

EUROPEAN SPACE AGENCY  
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**CLASSIFICATION OF  
GEOSYNCHRONOUS OBJECTS**

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by

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## Abstract

This is a status report on geosynchronous objects as of the end of 2009. 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 30 deg) is analysed. From 1161 objects for which orbital data are available, 391 are controlled inside their longitude slots, 594 are drifting above, below or through GEO, 169 are in a libration orbit and 7 whose status could not be determined. Furthermore, there are 77 uncontrolled objects without orbital data (of which 66 have not been catalogued). Thus the total number of known objects in the geostationary region is 1238.

During 2009 twenty-one spacecraft reached end-of-life. Eleven of them were reorbited following the IADC recommendations, one spacecraft was reorbited with a perigee of 225 km - it is not yet clear if it will enter the 200-km protected zone around GEO or not -, six spacecraft were reorbited too low and three spacecraft did not or could not make any reorbiting manoeuvre at all and are 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, six 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.

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 30 degrees

The basic source of information are the NASA Two-Line Elements (TLE). 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). As the data are determined by passive sensors, their accuracy 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 the status of which 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 three tables, there is a list of all objects in ascending order of their COSPAR identification 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: 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.
- Ind: the status could not be determined.
- U: uncontrolled objects (source: KIAM - no TLEs available).

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

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

COSPAR	NAME	TABLE	STATUS	No
64047A	Syncom 3	1.	D	376.
65028A	Intelsat I F-1	1.	L2	23.
66053A	GGTS 1	1.	D	491.
66053B	IDCSP 1	1.	D	489.
66053C	IDCSP 2	1.	D	487.
66053D	IDCSP 3	1.	D	484.
66053E	IDCSP 4	1.	D	481.
66053F	IDCSP 5	1.	D	478.
66053G	IDCSP 6	1.	D	475.
66053H	IDCSP 7	1.	D	473.
66053J	Titan IIC stage 3 (Transtage)	1.	D	471.
66110A	ATS 1	1.	D	379.
67001A	Intelsat II F-2	1.	D	377.
67003A	IDCSP 8	1.	D	495.
67003B	IDCSP 9	1.	D	494.
67003C	IDCSP 10	1.	D	493.
67003D	IDCSP 11	1.	D	492.
67003E	IDCSP 12	1.	D	490.
67003F	IDCSP 13	1.	D	483.
67003G	IDCSP 14	1.	D	480.
67003H	IDCSP 15	1.	D	476.
67003J	Titan IIC stage 3 (Transtage)	2.	U	1.
67026A	Intelsat II F-3	1.	L1	99.
67066A	IDCSP 16	1.	D	502.
67066B	IDCSP 17	1.	D	501.
67066C	IDCSP 18	1.	D	500.
67066D	IDCSP 19	1.	D	499.
67066E	LES 5	1.	D	498.
67066F	DODGE 1	1.	D	497.
67066G	Titan IIC stage 3 (Transtage)	1.	D	496.
67094A	Intelsat II F-4	1.	L2	27.
67111A	ATS 3	1.	C2	58.
68050A	OPS 9341 (IDSCS 20)	1.	D	488.
68050B	OPS 9342 (IDSCS 21)	1.	D	486.
68050C	OPS 9343 (IDSCS 22)	1.	D	485.
68050D	OPS 9344 (IDSCS 23)	1.	D	482.
68050E	OPS 9345 (IDSCS 24)	1.	D	479.
68050F	OPS 9346 (IDSCS 25)	1.	D	477.
68050G	OPS 9347 (IDSCS 26)	1.	D	474.
68050H	OPS 9348 (IDSCS 27)	1.	D	472.
68050J	Titan IIC stage 3 (Transtage)	1.	D	470.
68063A	OPS 2222 (CANYON 1)	2.	D1	66.
68063B	Atlas SLV-3A stage 2 (Agena D)	2.	D1	8.
68081A	OV2 5	1.	D	446.
68081C	OV5 4	2.	U	2.
68081D	LES 6	1.	L2	21.
68081E	Titan IIC stage 3 (Transtage)	1.	D	444.
68081G	LES 6 operational debris	1.	D	420.
68081H	LES 6 operational debris	1.	D	449.
68081J	Transtage 5 debris	1.	D	412.
68081K	Transtage 5 debris	1.	D	453.
68081L	Transtage 5 debris	1.	D	450.
68081M	Transtage 5 debris	1.	D	405.
68081N	Transtage 5 debris	1.	D	414.
68081P	Transtage 5 debris	1.	D	440.

COSPAR	NAME	TABLE	STATUS	No
68116A	Intelsat III F-2	1.	D	2.
69013A	TACSAT 1	1.	D	384.
69013B	Titan IIC stage 3 (Transtage)	1.	D	48.
69036A	OPS 3148 (CANYON 2)	2.	D	39.
69036B	Atlas SLV-3A stage 2 (Agena D)	2.	D	3.
69045A	Intelsat III F-4	1.	D	1.
69069A	ATS 5	1.	D	243.
69069C	JPL SR-28-3 (ATS 5 AKM)	1.	D	92.
69101A	Skynet 1A	1.	L2	6.
70003A	Intelsat III F-6	1.	D	187.
70021A	NATO I	1.	L2	9.
70032A	Intelsat III F-7	2.	L1	2.
70046A	OPS 5346 (Rhyolite 1)	2.	L1	4.
70055A	Intelsat III F-8	1.	D	456.
70069A	OPS 7329 (CANYON 3)	2.	L2	4.
70069B	Atlas SLV-3A stage 2 (Agena D)	2.	D	9.
71006A	Intelsat IV F-2	1.	D	147.
71009A	NATO IIB	1.	L2	5.
71039A	OPS 3811 (DSP F2)	2.	D	82.
71039B	Titan IIC stage 3 (Transtage)	2.	D	40.
71095A	OPS 9431 (DSCS II F-1)	1.	L2	10.
71095B	OPS 9432 (DSCS II F-2)	1.	L3	2.
71095C	Titan IIC stage 3 (Transtage)	1.	D	36.
71116A	Intelsat IV F-3	1.	D	260.
72003A	Intelsat IV F-4	1.	D	293.
72010A	OPS 1570 (DSP F3)	2.	D	48.
72010B	Titan IIC stage 3 (Transtage)	2.	D	28.
72041A	Intelsat IV F-5	1.	D	350.
72090A	Anik A1	1.	D	146.
72101A	OPS 9390 (CANYON 5)	2.	L1	8.
72101B	Atlas SLV-3A stage 2 (Agena D)	2.	D	5.
73013A	OPS 6063 (Rhyolite 2)	2.	L1	3.
73023A	Anik A2	1.	D	287.
73040A	OPS 6157 (DSP F4)	2.	D	47.
73040B	Titan IIC stage 3 (Transtage)	2.	D	56.
73058A	Intelsat IV F-7	1.	D	181.
73100A	OPS 9433 (DSCS II F-3)	1.	D	51.
73100B	OPS 9434 (DSCS II F-4)	1.	D	41.
73100D	Titan IIC stage 3 (Transtage)	1.	D	8.
74017A	Cosmos 637	1.	D	406.
74017F	Proton-K fourth stage (Block DM)	1.	D	417.
74022A	Westar I	1.	D	309.
74033A	SMS 1	1.	D	121.
74039A	ATS 6	1.	D	452.
74039C	Titan IIC stage 3 (Transtage)	1.	D	401.
74060A	Molniya 1-S	1.	L1	59.
74060F	Proton-K fourth stage (Block DM)	1.	L1	77.
74075A	Westar II	1.	D	300.
74093A	Intelsat IV F-8	1.	D	284.
74094A	Skynet 2B	1.	L1	94.
74101A	Symphonie A	1.	D	320.
75011A	SMS 2	1.	D	244.
75011F	Aerojet SVM-5 (SMS 2 AKM)	1.	D	118.
75038A	Anik A3	1.	D	341.
75042A	Intelsat IV F-1	1.	D	211.



COSPAR	NAME	TABLE	STATUS	No
75055A	OPS 4966 (CANYON 6)	2.	L1	6.
75055B	Atlas SLV-3A stage 2 (Agena D)	2.	D	7.
75077A	Symphonie B	1.	D	324.
75091A	Intelsat IVA F-1	1.	D	314.
75097A	Cosmos 775	1.	L1	65.
75097F	Proton-K fourth stage (Block DM)	1.	D	349.
75100A	GOES 1	1.	L2	15.
75100F	Aerojet SVM-5 (GOES 1 AKM)	1.	D	451.
75117A	RCA Satcom I	1.	D	258.
75118A	OPS 3165 (DSP F5)	2.	D	37.
75118C	Titan IIC stage 3 (Transtage)	2.	D	34.
75118D	OPS 3165 debris (Telescope aperture suncover)	2.	U	3.
75123A	Raduga 1	1.	L1	20.
75123F	Proton-K fourth stage (Block DM)	1.	D	390.
76004A	Hermes	1.	L2	19.
76010A	Intelsat IVA F-2	1.	D	269.
76017A	Marisat 1	1.	D	197.
76023A	LES 8 (RTGPP)	1.	L2	11.
76023B	LES 9 (RTGPP)	1.	L2	3.
76023F	Titan IIC stage 3 (Transtage)	1.	D	96.
76023J	LES 8, LES 9 operational debris	1.	D	95.
76023K	LES 8, LES 9 operational debris	1.	D	436.
76029A	RCA Satcom II	1.	D	123.
76035A	NATO IIIA	1.	D	297.
76042A	Comstar 1A	1.	D	291.
76053A	Marisat 2	1.	D	20.
76059A	OPS 2112 (DSP F6)	2.	D	59.
76059C	Titan IIC stage 3 (Transtage)	2.	D	35.
76059D	OPS 2112 debris (Telescope aperture suncover)	2.	U	4.
76066A	Palapa 1	1.	D	346.
76073A	Comstar 2	1.	D	326.
76092A	Raduga 2	1.	L1	22.
76092F	Proton-K fourth stage (Block DM)	1.	L1	36.
76101A	Marisat 3	1.	D	44.
76107A	Ekran 1	1.	L1	37.
76107F	Proton-K fourth stage (Block DM)	1.	D	442.
77005A	NATO IIIB	1.	D	13.
77007A	OPS 3151 (DSP F7)	2.	D	84.
77007C	Titan IIC stage 3 (Transtage)	2.	U	5.
77007D	OPS 3151 debris (Telescope aperture suncover)	2.	D	31.
77014A	Kiku-2	1.	D	331.
77018A	Palapa 2	1.	D	337.
77034A	OPS 9437 (DSCS II F-7)	1.	D	30.
77034B	OPS 9438 (DSCS II F-8)	1.	D	15.
77034C	Titan IIC stage 3 (Transtage)	1.	D	17.
77038A	OPS 9751 (CANYON 7)	2.	L1	1.
77038C	Atlas SLV-3A stage 2 (Agena D)	2.	D	4.
77041A	Intelsat IVA F-4	1.	D	237.
77048A	GOES 2	1.	D	227.
77048G	Aerojet SVM-5 (GOES 2 AKM)	1.	D	395.
77065A	Himawari	1.	D	209.
77071A	Raduga 3	1.	L1	68.
77071F	Proton-K fourth stage (Block DM)	1.	D	60.
77080A	SIRIO 1	1.	L1	2.
77092A	Ekran 2	1.	L1	43.

<b>COSPAR</b>	<b>NAME</b>	<b>TABLE</b>	<b>STATUS</b>	<b>No</b>
77092G	Proton-K fourth stage (Block DM)	1.	D	432.
77092H	Ekran 2 fragmentation debris	1.	L1	83.
77092J	Ekran 2 fragmentation debris	1.	D	335.
77092K	Ekran 2 fragmentation debris	1.	D	358.
77092L	Ekran 2 fragmentation debris	1.	L3	6.
77108A	Meteosat 1	1.	L1	89.
77108D	Mage 1 (Meteosat 1 AKM)	1.	D	66.
77114A	OPS 4258 (AQUACADE 3)	2.	L2	2.
77118A	Sakura	1.	D	155.
78002A	Intelsat IVA F-3	1.	D	311.
78016A	OPS 6391 (FLTSATCOM F1)	2.	D	70.
78035A	Intelsat IVA F-6	1.	L1	95.
78038A	OPS 8790 (AQUACADE 4)	2.	D	36.
78039A	Yuri	1.	L1	60.
78044A	OTS 2	1.	D	179.
78058A	OPS 9454 (VORTEX 1) (CHALET 1)	2.	D	43.
78058B	Titan IIC stage 3 (Transtage)	2.	D	52.
78062A	GOES 3	1.	L2	7.
78062D	Aerojet SVM-5 (GOES 3 AKM)	1.	D	242.
78068A	Comstar 3	1.	D	195.
78071A	ESA GEOS 2	1.	D	224.
78073A	Raduga 4	1.	L1	64.
78073F	Proton-K fourth stage (Block DM)	1.	D	42.
78106A	NATO IIC	1.	D	110.
78113A	OPS 9441 (DSCS II F-11)	1.	D	5.
78113B	OPS 9442 (DSCS II F-12)	1.	D	106.
78113D	Titan IIC stage 3 (Transtage)	1.	D	4.
78116A	Anik B1	1.	D	289.
79007A	Scatha	1.	D	445.
79007C	Scatha AKM	1.	D	447.
79015A	Ekran 3	1.	L1	44.
79015D	Proton-K fourth stage (Block DM)	1.	D	433.
79035A	Raduga 5	1.	L1	19.
79035E	Proton-K fourth stage (Block DM)	1.	D	367.
79038A	OPS 6392 (FLTSATCOM F2)	1.	D	114.
79053A	OPS 7484 (DSP F8)	2.	D	75.
79053C	Titan IIC stage 3 (Transtage)	2.	D	61.
79053D	OPS 7484 debris (Telescope aperture suncover)	2.	U	6.
79062A	Gorizont 2	1.	L1	25.
79062D	Proton-K fourth stage (Block DM)	1.	D	54.
79072A	Westar III	1.	D	319.
79086A	OPS 1948 (VORTEX 2) (CHALET 2)	2.	D	41.
79086C	Titan IIC stage 3 (Transtage)	2.	D	51.
79087A	Ekran 4	1.	L1	34.
79087C	Proton-K fourth stage (Block DM)	1.	D	388.
79098A	OPS 9443 (DSCS II F-13)	1.	D	18.
79098B	OPS 9444 (DSCS II F-14)	1.	D	102.
79098C	Titan IIC stage 3 (Transtage)	1.	D	14.
79105A	Gorizont 3	1.	L1	62.
79105E	Proton-K fourth stage (Block DM)	1.	D	129.
80004A	OPS 6393 (FLTSATCOM F3)	1.	L2	35.
80016A	Raduga 6	1.	L1	57.
80016D	Proton-K fourth stage (Block DM)	1.	D	49.
80049A	Gorizont 4	1.	D	125.
80049F	Proton-K fourth stage (Block DM)	1.	D	74.

COSPAR	NAME	TABLE	STATUS	No
80060A	Ekran 5	2.	L3	1.
80060F	Proton-K fourth stage (Block DM)	1.	D	448.
80074A	GOES 4	1.	D	204.
80081A	Raduga 7	1.	L2	30.
80081F	Proton-K fourth stage (Block DM)	1.	D	322.
80087A	OPS 6394 (FLTSATCOM F4)	2.	D	72.
80091A	SBS I	1.	D	290.
80098A	Intelsat V F-2	1.	D	150.
80104A	Ekran 6	1.	L1	39.
80104E	Proton-K fourth stage (Block DM)	1.	D	434.
81018A	Comstar 4	1.	L1	9.
81025A	OPS 7350 (DSP F9)	2.	D	74.
81025C	Titan IIC stage 3 (Transtage)	2.	D	11.
81027A	Raduga 8	1.	D	381.
81027F	Proton-K fourth stage (Block DM)	1.	D	53.
81049A	GOES 5	1.	L2	18.
81050A	Intelsat V F-1	1.	D	148.
81057A	Meteosat 2	1.	D	133.
81057B	APPLE	1.	D	334.
81057F	Mage 1 (Meteosat 2 AKM)	1.	D	223.
81061A	Ekran 7	1.	L1	45.
81061F	Proton-K fourth stage (Block DM)	1.	D	419.
81069A	Raduga 9	1.	L1	69.
81069F	Proton-K fourth stage (Block DM)	1.	D	58.
81073A	FLTSATCOM F5	1.	D	119.
81076A	Himawari-2	1.	D	251.
81096A	SBS II	1.	D	362.
81102A	Raduga 10	1.	L1	18.
81102F	Proton-K fourth stage (Block DM)	1.	D	375.
81107A	OPS 4029 (VORTEX 3)	2.	L2	1.
81107C	Titan IIC stage 3 (Transtage)	2.	D	53.
81114A	RCA Satcom IIIR	1.	D	351.
81119A	Intelsat V F-3	1.	D	241.
81122A	Marecs A	1.	D	10.
82004A	RCA Satcom IV	1.	D	257.
82009A	Ekran 8	1.	D	317.
82009F	Proton-K fourth stage (Block DM)	1.	D	416.
82014A	Westar IV	1.	D	281.
82017A	Intelsat V F-4	1.	D	202.
82019A	OPS 8701 (DSP F10)	2.	D	80.
82019B	Titan IIC stage 3 (Transtage)	2.	D	16.
82020A	Gorizont 5	1.	D	112.
82020F	Proton-K fourth stage (Block DM)	1.	D	127.
82031A	Insat-IA	1.	L1	76.
82044A	Cosmos 1366	1.	L1	13.
82044F	Proton-K fourth stage (Block DM)	1.	L3	1.
82058A	Westar V	1.	D	199.
82082A	Anik D1	1.	D	353.
82093A	Ekran 9	1.	L1	54.
82093F	Proton-K fourth stage (Block DM)	1.	D	430.
82097A	Intelsat V F-5	1.	D	104.
82103A	Gorizont 6	1.	L2	28.
82103E	Proton-K fourth stage (Block DM)	1.	D	380.
82105A	Aurora I	1.	L2	4.
82106A	DSCS II F-16	1.	D	11.

<b>COSPAR</b>	<b>NAME</b>	<b>TABLE</b>	<b>STATUS</b>	<b>No</b>
82106B	DSCS III A-01	2.	D	83.
82106D	IUS stage 2	1.	D	225.
82110B	SBS III	1.	D	315.
82110C	Anik C3	1.	D	310.
82113A	Raduga 11	1.	D	59.
82113F	Proton-K fourth stage (Block DM)	1.	D	43.
83006A	Sakura 2A	1.	D	232.
83016A	Ekran 10	1.	D	9.
83016F	Proton-K fourth stage (Block DM)	1.	D	424.
83026B	TDRS-East	1.	C2	74.
83028A	Raduga 12	1.	L1	17.
83028F	Proton-K fourth stage (Block DM)	1.	D	339.
83030A	RCA Satcom IR	1.	D	301.
83041A	GOES 6	1.	L2	16.
83047A	Intelsat V F-6	1.	D	188.
83058A	Eutelsat I F-1 (ECS 1)	1.	D	149.
83059B	Anik C2	1.	D	176.
83059C	Palapa Pacific System	1.	D	369.
83065A	Galaxy I	1.	D	357.
83066A	Gorizont 7	1.	D	101.
83066F	Proton-K fourth stage (Block DM)	1.	D	47.
83077A	Arabsat 1D-R	1.	D	245.
83081A	Sakura 2B	1.	D	144.
83088A	Raduga 13	1.	D	91.
83088F	Proton-K fourth stage (Block DM)	1.	D	46.
83089B	Insat-IB	1.	L1	85.
83094A	RCA Satcom IIR	1.	D	233.
83098A	Galaxy II	1.	D	373.
83100A	Ekran 11	1.	L1	48.
83100F	Proton-K fourth stage (Block DM)	1.	D	421.
83105A	Intelsat V F-7	1.	D	270.
83118A	Gorizont 8	1.	D	97.
83118F	Proton-K fourth stage (Block DM)	1.	L1	27.
84005A	Yuri 2A	1.	D	168.
84009A	OPS 0441 (VORTEX 4)	2.	C2	1.
84009C	Titan 34D stage 3 (Transtage)	2.	D	60.
84016A	Raduga 14	1.	L1	21.
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	303.
84023A	Intelsat V F-8	1.	D	37.
84028A	Ekran 12	1.	D	25.
84028F	Proton-K fourth stage (Block DM)	1.	D	441.
84031A	Cosmos 1546	1.	L1	11.
84031F	Proton-K fourth stage (Block DM)	1.	D	234.
84035A	STW F-2	1.	L1	91.
84037A	OPS 7641 (DSP F11)	2.	D	76.
84037B	Titan 34D stage 3 (Transtage)	2.	D	21.
84041A	Gorizont 9	1.	L1	33.
84041D	Proton-K fourth stage (Block DM)	1.	D	124.
84049A	Chinasat 5 (Spacenet 1)	1.	D	327.
84063A	Raduga 15	1.	L1	82.
84063F	Proton-K fourth stage (Block DM)	1.	D	462.
84078A	Gorizont 10	1.	L2	25.
84078F	Proton-K fourth stage (Block DM)	1.	L1	72.

COSPAR	NAME	TABLE	STATUS	No
84080A	Himawari-3	1.	D	294.
84080E	Star 27 (Himawari-3 AKM)	1.	D	277.
84081A	Eutelsat I F-2 (ECS 2)	1.	D	141.
84081B	Telecom 1A	1.	D	103.
84090A	Ekran 13	1.	D	23.
84090F	Proton-K fourth stage (Block DM)	1.	D	431.
84093B	SBS IV	1.	D	136.
84093C	Leasat 2	1.	D	39.
84093D	Telstar 3C	1.	D	282.
84101A	Galaxy III	1.	D	296.
84113B	Arabsat 1D	1.	D	153.
84113C	Leasat 1	1.	D	115.
84114A	Spacenet 2	1.	D	278.
84114B	Marecs B2	1.	D	21.
84115A	NATO IIID	1.	D	7.
84129A	USA 7 (DSP F12)	2.	D	73.
84129B	Titan 34D stage 3 (Transtage)	2.	D	22.
85007A	Gorizont 11	1.	L3	11.
85007D	Proton-K fourth stage (Block DM)	1.	D	459.
85010B	USA 8 (MAGNUM 1)	2.	C2	13.
85010D	IUS stage 2	2.	D	26.
85015A	Arabsat 1A	1.	D	383.
85015B	Brazilsat 1	1.	D	250.
85016A	Cosmos 1629	1.	L2	33.
85016F	Proton-K fourth stage (Block DM)	1.	D	229.
85024A	Ekran 14	1.	D	6.
85024D	Proton-K fourth stage (Block DM)	1.	D	428.
85025A	Intelsat VA F-10	1.	D	99.
85028B	Anik C1	1.	D	266.
85028C	Leasat 3	1.	D	33.
85035A	Gstar 1	1.	C2	61.
85035B	Telecom 1B	1.	L1	97.
85048B	Morelos 1	1.	D	239.
85048C	Arabsat 1B	1.	D	382.
85048D	Telstar 3D	1.	D	305.
85055A	Intelsat VA F-11	1.	D	347.
85070A	Raduga 16	1.	L2	29.
85070F	Proton-K fourth stage (Block DM)	1.	D	65.
85076B	Optus A1	1.	D	280.
85076C	ASC 1	1.	L2	14.
85076D	Leasat 4	1.	D	63.
85087A	Intelsat VA F-12	1.	D	174.
85092B	USA 11 (DSCS III B-04)	2.	D	71.
85092C	USA 12 (DSCS III B-05)	2.	D	63.
85092E	IUS stage 2	2.	D	24.
85102A	Cosmos 1700	1.	L1	30.
85102D	Proton-K fourth stage (Block DM-2)	1.	D	398.
85107A	Raduga 17	1.	D	365.
85107F	Proton-K fourth stage (Block DM)	1.	D	40.
85109B	Morelos 2	1.	D	254.
85109C	Optus A2	1.	D	318.
85109D	Satcom Ku-2	1.	D	259.
86003B	Satcom Ku-1	1.	D	252.
86007A	Raduga 18	1.	D	145.
86007F	Proton-K fourth stage (Block DM)	1.	D	64.

