906	26.9444
Ind. 8	**97002A**	**GE 2**					
	29-DEC-11					52	753
	22642.105637	42098.16248	0.0004301	0.2647	76.8624	227.3824	337.5769
Ind. 9	**04010A**	**Raduga-1**					
	29-DEC-11					52	392
	22642.806111	42188.04893	0.0000732	6.0244	69.5743	59.4957	41.3675
Ind. 10	**07063B**	**Horizons 2**					
	27-DEC-11					51	207
	22640.400000	41850.88955	0.0002432	0.0320	75.1340	199.8690	308.0045
Ind. 11	**08033A**	**Cosmos-2440**					
	29-DEC-11					52	186
	22642.625174	42163.58866	0.0002040	0.9495	42.2646	349.6655	78.9925
Ind. 12	**08065B**	**Eutelsat W2M**					
	20-DEC-11					50	157
	22633.962164	41938.58410	0.0000622	0.0494	316.8978	114.7860	41.7110

Ind.nn	COSPAR	NAME					
	Date					N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ
Ind. 13	**10008A**	**GOES 15**					
	30-DEC-11					51	96
	22643.329144	42165.16664	0.0002209	0.1063	263.9313	265.8444	225.2213
Ind. 14	**11035A**	**SES-3**					
	30-DEC-11					24	24
	22643.048588	41864.09723	0.0018911	0.0352	266.0823	99.2377	324.3384
Ind. 15	**11073A**	**Beidou DW 10**					
	29-DEC-11					5	5
	22642.852245	42164.20257	0.0018751	55.1639	333.5520	188.6503	94.4762
Ind. 16	**11074A**	**AMOS 5 (temp. name)**					
	29-DEC-11					3	3
	22642.775729	42244.50672	0.0013927	0.0931	108.3146	65.3263	17.2585
Ind. 17	**11074B**	**LUCH 5A (temp. name)**					
	29-DEC-11					3	3
	22642.725324	42164.83107	0.0001982	4.8600	268.5110	277.9406	58.4836
Ind. 18	**11077A**	**NIGCOMSAT 1R (temp. name)**					
	29-DEC-11					2	2
	22642.319502	27345.41353	0.7587584	24.3393	332.8855	184.2046	105.0837

The longitude histories of objects in this category are given in Figures 6.1 to 6.18.