COSPAR	NAME	TABLE	STATUS	No
86010A	STTW-1	1.	L1	49.
86016A	Yuri 2B	1.	D	215.
86026A	Gstar 2	1.	D	286.
86026B	Brazilsat 2	1.	D	262.
86027A	Cosmos 1738	1.	L3	16.
86027F	Proton-K fourth stage (Block DM)	1.	D	57.
86038A	Ekran 15	1.	D	28.
86038D	Proton-K fourth stage (Block DM)	1.	D	438.
86044A	Gorizont 12	1.	L1	61.
86044F	Proton-K fourth stage (Block DM)	1.	D	55.
86082A	Raduga 19	1.	D	109.
86082F	Proton-K fourth stage (Block DM)	1.	D	45.
86090A	Gorizont 13	1.	D	31.
86090D	Proton-K fourth stage (Block DM)	1.	L1	80.
86096A	USA 20 (FLTSATCOM F7)	2.	C2	18.
87022A	GOES 7	1.	C2	51.
87022F	Star 27 (GOES 7 AKM)	1.	D	139.
87028A	Raduga 20	1.	D	22.
87028D	Proton-K fourth stage (Block DM)	1.	D	304.
87029A	Agila 1	1.	D	312.
87040A	Gorizont 14	1.	D	52.
87040D	Proton-K fourth stage (Block DM)	1.	D	458.
87070A	Kiku-5	1.	D	220.
87073A	Ekran 16	1.	D	27.
87073D	Proton-K fourth stage (Block DM)	1.	D	439.
87078A	Optus A3	1.	D	152.
87078B	Eutelsat I F-4 (ECS 4)	1.	D	131.
87084A	Cosmos 1888	1.	L3	15.
87084D	Proton-K fourth stage (Block DM)	1.	D	338.
87091A	Cosmos 1894	1.	L2	34.
87091D	Proton-K fourth stage (Block DM)	1.	D	372.
87095A	TV-Sat 1	1.	D	156.
87096A	Cosmos 1897	1.	L1	32.
87096D	Proton-K fourth stage (Block DM)	1.	D	394.
87097A	USA 28 (DSP F13)	2.	D	79.
87097B	Titan 34D stage 3 (Transtage)	2.	D	17.
87100A	Raduga 21	1.	L2	22.
87100D	Proton-K fourth stage (Block DM)	1.	D	463.
87109A	Ekran 17	1.	D	19.
87109D	Proton-K fourth stage (Block DM)	1.	D	410.
88012A	Sakura 3A	1.	D	89.
88014A	STTW-2	1.	L1	24.
88018A	Spacenet 3R	1.	D	265.
88018B	Telecom 1C	1.	D	79.
88028A	Gorizont 15	1.	D	67.
88028D	Proton-K fourth stage (Block DM)	1.	D	62.
88034A	Cosmos 1940	1.	D	402.
88034D	Proton-K fourth stage (Block DM)	1.	D	348.
88036A	Ekran 18	1.	D	12.
88036E	Proton-K fourth stage (Block DM)	1.	D	425.
88040A	Intelsat VA F-13 (NSS 513)	1.	D	116.
88051A	Meteosat 3	1.	D	32.
88051C	PAS 1	1.	D	226.
88063A	Insat-IC	1.	L1	28.
88063B	Eutelsat I F-5 (ECS 5)	1.	D	90.

COSPAR	NAME	TABLE	STATUS	No
88066A	Cosmos 1961	1.	L1	6.
88066D	Proton-K fourth stage (Block DM-2)	1.	D	128.
88071A	Gorizont 16	1.	D	325.
88071D	Proton-K fourth stage (Block DM)	1.	D	393.
88081A	Gstar 3	1.	L2	2.
88081B	SBS V	1.	D	285.
88086A	Sakura 3B	1.	D	201.
88091B	TDRS-West	1.	C2	75.
88091D	IUS stage 2	1.	D	387.
88095A	Raduga 22	1.	L1	90.
88095F	Proton-K fourth stage (Block DM)	1.	D	75.
88098A	TDF 1	1.	D	194.
88108A	Ekran 19	1.	D	29.
88108D	Proton-K fourth stage (Block DM)	1.	D	443.
88109A	Skynet 4B	1.	D	268.
88109B	Astra 1A	1.	D	100.
88111A	STTW-3	1.	L1	63.
89004A	Gorizont 17	1.	D	170.
89004F	Proton-K fourth stage (Block DM)	1.	D	82.
89006A	Intelsat VA F-15	1.	D	173.
89020A	JC-Sat 1	1.	D	248.
89020B	Meteosat 4	1.	D	34.
89020E	Mage 1 (Meteosat 4 AKM)	1.	D	385.
89021B	TDRS 4	1.	C2	76.
89021D	IUS stage 2	1.	D	397.
89027A	Tele-X	1.	D	191.
89030A	Raduga 23	1.	L1	75.
89030D	Proton-K fourth stage (Block DM)	1.	D	73.
89035A	USA 37 (VORTEX 6)	2.	C2	7.
89035C	Titan 34D stage 3 (Transtage)	2.	D	62.
89041A	Superbird A	1.	D	276.
89041B	DFS-Kopernikus 1	1.	D	400.
89046A	USA 39 (DSP F14)	2.	C2	29.
89046D	IUS stage 2	2.	D	12.
89046E	USA 39 debris (Telescope aperture suncover)	2.	U	7.
89048A	Raduga 1-1	1.	D	132.
89048D	Proton-K fourth stage (Block DM)	1.	D	72.
89052A	Gorizont 18	1.	D	228.
89052D	Proton-K fourth stage (Block DM)	1.	D	460.
89053A	Olympus 1	1.	D	437.
89062A	TV-Sat 2	1.	D	298.
89067A	Sirius 1	1.	D	193.
89069A	USA 43 (DSCS II F-15)	2.	D	77.
89069B	USA 44 (DSCS III A-02)	2.	D	67.
89069D	Titan 34D stage 3 (Transtage)	2.	D	15.
89070A	Himawari-4	1.	D	38.
89070C	Star 27 (Himawari-4 AKM)	1.	D	138.
89077A	USA 46 (FLTSATCOM F8)	2.	C2	40.
89081A	Gorizont 19	1.	L1	66.
89081D	Proton-K fourth stage (Block DM)	1.	D	396.
89087A	Intelsat VI F-2	1.	C2	50.
89090B	USA 48 (MAGNUM 2)	2.	C2	15.
89090D	IUS stage 2	2.	D	57.
89098A	Raduga 24	1.	L1	55.
89098D	Proton-K fourth stage (Block DM)	1.	D	70.

COSPAR	NAME	TABLE	STATUS	No
89101A	Cosmos 2054	1.	L2	36.
89101D	Proton-K fourth stage (Block DM)	1.	D	94.
89101G	Cosmos 2054 debris	1.	D	69.
90001A	Skynet 4A	1.	D	162.
90001B	JC-Sat 2	1.	D	113.
90002B	Leasat 5	1.	C2	35.
90011A	DFH-2A	1.	L1	38.
90016A	Raduga 25	1.	L2	26.
90016D	Proton-K fourth stage (Block DM)	1.	D	332.
90021A	Intelsat VI F-3	1.	C2	81.
90030A	AsiaSat 1	1.	D	208.
90034A	Palapa B-2R	1.	D	246.
90051A	Insat-ID	1.	L1	12.
90054A	Gorizont 20	1.	L1	31.
90054D	Proton-K fourth stage (Block DM)	1.	D	392.
90056A	Intelsat VI F-4	1.	D	105.
90061A	Cosmos 2085	1.	L1	5.
90061D	Proton-K fourth stage (Block DM-2)	1.	L1	78.
90063A	TDF 2	1.	D	120.
90063B	DFS-Kopernikus 2	1.	D	249.
90074A	Thor I	1.	D	198.
90077A	Yuri 3A	1.	D	143.
90079A	Skynet 4C	1.	C2	4.
90079B	Eutelsat II F-1	1.	D	221.
90091A	SBS VI	1.	D	161.
90091B	Galaxy VI	1.	D	279.
90093A	Inmarsat 2-F1	1.	C2	54.
90094A	Gorizont 21	1.	L3	7.
90094D	Proton-K fourth stage (Block DM-2)	1.	D	411.
90095A	USA 65 (DSP F15)	2.	D	78.
90095D	IUS stage 2	2.	D	44.
90095E	USA 65 debris (Telescope aperture suncover)	2.	D	64.
90097B	USA 67 (SDS 2 F2)(QUASAR 2)	2.	C2	14.
90097D	AKM ?	2.	U	8.
90100A	Satcom C-1	1.	D	192.
90100B	Gstar 4	1.	D	180.
90102A	Gorizont 22	1.	L1	93.
90102D	Proton-K fourth stage (Block DM-2)	1.	D	71.
90112A	Raduga 26	1.	L1	35.
90112D	Proton-K fourth stage (Block DM-2)	1.	D	333.
90116A	Raduga 1-2	1.	L1	47.
90116D	Proton-K fourth stage (Block DM-2)	1.	D	77.
91001A	NATO IVA	1.	D	98.
91003A	Italsat 1	1.	D	321.
91003B	Eutelsat II F-2	1.	D	157.
91010A	Cosmos 2133	1.	L1	8.
91010F	Proton-K fourth stage (Block DM-2)	1.	D	356.
91014A	Raduga 27	1.	L1	81.
91014D	Proton-K fourth stage (Block DM-2)	1.	D	464.
91015A	Astra 1B	1.	D	111.
91015B	Meteosat 5	1.	D	108.
91015E	Mage 1 (Meteosat 5 AKM)	1.	D	360.
91018A	Inmarsat 2-F2	1.	C2	63.
91026A	Anik E2	1.	D	177.
91028A	Spacenet 4	1.	D	255.



COSPAR	NAME	TABLE	STATUS	No
91037A	Aurora II	1.	D	164.
91046A	Gorizont 23	1.	D	154.
91046D	Proton-K fourth stage (Block DM-2)	1.	D	413.
91054B	TDRS 5	1.	C2	53.
91054D	IUS stage 2	1.	L3	3.
91055A	Intelsat VI F-5	1.	D	219.
91060A	Yuri 3B	1.	D	140.
91064A	Cosmos 2155	1.	L3	5.
91064B	Proton-K fourth stage (Block DM-2)	1.	D	308.
91067A	Anik E1	1.	D	189.
91074A	Gorizont 24	1.	D	107.
91074D	Proton-K fourth stage (Block DM-2)	1.	D	273.
91075A	Intelsat VI F-1	1.	C2	19.
91079A	Cosmos 2172	1.	L3	13.
91079D	Proton-K fourth stage (Block DM-2)	1.	D	122.
91080B	USA 75 (DSP F16)	2.	C2	37.
91080D	IUS stage 2	2.	D	13.
91083A	Eutelsat II F-3	1.	D	216.
91084A	Telecom 2A	1.	D	158.
91084B	Inmarsat 2-F3	1.	D	26.
91087A	Raduga 28	1.	L1	74.
91087D	Proton-K fourth stage (Block DM-2)	1.	D	84.
92006A	USA 78 (DSCS III B-14)	2.	D	68.
92006C	IABS	2.	D	1.
92010A	Superbird B1	1.	D	169.
92010B	Insat-IIDT (Arabsat 1C)	1.	D	130.
92013A	Galaxy V	1.	D	214.
92017A	Gorizont 25	1.	D	299.
92017D	Proton-K fourth stage (Block DM-2)	1.	D	423.
92021A	Telecom 2B	1.	D	247.
92021B	Inmarsat 2-F4	1.	C2	39.
92027A	Palapa B4	1.	D	316.
92032A	Intelsat K (NSS K)	1.	D	35.
92037A	USA 82 (DSCS III B-12)(DSCS III F6)	2.	C2	21.
92037C	IABS	2.	D	10.
92041A	Insat-IIA	1.	D	374.
92041B	Eutelsat II F-4	1.	D	172.
92043A	Gorizont 26	1.	D	207.
92043D	Proton-K fourth stage (Block DM-2)	1.	D	68.
92054A	Optus B1	1.	D	196.
92057A	Satcom C-4	1.	D	165.
92059A	Cosmos 2209	1.	L2	32.
92059D	Proton-K fourth stage (Block DM-2)	1.	D	288.
92060A	Hispasat 1A	1.	D	218.
92060B	Satcom C-3	1.	C2	68.
92066A	DFS-Kopernikus 3	1.	D	275.
92072A	Galaxy VII	1.	D	271.
92074A	Ekran 20	1.	L1	41.
92074D	Proton-K fourth stage (Block DM-2)	1.	D	426.
92082A	Gorizont 27	1.	D	371.
92082D	Proton-K fourth stage (Block DM-2)	1.	D	85.
92084A	Superbird A1	1.	D	175.
92088A	Cosmos 2224	1.	L1	98.
92088D	Proton-K fourth stage (Block DM-2)	1.	D	342.
93003B	TDRS 6	1.	C2	52.

COSPAR	NAME	TABLE	STATUS	No
93003D	IUS stage 2	1.	D	354.
93013A	Raduga 29	1.	L1	88.
93013D	Proton-K fourth stage (Block DM-2)	1.	D	83.
93015A	USA 98 (UFO F1)	1.	D	210.
93031A	Astra 1C	1.	C2	1.
93039A	Galaxy IV	1.	L1	3.
93046A	USA 93 (DSCS III B-09)(DSCS III F7)	2.	D	69.
93046C	IABS	2.	D	6.
93048A	Hispasat 1B	1.	D	274.
93048B	Insat-IIB	1.	D	323.
93056A	USA 95 (UFO F2)	2.	C2	5.
93058B	ACTS	1.	L2	1.
93062A	Raduga 30	1.	L1	16.
93062D	Proton-K fourth stage (Block DM-2)	1.	L1	96.
93066A	Intelsat VII F-1	1.	C1	147.
93069A	Gorizont 28	1.	D	264.
93069D	Proton-K fourth stage (Block DM-2)	1.	D	389.
93072A	Gorizont 29	1.	D	363.
93072D	Proton-K fourth stage (Block DM-2)	1.	D	461.
93073A	Solidaridad 1	1.	L2	8.
93073B	Meteosat 6	1.	C2	23.
93073E	Mage 1 (Meteosat 6 AKM)	1.	D	328.
93074A	USA 97 (DSCS III B-10)(DSCS III F8)	2.	C2	9.
93074B	IABS	2.	D	65.
93076A	NATO IVB	1.	C2	14.
93077A	Telstar 4A	1.	L2	12.
93078A	DirecTV-1	1.	D	159.
93078B	Thaicom 1	1.	C2	40.
94002A	Gals 1	1.	L1	71.
94002D	Proton-K fourth stage (Block DM-2M)	1.	D	240.
94008A	Raduga 1-3	1.	L1	46.
94008D	Proton-K fourth stage (Block DM-2)	1.	D	81.
94009A	USA 99 (Milstar DFS-1)	2.	C2	36.
94009B	Titan IVA stage 3 (Centaur)	2.	D	30.
94012A	Raduga 31	1.	L1	56.
94012D	Proton-K fourth stage (Block DM-2)	1.	D	88.
94013A	Galaxy IR-A	1.	D	200.
94022A	GOES 8	1.	D	151.
94030A	Gorizont 30	1.	L3	14.
94030D	Proton-K fourth stage (Block DM-2)	1.	D	466.
94034A	Intelsat VII F-2	1.	C1	62.
94035A	USA 104 (UFO F3)	2.	L2	3.
94038A	Cosmos 2282	1.	L2	31.
94038D	Proton-K fourth stage (Block DM-2)	1.	D	235.
94040A	PAS 2	1.	C2	49.
94040B	BS-3N	1.	C1	104.
94043A	Apstar 1	1.	C2	45.
94047A	DirecTV-2	1.	D	126.
94049A	Brazilsat B1	1.	C2	72.
94049B	Turksat 2	1.	D	167.
94054A	USA 105 (MERCURY 1)	2.	C2	38.
94054B	Titan IVA stage 3 (Centaur)	2.	D	54.
94055A	Optus B3	1.	C2	48.
94060A	Cosmos 2291	1.	L2	38.
94060D	Proton-K fourth stage (Block DM-2)	1.	D	343.

COSPAR	NAME	TABLE	STATUS	No
94064A	Intelsat VII F-3 (NSS 703)	1.	C2	21.
94065A	Solidaridad 2	1.	C2	55.
94065B	Thaicom 2	1.	C1	75.
94067A	Ekspress 1	1.	D	292.
94067D	Proton-K fourth stage (Block DM-2M)	1.	L3	10.
94069A	Elektro 1	1.	L1	14.
94069D	Proton-K fourth stage (Block DM-2)	1.	D	355.
94070A	Astra 1D	1.	C2	12.
94079A	Orion 1	1.	D	117.
94080A	Zongxing 6 (A)	1.	D	415.
94082A	Luch 1	1.	L2	37.
94082D	Proton-K fourth stage (Block DM-2)	1.	D	408.
94084A	USA 107 (DSP F17)	2.	C2	35.
94084D	IUS stage 2	2.	D	19.
94087A	Raduga 32	1.	L1	4.
94087D	Proton-K fourth stage (Block DM-2)	1.	D	344.
95001A	Intelsat VII F-4	1.	D	190.
95003A	USA 108 (UFO F4)	2.	C2	25.
95011B	Himawari-5	1.	D	231.
95011D	Star 27 (Himawari-5 AKM)	1.	D	429.
95013A	Intelsat VII F-5	1.	C1	226.
95016A	Brazilsat B2	1.	C2	66.
95016B	Hot Bird 1	1.	D	217.
95019A	AMSC-1	1.	C2	62.
95022A	USA 110 (Advanced ORION 1)	2.	C2	20.
95022B	Titan IVA stage 3 (Centaur)	2.	D	33.
95023A	Intelsat VIIA F-1	1.	C1	51.
95025A	GOES 9	1.	D	142.
95027A	USA 111 (UFO F5)	2.	C2	33.
95029A	DirecTV-3	1.	D	163.
95035B	TDRS 7	1.	C2	29.
95035D	IUS stage 2	1.	D	391.
95038A	USA 113 (DSCS III B-07)(DSCS III F9)	2.	C2	24.
95038C	IABS	2.	D	14.
95040A	PAS 4	1.	C1	67.
95041A	Mugunghwa 1 (Koreasat 1)	1.	D	267.
95043A	JC-Sat 3	1.	D	182.
95044A	N-Star 1	1.	D	178.
95045A	Cosmos 2319	1.	L3	12.
95045D	Proton-K fourth stage (Block DM-2)	1.	D	366.
95049A	Telstar 402R	1.	L2	13.
95054A	Luch 1-1	1.	L1	1.
95054D	Proton-K fourth stage (Block DM-2)	1.	L1	86.
95055A	Astra 1E	1.	C1	22.
95057A	USA 114 (UFO F6)	2.	C2	32.
95060A	USA 115 (Milstar DFS-2)	2.	C2	28.
95060B	Titan IVA stage 3 (Centaur)	2.	D	29.
95063A	Gals 2	1.	D	306.
95063D	Proton-K fourth stage (Block DM-2M)	1.	L1	92.
95064A	AsiaSat 2	3.	Ind	1.
95067A	Telecom 2C	1.	D	76.
95067B	Insat-IIC	1.	D	283.
95069A	Galaxy IIR	1.	L2	17.
95073A	EchoStar 1	1.	C1	208.
96002A	PAS 3R	1.	C2	77.

COSPAR	NAME	TABLE	STATUS	No
96002B	MEASAT 1	1.	C2	17.
96003A	Mugunghwa 2 (Koreasat 2)	1.	C2	25.
96005A	Gorizont 31	1.	D	307.
96005D	Proton-K fourth stage (Block DM-2)	1.	D	56.
96006A	Palapa C1	1.	C1	39.
96007A	N-Star 2	1.	D	212.
96015A	Intelsat VIIA F-2	1.	C1	225.
96020A	Inmarsat 3-F1	1.	C1	60.
96021A	Astra 1F	1.	C1	54.
96022A	MSAT	1.	C2	57.
96026A	USA 118 (MERCURY 2)	2.	C2	2.
96026B	Titan IVA stage 3 (Centaur)	2.	D	55.
96030A	Palapa C2	1.	C1	136.
96030B	AMOS 1	1.	C2	18.
96033A	Galaxy IX	1.	C2	67.
96034A	Gorizont 32	1.	C2	82.
96034D	Proton-K fourth stage (Block DM-2)	1.	D	78.
96035A	Intelsat VII F-6	1.	C1	81.
96039A	Apstar 1A	1.	C2	43.
96040A	Arabsat 2A	1.	D	203.
96040B	Turksat 3	1.	C2	11.
96042A	USA 127 (UFO F7)	2.	C2	39.
96044A	Italsat 2	1.	D	407.
96044B	Telecom 2D	1.	C2	84.
96053A	Inmarsat 3-F2	1.	C1	241.
96053D	Proton-K fourth stage (Block DM1)	1.	D	87.
96054A	GE 1	1.	C1	178.
96055A	EchoStar 2	1.	L2	20.
96058A	Ekspress 2	1.	L1	50.
96058D	Proton-K fourth stage (Block DM-2M)	1.	L1	70.
96063A	Arabsat 2B	1.	C1	32.
96063B	MEASAT 2	1.	D	313.
96067A	Hot Bird 2	1.	C2	20.
96070A	Inmarsat 3-F3	1.	C1	146.
97002A	GE 2	1.	C1	184.
97002B	Nahuel 1A	1.	C2	71.
97007A	JC-Sat 4	1.	C2	42.
97008A	USA 130 (DSP F18)	2.	C2	3.
97008D	IUS stage 2	2.	D	58.
97008E	USA 130 debris (Telescope aperture suncover)	2.	U	9.
97009A	Intelsat VIII F-1	1.	C2	80.
97011A	Tempo 2	1.	D	166.
97016A	Thaicom 3	1.	D	134.
97016B	BSAT-1a	1.	C1	103.
97019A	GOES 10	1.	D	171.
97021A	Zhongxing 6 (B)	1.	L1	79.
97025A	Thor II	1.	C2	3.
97026A	Telstar 5	1.	C1	193.
97027A	Inmarsat 3-F4	1.	C1	224.
97027B	Insat-IID	1.	D	469.
97029A	FengYun 2A (FengYun 2-1R)	1.	D	24.
97029C	FengYun 2A AKM	1.	D	457.
97031A	Intelsat VIII F-2	1.	C1	35.
97036A	Superbird C	1.	C2	47.
97040A	PAS 6	2.	U	10.

COSPAR	NAME	TABLE	STATUS	No
97041A	Cosmos 2345	1.	L3	9.
97041D	Proton-K fourth stage (Block DM-2)	1.	D	329.
97042A	Agila 2	1.	C1	133.
97046A	PAS 5	1.	C1	144.
97049A	Hot Bird 3	1.	C2	26.
97049B	Meteosat 7	1.	C2	22.
97049E	Mage 1 (Meteosat 7 AKM)	1.	D	399.
97050A	GE 3	1.	C1	198.
97053A	Intelsat VIII F-3 (NSS 803)	1.	C1	56.
97059A	EchoStar 3	1.	C1	220.
97062A	Apstar 2R	1.	C1	72.
97065A	USA 134 (DSCS III B-13)(DSCS III F10)	2.	C2	31.
97065C	IABS	1.	D	422.
97070A	Kupon 1	1.	L1	29.
97070D	Proton-K fourth stage (Block DM-2)	1.	D	261.
97071A	Sirius 2	1.	D	230.
97071B	Cakrawatra 1	1.	C2	38.
97075A	JC-Sat 5	1.	C1	135.
97076A	Astra 1G	1.	C1	21.
97078A	Galaxy VIII-i	1.	D	272.
97083A	Intelsat 804	1.	L3	4.
97086A	HGS-1	1.	L2	24.
98002A	Skynet 4D	1.	D	186.
98006A	Brazilsat B-3A	1.	C1	210.
98006B	Inmarsat-3 F5	1.	C2	9.
98013A	Hot Bird 4	1.	C1	13.
98014A	Intelsat 806 (NSS 806)	1.	C1	229.
98016A	USA 138 (UFO F8)	2.	C2	23.
98024A	Nilesat 101	1.	C1	248.
98024B	BSAT-1b	1.	D	184.
98025A	Cosmos 2350	1.	L1	10.
98025D	Proton-K fourth stage (Block DM-2)	1.	D	340.
98028A	EchoStar 4	1.	C2	69.
98029A	USA 139 (Advanced ORION 2)	2.	C2	4.
98029B	Titan IVB stage 3 (Centaur)	2.	L1	5.
98033A	Zhongwei 1	1.	C1	83.
98035A	Thor III	1.	C1	255.
98037A	Intelsat 805	1.	C1	223.
98044A	Sinosat 1	1.	C1	109.
98049A	ST-1	1.	C1	84.
98050A	Astra 2A	1.	C1	29.
98052A	PAS 7	1.	C1	64.
98056A	Eutelsat W2	1.	C1	14.
98056B	Sirius 3	1.	C2	2.
98057A	Hot Bird 5	1.	C1	24.
98058A	USA 140 (UFO F9)	2.	D	81.
98063A	AfriStar 1	1.	C1	19.
98063B	GE 5	1.	C1	206.
98065A	PAS 8	1.	C1	143.
98068A	Bonum 1	1.	C1	53.
98070A	Satmex 5	1.	C1	166.
98075A	PAS 6B	1.	D	185.
99005A	Telstar 6	1.	C1	48.
99006A	JC-Sat 6	1.	C1	118.
99009A	Arabsat 3A	1.	D	364.

<b>COSPAR</b>	<b>NAME</b>	<b>TABLE</b>	<b>STATUS</b>	<b>No</b>
99009B	Skynet 4E	1.	C2	15.
99010A	Raduga 1-4	1.	L1	67.
99010D	Proton-K fourth stage (Block DM-2)	1.	D	86.
99013A	Asiasat 3S	1.	C1	99.
99016A	Insat 2E	1.	C1	79.
99018A	Eutelsat W3	1.	C1	20.
99027A	Nimiq	1.	C1	195.
99033A	Astra 1H	1.	C1	16.
99042A	Telkom 1	1.	C1	101.
99046A	Mugunghwa 3 (Koreasat 3)	1.	C1	114.
99047A	Yamal-100 No. 1	1.	D	302.
99047B	Yamal-100 No. 2	1.	C2	32.
99047E	Proton-K fourth stage (Block DM-2M)	1.	D	361.
99050A	EchoStar 5	1.	D	135.
99052A	Telstar 7	1.	C1	155.
99053A	LMI 1	1.	C1	71.
99056A	DirecTV-1R	1.	C1	214.
99059A	Orion 2	1.	C1	242.
99060A	GE 4	1.	C1	183.
99063A	USA 146 (UFO F10)	2.	C2	12.
99071A	Galaxy 11	1.	C1	34.
00001A	USA 148 (DSCS III B-08)(DSCS III F11)	2.	C1	4.
00001C	IABS	2.	D	20.
00002A	Galaxy 10R	1.	D	263.
00003A	Zhongxing-22 (FengHuo 1, FH-1)	1.	C2	33.
00007A	Hispasat 1C	1.	C1	233.
00011A	Garuda 1	1.	C2	41.
00012A	Superbird 4	1.	C1	142.
00013A	Ekspress 2A	1.	C2	36.
00013D	Proton-K fourth stage (Block DM-2M)	1.	D	404.
00016A	Asiastar	1.	C1	98.
00016B	Insat 3B	1.	C1	80.
00019A	Sesat	1.	C1	37.
00019D	Proton-K fourth stage (Block DM-2M)	1.	D	253.
00020A	Galaxy IVR	1.	D	295.
00022A	GOES 11	1.	C1	151.
00024A	USA 149 (DSP F20)	2.	C2	26.
00024D	IUS stage 2	2.	D	49.
00024E	DSP F20 Aperture Cover	2.	D	50.
00028A	Eutelsat W4	1.	C1	38.
00029A	Gorizont 33	1.	L3	8.
00029B	Proton-M fourth stage (Briz-M)	1.	D	378.
00031A	Ekspress 3A	1.	D	137.
00031D	Proton-K fourth stage (Block DM-2)	1.	D	236.
00032A	FengYun 2B	1.	D	345.
00032C	FengYun 2B AKM	1.	D	368.
00034A	TDRS 8	1.	C2	31.
00036A	Cosmos-2371	1.	L1	15.
00036D	Proton-K fourth stage (Block DM-2)	1.	D	370.
00038A	EchoStar 6	1.	C1	212.
00043A	PAS 9	1.	C1	222.
00046A	Brasilsat B4	1.	C1	203.
00046B	Nilesat 102	1.	C1	247.
00049A	Raduga 1-5	1.	L1	52.
00049D	Proton-K fourth stage (Block DM-2)	1.	D	93.

COSPAR	NAME	TABLE	STATUS	No
00052A	Eutelsat W1	1.	C1	4.
00054A	Astra 2B	1.	C1	28.
00054B	GE 7	1.	C1	150.
00059A	GE-1A	1.	C1	102.
00060A	N-SAT-110	1.	C1	108.
00065A	USA 153 (DSCS III B-11)(DSCS III F12)	2.	C1	6.
00065C	IABS	2.	D	18.
00066A	Thuraya 1	1.	D	160.
00067A	GE 6	1.	C1	215.
00068A	Europe*Star F1	1.	C1	44.
00069A	Beidou	1.	C2	44.
00072A	PAS 1R	1.	C1	227.
00076A	Anik F1	1.	C1	174.
00080A	USA 155 (SDS 3 F2)	2.	C2	42.
00081A	Astra 2D	1.	C1	27.
00081B	GE 8 (Aurora 3)	1.	C1	149.
00082A	Beidou 1B	1.	C2	28.
01002A	Turksat 2A (Eurasiasat 1)	1.	C1	43.
01005A	Sicral	1.	C2	6.
01005B	Skynet 4F	1.	C2	79.
01009A	USA 157 (Milstar-2 F2)	2.	C2	22.
01009B	Titan IVB stage 3 (Centaur)	2.	D	38.
01011A	Eurobird 1	1.	C1	30.
01011B	BSAT-2a	1.	C1	107.
01012A	XM Radio 2 (Rock)	1.	C1	199.
01014A	Ekran 21 (Ekran-M)	1.	D	256.
01014C	Proton-M fourth stage (Briz-M)	1.	D	80.
01015A	GSAT-1	1.	D	465.
01018A	XM Radio 1 (Roll)	1.	C1	200.
01019A	PAS 10	1.	C1	63.
01020A	USA 158 (GeoLITE)	2.	C2	17.
01024A	Intelsat 901	1.	C1	239.
01025A	Astra 2C	1.	C1	33.
01029A	Artemis	1.	C2	8.
01031A	GOES 12	1.	C2	70.
01033A	USA 159 (DSP F21)	2.	C2	10.
01033D	IUS stage 2	2.	D	45.
01033E	USA 159 debris (Telescope aperture suncover)	2.	U	11.
01037A	Cosmos-2379	1.	L1	87.
01037D	Proton-K fourth stage (Block DM-2)	1.	L1	73.
01039A	Intelsat 902	1.	C1	58.
01042A	Atlantic Bird 2	1.	C1	245.
01045A	Raduga 1-6	1.	D	61.
01045D	Proton-K fourth stage (Block DM-2)	1.	L1	51.
01046A	USA 162 (SDS 3 F3)	2.	C2	30.
01052A	DirecTV-4S	1.	C1	181.
02001A	USA 164 (Milstar-2 F3)	2.	C2	6.
02001B	Titan IVB stage 3 (Centaur)	2.	D	42.
02002A	Insat 3C	1.	C1	69.
02006A	EchoStar 7	1.	C1	164.
02007A	Intelsat 904	1.	C1	57.
02011A	TDRS 9	1.	C2	73.
02015A	JC-Sat 8	1.	C1	138.
02015B	Astra 3A	1.	C1	23.
02016A	Intelsat 903	1.	C1	232.

COSPAR	NAME	TABLE	STATUS	No
02019A	NSS-7	1.	C1	238.
02023A	DirecTV-5	1.	C1	172.
02027A	Intelsat 905	1.	C1	237.
02029A	Ekspress A1R (Express 4A)	1.	C2	83.
02029D	Proton-K fourth stage (Block DM-2M)	1.	D	213.
02030A	Galaxy 3C	1.	C1	191.
02035A	Atlantic Bird 3	1.	C1	250.
02035B	N-Star 3 (N-Star c)	1.	C1	125.
02038A	Hot Bird 6	1.	C1	12.
02039A	EchoStar 8	1.	C1	209.
02040A	Atlantic Bird 1	1.	C1	243.
02040B	MSG 1	1.	C2	5.
02041A	Intelsat 906	1.	C1	61.
02042B	Kodama (DRTS)	1.	C1	86.
02043A	KALPANA-1 (METSAT-1)	1.	C1	68.
02044A	Hispasat 1D	1.	C1	235.
02051A	Eutelsat W5	1.	C1	66.
02055A	TDRS 10	1.	C2	78.
02057A	NSS 6	1.	C1	92.
02062A	Nimiq 2	1.	C1	194.
03007A	Intelsat 907	1.	C1	236.
03008A	USA 167 (DSCS III A-3)(DSCS III F13)	2.	C	1.
03008C	IABS	2.	D	23.
03012A	USA 169 (Milstar-2 F4)	2.	C2	34.
03012B	Titan IVB stage 3 (Centaur)	2.	D	32.
03013A	Insat 3A	1.	C1	90.
03013B	Galaxy XII	1.	C1	160.
03014A	Asiasat 4	1.	C1	117.
03015A	Cosmos-2397	1.	D	386.
03015F	Proton-K fourth stage (Block DM-2)	1.	L1	84.
03018A	GSAT-2	1.	C1	46.
03020A	Hellas Sat 2	1.	C1	40.
03021A	Beidou 3	1.	C1	110.
03024A	AMC-9 (GE-12)	1.	C1	204.
03026A	Thuraya 2	1.	C2	16.
03028A	BSAT-2c	1.	C1	106.
03028B	Optus C1 (Defense C1)	1.	C1	140.
03033A	Rainbow 1	1.	C1	219.
03034A	EchoStar 9 (Telstar 13)	1.	C1	162.
03040A	USA 170 (DSCS III B-6)(DSCS III F14)	2.	C1	5.
03040C	IABS	2.	D	27.
03041A	USA 171 (Advanced ORION 3)	2.	C2	16.
03041B	Titan IVB stage 3 (Centaur)	2.	D	25.
03043A	Eurobird 3	1.	C1	36.
03043E	Insat 3E	1.	C1	52.
03044A	Galaxy 13/Horizons-1	1.	C1	157.
03052A	Zhongxing-20 (ShenTong 1, ST-1)	1.	C1	94.
03053A	Yamal 200 N2 (Yamal 202)	1.	C1	47.
03053B	Yamal 200 N1 (Yamal 201)	1.	C1	85.
03053E	Proton-K fourth stage (Block DM-2M)	1.	D	336.
03057A	USA 174 (UFO F11)	2.	C2	11.
03059A	AMOS 2	1.	C1	251.
03060A	Ekspress AM-22	1.	C1	50.
03060D	Proton-K fourth stage (Block DM-2M)	1.	L1	40.
04001A	Estrela do Sul 1 (Telstar 14)	1.	C1	218.



COSPAR	NAME	TABLE	STATUS	No
04003A	AMC-10 (GE 10)	1.	C1	152.
04004A	USA 176 (DSP F22)	2.	C2	19.
04004D	IUS stage 2	2.	D	46.
04007A	MBSAT	1.	C1	131.
04008A	Eutelsat W3A	1.	C1	6.
04010A	Raduga-1	1.	C2	30.
04010F	Proton-K fourth stage (Block DM-2)	1.	D	352.
04011A	Superbird A2 (Superbird 6)	1.	D	238.
04015A	Ekspress AM-11	1.	D	206.
04015D	Proton-K fourth stage (Block DM-2M)	1.	D	403.
04016A	DirecTV-7S	1.	C1	163.
04017A	AMC-11 (GE-11)	1.	C1	154.
04022A	Intelsat 10-02	1.	C1	254.
04024A	Telstar 18 (APstar 5)	1.	C1	126.
04027A	Anik F2	1.	C1	169.
04031A	Amazonas	1.	C1	221.
04036A	GSAT 3 (EDUSAT)	1.	C2	24.
04041A	AMC-15	1.	C1	176.
04042A	FengYun 2C	3.	Ind	2.
04042C	FengYun 2C AKM	1.	D	435.
04043A	Ekspress AM-1	1.	C1	41.
04043D	Proton-K fourth stage (Block DM-2M)	1.	D	359.
04048A	AMC 16	1.	C1	202.
05003A	AMC 12	1.	C1	231.
05005A	XTAR-EUR	1.	C1	31.
05006A	Himawari-6	1.	C1	128.
05008A	XM Radio 3 (Rhythm)	1.	C1	201.
05009A	Inmarsat 4 F1	1.	C2	46.
05010A	Ekspress AM-2	1.	C1	76.
05010F	Proton-K fourth stage (Block DM-2M)	1.	L1	53.
05012A	Apstar 6	1.	C1	124.
05015A	Spaceway 1	1.	C1	179.
05019A	DirectTV-8	1.	C1	185.
05022A	Intelsat Americas 8 (Telstar 8)	1.	C1	197.
05023A	Ekspress AM-3	1.	C1	127.
05023H	Proton-K fourth stage (Block DM-2)	1.	D	409.
05028A	Thaicom 4 (IPStar 1)	1.	C1	116.
05030A	Galaxy 14	1.	C1	158.
05036A	Anik F1R	1.	C1	175.
05041A	Galaxy 15	1.	C1	153.
05041B	Syracuse 3A	1.	C1	45.
05044A	Inmarsat 4 F2	1.	C2	10.
05046A	Telkom 2	1.	C1	115.
05046B	Spaceway 2	1.	C1	187.
05049A	Insat 4A	1.	C1	78.
05049B	MSG 2 (Meteosat 9)	1.	C1	1.
05049E	MSG-2 debris (SEVIRI Cooler Cover)	1.	D	427.
05049F	MSG-2 debris (entry baffle cover)	1.	D	455.
05052A	AMC 23	1.	C1	145.
06003A	Echostar 10	1.	C1	171.
06004A	MTSAT-2	1.	C1	132.
06007A	Spainsat	1.	C1	234.
06007B	Hot Bird 7A	1.	C1	7.
06010A	JCSAT 9	1.	C1	123.
06012A	Astra 1KR	1.	C1	17.

<b>COSPAR</b>	<b>NAME</b>	<b>TABLE</b>	<b>STATUS</b>	<b>No</b>
06018A	GOES N	1.	C2	59.
06020A	Satmex 6	1.	C1	168.
06020B	Thaicom 5	1.	C1	74.
06022A	KAZSAT	1.	D	205.
06022D	Proton-K fourth stage (Block DM3)	1.	D	418.
06023A	Galaxy 16	1.	C1	188.
06024A	USA 187 (MITEx OSC satellite)	2.	C2	27.
06024B	USA 188 (MITEx Lockheed satellite)	2.	C2	41.
06024C	USA 189 (NRL Upper Stage/Satellite)	2.	D	2.
06032A	Hot Bird 8	1.	C1	11.
06033A	JCSAT 3A	1.	C1	120.
06033B	Syracuse 3B	1.	C1	249.
06034A	Mugunghwa 5	1.	C1	112.
06038A	Zhongxing-22A (FengHuo 1, FH-1)	1.	C1	97.
06043A	DirecTV 9S	1.	C1	182.
06043B	Optus D1	1.	C1	141.
06048A	Xinnuo 2	1.	D	3.
06049A	XM Radio 4 (Blues)	1.	C1	167.
06051A	Badr 4	1.	C1	25.
06053A	FengYun 2D	1.	C1	82.
06053C	FengYun 2D AKM (FG-36 AKM)	1.	D	222.
06053D	FengYun 2D debris	1.	L1	23.
06054A	WildBlue 1	1.	C1	170.
06054B	AMC 18	1.	C1	177.
06056A	Measat 3	1.	C1	87.
06059A	Kiku-8 (ETS VIII)	1.	C1	134.
07003A	Beidou 4	1.	D	183.
07007A	Insat 4B	1.	C1	91.
07007B	Skynet 5A	1.	C1	253.
07009A	Anik F3	1.	C1	165.
07016A	Astra 1L	1.	C1	18.
07016B	Galaxy 17	1.	C1	196.
07018A	Nigcomsat 1	1.	L1	58.
07021A	Xinnuo 3	1.	C1	119.
07031A	Zhongxing 6B	1.	C1	113.
07032A	DirecTV 10	1.	C1	180.
07036A	Spaceway 3	1.	C1	192.
07036B	BSAT-3A	1.	C1	105.
07037A	INSAT 4CR	1.	C1	70.
07044A	Optus D2	1.	C1	137.
07044B	Intelsat IS-11	1.	C1	228.
07046A	USA 195 (WGS F1)	2.	C1	3.
07054A	USA 197 (DSP F23)	2.	L1	7.
07054B	Delta 4 second stage	2.	D	86.
07056A	Star One C1	1.	C1	217.
07056B	Skynet 5B	1.	C1	49.
07057A	Sirius 4	1.	C1	5.
07058A	Cosmos-2434 (Raduga-1M1)	1.	C1	65.
07058C	Proton-M fourth stage (Briz-M)	1.	D	468.
07063A	Rascom-QAF 1	1.	C1	2.
07063B	Horizons 2	1.	C1	211.
08001A	Thuraya 3	1.	C2	34.
08003A	Ekspress AM-33	1.	C1	93.
08003B	Proton-M fourth stage (Briz-M)	1.	D	467.
08006A	Thor 2R	1.	C1	256.

COSPAR	NAME	TABLE	STATUS	No
08007A	Kizuna	1.	C1	129.
08011A	AMC 14	1.	C2	13.
08013A	DirecTV 11	1.	C1	186.
08016A	ICO G1	1.	C2	65.
08018A	Vinasat	1.	C1	122.
08018B	Star One C2	1.	C1	216.
08019A	Tian Lian 1A	1.	C1	73.
08022A	Amos 3	1.	C1	252.
08022B	Zenith-3SLB third stage (Block DM-SLB)	1.	D	16.
08024A	Galaxy 18	1.	C1	161.
08028A	Zhongxing 9	1.	C1	89.
08030A	Skynet 5C	1.	C1	240.
08030B	Turksat 3A	1.	C1	42.
08033A	Cosmos-2440	1.	C2	27.
08033D	Proton-K fourth stage (Block DM-2M)	1.	L1	26.
08034A	Protostar 1	1.	C1	95.
08034B	Badr 6	1.	C1	26.
08035A	Echostar 11	1.	C1	173.
08038A	Superbird C2	1.	C1	130.
08038B	AMC 21	1.	C1	159.
08039A	Inmarsat 4 F3	1.	C2	64.
08044A	Nimiq 4	1.	C1	205.
08045A	Galaxy 19	1.	C1	189.
08055A	Simon Bolivar	1.	C1	207.
08057A	Astra 1M	1.	C1	15.
08063A	Ciel 2	1.	C1	156.
08065A	Hot Bird 9	1.	C1	10.
08065B	Eutelsat W2M	1.	C1	3.
08066A	Feng Yun 2E	1.	C2	37.
08066C	FengYun 2E AKM (FG-36 AKM)	1.	D	454.
09001A	USA 202	2.	C2	8.
09001B	Delta 4 second stage	2.	D	85.
09007A	Ekspress AM-44	1.	C1	244.
09007B	Ekspress MD-1	1.	C1	77.
09007D	Proton-M fourth stage (Briz-M)	1.	D	50.
09008A	NSS 9	1.	C1	148.
09008B	Atlantic Bird 4A	1.	C1	246.
09009A	Telstar 11N	1.	C1	230.
09010A	Raduga 1-8	1.	C2	7.
09010B	Proton-K fourth stage (Block DM-2)	1.	D	330.
09016A	Eutelsat W2A	1.	C1	8.
09017A	USA 204 (WGS F2)	2.	C1	2.
09018A	Beidou DW 2 (Compass G2)	3.	Ind	3.
09020A	SICRAL 1B	1.	C1	9.
09027A	Indostar II/Protostar II	1.	C1	100.
09032A	Measat 3A	1.	C1	88.
09033A	GOES O	1.	C2	60.
09034A	Sirius FM5	1.	C1	190.
09035A	Terrestar 1	1.	C2	56.
09042A	Asiasat 5	1.	C1	96.
09044A	JCSAT 12 (JCSAT-RA)	1.	C1	121.
09044B	Optus D3	1.	C1	139.
09046A	Palapa D	1.	C1	111.
09047A	USA 207 (PAN)	2.	C1	1.
09050A	Nimiq 5	1.	C1	213.

<b>COSPAR</b>	<b>NAME</b>	<b>TABLE</b>	<b>STATUS</b>	<b>No</b>
09054A	Amazonas 2	3.	Ind	4.
09054B	COMSATBw-1	1.	C1	59.
09058A	NSS 12	1.	C1	55.
09058B	Thor 6	1.	C1	257.
09064A	Intelsat IS-14	3.	Ind	5.
09065A	Eutelsat W7	3.	Ind	6.
09067A	Intelsat IS-15	3.	Ind	7.
09068A	USA 211 (WGS F3)	2.	C	2.

### 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 identification.
- Name: is the object's common name.
- Date: is the epoch of the last available TLE.
- $\bar{\lambda}$ : is the mean longitude of the satellite (in degrees).
- $\bar{\dot{\lambda}}$ : 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):  $\Delta\lambda = \lambda_{max} - \lambda_{min}$
- $\lambda_{min}$ : is the minimum longitude of the libration (in degrees).
- $\lambda_{max}$ : 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.
- MJD: is the Modified Julian Date (number of days since 01-Jan-1950) corresponding to "Date"
- a, e, i,  $\Omega$ ,  $\omega$  and  $\lambda$  are the last 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, the following data are given:

C1.nn	COSPAR	NAME					$N_{ly}$	$N_{tot}$
	Date	$\bar{\lambda}$						
	MJD	a	e	i	$\Omega$	$\omega$	$\lambda$	

For explanation, see definition at the beginning of Chapter 3 on page 29.

<b>C1 . 1</b>	<b>05049B</b>	<b>MSG 2 (Meteosat 9)</b>					
	27-DEC-09	0.08				51	192
	21910.878553	42166.65281	0.0000549	0.0166	14.7499	247.9950	0.1425
<b>C1 . 2</b>	<b>07063A</b>	<b>Rascom-QAF 1</b>					
	29-DEC-09	2.84				53	101
	21912.146516	42164.96255	0.0001583	0.0491	110.2584	214.7208	2.8736
<b>C1 . 3</b>	<b>08065B</b>	<b>Eutelsat W2M</b>					
	29-DEC-09	3.22				52	54
	21912.152095	42164.10249	0.0003281	0.0484	304.2604	310.6281	3.1125
<b>C1 . 4</b>	<b>00052A</b>	<b>Eutelsat W1</b>					
	23-DEC-09	4.03				50	465
	21906.768600	42164.45851	0.0005584	0.0657	353.6788	281.0889	4.0108
<b>C1 . 5</b>	<b>07057A</b>	<b>Sirius 4</b>					
	27-DEC-09	4.83				53	106
	21910.899988	42164.49607	0.0001561	0.0285	106.8470	154.2155	4.8293
<b>C1 . 6</b>	<b>04008A</b>	<b>Eutelsat W3A</b>					
	26-DEC-09	7.00				52	281
	21909.849479	42164.26592	0.0003093	0.0716	4.4252	252.8225	7.0158
<b>C1 . 7</b>	<b>06007B</b>	<b>Hot Bird 7A</b>					
	27-DEC-09	9.02				51	177
	21910.847928	42164.64661	0.0004686	0.0162	306.8047	330.0912	8.9941
<b>C1 . 8</b>	<b>09016A</b>	<b>Eutelsat W2A</b>					
	27-DEC-09	10.02				36	36
	21910.900417	42166.45823	0.0005084	0.0731	13.7790	270.9788	9.9940
<b>C1 . 9</b>	<b>09020A</b>	<b>SICRAL 1B</b>					
	24-DEC-09	11.80				36	36
	21907.764826	42163.54858	0.0003705	0.0526	356.2608	129.6206	11.8993
<b>C1 . 10</b>	<b>08065A</b>	<b>Hot Bird 9</b>					
	31-DEC-09	13.00				52	54
	21914.697720	42164.17706	0.0001359	0.0548	59.4861	113.1185	13.0264
<b>C1 . 11</b>	<b>06032A</b>	<b>Hot Bird 8</b>					
	31-DEC-09	13.02				52	161
	21914.697720	42163.87627	0.0003190	0.0794	317.4326	353.6645	13.0366
<b>C1 . 12</b>	<b>02038A</b>	<b>Hot Bird 6</b>					
	31-DEC-09	13.02				52	285
	21914.697720	42164.71389	0.0006329	0.0281	291.7381	323.3796	12.9852
<b>C1 . 13</b>	<b>98013A</b>	<b>Hot Bird 4</b>					
	28-DEC-09	15.81				52	435
	21911.978148	42162.55292	0.0005624	0.0172	305.1062	299.6085	15.9903