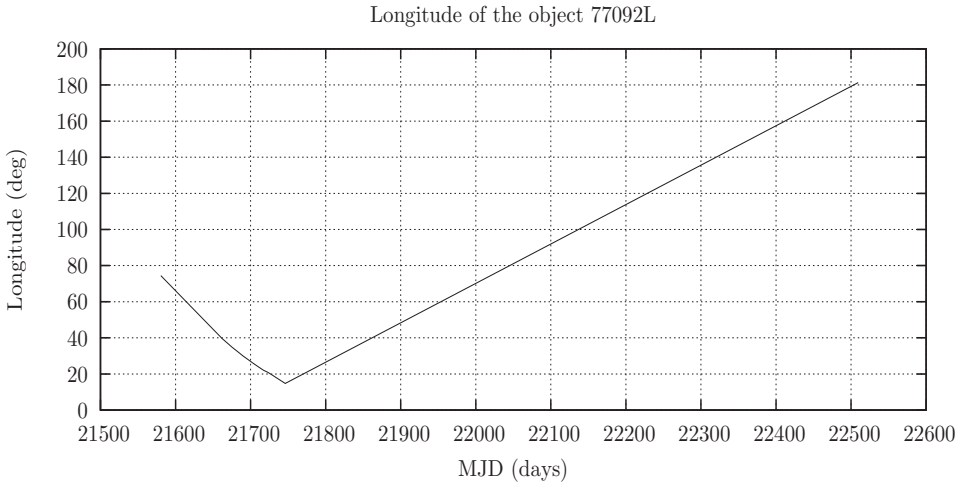

Figure 6.1: Longitude history of 77092L

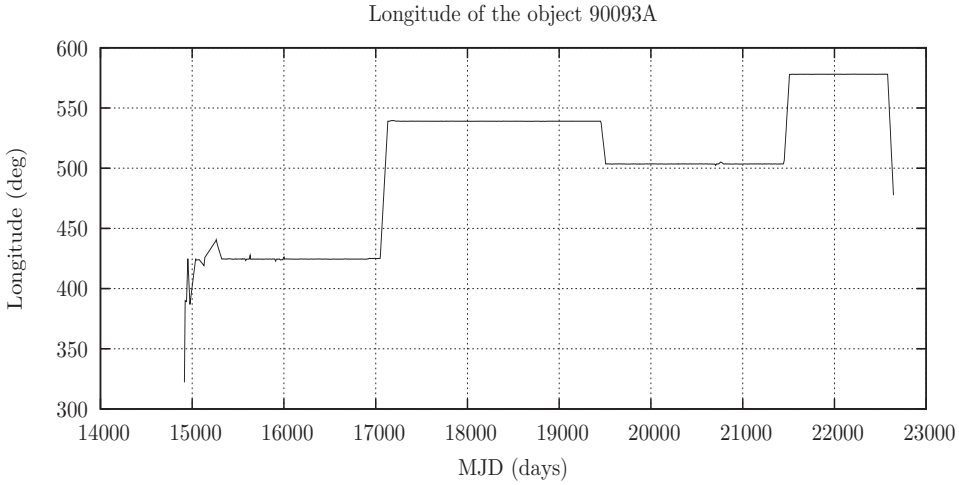

Figure 6.2: Longitude history of 90093A

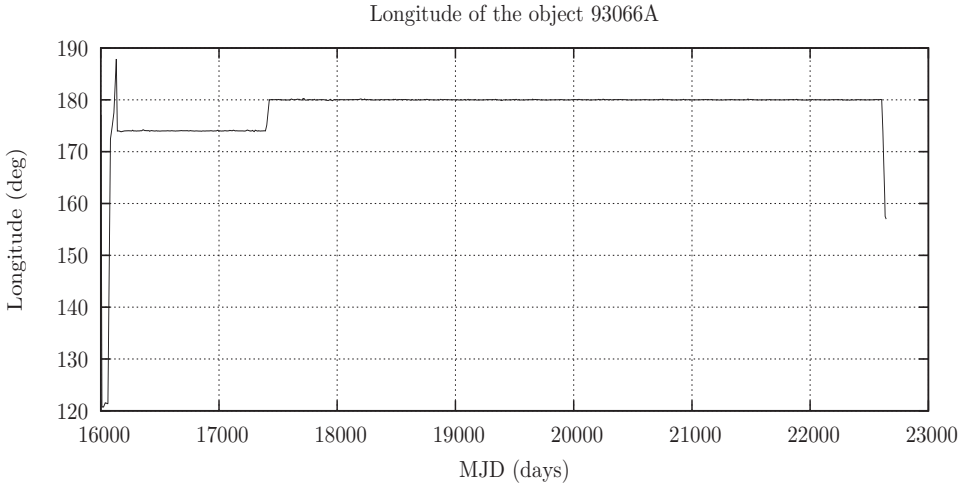

Figure 6.3: Longitude history of 93066A

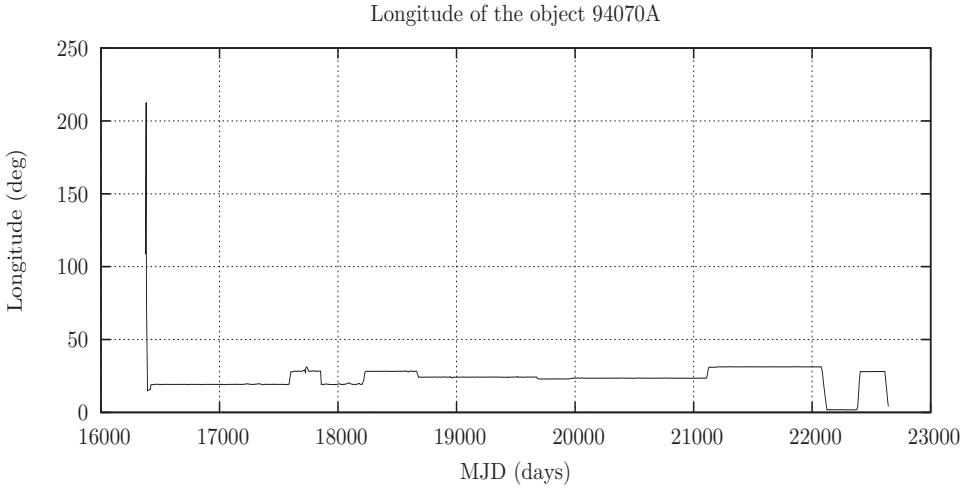

Figure 6.4: Longitude history of 94070A

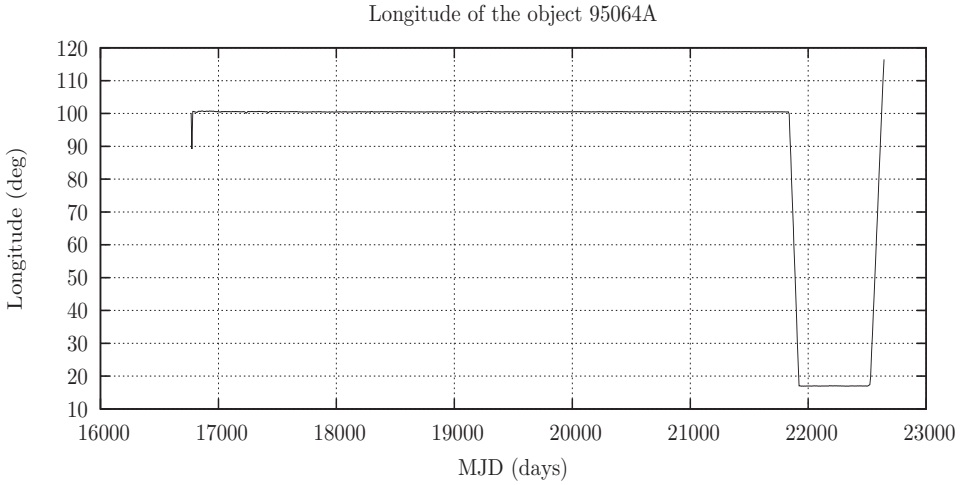