<b>C1 . 14</b>	<b>98056A</b>	<b>Eutelsat W2</b>					
	22-DEC-09	16.01				51	561
	21905.866713	42163.82581	0.0004085	0.0553	112.3083	120.2415	16.0610
<b>C1 . 15</b>	<b>08057A</b>	<b>Astra 1M</b>					
	17-DEC-09	19.16				24	34
	21900.475868	42164.46580	0.0002943	0.0372	232.4624	5.2635	19.2331
<b>C1 . 16</b>	<b>99033A</b>	<b>Astra 1H</b>					
	17-DEC-09	19.20				20	401
	21900.014838	42164.82182	0.0000840	0.0638	132.0095	74.7472	19.2271
<b>C1 . 17</b>	<b>06012A</b>	<b>Astra 1KR</b>					
	19-NOV-09	19.20				18	130
	21872.427882	42164.90957	0.0011559	0.0508	206.3770	292.2270	19.2941
<b>C1 . 18</b>	<b>07016A</b>	<b>Astra 1L</b>					
	19-NOV-09	19.21				23	93
	21872.570093	42164.44197	0.0002470	0.0367	271.3906	328.3597	19.2577
<b>C1 . 19</b>	<b>98063A</b>	<b>AfriStar 1</b>					
	31-DEC-09	21.01				53	564
	21914.796597	42164.66652	0.0004540	0.0368	4.1691	280.6132	20.9767
<b>C1 . 20</b>	<b>99018A</b>	<b>Eutelsat W3</b>					
	31-DEC-09	21.60				52	537
	21914.722708	42164.62867	0.0004023	0.0716	355.3709	276.3960	21.5870
<b>C1 . 21</b>	<b>97076A</b>	<b>Astra 1G</b>					
	16-DEC-09	23.50				19	446
	21899.974757	42164.94517	0.0000462	0.0695	121.7356	61.1661	23.5408
<b>C1 . 22</b>	<b>95055A</b>	<b>Astra 1E</b>					
	17-DEC-09	23.50				22	516
	21900.010787	42164.69875	0.0001724	0.0636	134.2364	125.9549	23.5061
<b>C1 . 23</b>	<b>02015B</b>	<b>Astra 3A</b>					
	17-DEC-09	23.51				19	356
	21900.483866	42164.20173	0.0004772	0.0398	245.0921	19.8406	23.5520
<b>C1 . 24</b>	<b>98057A</b>	<b>Hot Bird 5</b>					
	31-DEC-09	25.69				52	513
	21914.721991	42163.79329	0.0006403	0.0608	345.0776	329.5458	25.5061
<b>C1 . 25</b>	<b>06051A</b>	<b>Badr 4</b>					
	31-DEC-09	26.01				52	157
	21914.721991	42163.87235	0.0004605	0.0633	19.5785	311.7268	26.0106
<b>C1 . 26</b>	<b>08034B</b>	<b>Badr 6</b>					
	31-DEC-09	26.02				52	79
	21914.721991	42163.75125	0.0004606	0.0431	328.6197	323.2642	26.0304
<b>C1 . 27</b>	<b>00081A</b>	<b>Astra 2D</b>					
	17-DEC-09	28.20				22	356
	21900.366215	42164.54850	0.0008576	0.0561	218.6350	48.4339	28.1654
<b>C1 . 28</b>	<b>00054A</b>	<b>Astra 2B</b>					
	27-NOV-09	28.20				22	352
	21880.798796	42164.36123	0.0003510	0.0364	280.2084	338.3115	28.2309
<b>C1 . 29</b>	<b>98050A</b>	<b>Astra 2A</b>					
	27-DEC-09	28.21				26	475
	21910.977072	42164.50757	0.0003390	0.0467	163.4305	41.9693	28.2094
<b>C1 . 30</b>	<b>01011A</b>	<b>Eurobird 1</b>					
	31-DEC-09	28.51				53	444
	21914.720243	42164.20313	0.0003536	0.0649	350.4925	303.4041	28.4994

<b>C1 . 31</b>	<b>05005A</b>	<b>XTAR-EUR</b>					
	31-DEC-09	29.00				52	234
	21914.720255	42164.66820	0.0002833	0.0167	37.9824	176.7698	29.0102
<b>C1 . 32</b>	<b>96063A</b>	<b>Arabsat 2B</b>					
	27-DEC-09	30.48				53	614
	21910.798877	42162.01868	0.0002196	0.0434	191.8513	71.0053	30.6804
<b>C1 . 33</b>	<b>01025A</b>	<b>Astra 2C</b>					
	16-DEC-09	31.53				25	325
	21899.784826	42165.53221	0.0000915	0.0349	76.1002	141.0775	31.4950
<b>C1 . 34</b>	<b>99071A</b>	<b>Galaxy 11</b>					
	22-DEC-09	32.83				51	507
	21905.801493	42164.03633	0.0000841	0.0431	211.1316	168.5263	32.8053
<b>C1 . 35</b>	<b>97031A</b>	<b>Intelsat VIII F-2</b>					
	31-DEC-09	32.92				52	621
	21914.744340	42164.10585	0.0002144	0.0186	349.7169	296.6157	32.9080
<b>C1 . 36</b>	<b>03043A</b>	<b>Eurobird 3</b>					
	31-DEC-09	33.14				52	315
	21914.744352	42164.39684	0.0002527	0.0449	356.0944	307.8546	33.0894
<b>C1 . 37</b>	<b>00019A</b>	<b>Sesat</b>					
	31-DEC-09	35.94				53	489
	21914.739757	42163.83534	0.0007029	0.0670	343.9080	284.0253	35.9471
<b>C1 . 38</b>	<b>00028A</b>	<b>Eutelsat W4</b>					
	31-DEC-09	36.10				52	476
	21914.739757	42163.63127	0.0003082	0.0726	2.7447	346.7441	36.1091
<b>C1 . 39</b>	<b>96006A</b>	<b>Palapa C1</b>					
	27-DEC-09	38.01				53	692
	21910.938472	42164.22163	0.0003485	0.0414	203.1872	72.2113	38.0246
<b>C1 . 40</b>	<b>03020A</b>	<b>Hellas Sat 2</b>					
	31-DEC-09	39.01				52	330
	21914.626238	42164.98470	0.0002854	0.0361	253.9742	17.8887	38.9871
<b>C1 . 41</b>	<b>04043A</b>	<b>Ekspress AM-1</b>					
	30-DEC-09	40.01				52	259
	21913.762940	42164.19107	0.0001921	0.0424	151.0763	107.7623	40.0293
<b>C1 . 42</b>	<b>08030B</b>	<b>Turksat 3A</b>					
	26-DEC-09	42.00				52	82
	21909.828426	42164.22724	0.0002435	0.0281	71.7357	194.3076	41.9968
<b>C1 . 43</b>	<b>01002A</b>	<b>Turksat 2A (Eurasiasat 1)</b>					
	26-DEC-09	42.01				53	446
	21909.828426	42163.84431	0.0004308	0.0242	274.3723	348.5023	42.0306
<b>C1 . 44</b>	<b>00068A</b>	<b>Europe*Star F1</b>					
	31-DEC-09	45.00				53	450
	21914.666100	42164.30405	0.0003747	0.0193	38.2546	258.9085	45.0002
<b>C1 . 45</b>	<b>05041B</b>	<b>Syracuse 3A</b>					
	27-DEC-09	47.00				53	208
	21910.777442	42164.18939	0.0001719	0.0195	28.8207	341.4680	46.9863
<b>C1 . 46</b>	<b>03018A</b>	<b>GSAT-2</b>					
	31-DEC-09	48.01				53	333
	21914.852731	42164.92443	0.0003641	0.0149	292.6037	349.1451	47.9805
<b>C1 . 47</b>	<b>03053A</b>	<b>Yamal 200 N2 (Yamal 202)</b>					
	31-DEC-09	48.99				53	308
	21914.852731	42164.87929	0.0002673	0.0475	264.7005	10.6430	48.9897



<b>C1 . 48</b>	<b>99005A</b>	<b>Telstar 6</b>					
	27-DEC-09	50.78				51	540
	21910.756678	42163.97438	0.0002241	0.0161	347.6080	299.9402	50.7884
<b>C1 . 49</b>	<b>07056B</b>	<b>Skynet 5B</b>					
	31-DEC-09	52.74				53	110
	21914.614340	42164.94854	0.0003601	0.0615	355.1973	269.0344	52.7213
<b>C1 . 50</b>	<b>03060A</b>	<b>Ekspress AM-22</b>					
	31-DEC-09	53.01				53	302
	21914.614340	42164.28330	0.0000805	0.0449	183.5755	105.1168	53.0166
<b>C1 . 51</b>	<b>95023A</b>	<b>Intelsat VIIA F-1</b>					
	31-DEC-09	54.86				53	717
	21914.895741	42164.35366	0.0002977	0.0156	19.6277	238.0574	54.8533
<b>C1 . 52</b>	<b>03043E</b>	<b>Insat 3E</b>					
	22-DEC-09	55.00				52	296
	21905.842002	42164.73548	0.0004273	0.0344	239.7698	34.4796	55.0345
<b>C1 . 53</b>	<b>98068A</b>	<b>Bonum 1</b>					
	31-DEC-09	55.99				52	567
	21914.748287	42164.58718	0.0002112	0.0303	205.3864	34.9020	55.9348
<b>C1 . 54</b>	<b>96021A</b>	<b>Astra 1F</b>					
	31-DEC-09	57.02				31	528
	21914.604745	42164.05343	0.0008956	0.0874	274.4564	28.6939	56.9890
<b>C1 . 55</b>	<b>09058A</b>	<b>NSS 12</b>					
	31-DEC-09	57.03				9	9
	21914.604745	42163.61557	0.0004160	0.0351	59.2686	317.7869	57.0423
<b>C1 . 56</b>	<b>97053A</b>	<b>Intelsat VIII F-3 (NSS 803)</b>					
	31-DEC-09	57.03				48	605
	21914.604745	42164.16220	0.0008277	0.0184	241.6913	65.3483	56.9692
<b>C1 . 57</b>	<b>02007A</b>	<b>Intelsat 904</b>					
	31-DEC-09	59.99				52	393
	21914.586991	42164.47953	0.0003129	0.0083	347.4546	283.5453	59.9999
<b>C1 . 58</b>	<b>01039A</b>	<b>Intelsat 902</b>					
	24-DEC-09	61.99				52	418
	21907.886921	42164.39487	0.0003295	0.0143	30.3051	256.1038	61.9999
<b>C1 . 59</b>	<b>09054B</b>	<b>COMSATBw-1</b>					
	31-DEC-09	63.03				14	14
	21914.889282	42164.68418	0.0003205	0.0626	97.3082	172.2355	62.9660
<b>C1 . 60</b>	<b>96020A</b>	<b>Inmarsat 3-F1</b>					
	31-DEC-09	64.05				52	658
	21914.769236	42163.03000	0.0005961	0.0700	337.9922	303.2462	64.4951
<b>C1 . 61</b>	<b>02041A</b>	<b>Intelsat 906</b>					
	31-DEC-09	64.16				52	368
	21914.842130	42165.10356	0.0002782	0.0112	19.1727	253.0103	64.1490
<b>C1 . 62</b>	<b>94034A</b>	<b>Intelsat VII F-2</b>					
	27-DEC-09	66.02				53	750
	21910.793669	42164.44926	0.0002941	0.0126	315.0094	302.1750	66.0292
<b>C1 . 63</b>	<b>01019A</b>	<b>PAS 10</b>					
	31-DEC-09	68.55				52	428
	21914.592338	42164.25078	0.0002908	0.0192	173.3438	176.1349	68.4925
<b>C1 . 64</b>	<b>98052A</b>	<b>PAS 7</b>					
	31-DEC-09	68.66				53	566
	21914.592338	42164.35731	0.0002028	0.0020	271.1908	22.3656	68.6687

<b>C1 . 65</b>	<b>07058A</b>	<b>Cosmos-2434 (Raduga-1M1)</b>					
	31-DEC-09	70.02				53	106
	21914.616782	42164.64885	0.0001612	0.0276	255.7640	37.4316	70.0128
<b>C1 . 66</b>	<b>02051A</b>	<b>Eutelsat W5</b>					
	31-DEC-09	70.50				53	351
	21914.592928	42164.67324	0.0005553	0.0410	310.9702	349.8213	70.4986
<b>C1 . 67</b>	<b>95040A</b>	<b>PAS 4</b>					
	31-DEC-09	72.01				52	672
	21914.671435	42164.73239	0.0003472	0.0373	255.6740	33.0497	71.9969
<b>C1 . 68</b>	<b>02043A</b>	<b>KALPANA-1 (METSAT-1)</b>					
	31-DEC-09	74.00				52	363
	21914.610706	42165.03600	0.0000612	0.0549	276.5585	186.9085	73.9610
<b>C1 . 69</b>	<b>02002A</b>	<b>Insat 3C</b>					
	31-DEC-09	74.00				52	402
	21914.610706	42164.51626	0.0004709	0.0626	257.6899	26.8796	73.9991
<b>C1 . 70</b>	<b>07037A</b>	<b>INSAT 4CR</b>					
	31-DEC-09	74.02				53	121
	21914.610706	42164.44141	0.0001629	0.0483	39.4798	205.3051	74.0840
<b>C1 . 71</b>	<b>99053A</b>	<b>LMI 1</b>					
	31-DEC-09	74.98				53	523
	21914.613102	42164.97068	0.0002460	0.0317	273.7972	337.3724	74.9703
<b>C1 . 72</b>	<b>97062A</b>	<b>Apstar 2R</b>					
	31-DEC-09	76.50				53	627
	21914.629248	42165.03264	0.0003961	0.0427	231.7030	46.4778	76.4963
<b>C1 . 73</b>	<b>08019A</b>	<b>Tian Lian 1A</b>					
	31-DEC-09	77.01				52	90
	21914.616227	42164.89135	0.0001110	0.0218	18.3466	189.4404	77.0728
<b>C1 . 74</b>	<b>06020B</b>	<b>Thaicom 5</b>					
	31-DEC-09	78.50				51	179
	21914.587361	42164.64044	0.0003869	0.0241	255.2139	29.3783	78.5362
<b>C1 . 75</b>	<b>94065B</b>	<b>Thaicom 2</b>					
	31-DEC-09	78.52				53	687
	21914.587361	42164.86387	0.0004272	0.0761	14.8715	280.2039	78.4803
<b>C1 . 76</b>	<b>05010A</b>	<b>Ekspress AM-2</b>					
	31-DEC-09	80.00				53	239
	21914.792627	42164.88350	0.0001822	0.0207	233.7535	83.6616	79.9938
<b>C1 . 77</b>	<b>09007B</b>	<b>Ekspress MD-1</b>					
	31-DEC-09	80.09				47	47
	21914.588553	42164.76940	0.0002827	0.0296	271.5449	357.5099	80.1081
<b>C1 . 78</b>	<b>05049A</b>	<b>Insat 4A</b>					
	31-DEC-09	82.99				52	200
	21914.700683	42164.63456	0.0001560	0.0509	279.3447	215.1615	83.1051
<b>C1 . 79</b>	<b>99016A</b>	<b>Insat 2E</b>					
	31-DEC-09	82.99				52	530
	21914.700683	42165.11590	0.0003942	0.1484	76.1660	179.0248	83.0313
<b>C1 . 80</b>	<b>00016B</b>	<b>Insat 3B</b>					
	31-DEC-09	83.00				52	488
	21914.700683	42164.91209	0.0006385	0.0078	223.3694	56.4324	83.0107
<b>C1 . 81</b>	<b>96035A</b>	<b>Intelsat VII F-6</b>					
	31-DEC-09	85.15				53	671
	21914.596285	42165.04778	0.0003286	0.0169	27.1876	254.9450	85.1494

C1 . 82	<b>06053A</b>	<b>FengYun 2D</b>					
	31-DEC-09	86.44				53	156
	21914.615660	42165.24121	0.0002459	0.2620	117.9045	224.0068	86.6547
C1 . 83	<b>98033A</b>	<b>Zhongwei 1</b>					
	28-DEC-09	87.51				52	595
	21911.039722	42164.83864	0.0002913	0.0299	255.9403	41.2701	87.5466
C1 . 84	<b>98049A</b>	<b>ST-1</b>					
	22-DEC-09	88.00				51	569
	21905.823403	42164.94545	0.0003827	0.0154	15.7550	253.2466	88.0042
C1 . 85	<b>03053B</b>	<b>Yamal 200 N1 (Yamal 201)</b>					
	31-DEC-09	90.00				53	301
	21914.795417	42164.31274	0.0002760	0.0491	275.2202	324.8442	90.0262
C1 . 86	<b>02042B</b>	<b>Kodama (DRTS)</b>					
	31-DEC-09	90.74				53	366
	21914.592569	42165.26560	0.0003497	0.0673	274.0794	341.8689	90.7542
C1 . 87	<b>06056A</b>	<b>Measat 3</b>					
	31-DEC-09	91.48				53	156
	21914.592847	42165.17561	0.0001753	0.0024	317.3905	336.8796	91.5064
C1 . 88	<b>09032A</b>	<b>Measat 3A</b>					
	31-DEC-09	91.51				28	28
	21914.592847	42165.72033	0.0003362	0.0175	315.3049	318.7561	91.4663
C1 . 89	<b>08028A</b>	<b>Zhongxing 9</b>					
	31-DEC-09	92.20				52	82
	21914.736470	42164.75174	0.0004971	0.0158	50.9665	237.4871	92.2125
C1 . 90	<b>03013A</b>	<b>Insat 3A</b>					
	28-DEC-09	93.50				53	336
	21911.756400	42165.28102	0.0006147	0.0471	257.1093	18.3998	93.4964
C1 . 91	<b>07007A</b>	<b>Insat 4B</b>					
	28-DEC-09	93.50				53	143
	21911.754688	42165.05731	0.0000741	0.0610	262.4698	169.1578	93.5056
C1 . 92	<b>02057A</b>	<b>NSS 6</b>					
	29-DEC-09	95.00				53	349
	21912.221991	42165.07413	0.0002959	0.0162	263.9952	13.7040	95.0129
C1 . 93	<b>08003A</b>	<b>Ekspress AM-33</b>					
	31-DEC-09	96.50				53	99
	21914.231968	42163.78713	0.0000796	0.0533	264.4646	131.9272	96.4976
C1 . 94	<b>03052A</b>	<b>Zhongxing-20 (ShenTong 1, ST-1)</b>					
	31-DEC-09	98.11				52	308
	21914.876493	42164.10557	0.0003024	0.0202	43.2538	279.3486	98.0750
C1 . 95	<b>08034A</b>	<b>Protostar 1</b>					
	31-DEC-09	98.34				52	78
	21914.876493	42165.53221	0.0002938	0.0302	218.5141	77.8292	98.3338
C1 . 96	<b>09042A</b>	<b>Asiasat 5</b>					
	31-DEC-09	100.70				20	20
	21914.608275	42165.02507	0.0001747	0.0159	338.2506	264.3734	100.5328
C1 . 97	<b>06038A</b>	<b>Zhongxing-22A (FengHuo 1, FH-1)</b>					
	30-DEC-09	103.30				52	168
	21913.728669	42163.35796	0.0002945	0.1301	73.5308	230.9441	103.1650
C1 . 98	<b>00016A</b>	<b>Asiastar</b>					
	31-DEC-09	105.00				52	497
	21914.585382	42165.30653	0.0003915	0.0161	340.6422	281.6656	105.0218

<b>C1 . 99</b>	<b>99013A</b>	<b>Asiasat 3S</b>					
	31-DEC-09	105.50				52	543
	21914.585382	42165.01834	0.0002058	0.0442	185.3749	105.0582	105.5230
<b>C1 . 100</b>	<b>09027A</b>	<b>Indostar II/Protostar II</b>					
	31-DEC-09	107.35				33	33
	21914.781748	42165.62585	0.0001053	0.0138	25.7291	254.8926	107.3566
<b>C1 . 101</b>	<b>99042A</b>	<b>Telkom 1</b>					
	31-DEC-09	107.98				53	526
	21914.584502	42164.82771	0.0002083	0.0377	260.4733	11.5298	108.0279
<b>C1 . 102</b>	<b>00059A</b>	<b>GE-1A</b>					
	31-DEC-09	108.20				53	467
	21914.584502	42165.49296	0.0002943	0.0364	254.9117	7.4777	108.1971
<b>C1 . 103</b>	<b>97016B</b>	<b>BSAT-1a</b>					
	31-DEC-09	109.71				52	621
	21914.278171	42165.43858	0.0001555	0.0287	274.7240	11.2967	109.6239
<b>C1 . 104</b>	<b>94040B</b>	<b>BS-3N</b>					
	29-DEC-09	109.84				51	708
	21912.286238	42165.32391	0.0001308	0.0160	325.3170	7.7985	109.8944
<b>C1 . 105</b>	<b>07036B</b>	<b>BSAT-3A</b>					
	29-DEC-09	109.86				48	117
	21912.279792	42165.00516	0.0005520	0.0569	275.5283	22.7471	109.8993
<b>C1 . 106</b>	<b>03028A</b>	<b>BSAT-2c</b>					
	29-DEC-09	109.87				51	312
	21912.286238	42166.09965	0.0003873	0.0566	145.4156	100.6665	109.8483
<b>C1 . 107</b>	<b>01011B</b>	<b>BSAT-2a</b>					
	29-DEC-09	109.87				51	433
	21912.284109	42164.69651	0.0002569	0.0889	274.5961	262.9486	109.9644
<b>C1 . 108</b>	<b>00060A</b>	<b>N-SAT-110</b>					
	22-DEC-09	110.06				51	461
	21905.842708	42165.39961	0.0000165	0.0443	241.1987	132.6971	110.0844
<b>C1 . 109</b>	<b>98044A</b>	<b>Sinosat 1</b>					
	31-DEC-09	110.50				52	587
	21914.256076	42165.21935	0.0004623	0.0517	47.1101	267.2474	110.5072
<b>C1 . 110</b>	<b>03021A</b>	<b>Beidou 3</b>					
	22-DEC-09	110.51				52	333
	21905.842708	42165.41783	0.0003140	0.1568	159.9290	43.2781	110.5016
<b>C1 . 111</b>	<b>09046A</b>	<b>Palapa D</b>					
	28-DEC-09	113.02				18	18
	21911.687373	42164.78117	0.0000853	0.0085	28.1236	215.0330	113.0722
<b>C1 . 112</b>	<b>06034A</b>	<b>Mugunghwa 5</b>					
	28-DEC-09	113.05				52	168
	21911.689618	42164.97293	0.0001890	0.0521	90.4110	223.8977	112.9774
<b>C1 . 113</b>	<b>07031A</b>	<b>Zhongxing 6B</b>					
	31-DEC-09	115.55				53	129
	21914.582488	42165.75341	0.0002877	0.0449	76.3654	209.9512	115.5297
<b>C1 . 114</b>	<b>99046A</b>	<b>Mugunghwa 3 (Koreasat 3)</b>					
	30-DEC-09	115.99				53	509
	21913.740081	42164.42683	0.0000189	0.0232	357.6998	243.5978	116.2031
<b>C1 . 115</b>	<b>05046A</b>	<b>Telkom 2</b>					
	31-DEC-09	118.01				52	206
	21914.604306	42165.10721	0.0001207	0.0509	183.9102	81.9569	118.0358

<b>C1 . 116</b>	<b>05028A</b>	<b>Thaicom 4 (IPStar 1)</b>					
	31-DEC-09	119.45				52	219
	21914.604028	42165.53894	0.0002726	0.0080	297.8916	340.9656	119.5064
<b>C1 . 117</b>	<b>03014A</b>	<b>Asiasat 4</b>					
	25-DEC-09	122.16				52	339
	21908.239931	42164.42459	0.0000745	0.0081	39.9893	67.3570	122.2564
<b>C1 . 118</b>	<b>99006A</b>	<b>JC-Sat 6</b>					
	30-DEC-09	123.94				52	545
	21913.184063	42164.93452	0.0001678	0.0240	212.6240	52.7389	124.0179
<b>C1 . 119</b>	<b>07021A</b>	<b>Xinnuo 3</b>					
	31-DEC-09	125.00				53	129
	21914.690394	42165.03881	0.0003162	0.0966	251.2398	22.4167	125.0052
<b>C1 . 120</b>	<b>06033A</b>	<b>JCSAT 3A</b>					
	31-DEC-09	127.60				52	167
	21914.734942	42165.47362	0.0000640	0.0119	320.7111	301.7413	128.0205
<b>C1 . 121</b>	<b>09044A</b>	<b>JCSAT 12 (JCSAT-RA)</b>					
	31-DEC-09	127.96				20	20
	21914.613472	42165.57735	0.0001339	0.0657	66.9210	185.8151	127.9289
<b>C1 . 122</b>	<b>08018A</b>	<b>Vinasat</b>					
	29-DEC-09	131.94				52	88
	21912.120058	42165.08058	0.0001376	0.0105	347.6868	280.9585	131.9570
<b>C1 . 123</b>	<b>06010A</b>	<b>JCSAT 9</b>					
	29-DEC-09	132.01				53	188
	21912.118403	42165.22355	0.0000943	0.0097	332.2863	273.0000	132.0662
<b>C1 . 124</b>	<b>05012A</b>	<b>Apstar 6</b>					
	24-DEC-09	134.00				52	237
	21907.243935	42164.76884	0.0001771	0.0393	71.6247	209.7833	134.0305
<b>C1 . 125</b>	<b>02035B</b>	<b>N-Star 3 (N-Star c)</b>					
	26-DEC-09	135.96				53	370
	21909.609352	42165.12936	0.0002160	0.0473	213.0480	75.8050	136.0054
<b>C1 . 126</b>	<b>04024A</b>	<b>Telstar 18 (APstar 5)</b>					
	25-DEC-09	138.02				52	275
	21908.459306	42165.02591	0.0002122	0.0132	305.8709	320.5430	138.0081
<b>C1 . 127</b>	<b>05023A</b>	<b>Ekspress AM-3</b>					
	31-DEC-09	140.04				52	227
	21914.620370	42165.14702	0.0002462	0.0901	210.5888	71.8438	140.1086
<b>C1 . 128</b>	<b>05006A</b>	<b>Himawari-6</b>					
	28-DEC-09	140.15				52	242
	21911.528715	42165.25327	0.0002040	0.0447	102.6215	0.2208	140.0651
<b>C1 . 129</b>	<b>08007A</b>	<b>Kizuna</b>					
	30-DEC-09	143.00				52	92
	21913.566250	42165.32139	0.0003005	0.0630	274.2346	341.6356	142.9880
<b>C1 . 130</b>	<b>08038A</b>	<b>Superbird C2</b>					
	31-DEC-09	143.80				52	74
	21914.621609	42165.28186	0.0001424	0.0097	357.8417	274.5093	143.9338
<b>C1 . 131</b>	<b>04007A</b>	<b>MBSAT</b>					
	29-DEC-09	144.06				52	290
	21912.640359	42165.17253	0.0001911	0.0081	301.9444	317.0034	144.0693
<b>C1 . 132</b>	<b>06004A</b>	<b>MTSAT-2</b>					
	31-DEC-09	145.01				52	193
	21914.659236	42164.90424	0.0002477	0.0509	71.8856	217.1501	145.0448

<b>C1 . 133</b>	<b>97042A</b>	<b>Agila 2</b>					
	29-DEC-09	145.98				52	614
	21912.773542	42166.29702	0.0004589	0.0136	211.9331	59.2535	145.9401
<b>C1 . 134</b>	<b>06059A</b>	<b>Kiku-8 (ETS VIII)</b>					
	30-DEC-09	146.01				52	151
	21913.364201	42166.47954	0.0003703	0.0275	23.4046	220.4994	146.0027
<b>C1 . 135</b>	<b>97075A</b>	<b>JC-Sat 5</b>					
	29-DEC-09	150.03				53	600
	21912.636736	42165.00488	0.0001590	0.0040	339.9721	287.3633	150.0206
<b>C1 . 136</b>	<b>96030A</b>	<b>Palapa C2</b>					
	29-DEC-09	150.50				52	658
	21912.636736	42165.35559	0.0002969	0.1437	80.9096	180.9028	150.6759
<b>C1 . 137</b>	<b>07044A</b>	<b>Optus D2</b>					
	31-DEC-09	152.01				52	114
	21914.442546	42165.51707	0.0003215	0.0392	235.1973	34.1204	151.9965
<b>C1 . 138</b>	<b>02015A</b>	<b>JC-Sat 8</b>					
	31-DEC-09	154.00				53	391
	21914.492488	42164.80276	0.0002024	0.0322	241.4172	12.3166	154.0201
<b>C1 . 139</b>	<b>09044B</b>	<b>Optus D3</b>					
	30-DEC-09	155.99				19	19
	21913.192303	42166.11143	0.0003349	0.0364	293.4697	349.7555	156.0204
<b>C1 . 140</b>	<b>03028B</b>	<b>Optus C1 (Defense C1)</b>					
	29-DEC-09	156.01				52	328
	21912.856748	42165.79883	0.0003718	0.0166	175.3287	70.2842	156.0022
<b>C1 . 141</b>	<b>06043B</b>	<b>Optus D1</b>					
	31-DEC-09	160.01				53	158
	21914.663125	42164.77164	0.0002773	0.0289	261.9421	9.8975	160.0178
<b>C1 . 142</b>	<b>00012A</b>	<b>Superbird 4</b>					
	31-DEC-09	162.03				52	500
	21914.642743	42164.73996	0.0002540	0.0160	244.2828	28.8131	162.0189
<b>C1 . 143</b>	<b>98065A</b>	<b>PAS 8</b>					
	30-DEC-09	166.01				52	546
	21913.662477	42164.84677	0.0003130	0.0294	274.7436	350.0388	166.0028
<b>C1 . 144</b>	<b>97046A</b>	<b>PAS 5</b>					
	24-DEC-09	168.99				51	598
	21907.558877	42164.71221	0.0002015	0.0193	64.6332	190.9531	169.0063
<b>C1 . 145</b>	<b>05052A</b>	<b>AMC 23</b>					
	30-DEC-09	172.01				52	202
	21913.265266	42164.59335	0.0003257	0.0115	287.5573	351.3971	172.0116
<b>C1 . 146</b>	<b>96070A</b>	<b>Inmarsat 3-F3</b>					
	31-DEC-09	178.07				53	663
	21914.585000	42164.50869	0.0006168	0.0746	320.1212	332.7153	178.0969
<b>C1 . 147</b>	<b>93066A</b>	<b>Intelsat VII F-1</b>					
	30-DEC-09	180.01				53	779
	21913.620486	42164.60933	0.0003439	0.0050	301.5150	354.8588	180.0033
<b>C1 . 148</b>	<b>09008A</b>	<b>NSS 9</b>					
	31-DEC-09	182.99				48	48
	21914.596910	42164.70072	0.0001359	0.0110	40.0935	226.0849	182.9720
<b>C1 . 149</b>	<b>00081B</b>	<b>GE 8 (Aurora 3)</b>					
	29-DEC-09	221.04				52	456
	21912.456736	42164.03353	0.0002797	0.0295	265.1435	22.8937	221.0418

<b>C1 . 150</b>	<b>00054B</b>	<b>GE 7</b>					
	31-DEC-09	223.01				53	468
	21914.525567	42164.56952	0.0003442	0.0419	211.1815	65.5534	223.0082
<b>C1 . 151</b>	<b>00022A</b>	<b>GOES 11</b>					
	31-DEC-09	224.80				53	493
	21914.464537	42162.83519	0.0003722	0.0049	248.7351	22.8939	224.6193
<b>C1 . 152</b>	<b>04003A</b>	<b>AMC-10 (GE 10)</b>					
	31-DEC-09	225.01				52	296
	21914.464525	42165.04413	0.0003278	0.0200	82.8393	212.2621	225.0062
<b>C1 . 153</b>	<b>05041A</b>	<b>Galaxy 15</b>					
	31-DEC-09	227.01				52	211
	21914.563553	42164.43608	0.0002779	0.0061	1.1426	278.6709	227.0066
<b>C1 . 154</b>	<b>04017A</b>	<b>AMC-11 (GE-11)</b>					
	30-DEC-09	229.01				53	281
	21913.480000	42164.27545	0.0003055	0.0130	324.8437	310.6174	229.0188
<b>C1 . 155</b>	<b>99052A</b>	<b>Telstar 7</b>					
	31-DEC-09	231.01				52	515
	21914.618565	42164.62026	0.0002549	0.0129	2.9112	275.7216	231.0093
<b>C1 . 156</b>	<b>08063A</b>	<b>Ciel 2</b>					
	31-DEC-09	231.18				52	54
	21914.618565	42164.49747	0.0003554	0.0251	238.6193	49.6185	231.1571
<b>C1 . 157</b>	<b>03044A</b>	<b>Galaxy 13/Horizons-1</b>					
	30-DEC-09	233.01				53	309
	21913.606400	42164.11202	0.0000527	0.0080	6.3091	347.7365	233.0207
<b>C1 . 158</b>	<b>05030A</b>	<b>Galaxy 14</b>					
	29-DEC-09	235.01				52	221
	21912.525799	42164.25667	0.0002532	0.0076	321.9439	306.4525	235.0270
<b>C1 . 159</b>	<b>08038B</b>	<b>AMC 21</b>					
	30-DEC-09	235.11				53	75
	21913.188113	42164.42122	0.0002808	0.0365	65.8553	199.4843	235.1507
<b>C1 . 160</b>	<b>03013B</b>	<b>Galaxy XII</b>					
	31-DEC-09	235.51				51	337
	21914.617697	42165.09319	0.0002487	0.0160	0.8524	256.9022	237.0966
<b>C1 . 161</b>	<b>08024A</b>	<b>Galaxy 18</b>					
	31-DEC-09	237.00				52	86
	21914.617697	42164.74445	0.0003247	0.0322	9.1635	266.5529	236.9995
<b>C1 . 162</b>	<b>03034A</b>	<b>EchoStar 9 (Telstar 13)</b>					
	25-DEC-09	239.00				52	322
	21908.386447	42164.70268	0.0002933	0.0063	346.5605	280.6071	239.0139
<b>C1 . 163</b>	<b>04016A</b>	<b>DirecTV-7S</b>					
	31-DEC-09	240.89				52	281
	21914.215556	42164.63147	0.0002867	0.0071	282.5225	0.8882	240.9497
<b>C1 . 164</b>	<b>02006A</b>	<b>EchoStar 7</b>					
	25-DEC-09	241.10				52	395
	21908.503356	42164.66119	0.0001576	0.0198	359.0709	248.0374	241.1077
<b>C1 . 165</b>	<b>07009A</b>	<b>Anik F3</b>					
	31-DEC-09	241.30				53	138
	21914.346921	42165.16973	0.0002726	0.0199	290.6101	347.3520	241.2980
<b>C1 . 166</b>	<b>98070A</b>	<b>Satmex 5</b>					
	25-DEC-09	243.21				52	559
	21908.522211	42164.54121	0.0001538	0.0123	270.4638	341.3814	243.2018

<b>C1 . 167</b>	<b>06049A</b>	<b>XM Radio 4 (Blues)</b>					
	31-DEC-09	245.01				52	160
	21914.527847	42164.81986	0.0000410	0.0094	28.9151	231.9830	245.0288
<b>C1 . 168</b>	<b>06020A</b>	<b>Satmex 6</b>					
	29-DEC-09	246.97				51	181
	21912.236088	42164.35142	0.0002502	0.0419	143.2697	123.9205	247.0332
<b>C1 . 169</b>	<b>04027A</b>	<b>Anik F2</b>					
	28-DEC-09	248.82				53	270
	21911.486019	42164.71445	0.0002338	0.0063	310.1344	298.0656	248.9159
<b>C1 . 170</b>	<b>06054A</b>	<b>WildBlue 1</b>					
	28-DEC-09	248.97				53	155
	21911.486181	42164.71670	0.0002774	0.0111	353.7265	310.7601	248.9127
<b>C1 . 171</b>	<b>06003A</b>	<b>Echostar 10</b>					
	28-DEC-09	249.80				52	197
	21911.541829	42164.82463	0.0001738	0.0234	2.9312	247.3439	249.7934
<b>C1 . 172</b>	<b>02023A</b>	<b>DirecTV-5</b>					
	28-DEC-09	249.98				52	387
	21911.541829	42164.41338	0.0003549	0.0170	257.7725	23.8290	249.9095
<b>C1 . 173</b>	<b>08035A</b>	<b>Echostar 11</b>					
	30-DEC-09	250.01				53	79
	21913.254225	42164.48122	0.0003122	0.0186	357.1564	274.7659	250.0288
<b>C1 . 174</b>	<b>00076A</b>	<b>Anik F1</b>					
	28-DEC-09	252.60				53	461
	21911.572014	42164.78145	0.0001833	0.0153	356.2585	252.5742	252.7147
<b>C1 . 175</b>	<b>05036A</b>	<b>Anik F1R</b>					
	28-DEC-09	252.70				53	216
	21911.572014	42164.78454	0.0002501	0.0004	273.6318	24.6498	252.7084
<b>C1 . 176</b>	<b>04041A</b>	<b>AMC-15</b>					
	25-DEC-09	254.98				51	259
	21908.523438	42164.54205	0.0001902	0.0332	237.8383	16.5785	254.9733
<b>C1 . 177</b>	<b>06054B</b>	<b>AMC 18</b>					
	24-DEC-09	255.06				52	154
	21907.183843	42164.35366	0.0002525	0.0208	290.0132	337.8650	255.0786
<b>C1 . 178</b>	<b>96054A</b>	<b>GE 1</b>					
	31-DEC-09	256.99				52	663
	21914.326250	42164.82491	0.0003538	0.0315	236.7771	40.1911	257.0098
<b>C1 . 179</b>	<b>05015A</b>	<b>Spaceway 1</b>					
	31-DEC-09	257.16				52	235
	21914.432188	42164.77641	0.0000479	0.0407	180.1399	156.8276	257.1149
<b>C1 . 180</b>	<b>07032A</b>	<b>DirecTV 10</b>					
	24-DEC-09	257.24				51	127
	21907.197940	42164.68586	0.0001059	0.0253	181.1057	183.3202	257.2494
<b>C1 . 181</b>	<b>01052A</b>	<b>DirecTV-4S</b>					
	28-DEC-09	258.84				53	408
	21911.464664	42164.76379	0.0002123	0.0070	326.8747	303.1170	258.8549
<b>C1 . 182</b>	<b>06043A</b>	<b>DirecTV 9S</b>					
	25-DEC-09	258.90				51	160
	21908.297824	42164.66371	0.0002399	0.0228	15.5323	248.5409	258.9061
<b>C1 . 183</b>	<b>99060A</b>	<b>GE 4</b>					
	28-DEC-09	258.95				52	510
	21911.464653	42164.72903	0.0001700	0.0066	353.1180	251.1176	259.0123



<b>C1 . 184</b>	<b>97002A</b>	<b>GE 2</b>					
	28-DEC-09	259.00				52	649
	21911.464653	42164.74641	0.0003007	0.0358	63.6577	202.0381	259.0207
<b>C1 . 185</b>	<b>05019A</b>	<b>DirectTV-8</b>					
	25-DEC-09	259.18				51	229
	21908.297824	42164.59896	0.0002233	0.0100	3.3653	259.7051	259.1634
<b>C1 . 186</b>	<b>08013A</b>	<b>DirecTV 11</b>					
	31-DEC-09	260.67				53	93
	21914.345729	42164.87901	0.0000550	0.0294	175.4095	132.0516	260.7749
<b>C1 . 187</b>	<b>05046B</b>	<b>Spaceway 2</b>					
	31-DEC-09	260.84				53	210
	21914.510243	42165.00881	0.0000226	0.0219	179.5019	151.9146	260.8881
<b>C1 . 188</b>	<b>06023A</b>	<b>Galaxy 16</b>					
	25-DEC-09	261.00				51	178
	21908.383495	42164.79883	0.0002961	0.0334	120.3258	158.4177	261.0087
<b>C1 . 189</b>	<b>08045A</b>	<b>Galaxy 19</b>					
	30-DEC-09	262.93				52	68
	21913.450035	42165.00040	0.0003009	0.0290	131.4717	144.7412	262.9270
<b>C1 . 190</b>	<b>09034A</b>	<b>Sirius FM5</b>					
	31-DEC-09	264.02				27	27
	21914.522627	42164.94797	0.0003027	0.0078	331.4609	298.7998	264.0046
<b>C1 . 191</b>	<b>02030A</b>	<b>Galaxy 3C</b>					
	31-DEC-09	264.95				53	378
	21914.407720	42164.76071	0.0000281	0.0253	167.4202	168.0137	264.9582
<b>C1 . 192</b>	<b>07036A</b>	<b>Spaceway 3</b>					
	31-DEC-09	265.06				53	123
	21914.407720	42164.98105	0.0000263	0.0144	219.6833	65.9467	265.0424
<b>C1 . 193</b>	<b>97026A</b>	<b>Telstar 5</b>					
	29-DEC-09	266.90				53	634
	21912.499954	42164.93732	0.0003079	0.0101	280.3630	358.5664	266.9053
<b>C1 . 194</b>	<b>02062A</b>	<b>Nimiq 2</b>					
	28-DEC-09	268.86				52	353
	21911.448206	42164.44113	0.0004561	0.0268	265.4903	358.1262	268.9543
<b>C1 . 195</b>	<b>99027A</b>	<b>Nimiq</b>					
	28-DEC-09	268.88				52	533
	21911.448206	42164.92162	0.0004999	0.0042	333.2015	316.6136	268.9245
<b>C1 . 196</b>	<b>07016B</b>	<b>Galaxy 17</b>					
	28-DEC-09	269.01				52	132
	21911.448206	42164.99731	0.0002691	0.0041	290.0569	341.3682	269.0077
<b>C1 . 197</b>	<b>05022A</b>	<b>Intelsat Americas 8 (Telstar 8)</b>					
	31-DEC-09	271.00				52	228
	21914.501331	42165.07581	0.0000418	0.0340	60.6185	61.8737	270.9873
<b>C1 . 198</b>	<b>97050A</b>	<b>GE 3</b>					
	28-DEC-09	272.95				53	619
	21911.483414	42164.40833	0.0002385	0.0504	249.1087	17.9047	273.0127
<b>C1 . 199</b>	<b>01012A</b>	<b>XM Radio 2 (Rock)</b>					
	31-DEC-09	274.78				52	446
	21914.495197	42165.40494	0.0000219	0.0768	272.0121	310.3710	274.7570
<b>C1 . 200</b>	<b>01018A</b>	<b>XM Radio 1 (Roll)</b>					
	31-DEC-09	274.83				52	434
	21914.495185	42165.22355	0.0000423	0.0644	270.7841	321.0820	274.8467

<b>C1 . 201</b>	<b>05008A</b>	<b>XM Radio 3 (Rhythm)</b>					
	29-DEC-09	274.91				52	240
	21912.133137	42165.03460	0.0000411	0.0042	333.3549	127.9460	274.9360
<b>C1 . 202</b>	<b>04048A</b>	<b>AMC 16</b>					
	29-DEC-09	275.00				52	252
	21912.126840	42165.31943	0.0002082	0.0197	269.5457	359.7137	274.9997
<b>C1 . 203</b>	<b>00046A</b>	<b>Brasilsat B4</b>					
	28-DEC-09	275.99				53	474
	21911.433704	42165.50530	0.0001742	0.0502	183.0568	81.6151	275.9376
<b>C1 . 204</b>	<b>03024A</b>	<b>AMC-9 (GE-12)</b>					
	25-DEC-09	276.49				52	328
	21908.366667	42164.88938	0.0002866	0.0206	65.0277	201.9808	277.0135
<b>C1 . 205</b>	<b>08044A</b>	<b>Nimiq 4</b>					
	28-DEC-09	278.00				52	68
	21911.347546	42164.63147	0.0002936	0.0276	267.1096	354.5991	278.0279
<b>C1 . 206</b>	<b>98063B</b>	<b>GE 5</b>					
	28-DEC-09	281.01				53	549
	21911.292477	42164.82631	0.0002844	0.0062	18.1451	258.6632	281.0680
<b>C1 . 207</b>	<b>08055A</b>	<b>Simon Bolivar</b>					
	25-DEC-09	282.02				51	61
	21908.034444	42164.12884	0.0002447	0.0386	151.2217	176.8210	282.0458
<b>C1 . 208</b>	<b>95073A</b>	<b>EchoStar 1</b>					
	22-DEC-09	282.87				52	675
	21905.316736	42165.08226	0.0002257	0.0316	268.7968	1.8636	282.8464
<b>C1 . 209</b>	<b>02039A</b>	<b>EchoStar 8</b>					
	25-DEC-09	283.00				52	372
	21908.025718	42165.08002	0.0002693	0.0336	65.4412	202.4471	283.0010
<b>C1 . 210</b>	<b>98006A</b>	<b>Brazilsat B-3A</b>					
	28-DEC-09	285.00				52	591
	21911.461019	42165.33289	0.0004877	0.0583	144.6601	121.0601	284.9952
<b>C1 . 211</b>	<b>07063B</b>	<b>Horizons 2</b>					
	28-DEC-09	285.95				52	103
	21911.431343	42164.63848	0.0002804	0.0350	268.9782	10.2883	285.9595
<b>C1 . 212</b>	<b>00038A</b>	<b>EchoStar 6</b>					
	28-DEC-09	287.31				53	478
	21911.446609	42164.62923	0.0002946	0.0363	263.2681	5.6334	287.4227
<b>C1 . 213</b>	<b>09050A</b>	<b>Nimiq 5</b>					
	28-DEC-09	287.32				16	16
	21911.446609	42164.62727	0.0002267	0.0231	288.3359	339.4778	287.3274
<b>C1 . 214</b>	<b>99056A</b>	<b>DirecTV-1R</b>					
	28-DEC-09	287.49				52	517
	21911.446609	42164.34049	0.0002329	0.0272	258.7462	15.0212	287.5061
<b>C1 . 215</b>	<b>00067A</b>	<b>GE 6</b>					
	28-DEC-09	288.00				52	462
	21911.388981	42165.07469	0.0002698	0.0328	61.7224	199.2258	288.0169
<b>C1 . 216</b>	<b>08018B</b>	<b>Star One C2</b>					
	28-DEC-09	290.01				53	89
	21911.431667	42164.77080	0.0002146	0.0342	202.3328	85.5927	290.0315
<b>C1 . 217</b>	<b>07056A</b>	<b>Star One C1</b>					
	28-DEC-09	295.01				52	108
	21911.442986	42164.64381	0.0002437	0.0425	77.6282	215.5315	295.0243

<b>C1 . 218</b>	<b>04001A</b>	<b>Estrela do Sul 1 (Telstar 14)</b>					
	28-DEC-09	296.95				52	293
	21911.387188	42164.44645	0.0002895	0.0166	278.7401	355.5585	296.9674
<b>C1 . 219</b>	<b>03033A</b>	<b>Rainbow 1</b>					
	25-DEC-09	298.35				52	324
	21908.351030	42164.65334	0.0001408	0.0208	13.1333	305.9760	298.3828
<b>C1 . 220</b>	<b>97059A</b>	<b>EchoStar 3</b>					
	25-DEC-09	298.52				52	613
	21908.351030	42164.73856	0.0001599	0.0197	2.3702	285.9888	298.5182
<b>C1 . 221</b>	<b>04031A</b>	<b>Amazonas</b>					
	28-DEC-09	298.98				52	270
	21911.031111	42164.88013	0.0002736	0.0429	45.9737	266.4367	299.0053
<b>C1 . 222</b>	<b>00043A</b>	<b>PAS 9</b>					
	22-DEC-09	302.00				52	476
	21905.373229	42164.68502	0.0001205	0.0150	284.4687	325.4572	302.0092
<b>C1 . 223</b>	<b>98037A</b>	<b>Intelsat 805</b>					
	28-DEC-09	304.51				53	576
	21911.207454	42165.29812	0.0002903	0.0184	11.8967	252.8463	304.5015
<b>C1 . 224</b>	<b>97027A</b>	<b>Inmarsat 3-F4</b>					
	23-DEC-09	306.01				51	630
	21906.747211	42165.91714	0.0004949	0.1180	44.7810	237.5396	305.9546
<b>C1 . 225</b>	<b>96015A</b>	<b>Intelsat VIIA F-2</b>					
	24-DEC-09	307.00				51	681
	21907.204016	42164.66596	0.0003503	0.0147	313.3188	307.1870	307.0425
<b>C1 . 226</b>	<b>95013A</b>	<b>Intelsat VII F-5</b>					
	25-DEC-09	309.93				51	732
	21908.372176	42164.84173	0.0002708	0.1381	80.2684	201.7761	310.0294
<b>C1 . 227</b>	<b>00072A</b>	<b>PAS 1R</b>					
	31-DEC-09	310.00				52	440
	21914.013565	42163.88216	0.0000583	0.1124	77.4925	62.7550	310.0043
<b>C1 . 228</b>	<b>07044B</b>	<b>Intelsat IS-11</b>					
	28-DEC-09	316.91				52	115
	21911.025463	42165.18374	0.0002526	0.0430	75.6964	199.8127	317.0174
<b>C1 . 229</b>	<b>98014A</b>	<b>Intelsat 806 (NSS 806)</b>					
	27-DEC-09	319.39				51	584
	21910.843877	42165.16075	0.0002549	0.0220	19.8921	274.9019	319.5232
<b>C1 . 230</b>	<b>09009A</b>	<b>Telstar 11N</b>					
	30-DEC-09	322.43				45	45
	21913.978403	42165.47698	0.0002764	0.0281	52.3102	210.0275	322.4592
<b>C1 . 231</b>	<b>05003A</b>	<b>AMC 12</b>					
	30-DEC-09	322.59				52	226
	21913.983530	42165.16188	0.0002754	0.0087	333.9618	298.5342	322.6161
<b>C1 . 232</b>	<b>02016A</b>	<b>Intelsat 903</b>					
	30-DEC-09	325.49				53	378
	21913.783947	42164.87312	0.0003125	0.0073	85.2618	193.5014	325.5106
<b>C1 . 233</b>	<b>00007A</b>	<b>Hispasat 1C</b>					
	30-DEC-09	329.97				51	488
	21913.771563	42165.32195	0.0003133	0.0546	51.0224	247.8878	330.0124
<b>C1 . 234</b>	<b>06007A</b>	<b>Spainsat</b>					
	30-DEC-09	330.00				51	178
	21913.775174	42165.29280	0.0005351	0.0344	244.2702	6.7378	329.9902