Figure 6.5: Longitude history of 95064A

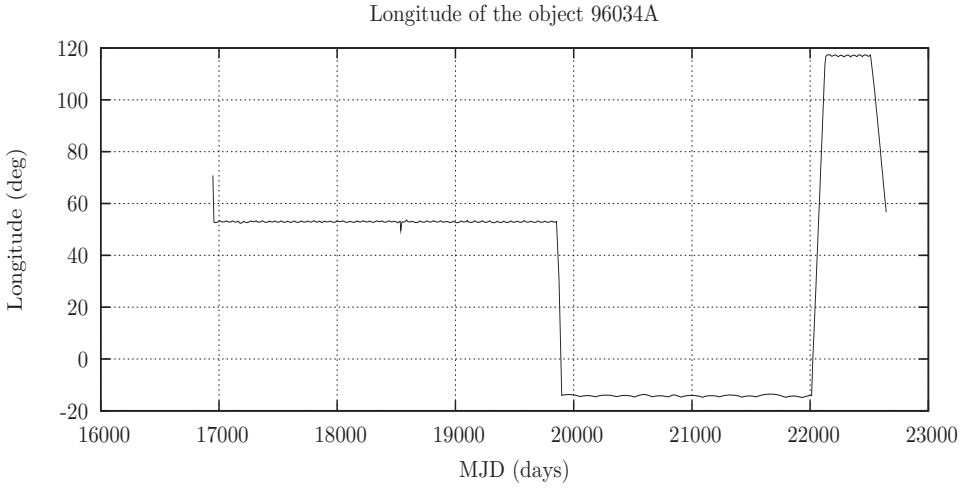

Figure 6.6: Longitude history of 96034A

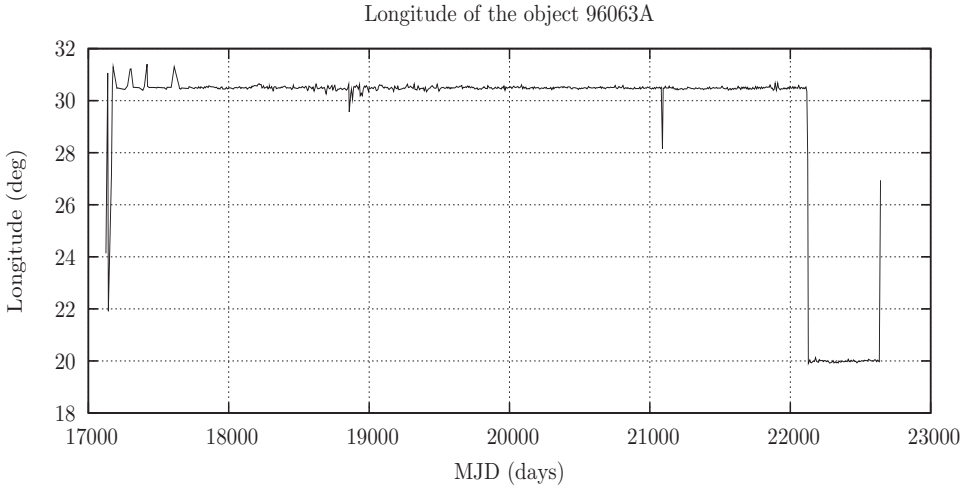

Figure 6.7: Longitude history of 96063A

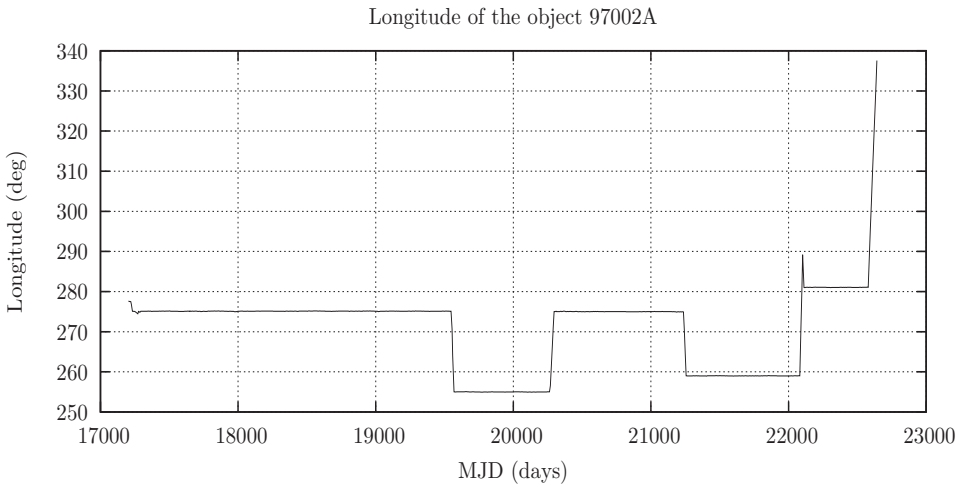

Figure 6.8: Longitude history of 97002A

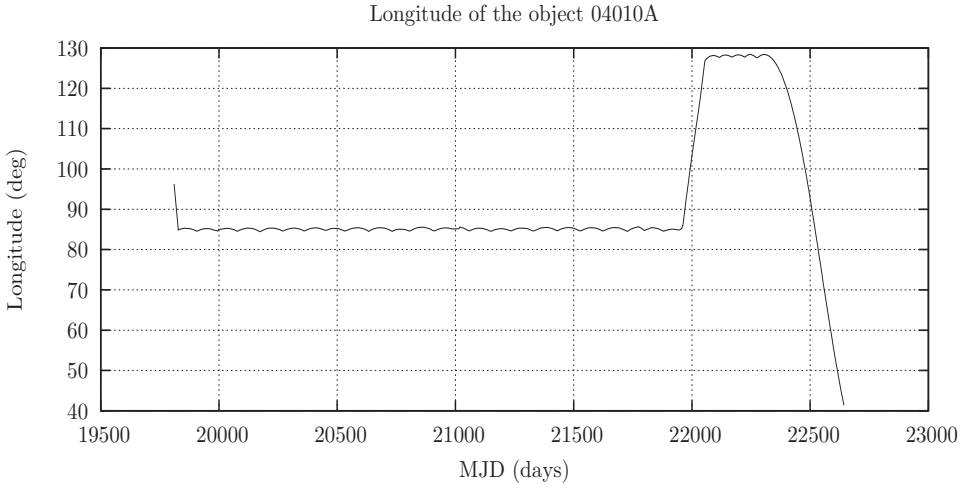

Figure 6.9: Longitude history of 04010A

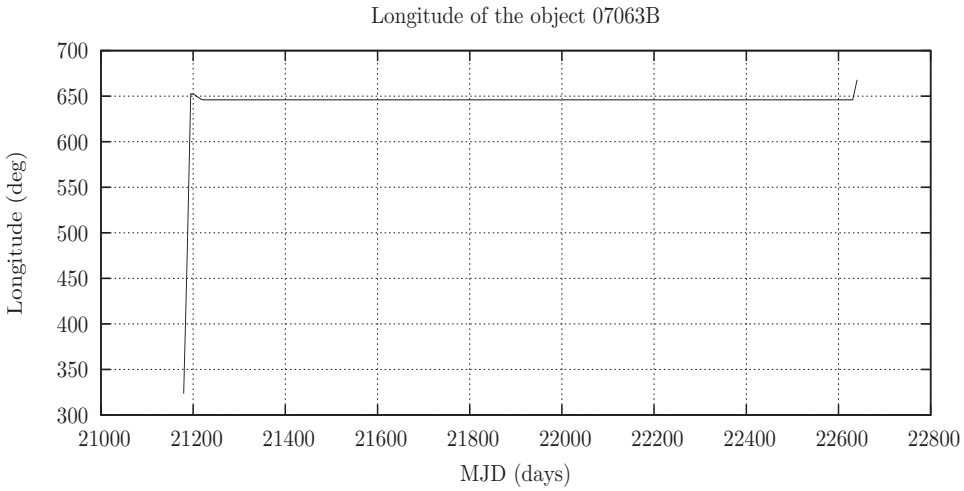

Figure 6.10: Longitude history of 07063B

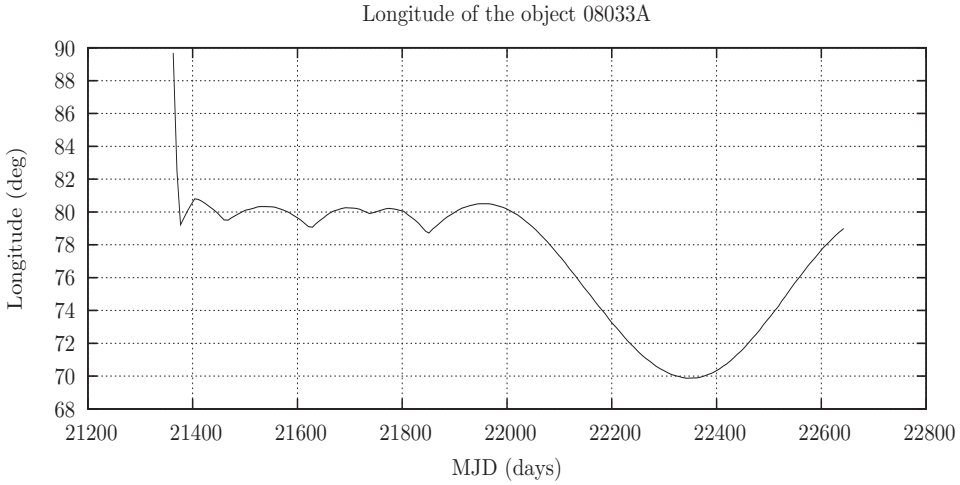

Figure 6.11: Longitude history of 08033A

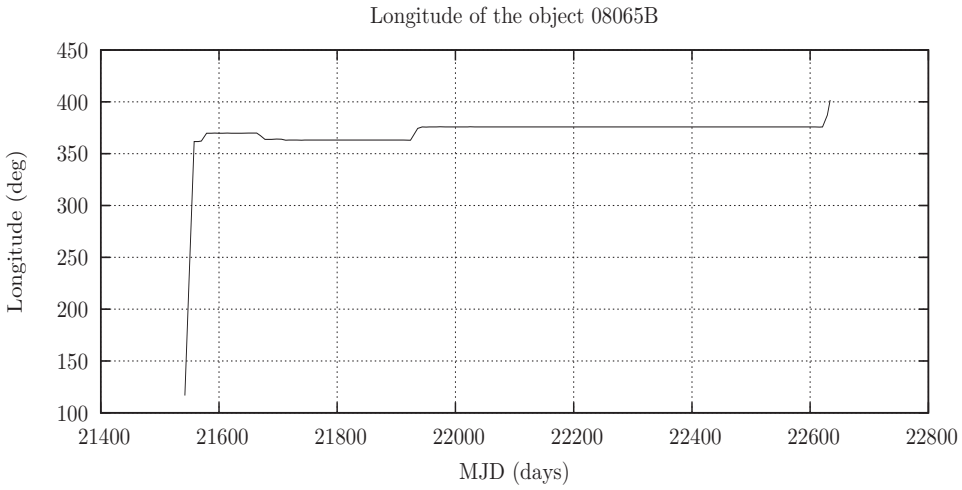

Figure 6.12: Longitude history of 08065B

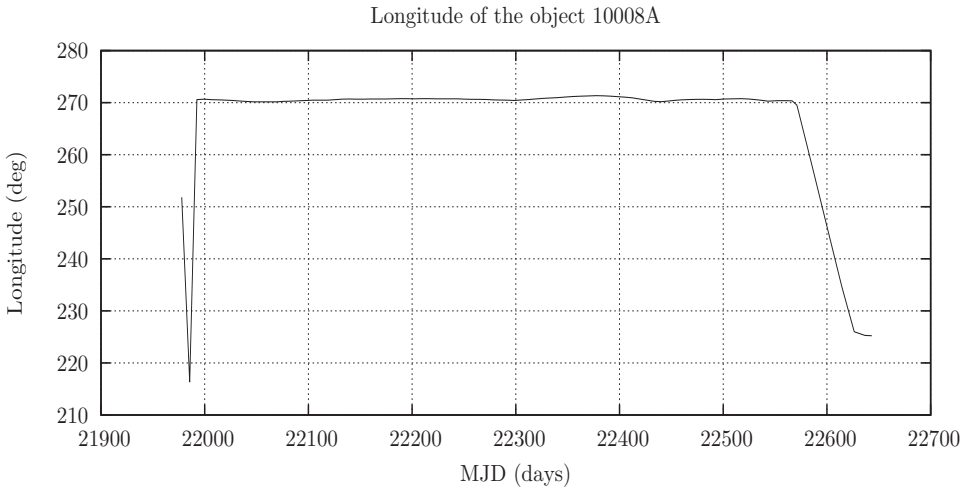

Figure 6.13: Longitude history of 10008A

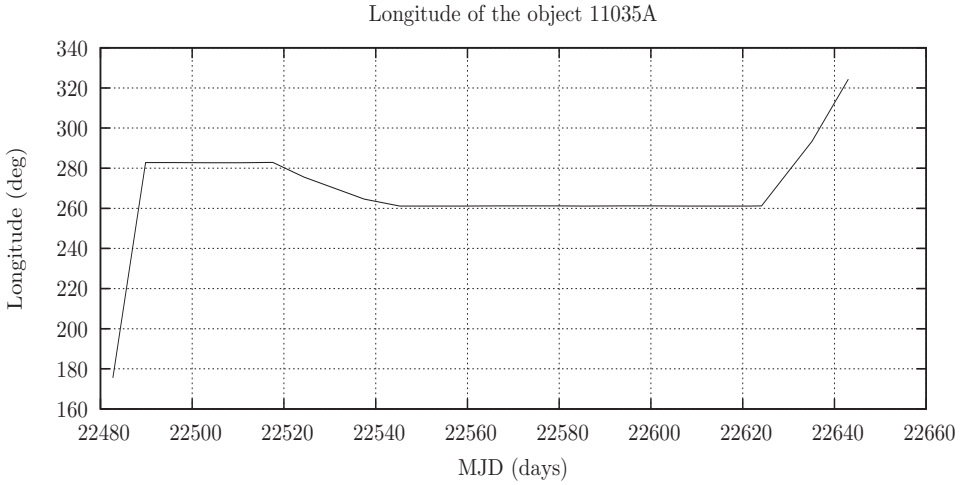