<b>C1 . 235</b>	<b>02044A</b>	<b>Hispasat 1D</b>					
	30-DEC-09	330.00				51	355
	21913.768032	42164.80584	0.0005768	0.0267	327.0171	323.6266	330.0148
<b>C1 . 236</b>	<b>03007A</b>	<b>Intelsat 907</b>					
	27-DEC-09	332.52				52	332
	21910.850463	42165.74079	0.0003445	0.0126	352.1219	290.7431	332.4298
<b>C1 . 237</b>	<b>02027A</b>	<b>Intelsat 905</b>					
	27-DEC-09	335.48				46	360
	21910.850046	42164.73183	0.0002933	0.0061	301.1927	328.8084	335.5179
<b>C1 . 238</b>	<b>02019A</b>	<b>NSS-7</b>					
	28-DEC-09	338.03				52	386
	21911.725891	42164.79351	0.0002708	0.0481	217.4987	42.4126	338.0218
<b>C1 . 239</b>	<b>01024A</b>	<b>Intelsat 901</b>					
	26-DEC-09	342.00				52	432
	21909.902083	42164.73324	0.0003566	0.0083	310.3947	304.5630	342.0269
<b>C1 . 240</b>	<b>08030A</b>	<b>Skynet 5C</b>					
	26-DEC-09	342.22				52	82
	21909.902083	42164.56560	0.0003221	0.2298	175.2702	91.9295	342.2316
<b>C1 . 241</b>	<b>96053A</b>	<b>Inmarsat 3-F2</b>					
	27-DEC-09	344.51				53	671
	21910.927685	42164.73520	0.0005762	0.1259	295.2431	343.7885	344.5255
<b>C1 . 242</b>	<b>99059A</b>	<b>Orion 2</b>					
	27-DEC-09	345.00				52	517
	21910.928102	42164.93031	0.0002780	0.0107	319.2063	322.6199	344.9909
<b>C1 . 243</b>	<b>02040A</b>	<b>Atlantic Bird 1</b>					
	27-DEC-09	347.51				51	365
	21910.920810	42164.59307	0.0004027	0.0613	339.6876	355.6943	347.5283
<b>C1 . 244</b>	<b>09007A</b>	<b>Ekspress AM-44</b>					
	31-DEC-09	349.01				47	47
	21914.227338	42164.73604	0.0001241	0.0624	109.2503	235.6763	349.0112
<b>C1 . 245</b>	<b>01042A</b>	<b>Atlantic Bird 2</b>					
	28-DEC-09	351.91				53	414
	21911.767407	42164.84201	0.0005206	0.0527	10.9210	266.8150	351.9031
<b>C1 . 246</b>	<b>09008B</b>	<b>Atlantic Bird 4A</b>					
	27-DEC-09	352.71				48	48
	21910.899537	42164.39627	0.0003470	0.0668	358.9088	248.1781	352.7380
<b>C1 . 247</b>	<b>00046B</b>	<b>Nilesat 102</b>					
	27-DEC-09	353.01				52	472
	21910.899537	42164.69427	0.0005695	0.0169	274.3478	359.2556	353.0158
<b>C1 . 248</b>	<b>98024A</b>	<b>Nilesat 101</b>					
	27-DEC-09	353.01				52	583
	21910.899537	42164.56503	0.0004462	0.0525	44.3414	259.4756	353.0052
<b>C1 . 249</b>	<b>06033B</b>	<b>Syracuse 3B</b>					
	27-DEC-09	354.81				52	169
	21910.891944	42164.43020	0.0004066	0.0367	33.5016	231.0248	354.8264
<b>C1 . 250</b>	<b>02035A</b>	<b>Atlantic Bird 3</b>					
	27-DEC-09	355.00				52	373
	21910.891944	42164.31021	0.0004817	0.0730	26.8902	232.1989	355.0342
<b>C1 . 251</b>	<b>03059A</b>	<b>AMOS 2</b>					
	27-DEC-09	356.02				52	295
	21910.889699	42165.17926	0.0003094	0.0276	345.2563	280.5569	356.0098

<b>C1 . 252</b>	<b>08022A</b>	<b>Amos 3</b>					
	27-DEC-09	356.12				52	89
	21910.889699	42164.19752	0.0000181	0.0293	65.4480	154.5883	356.0400
<b>C1 . 253</b>	<b>07007B</b>	<b>Skynet 5A</b>					
	30-DEC-09	358.89				52	138
	21913.185509	42163.95616	0.0004445	0.0554	347.0587	269.1838	358.8977
<b>C1 . 254</b>	<b>04022A</b>	<b>Intelsat 10-02</b>					
	30-DEC-09	359.05				52	274
	21913.176331	42164.46299	0.0000303	0.0450	120.1171	102.2766	359.0342
<b>C1 . 255</b>	<b>98035A</b>	<b>Thor III</b>					
	30-DEC-09	359.16				50	569
	21913.172454	42164.68278	0.0000765	0.1145	81.4775	285.0424	359.1307
<b>C1 . 256</b>	<b>08006A</b>	<b>Thor 2R</b>					
	30-DEC-09	359.25				51	93
	21913.191528	42164.25779	0.0002613	0.0488	196.8424	83.5285	359.2799
<b>C1 . 257</b>	<b>09058B</b>	<b>Thor 6</b>					
	30-DEC-09	359.30				10	10
	21913.195093	42164.58157	0.0001791	0.0315	132.9051	316.7454	359.1756

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

In the case where the satellite is only under longitude control, the following data are given:

C2.nn	COSPAR	NAME					$N_{ly}$	$N_{tot}$
	Date	$\bar{\lambda}$						
	MJD	a	e	i	$\Omega$	$\omega$	$\lambda$	

For explanation, see definition at the beginning of Chapter 3 on page 29.

<b>C2 . 1</b>	<b>93031A</b>	<b>Astra 1C</b>					
	28-DEC-09	2.01				52	643
	21911.085822	42164.06072	0.0004856	3.0634	75.1374	198.6353	2.0147
<b>C2 . 2</b>	<b>98056B</b>	<b>Sirius 3</b>					
	22-DEC-09	4.99				52	556
	21905.888785	42164.37777	0.0001380	0.9563	79.8910	191.3749	4.9517
<b>C2 . 3</b>	<b>97025A</b>	<b>Thor II</b>					
	27-DEC-09	5.10				52	613
	21910.899988	42163.99849	0.0013274	1.5844	78.4491	101.4569	5.2525
<b>C2 . 4</b>	<b>90079A</b>	<b>Skynet 4C</b>					
	28-DEC-09	6.00				51	900
	21911.094931	42164.57232	0.0003466	10.2519	45.3659	238.8726	5.9978
<b>C2 . 5</b>	<b>02040B</b>	<b>MSG 1</b>					
	12-DEC-09	9.39				47	354
	21895.846771	42163.02187	0.0006390	0.4172	5.1676	116.5621	9.5428
<b>C2 . 6</b>	<b>01005A</b>	<b>Sicral</b>					
	27-DEC-09	16.19				52	442
	21910.822164	42163.57324	0.0003313	1.8354	76.5757	192.0868	16.2060
<b>C2 . 7</b>	<b>09010A</b>	<b>Raduga 1-8</b>					
	31-DEC-09	17.24				44	44
	21914.696782	42165.24374	0.0008293	0.9630	200.7196	261.4826	16.7732
<b>C2 . 8</b>	<b>01029A</b>	<b>Artemis</b>					
	31-DEC-09	21.41				53	427
	21914.790810	42164.26256	0.0004022	7.9243	66.4000	246.8934	21.3896
<b>C2 . 9</b>	<b>98006B</b>	<b>Inmarsat-3 F5</b>					
	27-DEC-09	24.99				53	604
	21910.810104	42163.59987	0.0004069	0.4864	358.8822	274.5778	24.8053
<b>C2 . 10</b>	<b>05044A</b>	<b>Inmarsat 4 F2</b>					
	31-DEC-09	25.09				52	208
	21914.929213	42164.53111	0.0003261	2.2264	319.4840	325.2662	25.0915
<b>C2 . 11</b>	<b>96040B</b>	<b>Turksat 3</b>					
	31-DEC-09	31.00				52	657
	21914.742940	42163.78909	0.0003320	1.6569	76.7943	203.9959	31.0253
<b>C2 . 12</b>	<b>94070A</b>	<b>Astra 1D</b>					
	16-DEC-09	31.25				30	651
	21899.884120	42164.58017	0.0002186	2.1065	75.9319	185.2059	31.2930
<b>C2 . 13</b>	<b>08011A</b>	<b>AMC 14</b>					
	27-DEC-09	34.48				51	90
	21910.820370	42163.59987	0.0044999	13.6864	113.6312	2.4874	34.5058

<b>C2 . 14</b>	<b>93076A</b>	<b>NATO IVB</b>						
	31-DEC-09	35.43				52	731	
	21914.812963	42163.17240	0.0002923	8.2083	50.8121	219.7934	34.7341	
<b>C2 . 15</b>	<b>99009B</b>	<b>Skynet 4E</b>						
	31-DEC-09	35.43				53	521	
	21914.812951	42162.97758	0.0002967	5.8427	51.0077	223.1581	35.4564	
<b>C2 . 16</b>	<b>03026A</b>	<b>Thuraya 2</b>						
	29-DEC-09	44.04				53	331	
	21912.067211	42164.10950	0.0005176	2.8067	348.7653	281.9551	44.0580	
<b>C2 . 17</b>	<b>96002B</b>	<b>MEASAT 1</b>						
	31-DEC-09	46.00				53	690	
	21914.635590	42163.72938	0.0000671	2.0973	76.6972	345.6869	46.0283	
<b>C2 . 18</b>	<b>96030B</b>	<b>AMOS 1</b>						
	31-DEC-09	47.30				53	687	
	21914.768507	42164.83360	0.0005046	1.3855	80.4385	192.1071	47.2890	
<b>C2 . 19</b>	<b>91075A</b>	<b>Intelsat VI F-1</b>						
	31-DEC-09	47.51				53	851	
	21914.768507	42164.60933	0.0000852	4.9690	69.8336	207.9767	47.4920	
<b>C2 . 20</b>	<b>96067A</b>	<b>Hot Bird 2</b>						
	31-DEC-09	48.25				52	465	
	21914.803206	42164.26228	0.0006705	0.7570	80.2415	217.8896	48.2444	
<b>C2 . 21</b>	<b>94064A</b>	<b>Intelsat VII F-3 (NSS 703)</b>						
	31-DEC-09	57.01				49	690	
	21914.611840	42166.37132	0.0003251	0.3778	80.8727	221.5412	56.4257	
<b>C2 . 22</b>	<b>97049B</b>	<b>Meteosat 7</b>						
	31-DEC-09	57.45				52	621	
	21914.600914	42163.87599	0.0000494	5.6757	67.1817	323.4799	57.3520	
<b>C2 . 23</b>	<b>93073B</b>	<b>Meteosat 6</b>						
	31-DEC-09	67.48				52	759	
	21914.635706	42164.37357	0.0001755	8.8274	57.5417	259.4691	67.4168	
<b>C2 . 24</b>	<b>04036A</b>	<b>GSAT 3 (EDUSAT)</b>						
	31-DEC-09	74.01				52	263	
	21914.610428	42164.67240	0.0007643	0.7521	80.5957	198.0263	73.9922	
<b>C2 . 25</b>	<b>96003A</b>	<b>Mugunghwa 2 (Koreasat 2)</b>						
	31-DEC-09	74.84				52	656	
	21914.629896	42164.36376	0.0000636	2.8470	74.9632	250.1411	74.8420	
<b>C2 . 26</b>	<b>97049A</b>	<b>Hot Bird 3</b>						
	31-DEC-09	75.64				52	454	
	21914.833206	42164.82378	0.0006128	0.8350	80.4938	118.5964	75.1695	
<b>C2 . 27</b>	<b>08033A</b>	<b>Cosmos-2440</b>						
	31-DEC-09	79.90				53	82	
	21914.588843	42163.55390	0.0002444	1.0467	295.2268	28.8386	80.2362	
<b>C2 . 28</b>	<b>00082A</b>	<b>Beidou 1B</b>						
	31-DEC-09	80.34				52	458	
	21914.834502	42164.86079	0.0004722	2.5021	75.2020	206.7617	80.3644	
<b>C2 . 29</b>	<b>95035B</b>	<b>TDRS 7</b>						
	31-DEC-09	84.89				52	724	
	21914.591412	42165.20225	0.0030518	11.4501	46.0281	311.7467	84.8805	
<b>C2 . 30</b>	<b>04010A</b>	<b>Raduga-1</b>						
	31-DEC-09	85.08				53	288	
	21914.826319	42164.40188	0.0003615	4.3108	81.3053	198.6864	85.0604	

<b>C2 . 31</b>	<b>00034A</b>	<b>TDRS 8</b>						
	31-DEC-09	89.10					51	480
	21914.922789	42163.50625	0.0005211	1.8535	98.9408	165.3413		89.1910
<b>C2 . 32</b>	<b>99047B</b>	<b>Yamal-100 No. 2</b>						
	31-DEC-09	89.78					52	527
	21914.612477	42164.96536	0.0004617	5.8999	67.7457	222.2959		89.7284
<b>C2 . 33</b>	<b>00003A</b>	<b>Zhongxing-22 (FengHuo 1, FH-1)</b>						
	31-DEC-09	97.97					52	509
	21914.694363	42164.52186	0.0002800	1.5765	76.9263	219.7216		97.8875
<b>C2 . 34</b>	<b>08001A</b>	<b>Thuraya 3</b>						
	31-DEC-09	98.62					52	98
	21914.598241	42165.06544	0.0005088	5.4575	332.2467	297.5535		98.6519
<b>C2 . 35</b>	<b>90002B</b>	<b>Leasat 5</b>						
	27-DEC-09	100.03					53	920
	21910.708275	42165.79378	0.0000479	8.6513	34.2337	290.2814		99.9879
<b>C2 . 36</b>	<b>00013A</b>	<b>Ekspress 2A</b>						
	31-DEC-09	102.80					52	500
	21914.614433	42164.87649	0.0000836	3.7140	72.6397	168.9576		102.7675
<b>C2 . 37</b>	<b>08066A</b>	<b>Feng Yun 2E</b>						
	25-DEC-09	104.20					51	53
	21908.459213	42164.16613	0.0001002	1.7997	286.8715	275.2450		104.4984
<b>C2 . 38</b>	<b>97071B</b>	<b>Cakrawatra 1</b>						
	31-DEC-09	107.63					53	594
	21914.658530	42166.37048	0.0004581	4.0590	71.7782	224.8447		107.4400
<b>C2 . 39</b>	<b>92021B</b>	<b>Inmarsat 2-F4</b>						
	22-DEC-09	109.00					51	844
	21905.800197	42163.94915	0.0001785	4.9397	49.7795	200.0466		109.0127
<b>C2 . 40</b>	<b>93078B</b>	<b>Thaicom 1</b>						
	31-DEC-09	120.00					52	747
	21914.604028	42166.17226	0.0002195	0.8142	76.6212	200.2710		119.9607
<b>C2 . 41</b>	<b>00011A</b>	<b>Garuda 1</b>						
	22-DEC-09	123.03					51	490
	21905.886354	42165.49381	0.0002796	1.2989	251.1927	36.4293		123.0662
<b>C2 . 42</b>	<b>97007A</b>	<b>JC-Sat 4</b>						
	29-DEC-09	127.51					53	640
	21912.268692	42166.36459	0.0002415	1.9933	76.6491	202.3947		127.3920
<b>C2 . 43</b>	<b>96039A</b>	<b>Apstar 1A</b>						
	31-DEC-09	130.01					52	696
	21914.699271	42165.29896	0.0001451	4.1887	71.5363	193.9567		130.0292
<b>C2 . 44</b>	<b>00069A</b>	<b>Beidou</b>						
	31-DEC-09	139.98					53	467
	21914.609375	42165.53810	0.0003525	1.0371	79.1664	206.8337		139.8717
<b>C2 . 45</b>	<b>94043A</b>	<b>Apstar 1</b>						
	30-DEC-09	142.03					52	798
	21913.124514	42165.78677	0.0000783	4.8765	70.0858	215.2150		141.9163
<b>C2 . 46</b>	<b>05009A</b>	<b>Inmarsat 4 F1</b>						
	30-DEC-09	143.50					53	241
	21913.238646	42166.19581	0.0003079	2.3345	327.8482	314.5811		143.4842
<b>C2 . 47</b>	<b>97036A</b>	<b>Superbird C</b>						
	31-DEC-09	144.00					52	616
	21914.621609	42164.48822	0.0003124	1.1039	79.2081	193.8579		143.7508



<b>C2 . 48</b>	<b>94055A</b>	<b>Optus B3</b>					
	31-DEC-09	164.00				53	756
	21914.456181	42164.63792	0.0004428	1.9366	77.1386	200.4185	163.9959
<b>C2 . 49</b>	<b>94040A</b>	<b>PAS 2</b>					
	30-DEC-09	169.01				52	779
	21913.584306	42164.42683	0.0002643	0.9446	80.6365	192.8627	169.1266
<b>C2 . 50</b>	<b>89087A</b>	<b>Intelsat VI F-2</b>					
	30-DEC-09	177.84				53	885
	21913.582361	42164.98470	0.0001093	7.3804	63.6605	214.9126	177.8406
<b>C2 . 51</b>	<b>87022A</b>	<b>GOES 7</b>					
	24-DEC-09	185.00				52	984
	21907.563171	42163.61137	0.0003527	12.4479	35.3688	135.5968	186.6062
<b>C2 . 52</b>	<b>93003B</b>	<b>TDRS 6</b>					
	31-DEC-09	189.00				53	827
	21914.624201	42162.71662	0.0007050	9.6611	56.2728	325.3623	188.8104
<b>C2 . 53</b>	<b>91054B</b>	<b>TDRS 5</b>					
	31-DEC-09	192.50				53	913
	21914.859861	42163.74928	0.0013916	10.3018	53.2608	308.4408	192.3066
<b>C2 . 54</b>	<b>90093A</b>	<b>Inmarsat 2-F1</b>					
	31-DEC-09	217.99				53	846
	21914.430775	42163.43505	0.0003051	7.0473	53.5411	218.2592	218.0362
<b>C2 . 55</b>	<b>94065A</b>	<b>Solidaridad 2</b>					
	31-DEC-09	246.58				52	762
	21914.558183	42164.75791	0.0002443	1.7242	77.7348	199.6700	245.1021
<b>C2 . 56</b>	<b>09035A</b>	<b>Terrestar 1</b>					
	31-DEC-09	249.01				27	27
	21914.480741	42164.68698	0.0003454	5.6974	319.4532	322.9303	249.0120
<b>C2 . 57</b>	<b>96022A</b>	<b>MSAT</b>					
	25-DEC-09	253.51				52	696
	21908.358519	42164.68810	0.0005595	2.3339	76.0915	197.3119	253.4918
<b>C2 . 58</b>	<b>67111A</b>	<b>ATS 3</b>					
	29-DEC-09	254.71				53	957
	21912.899421	42164.61998	0.0015989	9.1443	316.9185	42.3871	254.8789
<b>C2 . 59</b>	<b>06018A</b>	<b>GOES N</b>					
	25-DEC-09	254.76				52	184
	21908.032373	42164.53840	0.0003080	0.3455	93.5716	147.5134	254.5930
<b>C2 . 60</b>	<b>09033A</b>	<b>GOES O</b>					
	29-DEC-09	255.38				27	27
	21912.400231	42164.64185	0.0001107	0.3564	260.0922	53.3433	255.4009
<b>C2 . 61</b>	<b>85035A</b>	<b>Gstar 1</b>					
	23-DEC-09	255.56				51	1004
	21906.171829	42164.61550	0.0008402	11.0923	48.6719	259.9371	254.8684
<b>C2 . 62</b>	<b>95019A</b>	<b>AMSC-1</b>					
	31-DEC-09	259.00				52	735
	21914.430046	42164.84621	0.0002565	4.9914	69.9391	205.3964	258.7160
<b>C2 . 63</b>	<b>91018A</b>	<b>Inmarsat 2-F2</b>					
	25-DEC-09	262.00				51	875
	21908.371516	42164.84621	0.0003689	6.3483	54.1482	215.2614	261.9561
<b>C2 . 64</b>	<b>08039A</b>	<b>Inmarsat 4 F3</b>					
	25-DEC-09	262.37				52	73
	21908.370926	42164.68642	0.0002518	3.0137	334.3624	299.0689	262.3961

<b>C2 . 65</b>	<b>08016A</b>	<b>ICO G1</b>					
	31-DEC-09	267.16				52	90
	21914.496100	42164.94545	0.0003057	5.3140	330.4273	301.7060	267.1634
<b>C2 . 66</b>	<b>95016A</b>	<b>Brazilsat B2</b>					
	28-DEC-09	267.99				53	714
	21911.043750	42164.62250	0.0002129	1.7994	78.9318	193.9815	268.0113
<b>C2 . 67</b>	<b>96033A</b>	<b>Galaxy IX</b>					
	28-DEC-09	279.01				53	674
	21911.449722	42164.49467	0.0001446	1.2798	78.2881	191.3951	279.0117
<b>C2 . 68</b>	<b>92060B</b>	<b>Satcom C-3</b>					
	24-DEC-09	280.94				52	862
	21907.212813	42164.27069	0.0002096	4.8526	70.0444	183.7367	280.9795
<b>C2 . 69</b>	<b>98028A</b>	<b>EchoStar 4</b>					
	29-DEC-09	283.00				52	582
	21912.055845	42164.86247	0.0004605	1.5315	55.6887	205.5096	283.2043
<b>C2 . 70</b>	<b>01031A</b>	<b>GOES 12</b>					
	22-DEC-09	285.03				52	424
	21905.317049	42167.11991	0.0001465	0.4840	82.7120	236.2324	285.0140
<b>C2 . 71</b>	<b>97002B</b>	<b>Nahuel 1A</b>					
	29-DEC-09	288.19				53	642
	21912.203750	42165.07441	0.0004601	2.2470	76.5132	200.0127	288.2038
<b>C2 . 72</b>	<b>94049A</b>	<b>Brazilsat B1</b>					
	28-DEC-09	292.00				52	747
	21911.449282	42164.10249	0.0001458	2.6247	75.9246	192.2824	292.0561
<b>C2 . 73</b>	<b>02011A</b>	<b>TDRS 9</b>					
	30-DEC-09	297.75				53	391
	21913.169641	42166.36403	0.0010316	1.9621	221.6969	132.2219	297.7208
<b>C2 . 74</b>	<b>83026B</b>	<b>TDRS-East</b>					
	24-DEC-09	303.75				51	994
	21907.223785	42164.17706	0.0032903	13.4771	7.7719	244.4336	303.6863
<b>C2 . 75</b>	<b>88091B</b>	<b>TDRS-West</b>					
	25-DEC-09	310.90				51	927
	21908.161597	42162.79706	0.0032772	12.1994	37.9580	311.7132	310.9710
<b>C2 . 76</b>	<b>89021B</b>	<b>TDRS 4</b>					
	25-DEC-09	314.08				52	954
	21908.365995	42163.04738	0.0005812	10.9265	49.6382	281.9734	314.0449
<b>C2 . 77</b>	<b>96002A</b>	<b>PAS 3R</b>					
	28-DEC-09	316.99				52	679
	21911.025046	42165.13636	0.0003134	0.4059	80.8517	187.6487	316.9154
<b>C2 . 78</b>	<b>02055A</b>	<b>TDRS 10</b>					
	29-DEC-09	319.17				50	342
	21912.051725	42164.64185	0.0006563	0.6518	290.3840	311.9930	319.2605
<b>C2 . 79</b>	<b>01005B</b>	<b>Skynet 4F</b>					
	26-DEC-09	326.02				51	436
	21909.950648	42164.16556	0.0003977	4.1472	57.5021	211.5604	326.0171
<b>C2 . 80</b>	<b>97009A</b>	<b>Intelsat VIII F-1</b>					
	27-DEC-09	328.50				52	603
	21910.835683	42165.40017	0.0010176	1.2097	80.0968	213.1797	328.4322
<b>C2 . 81</b>	<b>90021A</b>	<b>Intelsat VI F-3</b>					
	28-DEC-09	340.06				53	935
	21911.187662	42165.06908	0.0001714	6.8532	65.2704	211.2237	340.0255

<b>C2 . 82</b>	<b>96034A</b>	<b>Gorizont 32</b>					
	31-DEC-09	345.80				53	698
	21914.023981	42165.47979	0.0003143	9.8733	54.1511	238.5163	345.3425
<b>C2 . 83</b>	<b>02029A</b>	<b>Ekspress A1R (Express 4A)</b>					
	30-DEC-09	346.00				53	384
	21913.047986	42164.89387	0.0004843	0.4342	81.9987	198.3984	345.9869
<b>C2 . 84</b>	<b>96044B</b>	<b>Telecom 2D</b>					
	27-DEC-09	352.10				52	650
	21910.826528	42164.83191	0.0005593	3.3896	73.2935	199.2314	352.1519

### 3.3 Objects in a drift orbit

In the case where the object is in a drift orbit, the following data are given:

D.nn	COSPAR	NAME					
	Date	$\bar{\lambda}$	$\overline{\Delta a}$	$\overline{\Delta r_p}$	$\overline{\Delta r_a}$	$N_{ly}$	$N_{tot}$
	MJD	a	e	i	$\Omega$	$\omega$	$\lambda$

For explanation, see definition at the beginning of Chapter 3 on page 29.