Figure 6.14: Longitude history of 11035A

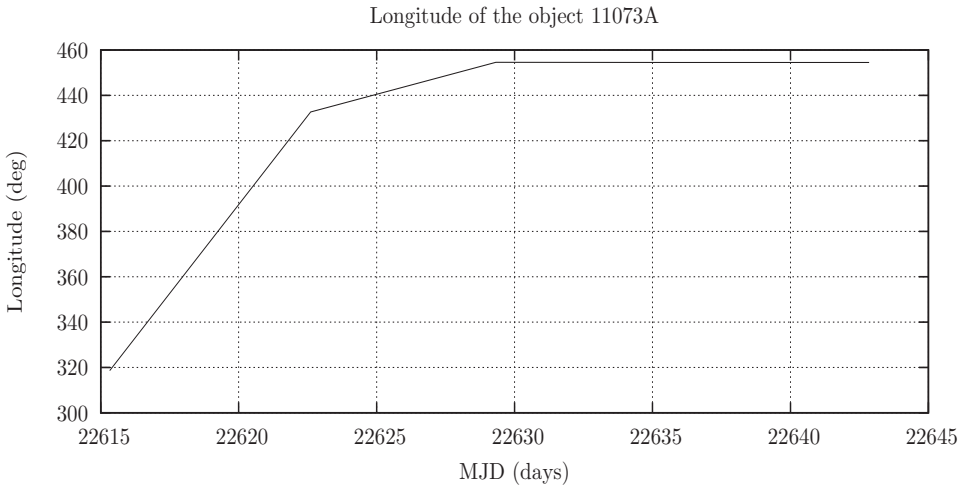

Figure 6.15: Longitude history of 11073A

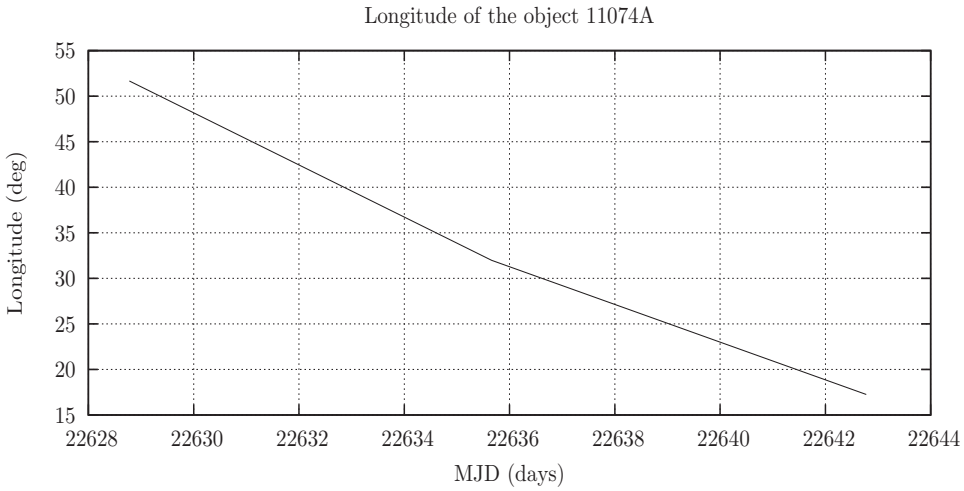

Figure 6.16: Longitude history of 11074A

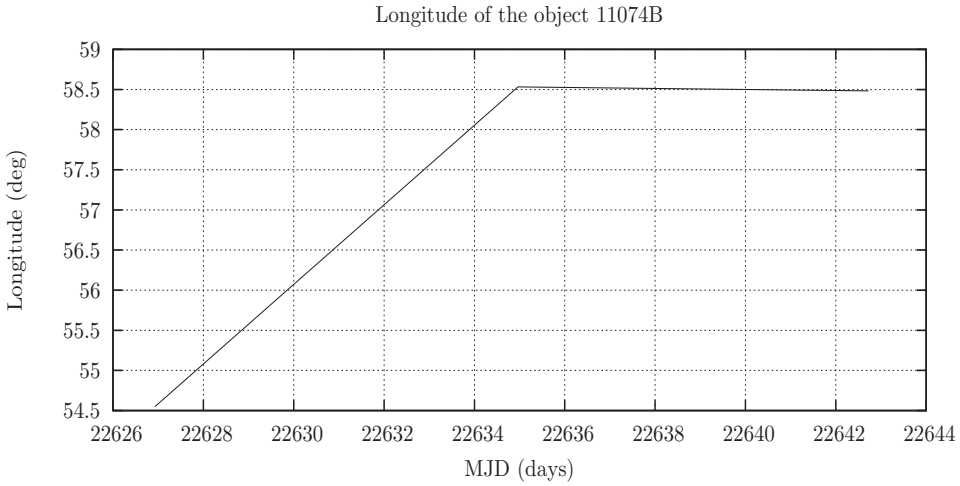

Figure 6.17: Longitude history of 11074B

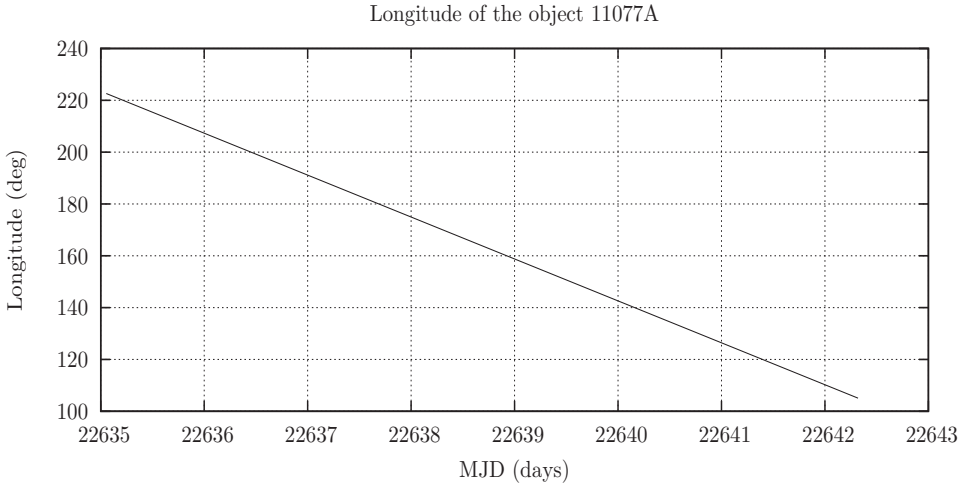

Figure 6.18: Longitude history of 11077A

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

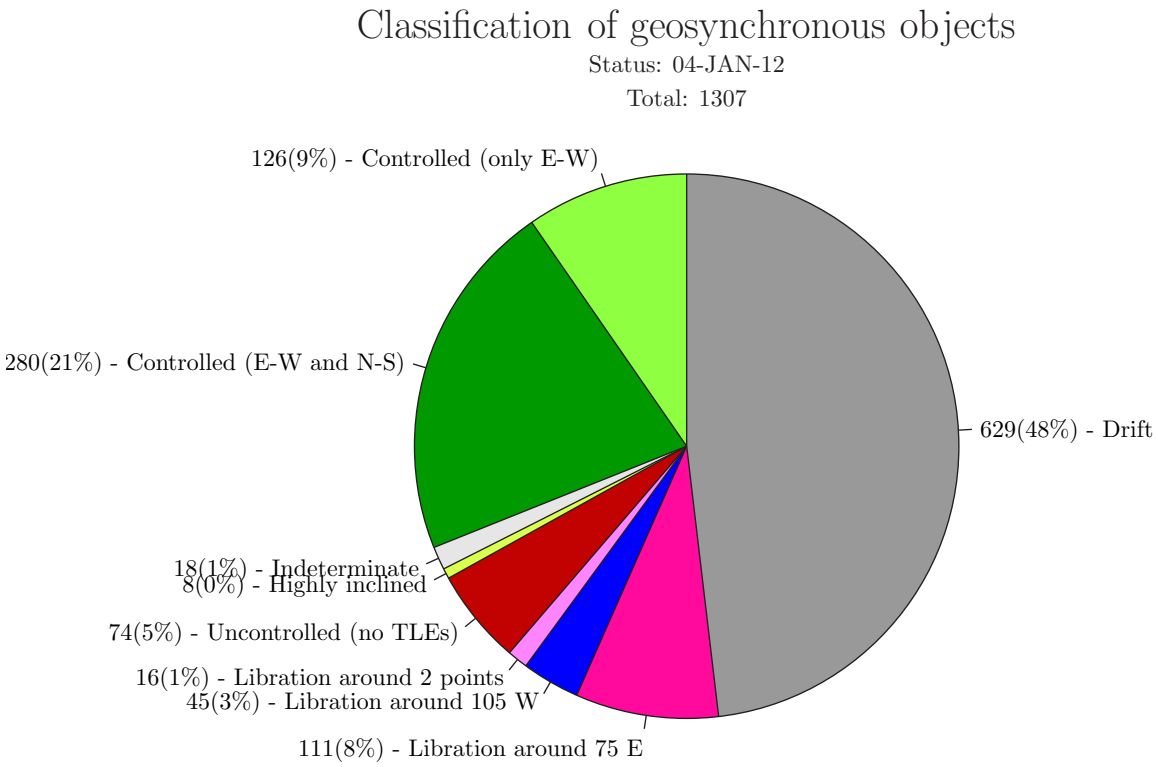

Figure 7.1:
Number of objects in each category

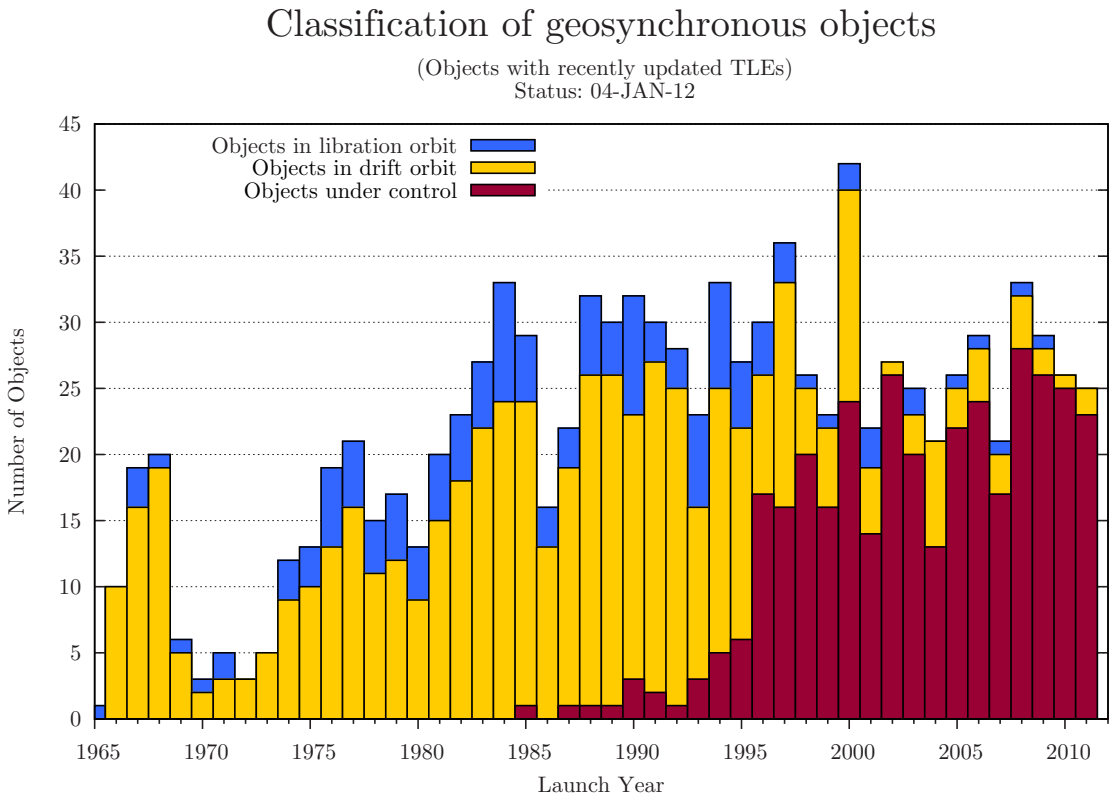

Figure 7.2:
Number of objects in each category according to the launch year.

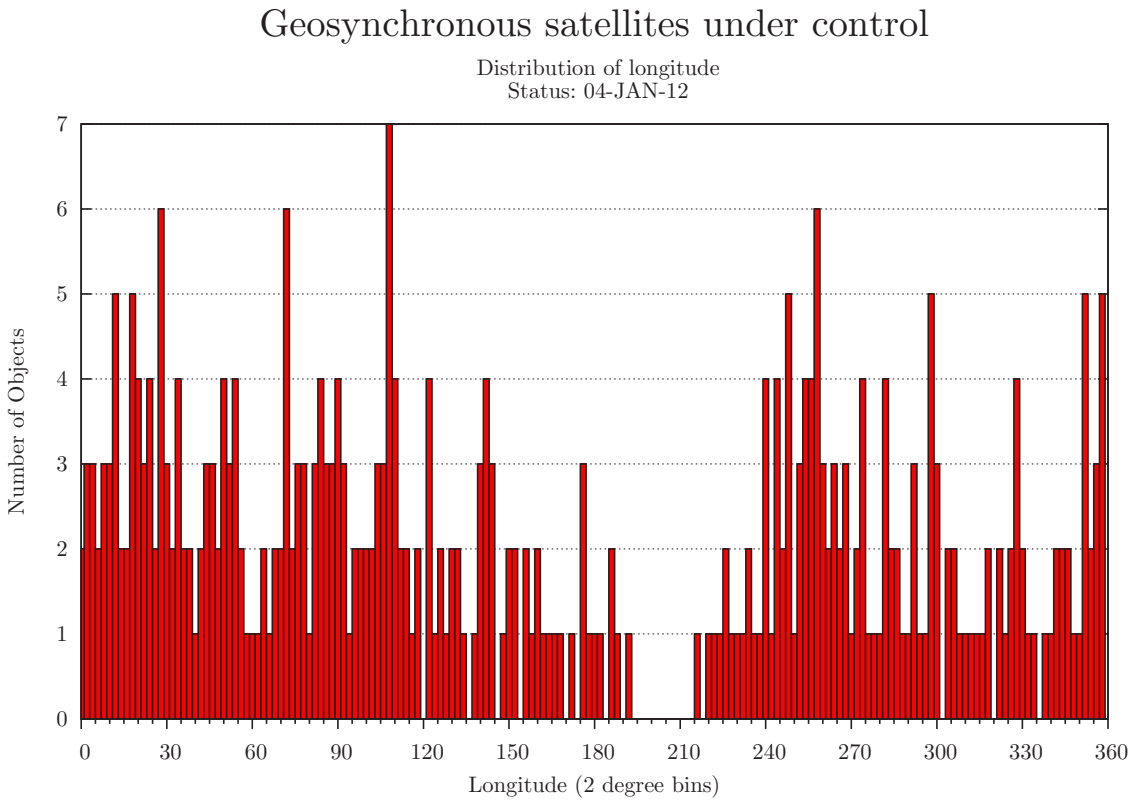

Figure 7.3:
Distribution of the longitude of the 350 satellites under control (with updated TLEs).