<b>D . 1</b>	<b>69045A</b>	<b>Intelsat III F-4</b>					
	30-DEC-09	-36.83	3135.899	3002.598	3269.200	52	72
	21913.160185	45301.26819	0.0030386	15.3750	335.7005	304.7121	179.0435
<b>D . 2</b>	<b>68116A</b>	<b>Intelsat III F-2</b>					
	31-DEC-09	-36.29	3085.678	2614.477	3556.879	48	67
	21914.913819	45249.85978	0.0105218	15.0172	338.1015	311.7771	267.7940
<b>D . 3</b>	<b>06048A</b>	<b>Xinnuo 2</b>					
	24-DEC-09	-26.69	2215.000	2018.600	2411.600	49	157
	21907.416470	44379.16097	0.0044300	3.2554	207.5945	42.7960	147.5873
<b>D . 4</b>	<b>78113D</b>	<b>Titan IIIC stage 3 (Transtage)</b>					
	30-DEC-09	-23.46	1931.719	725.558	3137.880	51	761
	21913.293785	44097.02209	0.0276464	17.6650	2.9875	274.1451	155.2180
<b>D . 5</b>	<b>78113A</b>	<b>OPS 9441 (DSCS II F-11)</b>					
	31-DEC-09	-22.47	1845.502	1732.785	1958.219	53	887
	21914.581053	44009.86835	0.0024719	16.2921	7.4076	41.0659	58.3170
<b>D . 6</b>	<b>85024A</b>	<b>Ekran 14</b>					
	31-DEC-09	-19.72	1608.716	1531.144	1686.288	53	874
	21914.684167	43772.82503	0.0020244	15.8911	14.4759	228.7113	27.7940
<b>D . 7</b>	<b>84115A</b>	<b>NATO IIID</b>					
	24-DEC-09	-19.15	1560.181	1143.149	1977.214	50	905
	21907.457431	43724.22945	0.0099552	10.5762	41.9964	341.4562	143.8541
<b>D . 8</b>	<b>73100D</b>	<b>Titan IIIC stage 3 (Transtage)</b>					
	31-DEC-09	-18.99	1546.937	362.515	2731.358	52	788
	21914.797569	43711.21216	0.0272114	16.4664	346.7887	326.9833	317.6484
<b>D . 9</b>	<b>83016A</b>	<b>Ekran 10</b>					
	31-DEC-09	-18.88	1537.315	1384.946	1689.684	52	867
	21914.073449	43701.47058	0.0035636	16.4578	5.8905	239.2394	239.4951
<b>D . 10</b>	<b>81122A</b>	<b>Marecs A</b>					
	22-DEC-09	-18.84	1534.075	1013.261	2054.889	51	895
	21905.615255	43698.50986	0.0110931	14.2524	17.8137	114.0432	66.2198
<b>D . 11</b>	<b>82106A</b>	<b>DSCS II F-16</b>					
	25-DEC-09	-18.66	1518.620	1503.076	1534.164	50	935
	21908.284433	43682.66089	0.0002731	14.9272	18.2674	322.9128	181.9534
<b>D . 12</b>	<b>88036A</b>	<b>Ekran 18</b>					
	31-DEC-09	-18.45	1500.706	1447.652	1553.759	53	859
	21914.649444	43663.91425	0.0015436	14.6780	25.0748	306.5143	50.9677
<b>D . 13</b>	<b>77005A</b>	<b>NATO IIIB</b>					
	30-DEC-09	-18.01	1463.779	1270.086	1657.473	51	870
	21913.976782	43628.26990	0.0048547	14.9538	0.1957	262.5219	268.4902

D . 14	<b>79098C</b>	<b>Titan IIIC stage 3 (Transtage)</b>					
	31-DEC-09	-17.84	1448.900	67.613	2830.187	51	861
	21913.916713	43613.11257	0.0318387	16.8823	3.8234	277.9990	290.7408
D . 15	<b>77034B</b>	<b>OPS 9438 (DSCS II F-8)</b>					
	31-DEC-09	-17.45	1416.016	1265.706	1566.327	51	847
	21914.500544	43580.26905	0.0038117	16.5896	357.9530	352.0043	77.6665
D . 16	<b>08022B</b>	<b>Zenith-3SLB third stage (Block DM-SLB)</b>					
	30-DEC-09	-17.06	1383.321	-801.558	3568.200	51	79
	21913.691979	43547.62587	0.0499005	2.2507	88.0883	256.5067	93.4948
D . 17	<b>77034C</b>	<b>Titan IIIC stage 3 (Transtage)</b>					
	24-DEC-09	-16.97	1375.168	65.814	2684.521	52	873
	21907.309525	43540.19004	0.0305136	17.0252	356.2536	303.2026	148.9778
D . 18	<b>79098A</b>	<b>OPS 9443 (DSCS II F-13)</b>					
	27-DEC-09	-16.83	1363.542	1324.264	1402.821	51	905
	21910.673137	43527.57031	0.0012188	15.8592	7.3926	323.4136	28.7387
D . 19	<b>87109A</b>	<b>Ekran 17</b>					
	31-DEC-09	-15.81	1277.492	1094.746	1460.237	52	848
	21914.546991	43441.95393	0.0038296	14.1412	27.9188	82.3482	91.3742
D . 20	<b>76053A</b>	<b>Marisat 2</b>					
	21-DEC-09	-15.75	1272.540	726.818	1818.263	50	872
	21904.652106	43436.72683	0.0121919	15.6291	356.4185	177.2497	31.4051
D . 21	<b>84114B</b>	<b>Marecs B2</b>					
	19-DEC-09	-15.64	1263.968	751.577	1776.359	51	943
	21902.281725	43428.10410	0.0119513	14.5076	26.9770	256.9807	196.2194
D . 22	<b>87028A</b>	<b>Raduga 20</b>					
	31-DEC-09	-15.52	1253.441	1134.143	1372.740	52	817
	21914.056157	43418.09566	0.0028073	15.2483	23.7755	6.0342	264.0135
D . 23	<b>84090A</b>	<b>Ekran 13</b>					
	31-DEC-09	-15.30	1235.397	1172.197	1298.598	53	891
	21914.493021	43399.67277	0.0014120	15.5977	11.2862	39.9260	93.8909
D . 24	<b>97029A</b>	<b>FengYun 2A (FengYun 2-1R)</b>					
	20-DEC-09	-15.20	1226.778	810.002	1643.554	51	629
	21903.465220	43390.73744	0.0094455	8.8483	60.5217	77.8618	164.8550
D . 25	<b>84028A</b>	<b>Ekran 12</b>					
	31-DEC-09	-15.17	1224.049	1183.502	1264.597	52	865
	21914.207813	43387.92693	0.0010819	15.8302	8.0191	329.3397	193.4100
D . 26	<b>91084B</b>	<b>Inmarsat 2-F3</b>					
	31-DEC-09	-15.16	1223.283	1179.948	1266.619	52	828
	21914.607269	43387.54844	0.0011021	6.4224	59.1892	282.2541	100.1865
D . 27	<b>87073A</b>	<b>Ekran 16</b>					
	28-DEC-09	-13.64	1096.829	1079.411	1114.247	51	788
	21911.389491	43260.84094	0.0003287	14.5558	21.3423	313.0052	144.1357
D . 28	<b>86038A</b>	<b>Ekran 15</b>					
	31-DEC-09	-13.42	1078.355	1019.540	1137.169	52	836
	21914.231563	43242.35623	0.0012589	14.9911	16.2946	246.4416	193.0453
D . 29	<b>88108A</b>	<b>Ekran 19</b>					
	31-DEC-09	-13.03	1046.486	924.465	1168.507	52	934
	21914.562986	43211.34295	0.0025450	13.7348	30.5210	52.5806	87.9959
D . 30	<b>77034A</b>	<b>OPS 9437 (DSCS II F-7)</b>					
	31-DEC-09	-12.96	1040.320	961.860	1118.780	52	827
	21914.808981	43204.40824	0.0017714	16.5359	355.1856	214.5603	323.5049

D . 31	<b>86090A</b>	<b>Gorizont 13</b>						
	31-DEC-09	-12.77	1025.029	956.709	1093.349	52	845	
	21914.974016	43189.31354	0.0017524	14.3447	22.1761	226.1198	290.8953	
D . 32	<b>88051A</b>	<b>Meteosat 3</b>						
	31-DEC-09	-11.97	958.906	933.218	984.594	50	904	
	21914.339329	43122.78670	0.0008547	13.0827	37.0255	254.9815	174.9006	
D . 33	<b>85028C</b>	<b>Leasat 3</b>						
	20-DEC-09	-11.92	954.413	622.197	1286.629	46	960	
	21903.875868	43118.58683	0.0071815	17.0648	9.1253	142.5305	324.7512	
D . 34	<b>89020B</b>	<b>Meteosat 4</b>						
	31-DEC-09	-11.39	910.945	828.456	993.434	51	873	
	21914.251840	43075.18095	0.0016409	12.4810	42.2574	26.0475	211.8840	
D . 35	<b>92032A</b>	<b>Intelsat K (NSS K)</b>						
	31-DEC-09	-11.14	890.321	496.651	1283.990	53	840	
	21914.112280	43054.69622	0.0094393	6.9986	67.2409	203.0448	286.5905	
D . 36	<b>71095C</b>	<b>Titan IIIC stage 3 (Transtage)</b>						
	30-DEC-09	-11.11	887.572	207.092	1568.051	49	851	
	21913.932685	43052.13088	0.0156011	14.1558	338.5242	16.8478	263.8016	
D . 37	<b>84023A</b>	<b>Intelsat V F-8</b>						
	31-DEC-09	-10.74	857.537	769.450	945.624	50	962	
	21914.099734	43022.11153	0.0015560	13.3895	32.6241	47.7094	257.2215	
D . 38	<b>89070A</b>	<b>Himawari-4</b>						
	31-DEC-09	-10.30	821.845	631.042	1012.647	52	926	
	21914.433831	42985.64270	0.0046110	12.2687	42.9363	344.5010	146.6456	
D . 39	<b>84093C</b>	<b>Leasat 2</b>						
	24-DEC-09	-10.14	808.791	676.671	940.910	52	944	
	21907.340938	42972.64864	0.0025863	15.9034	11.1838	119.0486	155.7377	
D . 40	<b>85107F</b>	<b>Proton-K fourth stage (Block DM)</b>						
	31-DEC-09	-10.00	797.106	713.416	880.796	51	834	
	21914.174884	42961.28031	0.0019985	14.4535	16.9164	315.4098	214.0978	
D . 41	<b>73100B</b>	<b>OPS 9434 (DSCS II F-4)</b>						
	26-DEC-09	-9.92	790.356	490.734	1089.977	53	880	
	21909.637257	42954.41289	0.0074893	14.7142	344.4461	281.1964	18.9490	
D . 42	<b>78073F</b>	<b>Proton-K fourth stage (Block DM)</b>						
	30-DEC-09	-9.74	775.612	710.281	840.942	52	860	
	21913.971447	42940.31217	0.0016631	15.5904	350.6274	354.3884	261.3808	
D . 43	<b>82113F</b>	<b>Proton-K fourth stage (Block DM)</b>						
	27-DEC-09	-9.72	774.695	678.293	871.097	52	852	
	21910.636852	42939.11189	0.0018607	15.0698	6.4790	127.6287	41.1636	
D . 44	<b>76101A</b>	<b>Marisat 3</b>						
	24-DEC-09	-9.66	769.347	340.888	1197.805	49	927	
	21907.075081	42933.66429	0.0100967	13.2627	354.7109	204.6682	234.4818	
D . 45	<b>86082F</b>	<b>Proton-K fourth stage (Block DM)</b>						
	20-DEC-09	-9.63	766.684	651.088	882.279	52	779	
	21903.583565	42931.48028	0.0028042	14.1812	20.4519	4.6209	81.1264	
D . 46	<b>83088F</b>	<b>Proton-K fourth stage (Block DM)</b>						
	31-DEC-09	-9.57	761.874	693.625	830.122	50	855	
	21914.163831	42926.22947	0.0017666	15.0655	9.2403	333.3005	210.4801	
D . 47	<b>83066F</b>	<b>Proton-K fourth stage (Block DM)</b>						
	31-DEC-09	-9.56	761.142	717.448	804.835	50	852	
	21914.413819	42925.56488	0.0010764	15.0262	8.9092	6.6429	120.0180	

D . 48	<b>69013B</b>	<b>Titan IIIC stage 3 (Transtage)</b>					
	21-DEC-09	-9.55	760.730	201.586	1319.874	49	793
	21904.792130	42924.80709	0.0126819	10.8823	323.8164	46.5748	309.2589
D . 49	<b>80016D</b>	<b>Proton-K fourth stage (Block DM)</b>					
	31-DEC-09	-9.54	759.863	696.202	823.523	51	881
	21914.419549	42924.57317	0.0010761	15.6379	355.0165	137.3125	104.1178
D . 50	<b>09007D</b>	<b>Proton-M fourth stage (Briz-M)</b>					
	30-DEC-09	-9.51	757.582	-56.380	1571.545	45	45
	21913.103646	42921.83519	0.0188374	0.8089	95.5098	255.9021	223.6996
D . 51	<b>73100A</b>	<b>OPS 9433 (DSCS II F-3)</b>					
	24-DEC-09	-9.43	750.357	627.827	872.886	48	779
	21907.832639	42914.50041	0.0027242	15.3207	344.1419	60.6303	311.2005
D . 52	<b>87040A</b>	<b>Gorizont 14</b>					
	21-DEC-09	-9.42	749.651	628.067	871.236	50	888
	21904.575278	42914.23411	0.0027257	14.6926	14.7481	47.4924	77.6353
D . 53	<b>81027F</b>	<b>Proton-K fourth stage (Block DM)</b>					
	27-DEC-09	-9.40	748.089	676.269	819.909	52	854
	21910.697060	42912.22569	0.0016021	15.8392	358.1122	41.1673	11.0103
D . 54	<b>79062D</b>	<b>Proton-K fourth stage (Block DM)</b>					
	31-DEC-09	-9.37	746.137	727.487	764.788	51	820
	21914.283947	42910.20403	0.0001845	15.6903	354.6336	2.8081	152.6006
D . 55	<b>86044F</b>	<b>Proton-K fourth stage (Block DM)</b>					
	30-DEC-09	-9.37	745.821	704.661	786.982	52	872
	21913.371400	42910.95473	0.0008387	14.2240	19.2460	20.3425	146.6686
D . 56	<b>96005D</b>	<b>Proton-K fourth stage (Block DM-2)</b>					
	31-DEC-09	-9.35	744.568	693.314	795.821	50	636
	21914.792928	42908.91330	0.0011457	10.3359	54.2537	12.6488	28.4685
D . 57	<b>86027F</b>	<b>Proton-K fourth stage (Block DM)</b>					
	29-DEC-09	-9.30	740.083	586.269	893.897	52	857
	21912.362523	42904.31147	0.0036589	14.8497	19.0889	341.0626	150.5273
D . 58	<b>81069F</b>	<b>Proton-K fourth stage (Block DM)</b>					
	31-DEC-09	-9.27	737.329	646.570	828.088	51	857
	21914.524919	42902.04659	0.0021745	15.6148	359.3789	16.4837	70.4564
D . 59	<b>82113A</b>	<b>Raduga 11</b>					
	31-DEC-09	-9.24	734.999	556.161	913.838	52	797
	21914.950359	42899.33591	0.0037978	14.9362	6.6865	132.4073	284.4225
D . 60	<b>77071F</b>	<b>Proton-K fourth stage (Block DM)</b>					
	22-DEC-09	-9.12	725.853	677.298	774.407	50	835
	21905.370579	42890.30624	0.0014770	15.3180	347.5373	331.3903	123.0041
D . 61	<b>01045A</b>	<b>Raduga 1-6</b>					
	31-DEC-09	-9.10	724.174	653.686	794.662	52	416
	21914.570637	42888.29974	0.0014233	6.2427	69.5328	40.4195	123.9464
D . 62	<b>88028D</b>	<b>Proton-K fourth stage (Block DM)</b>					
	31-DEC-09	-8.96	712.823	622.437	803.208	52	871
	21914.276192	42876.49192	0.0022575	14.0441	26.4895	322.2721	187.1025
D . 63	<b>85076D</b>	<b>Leasat 4</b>					
	31-DEC-09	-8.91	708.252	680.417	736.087	51	847
	21914.395139	42872.20358	0.0009400	12.6104	17.0766	241.2712	134.8135
D . 64	<b>86007F</b>	<b>Proton-K fourth stage (Block DM)</b>					
	22-DEC-09	-8.90	707.993	577.705	838.281	50	856
	21905.611053	42872.89299	0.0031514	14.4143	17.2787	11.7032	66.1075

D . 65	<b>85070F</b>	<b>Proton-K fourth stage (Block DM)</b>					
	31-DEC-09	-8.89	706.494	658.439	754.549	52	861
	21914.357384	42870.34734	0.0010612	14.4888	15.7163	1.9369	147.1859
D . 66	<b>77108D</b>	<b>Mage 1 (Meteosat 1 AKM)</b>					
	31-DEC-09	-8.89	706.411	325.032	1087.789	50	456
	21914.292708	42870.54576	0.0090833	15.9045	348.6238	336.6427	143.0094
D . 67	<b>88028A</b>	<b>Gorizont 15</b>					
	31-DEC-09	-8.81	700.061	555.651	844.471	51	898
	21914.313819	42863.74666	0.0034678	13.9815	26.7050	27.9909	174.0809
D . 68	<b>92043D</b>	<b>Proton-K fourth stage (Block DM-2)</b>					
	31-DEC-09	-8.79	698.361	593.249	803.473	52	743
	21914.165787	42862.96064	0.0023111	12.1434	42.9873	26.6500	243.7112
D . 69	<b>89101G</b>	<b>Cosmos 2054 debris</b>					
	24-DEC-09	-8.72	693.300	553.111	833.489	46	500
	21907.425949	42857.07056	0.0028728	13.1150	33.0650	178.9472	146.6637
D . 70	<b>89098D</b>	<b>Proton-K fourth stage (Block DM)</b>					
	31-DEC-09	-8.71	691.915	616.899	766.932	51	824
	21914.506458	42856.61244	0.0016834	13.3623	33.4099	18.9076	111.1171
D . 71	<b>90102D</b>	<b>Proton-K fourth stage (Block DM-2)</b>					
	25-DEC-09	-8.66	688.000	608.973	767.028	50	786
	21908.162581	42852.62915	0.0016990	12.8094	36.5642	37.3386	244.3579
D . 72	<b>89048D</b>	<b>Proton-K fourth stage (Block DM)</b>					
	19-DEC-09	-8.57	681.099	588.656	773.542	50	792
	21902.762708	42845.34782	0.0022425	13.2725	31.1171	337.7701	27.9749
D . 73	<b>89030D</b>	<b>Proton-K fourth stage (Block DM)</b>					
	31-DEC-09	-8.45	671.474	598.451	744.497	52	861
	21914.131933	42836.43490	0.0015601	13.2885	30.0573	32.6181	242.9961
D . 74	<b>80049F</b>	<b>Proton-K fourth stage (Block DM)</b>					
	29-DEC-09	-8.41	667.649	544.297	791.001	52	871
	21912.321563	42831.77987	0.0027835	15.5953	357.1187	45.9749	143.7074
D . 75	<b>88095F</b>	<b>Proton-K fourth stage (Block DM)</b>					
	31-DEC-09	-8.40	667.309	606.738	727.880	50	852
	21914.151076	42831.66850	0.0010059	13.4730	28.4212	105.3801	234.4639
D . 76	<b>95067A</b>	<b>Telecom 2C</b>					
	30-DEC-09	-8.40	667.057	581.936	752.179	53	705
	21913.475637	42831.34984	0.0020006	5.6486	68.4204	160.5574	158.0470
D . 77	<b>90116D</b>	<b>Proton-K fourth stage (Block DM-2)</b>					
	31-DEC-09	-8.38	665.559	519.037	812.081	52	843
	21914.124063	42830.46064	0.0034644	12.7729	36.9903	293.8172	252.3042
D . 78	<b>96034D</b>	<b>Proton-K fourth stage (Block DM-2)</b>					
	17-DEC-09	-8.37	664.908	529.947	799.869	52	646
	21900.828044	42829.19106	0.0030573	10.1229	55.4324	293.1730	30.3710
D . 79	<b>88018B</b>	<b>Telecom 1C</b>					
	31-DEC-09	-8.34	662.240	251.740	1072.741	49	831
	21914.536285	42826.50703	0.0098623	11.8420	47.0270	350.4164	113.7006
D . 80	<b>01014C</b>	<b>Proton-M fourth stage (Briz-M)</b>					
	24-DEC-09	-8.31	659.452	-100.243	1419.148	52	425
	21907.080255	42823.50636	0.0163193	6.7046	74.2638	66.0273	314.2156
D . 81	<b>94008D</b>	<b>Proton-K fourth stage (Block DM-2)</b>					
	31-DEC-09	-8.30	658.837	563.767	753.907	51	710
	21914.396319	42822.79620	0.0022803	11.4583	48.6622	260.9170	165.7769



D . 82	<b>89004F</b>	<b>Proton-K fourth stage (Block DM)</b>					
	31-DEC-09	-8.20	650.827	550.734	750.919	52	865
	21914.547338	42815.71599	0.0023225	13.3556	29.2989	321.8042	92.0245
D . 83	<b>93013D</b>	<b>Proton-K fourth stage (Block DM-2)</b>					
	26-DEC-09	-8.14	645.766	577.690	713.842	48	696
	21909.862338	42809.51863	0.0016839	11.8784	45.5802	316.7295	359.5315
D . 84	<b>91087D</b>	<b>Proton-K fourth stage (Block DM-2)</b>					
	21-DEC-09	-8.11	643.651	565.346	721.956	49	744
	21904.688414	42808.67045	0.0019464	12.4065	40.8770	268.5330	62.4495
D . 85	<b>92082D</b>	<b>Proton-K fourth stage (Block DM-2)</b>					
	22-DEC-09	-8.10	642.477	599.242	685.713	50	739
	21905.724271	42807.05050	0.0010676	12.0083	44.1614	290.6278	51.9106
D . 86	<b>99010D</b>	<b>Proton-K fourth stage (Block DM-2)</b>					
	30-DEC-09	-8.02	636.267	547.487	725.047	50	506
	21913.774306	42800.84172	0.0022331	9.5497	67.1935	179.6865	49.0321
D . 87	<b>96053D</b>	<b>Proton-K fourth stage (Block DM1)</b>					
	30-DEC-09	-7.85	622.758	408.056	837.460	52	561
	21913.636076	42787.16153	0.0052800	8.9430	60.2420	159.6477	92.1976
D . 88	<b>94012D</b>	<b>Proton-K fourth stage (Block DM-2)</b>					
	27-DEC-09	-7.79	617.868	473.878	761.858	51	688
	21910.874954	42781.65793	0.0033889	11.3986	48.5394	317.6844	356.8011
D . 89	<b>88012A</b>	<b>Sakura 3A</b>					
	30-DEC-09	-7.69	609.868	573.826	645.910	52	854
	21913.577014	42774.39421	0.0010696	11.4012	49.9084	197.8340	102.9949
D . 90	<b>88063B</b>	<b>Eutelsat I F-5 (ECS 5)</b>					
	30-DEC-09	-7.59	601.698	551.631	651.765	52	821
	21913.765752	42765.82076	0.0009460	12.1602	42.9921	342.2900	27.9657
D . 91	<b>83088A</b>	<b>Raduga 13</b>					
	31-DEC-09	-7.56	599.177	525.767	672.588	51	777
	21914.182049	42763.22157	0.0020805	14.8551	8.8555	279.9083	203.3725
D . 92	<b>69069C</b>	<b>JPL SR-28-3 (ATS 5 AKM)</b>					
	31-DEC-09	-7.54	597.427	41.890	1152.964	48	631
	21914.118206	42760.93607	0.0128013	12.1050	330.6751	140.3890	189.4440
D . 93	<b>00049D</b>	<b>Proton-K fourth stage (Block DM-2)</b>					
	31-DEC-09	-7.50	594.529	518.323	670.735	52	451
	21914.696019	42759.05411	0.0018835	7.1300	65.3052	221.3410	74.2528
D . 94	<b>89101D</b>	<b>Proton-K fourth stage (Block DM)</b>					
	25-DEC-09	-7.28	576.937	534.096	619.778	51	812
	21908.235266	42741.39671	0.0006624	13.0124	32.9774	56.6547	214.4828
D . 95	<b>76023J</b>	<b>LES 8, LES 9 operational debris</b>					
	29-DEC-09	-7.25	573.915	-15.663	1163.493	51	637
	21912.712431	42737.78170	0.0148842	10.2838	150.7867	262.6741	154.2007
D . 96	<b>76023F</b>	<b>Titan IIC stage 3 (Transtage)</b>					
	30-DEC-09	-7.24	573.554	-11.675	1158.783	52	839
	21913.551539	42737.44738	0.0147998	10.2835	150.7423	263.7663	211.2241
D . 97	<b>83118A</b>	<b>Gorizont 8</b>					
	27-DEC-09	-7.22	571.510	463.958	679.061	49	784
	21910.649236	42735.80227	0.0026237	14.6055	9.9959	19.1723	40.1401
D . 98	<b>91001A</b>	<b>NATO IVA</b>					
	23-DEC-09	-7.16	567.181	542.177	592.184	51	893
	21906.883403	42730.91483	0.0005470	9.4657	42.9118	116.4909	352.3876