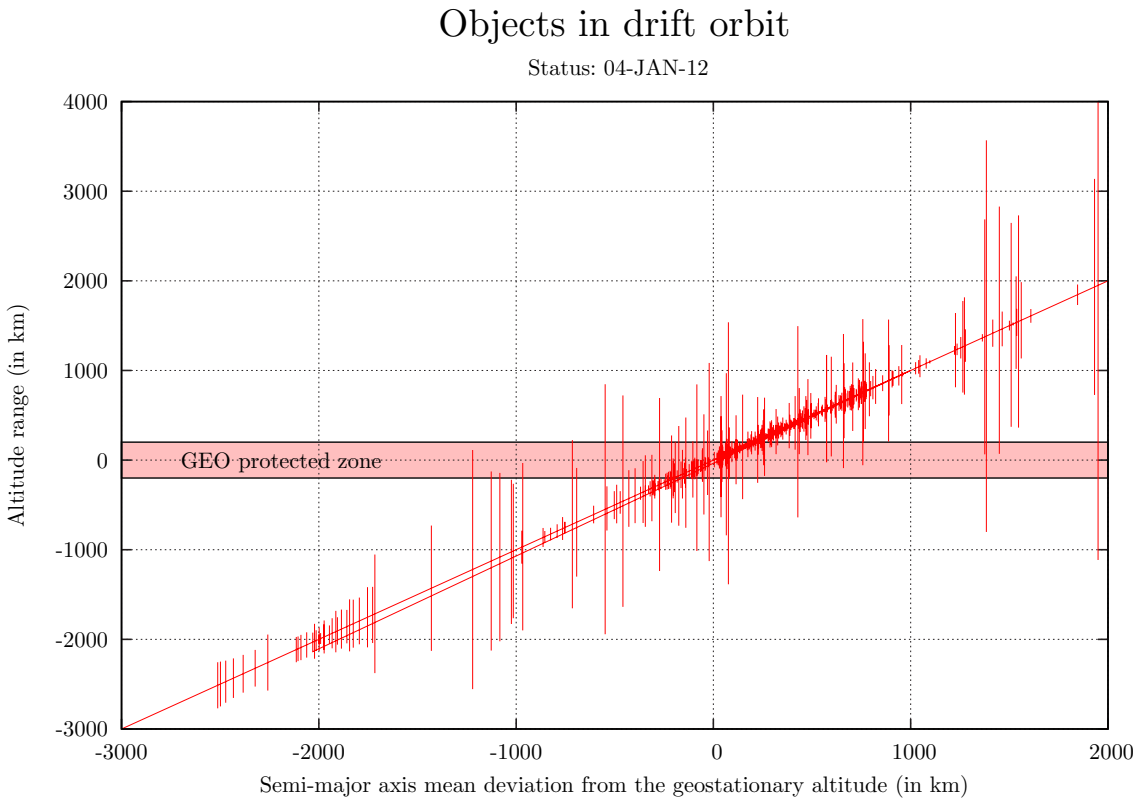

Figure 7.4:
Distribution and altitude range of the objects in drift orbit.

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.

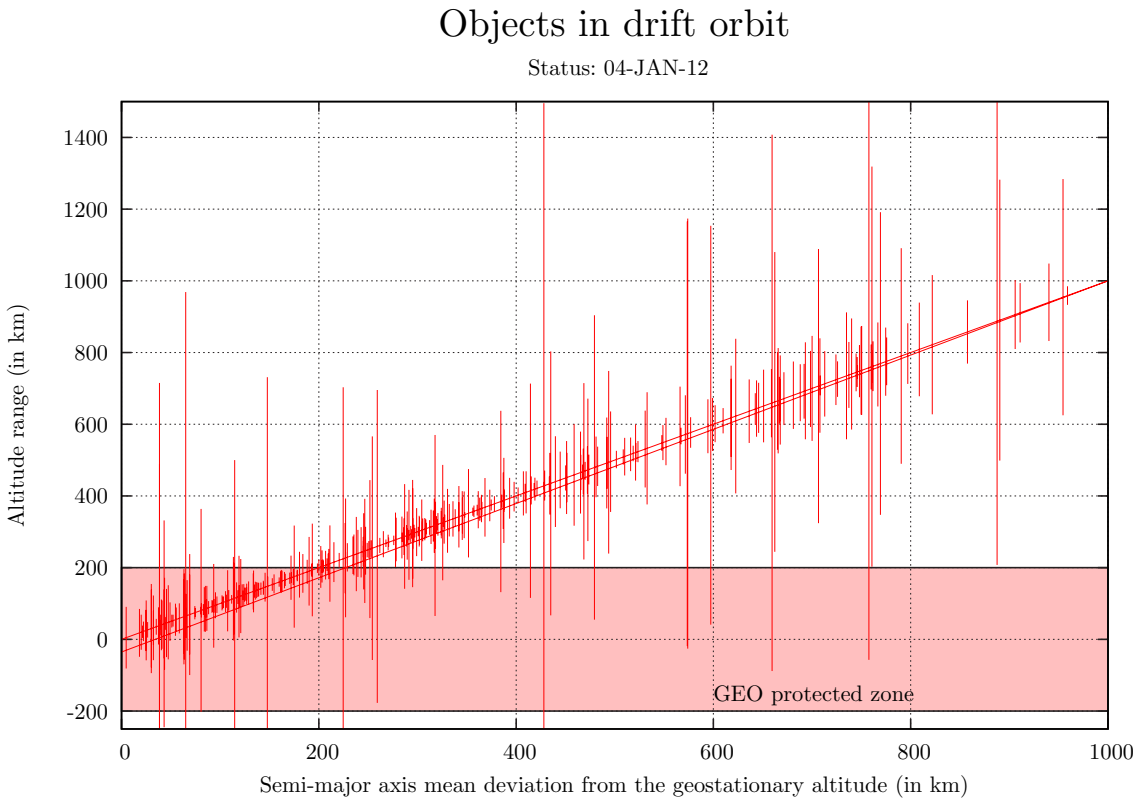

Figure 7.5:
Zoom in the distribution and altitude range of the objects in drift orbit.

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.

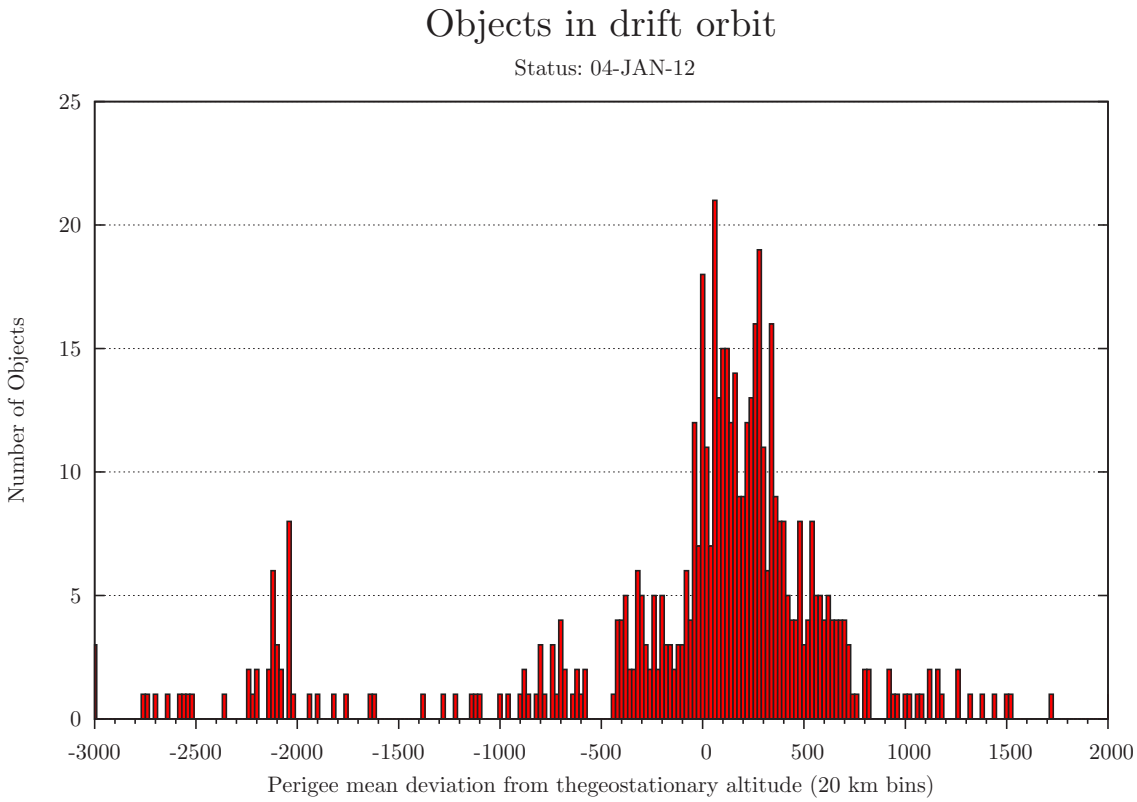

Figure 7.6:
Distribution of the perigee mean deviation from the geostationary altitude.

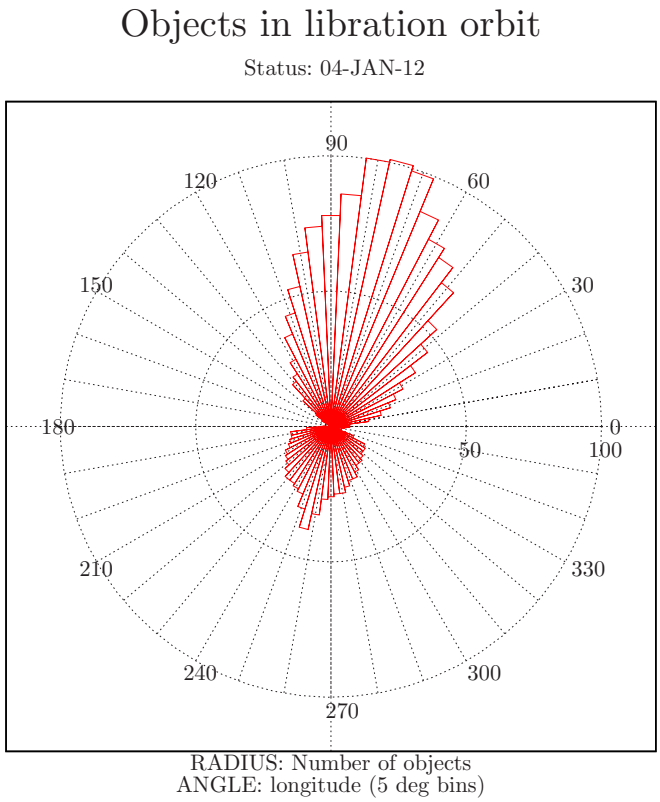

Figure 7.7:
Distribution of the objects in libration orbit in 5-deg bins of geographic longitude.

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.

1069 objects met these criteria as of 31 December 2011. 238 more objects are also known to be in this orbital region. For 164 of them KIAM provided orbital elements; 157 objects can be correlated with a launch and 7 are tracked objects that cannot be correlated with a launch. Thus, the total number of known objects in the geostationary region is 1307 .

They can be classified as follows:

- 406 are controlled (280 under longitude and inclination control),
- 629 are in a drift orbit,
- 172 are in a libration orbit,
- 8 are uncontrolled with no recent orbital elements available,
- 66 are uncatalogued objects which can, however, be associated with a launch,
- 8 are in highly-inclined orbits,
- 18 could not be classified.

Compared with the past issue of February 2011 the following changes can be observed: There were 34 new objects (32 payloads and 2 rocket bodies) launched into or near GEO in 2011. One object launched in 2010 (10039A, USA 214 (AEHF SV-1)) reached GEO in 2011. Starting with this issue of the report we consider also objects with an inclination of up to 70 degrees, replacing the previous limit of 30 degree. A new dedicated Table 3 lists objects in highly-inclined orbits with an inclination larger than 25 degree. Before 2011 6 objects were launched into highly-inclined orbits and are now reported, 2 additional objects were launched in 2011.

At least 14 spacecraft reached end of life as far as can be inferred from the orbital elements stored in DISCOS or declared by spacecraft operators. Only 10 were reorbited more than 250 km above GEO and complied with the IADC reorbiting guidelines:

- TDRS 4 (89021B, USA, 457 km $\times$ 562 km),
- Meteosat 6 (93073B, EUMETSAT, 347 km $\times$ 384 km),
- PAS 2 (94040A, USA, 274 km $\times$ 337 km),
- Intelsat VII F-5 (95013A, INTELSAT, 287 km $\times$ 450 km),

- PAS 3R (96002A, USA, 287 km × 385 km),
- Echostar 4 (98028A, USA, 329 km × 417 km),
- GOES 11 (00022A, USA, 340 km × 355 km),
- Beidou (00069A, China, 308 km × 465 km),
- BSAT-2a (01011B, Japan, 313 km × 340 km),
- Estrela do Sul 1 (Telstar 14) (04001A, Brazil, 384 km × 434 km).

One spacecraft was reorbited below the GEO, which is also compliant with the IADC reorbiting guidelines:

- Hot Bird 3 (97049A, EUTELSAT, -705 km × -510 km).

Three spacecraft were reorbited too low:

- Intelsat VI F-1 (91075A, INTELSAT, 177 km × 208 km)
- Beidou 1B (00082A, China, 141 km × 433 km)
- GSAT-2 (03018A, India, 103 km × 135 km)

At least one spacecraft seems to be abandoned and has started librating around the libration point L1, already in 2009:

- Beidou DW2 (Compass G2) (09018A, China).

In addition, two spacecraft listed in Table 2 were reorbited in 2011 and complied with the IADC reorbiting guidelines:

- USA 39 (DSP F14) (89046A, USA, 400 km × 425 km),
- USA 158 (GeoLITE) (01020A, USA, 325 km × 490 km).

The status of Cosmos-2240 (08033A, Russia) is indeterminate, as it is in an L1-type orbit, but it is not passive.

Currently, Raduga-1 (04010A, Russia) is in an L1-type orbit, but is unclear whether it has reached end-of-life.

Orbital data of Galaxy 15 (05041A), stranded in a orbit librating around the libration point L2, confirm that it is under full control again, as already indicated in the last issue of this report.

The perigee of the drifting GOES-10 (97019A) dropped by about 20 km around September 15, 2011. As the spacecraft was decommissioned in 2009 and no known energy source remained on-board this might be due to an impact of an unknown object.

The reported reorbits of Insat 2E and Insat 4CR in issue 13 of this report must be corrected due to a mistagging in the DISCOS TLE data. In fact Insat 3B (00016B) instead of Insat 2E (99016A), and GSAT 3 (04036A) instead of Insat 4CR (07037A) were reorbited.

One object (98024B, BSAT-1b) that we reported to have reached end-of-life and to have been re-orbited into a 295 km $\times$ 340 km orbit in 2008 (in issue 10 of this report) is also subject to mistagging. In fact BS-3N (94040B) was deorbited in 2008.

In the previous versions of this report ATS 3 (67111A) was reported as controlled (C2). ATS3 was decommissioned in 2001 and is librating around L2 with a very small amplitude of only 0.3 deg.

This analysis has shown that in 2011, fourteen years after the IADC guidelines were established, there are still satellites that were not or could not be properly reorbited.

9 References

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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.

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