<b>D . 99</b>	<b>85025A</b>	<b>Intelsat VA F-10</b>					
	31-DEC-09	-7.15	566.193	426.465	705.922	51	946
	21914.523426	42730.75658	0.0036790	12.7486	36.6096	221.7698	107.8413
<b>D . 100</b>	<b>88109B</b>	<b>Astra 1A</b>					
	30-DEC-09	-6.97	551.865	489.432	614.299	49	830
	21913.716111	42716.54616	0.0014306	8.0919	61.9912	304.5798	64.7106
<b>D . 101</b>	<b>83066A</b>	<b>Gorizont 7</b>					
	24-DEC-09	-6.94	548.849	498.569	599.129	50	800
	21907.889549	42712.80264	0.0011078	14.7068	8.5113	210.1251	314.6966
<b>D . 102</b>	<b>79098B</b>	<b>OPS 9444 (DSCS II F-14)</b>					
	31-DEC-09	-6.92	547.728	527.118	568.339	52	881
	21914.305706	42711.35908	0.0008616	15.0362	3.3873	303.5732	153.4200
<b>D . 103</b>	<b>84081B</b>	<b>Telecom 1A</b>					
	31-DEC-09	-6.73	532.703	375.630	689.777	52	839
	21914.029711	42697.43727	0.0040409	13.3602	29.5018	245.7739	278.8184
<b>D . 104</b>	<b>82097A</b>	<b>Intelsat V F-5</b>					
	30-DEC-09	-6.71	530.828	422.769	638.888	52	909
	21913.395255	42694.64889	0.0030129	13.4590	26.0267	256.5135	144.4605
<b>D . 105</b>	<b>90056A</b>	<b>Intelsat VI F-4</b>					
	31-DEC-09	-6.62	523.593	491.271	555.915	53	841
	21914.585775	42687.86351	0.0009087	7.1576	65.8195	194.0679	114.6791
<b>D . 106</b>	<b>78113B</b>	<b>OPS 9442 (DSCS II F-12)</b>					
	31-DEC-09	-6.59	521.413	496.828	545.998	51	860
	21914.170683	42685.51695	0.0007593	15.1508	1.8897	341.0129	200.7164
<b>D . 107</b>	<b>91074A</b>	<b>Gorizont 24</b>					
	25-DEC-09	-6.59	521.143	441.229	601.056	51	877
	21908.023785	42685.41143	0.0016371	12.2602	39.9846	103.3390	297.9413
<b>D . 108</b>	<b>91015B</b>	<b>Meteosat 5</b>					
	31-DEC-09	-6.56	518.619	493.794	543.443	52	899
	21914.686308	42683.34644	0.0005582	11.3443	47.0364	156.1090	59.7623
<b>D . 109</b>	<b>86082A</b>	<b>Raduga 19</b>					
	31-DEC-09	-6.53	516.103	470.319	561.886	51	879
	21914.547801	42680.99991	0.0010401	13.8836	19.8916	7.4207	82.6254
<b>D . 110</b>	<b>78106A</b>	<b>NATO IIIC</b>					
	21-DEC-09	-6.43	508.573	486.159	530.986	49	867
	21904.640845	42673.57172	0.0006321	14.1735	9.2275	246.5644	48.1432
<b>D . 111</b>	<b>91015A</b>	<b>Astra 1B</b>					
	31-DEC-09	-6.35	501.629	477.722	525.536	52	715
	21914.274410	42666.25706	0.0009685	3.9598	72.8259	196.7362	233.8901
<b>D . 112</b>	<b>82020A</b>	<b>Gorizont 5</b>					
	29-DEC-09	-6.27	495.731	355.631	635.832	50	808
	21912.330000	42659.30805	0.0030333	15.4107	1.5742	81.1490	145.2315
<b>D . 113</b>	<b>90001B</b>	<b>JC-Sat 2</b>					
	31-DEC-09	-6.25	493.780	240.772	746.788	51	888
	21914.064201	42657.72557	0.0064539	7.8158	75.1490	161.8633	312.5294
<b>D . 114</b>	<b>79038A</b>	<b>OPS 6392 (FLTSATCOM F2)</b>					
	22-DEC-09	-6.23	492.282	420.291	564.274	51	959
	21905.403125	42656.38073	0.0021319	14.8445	0.3646	283.7657	123.9371
<b>D . 115</b>	<b>84113C</b>	<b>Leasat 1</b>					
	26-DEC-09	-6.23	491.828	362.773	620.884	51	848
	21909.745856	42655.97990	0.0027112	11.8283	26.8818	148.8340	23.1691

D . 116	<b>88040A</b>	<b>Intelsat VA F-13 (NSS 513)</b>					
	25-DEC-09	-6.11	482.609	431.958	533.260	51	995
	21908.334398	42646.53088	0.0015226	11.5694	46.5235	287.7404	191.9914
D . 117	<b>94079A</b>	<b>Orion 1</b>					
	31-DEC-09	-6.09	481.049	390.828	571.270	52	703
	21914.212928	42645.71960	0.0025867	5.2982	69.3325	216.8971	252.5467
D . 118	<b>75011F</b>	<b>Aerojet SVM-5 (SMS 2 AKM)</b>					
	22-DEC-09	-6.07	479.362	55.637	903.087	49	661
	21905.552072	42644.16692	0.0102418	14.2202	341.3890	324.7341	50.7520
D . 119	<b>81073A</b>	<b>FLTSATCOM F5</b>					
	21-DEC-09	-6.00	473.760	433.763	513.757	49	864
	21904.658611	42638.51892	0.0010139	18.5812	17.2499	322.0262	49.7569
D . 120	<b>90063A</b>	<b>TDF 2</b>					
	25-DEC-09	-5.99	472.977	274.867	671.087	49	847
	21908.117720	42636.55989	0.0053088	9.9033	56.9886	169.7647	280.9166
D . 121	<b>74033A</b>	<b>SMS 1</b>					
	31-DEC-09	-5.98	472.237	407.099	537.376	50	786
	21914.387303	42636.91213	0.0019159	15.3975	335.7783	278.2897	96.2160
D . 122	<b>91079D</b>	<b>Proton-K fourth stage (Block DM-2)</b>					
	27-DEC-09	-5.95	469.945	445.021	494.869	49	744
	21910.783762	42633.98491	0.0006110	12.3591	39.9231	267.2506	21.3102
D . 123	<b>76029A</b>	<b>RCA Satcom II</b>					
	31-DEC-09	-5.94	468.674	222.390	714.958	53	812
	21914.026701	42633.49555	0.0052401	14.8494	6.2515	70.6717	257.6733
D . 124	<b>84041D</b>	<b>Proton-K fourth stage (Block DM)</b>					
	31-DEC-09	-5.93	468.053	405.179	530.927	51	868
	21914.892025	42632.46010	0.0013964	14.4677	10.6700	43.9208	309.2470
D . 125	<b>80049A</b>	<b>Gorizont 4</b>					
	31-DEC-09	-5.92	467.631	446.368	488.895	51	787
	21914.001516	42632.19844	0.0004584	15.1968	356.4678	262.1221	256.3355
D . 126	<b>94047A</b>	<b>DirecTV-2</b>					
	25-DEC-09	-5.90	465.679	412.418	518.941	53	782
	21908.941285	42629.34608	0.0014525	2.8670	75.2392	183.7489	1.4183
D . 127	<b>82020F</b>	<b>Proton-K fourth stage (Block DM)</b>					
	31-DEC-09	-5.89	465.278	352.313	578.243	50	859
	21914.568507	42630.07994	0.0026371	15.4829	1.1724	33.9253	56.5908
D . 128	<b>88066D</b>	<b>Proton-K fourth stage (Block DM-2)</b>					
	21-DEC-09	-5.81	458.776	318.352	599.200	49	854
	21904.588993	42623.41466	0.0032967	13.3240	26.9778	337.3517	84.5336
D . 129	<b>79105E</b>	<b>Proton-K fourth stage (Block DM)</b>					
	31-DEC-09	-5.72	451.456	381.537	521.376	53	833
	21914.494213	42616.70592	0.0012554	15.2418	354.5989	136.8459	76.7608
D . 130	<b>92010B</b>	<b>Insat-IIDT (Arabsat 1C)</b>					
	31-DEC-09	-5.72	451.217	348.683	553.751	51	795
	21914.746238	42616.04144	0.0026047	6.6258	66.9459	123.4748	58.1404
D . 131	<b>87078B</b>	<b>Eutelsat I F-4 (ECS 4)</b>					
	30-DEC-09	-5.71	450.231	415.505	484.957	50	884
	21913.733032	42614.47304	0.0011442	12.3881	38.7806	234.7813	35.4963
D . 132	<b>89048A</b>	<b>Raduga 1-1</b>					
	31-DEC-09	-5.64	444.642	367.847	521.437	51	952
	21914.341644	42608.13672	0.0019691	13.0436	30.6738	342.3927	167.7467

D . 133	<b>81057A</b>	<b>Meteosat 2</b>					
	24-DEC-09	-5.58	439.867	313.330	566.404	51	866
	21907.921146	42604.03715	0.0033070	14.2281	14.8117	230.7579	309.3524
D . 134	<b>97016A</b>	<b>Thaicom 3</b>					
	21-DEC-09	-5.52	435.262	63.693	806.832	52	622
	21904.836956	42599.76167	0.0086866	3.1528	74.9069	249.2424	41.8224
D . 135	<b>99050A</b>	<b>EchoStar 5</b>					
	31-DEC-09	-5.50	433.626	407.755	459.496	52	520
	21914.395208	42597.81601	0.0007723	0.6021	80.1045	157.1783	117.7068
D . 136	<b>84093B</b>	<b>SBS IV</b>					
	30-DEC-09	-5.44	428.861	390.869	466.853	52	1005
	21913.641771	42593.80948	0.0010409	12.2742	37.7517	292.7059	67.4073
D . 137	<b>00031A</b>	<b>Ekspress 3A</b>					
	30-DEC-09	-5.43	428.617	417.548	439.687	49	482
	21913.786123	42593.28534	0.0002812	1.4737	77.4980	160.7312	54.2310
D . 138	<b>89070C</b>	<b>Star 27 (Himawari-4 AKM)</b>					
	25-DEC-09	-5.43	428.147	-647.380	1503.674	45	481
	21908.174560	42592.84832	0.0250298	12.5751	31.5663	258.7221	232.0922
D . 139	<b>87022F</b>	<b>Star 27 (GOES 7 AKM)</b>					
	21-DEC-09	-5.41	426.761	-4210.060	5063.581	45	226
	21904.418356	42590.71056	0.1075614	14.1833	16.1137	281.5812	123.5012
D . 140	<b>91060A</b>	<b>Yuri 3B</b>					
	31-DEC-09	-5.34	421.201	400.905	441.498	50	789
	21914.673843	42586.06193	0.0002481	9.1175	47.5528	317.1226	64.7122
D . 141	<b>84081A</b>	<b>Eutelsat I F-2 (ECS 2)</b>					
	22-DEC-09	-5.32	419.050	387.978	450.122	51	874
	21905.702141	42583.55864	0.0004272	13.2901	28.8370	27.0953	44.7305
D . 142	<b>95025A</b>	<b>GOES 9</b>					
	25-DEC-09	-5.31	418.374	404.761	431.987	51	735
	21908.097859	42582.31332	0.0002527	5.7774	68.2525	280.5373	299.1196
D . 143	<b>90077A</b>	<b>Yuri 3A</b>					
	27-DEC-09	-5.27	415.320	375.353	455.287	50	857
	21910.069792	42579.54858	0.0008057	10.3519	58.2301	136.4226	297.4403
D . 144	<b>83081A</b>	<b>Sakura 2B</b>					
	22-DEC-09	-5.26	414.685	392.061	437.309	48	821
	21905.630590	42579.55605	0.0008276	13.8999	19.9135	264.8877	61.5200
D . 145	<b>86007A</b>	<b>Raduga 18</b>					
	30-DEC-09	-5.26	414.535	118.257	710.813	53	854
	21913.687477	42578.74306	0.0071802	14.0839	16.4962	37.0270	30.2835
D . 146	<b>72090A</b>	<b>Anik A1</b>					
	31-DEC-09	-5.20	410.071	352.924	467.218	49	753
	21914.848056	42574.18098	0.0013500	14.7063	353.1642	12.9492	307.5290
D . 147	<b>71006A</b>	<b>Intelsat IV F-2</b>					
	31-DEC-09	-5.17	407.298	345.882	468.713	52	804
	21914.222813	42570.91621	0.0018116	14.4690	343.7180	293.7420	163.5682
D . 148	<b>81050A</b>	<b>Intelsat V F-1</b>					
	31-DEC-09	-5.10	401.917	379.107	424.728	52	936
	21914.279375	42565.60903	0.0002912	13.8011	19.6043	232.0594	179.2003
D . 149	<b>83058A</b>	<b>Eutelsat I F-1 (ECS 1)</b>					
	29-DEC-09	-5.05	397.992	358.297	437.686	49	900
	21912.481794	42562.39039	0.0006668	13.4552	24.9994	23.2300	113.5471

D . 150	<b>80098A</b>	<b>Intelsat V F-2</b>					
	31-DEC-09	-5.00	393.516	333.318	453.714	50	931
	21914.234826	42557.10165	0.0011875	13.6043	21.8131	191.4248	197.4886
D . 151	<b>94022A</b>	<b>GOES 8</b>					
	30-DEC-09	-4.92	387.903	359.700	416.107	53	786
	21913.685035	42552.94464	0.0008747	6.2365	70.8899	179.3044	84.8692
D . 152	<b>87078A</b>	<b>Optus A3</b>					
	27-DEC-09	-4.92	387.606	351.441	423.770	52	867
	21910.444907	42551.09351	0.0009525	10.8403	48.0222	230.9853	151.6929
D . 153	<b>84113B</b>	<b>Arabsat 1D</b>					
	21-DEC-09	-4.92	387.550	268.463	506.636	50	920
	21904.813634	42551.36512	0.0030969	12.2724	38.1373	228.9402	14.4668
D . 154	<b>91046A</b>	<b>Gorizont 23</b>					
	21-DEC-09	-4.92	387.270	359.239	415.301	51	794
	21904.734514	42551.78816	0.0007131	12.3994	38.5613	208.7761	43.6827
D . 155	<b>77118A</b>	<b>Sakura</b>					
	31-DEC-09	-4.89	385.453	367.401	403.504	50	821
	21914.932523	42550.05303	0.0006407	15.0944	357.9575	290.6061	281.7326
D . 156	<b>87095A</b>	<b>TV-Sat 1</b>					
	24-DEC-09	-4.88	384.428	134.087	634.769	50	648
	21907.080150	42549.25607	0.0059404	13.3975	22.2737	329.1014	260.3594
D . 157	<b>91003B</b>	<b>Eutelsat II F-2</b>					
	31-DEC-09	-4.80	378.032	360.301	395.764	51	829
	21914.485451	42541.56602	0.0004257	8.9985	59.5514	296.4337	144.6620
D . 158	<b>91084A</b>	<b>Telecom 2A</b>					
	23-DEC-09	-4.76	374.767	359.807	389.726	48	867
	21906.049641	42538.77407	0.0004399	7.7951	63.3081	187.4715	313.6385
D . 159	<b>93078A</b>	<b>DirecTV-1</b>					
	31-DEC-09	-4.64	364.974	328.942	401.006	52	817
	21914.309479	42529.44396	0.0004386	1.0660	79.9334	63.4713	227.4261
D . 160	<b>00066A</b>	<b>Thuraya 1</b>					
	22-DEC-09	-4.63	364.775	328.768	400.781	52	453
	21905.048877	42528.39047	0.0011370	3.5730	19.5905	250.9899	0.0600
D . 161	<b>90091A</b>	<b>SBS VI</b>					
	27-DEC-09	-4.61	363.078	336.851	389.305	51	915
	21910.153125	42527.57763	0.0003883	2.2600	77.9705	326.8775	286.5291
D . 162	<b>90001A</b>	<b>Skynet 4A</b>					
	31-DEC-09	-4.60	361.680	307.503	415.858	53	884
	21914.087153	42526.49992	0.0013923	10.1144	38.6264	176.3641	267.6196
D . 163	<b>95029A</b>	<b>DirecTV-3</b>					
	30-DEC-09	-4.58	360.665	348.465	372.865	53	709
	21913.622998	42524.80373	0.0001256	0.7729	81.1594	186.9416	36.5266
D . 164	<b>91037A</b>	<b>Aurora II</b>					
	30-DEC-09	-4.54	357.294	340.976	373.612	52	897
	21913.828785	42521.35831	0.0004706	8.1109	62.5968	163.7000	24.7729
D . 165	<b>92057A</b>	<b>Satcom C-4</b>					
	31-DEC-09	-4.52	356.024	343.693	368.354	52	782
	21914.259873	42520.77484	0.0004006	5.3209	69.4499	192.8293	235.8897
D . 166	<b>97011A</b>	<b>Tempo 2</b>					
	29-DEC-09	-4.47	351.727	225.483	477.972	53	635
	21912.518009	42515.09089	0.0032778	3.6852	73.1693	163.2815	148.3624

D . 167	<b>94049B</b>	<b>Turksat 2</b>					
	25-DEC-09	-4.41	347.321	286.809	407.834	51	716
	21908.080359	42511.46718	0.0014091	5.2142	69.6693	298.4918	306.7165
D . 168	<b>84005A</b>	<b>Yuri 2A</b>					
	20-DEC-09	-4.39	345.559	296.041	395.077	50	834
	21903.637720	42510.82825	0.0006234	13.7949	20.2962	79.4552	61.4637
D . 169	<b>92010A</b>	<b>Superbird B1</b>					
	26-DEC-09	-4.39	345.352	278.795	411.909	50	876
	21909.917442	42508.79231	0.0014243	7.8010	63.2074	302.3602	357.1667
D . 170	<b>89004A</b>	<b>Gorizont 17</b>					
	31-DEC-09	-4.35	342.050	258.015	426.086	52	980
	21914.610405	42507.12649	0.0019656	13.0407	28.6792	358.7273	68.8000
D . 171	<b>97019A</b>	<b>GOES 10</b>					
	25-DEC-09	-4.33	340.700	329.600	351.900	52	636
	21908.545486	42504.06104	0.0002561	3.9987	70.6364	42.3402	196.9958
D . 172	<b>92041B</b>	<b>Eutelsat II F-4</b>					
	30-DEC-09	-4.30	338.291	311.713	364.868	51	761
	21913.811898	42502.62218	0.0005793	8.0918	63.1637	137.8246	31.4667
D . 173	<b>89006A</b>	<b>Intelsat VA F-15</b>					
	24-DEC-09	-4.20	330.515	244.868	416.163	51	950
	21907.368530	42494.12508	0.0020730	10.5103	53.0796	306.9274	187.1794
D . 174	<b>85087A</b>	<b>Intelsat VA F-12</b>					
	30-DEC-09	-4.17	327.717	307.089	348.346	52	947
	21913.651632	42492.91171	0.0007082	12.1499	41.7221	189.8431	67.9081
D . 175	<b>92084A</b>	<b>Superbird A1</b>					
	30-DEC-09	-4.16	327.063	272.137	381.988	47	835
	21913.845613	42490.84905	0.0010962	3.4913	65.2633	6.0622	21.1499
D . 176	<b>83059B</b>	<b>Anik C2</b>					
	30-DEC-09	-4.14	325.617	165.615	485.619	50	965
	21913.416285	42489.07897	0.0037940	12.8747	32.6801	312.9807	143.5375
D . 177	<b>91026A</b>	<b>Anik E2</b>					
	31-DEC-09	-4.13	324.368	289.236	359.499	51	913
	21914.313137	42488.26715	0.0010696	6.2667	67.3508	221.5566	214.5366
D . 178	<b>95044A</b>	<b>N-Star 1</b>					
	29-DEC-09	-4.12	324.194	284.107	364.282	50	686
	21912.564850	42488.00227	0.0014420	3.9976	72.1531	217.9520	130.2591
D . 179	<b>78044A</b>	<b>OTS 2</b>					
	24-DEC-09	-4.08	320.691	287.736	353.646	48	766
	21907.198426	42484.63229	0.0007516	14.7361	2.5018	235.3453	198.1611
D . 180	<b>90100B</b>	<b>Gstar 4</b>					
	30-DEC-09	-4.07	320.023	303.653	336.394	51	944
	21913.695069	42485.19424	0.0006498	6.8469	65.9698	179.5745	76.3638
D . 181	<b>73058A</b>	<b>Intelsat IV F-7</b>					
	24-DEC-09	-4.06	319.243	295.830	342.656	49	814
	21907.176354	42483.24507	0.0005947	14.9649	357.8571	351.7645	201.5446
D . 182	<b>95043A</b>	<b>JC-Sat 3</b>					
	31-DEC-09	-4.05	318.384	256.809	379.960	53	687
	21914.279549	42482.77488	0.0016604	4.6320	63.6863	268.7215	222.8351
D . 183	<b>07003A</b>	<b>Beidou 4</b>					
	31-DEC-09	-4.04	317.905	54.604	581.206	53	144
	21914.395486	42482.10304	0.0062946	3.7708	273.5226	315.1177	31.1328

D . 184	<b>98024B</b>	<b>BSAT-1b</b>					
	30-DEC-09	-4.04	317.563	293.904	341.222	51	577
	21913.711632	42482.82087	0.0006716	4.3558	71.9203	208.8348	76.1679
D . 185	<b>98075A</b>	<b>PAS 6B</b>					
	31-DEC-09	-4.03	316.975	244.047	389.902	52	539
	21914.424398	42480.40156	0.0015360	1.7385	77.2315	20.1780	183.7903
D . 186	<b>98002A</b>	<b>Skynet 4D</b>					
	21-DEC-09	-4.03	316.825	299.170	334.480	52	561
	21904.795150	42481.36067	0.0004625	5.9458	55.6151	317.2242	38.7448
D . 187	<b>70003A</b>	<b>Intelsat III F-6</b>					
	24-DEC-09	-4.02	315.994	273.853	358.135	47	404
	21907.008947	42480.61577	0.0013844	10.8850	324.8110	300.9958	228.8373
D . 188	<b>83047A</b>	<b>Intelsat V F-6</b>					
	31-DEC-09	-3.99	313.778	272.158	355.399	50	900
	21914.350868	42477.06279	0.0018392	13.0789	29.6957	159.9711	163.5784
D . 189	<b>91067A</b>	<b>Anik E1</b>					
	24-DEC-09	-3.97	312.211	291.715	332.707	52	891
	21907.078113	42476.36090	0.0007168	6.2314	68.1345	196.8503	307.1471
D . 190	<b>95001A</b>	<b>Intelsat VII F-4</b>					
	31-DEC-09	-3.93	309.014	294.760	323.267	53	722
	21914.944815	42473.81232	0.0005060	0.6177	76.6203	137.1397	279.3473
D . 191	<b>89027A</b>	<b>Tele-X</b>					
	31-DEC-09	-3.93	308.444	281.766	335.123	51	860
	21914.422060	42471.77425	0.0002655	10.8880	51.5042	202.7956	159.5734
D . 192	<b>90100A</b>	<b>Satcom C-1</b>					
	31-DEC-09	-3.92	308.301	286.018	330.584	51	945
	21914.671366	42473.45859	0.0007288	5.3195	66.2209	205.1573	84.1192
D . 193	<b>89067A</b>	<b>Sirius 1</b>					
	24-DEC-09	-3.91	307.413	277.148	337.679	52	868
	21907.100938	42471.96180	0.0010174	9.1659	58.7100	233.7252	289.4788
D . 194	<b>88098A</b>	<b>TDF 1</b>					
	27-DEC-09	-3.88	305.042	282.481	327.604	52	867
	21910.987025	42468.89812	0.0005293	11.1861	49.2746	127.9381	317.3819
D . 195	<b>78068A</b>	<b>Comstar 3</b>					
	21-DEC-09	-3.87	304.430	217.073	391.788	50	846
	21904.670729	42468.88128	0.0018012	14.2606	11.4369	167.1178	39.6797
D . 196	<b>92054A</b>	<b>Optus B1</b>					
	30-DEC-09	-3.84	302.043	270.306	333.780	51	842
	21913.802986	42466.73535	0.0004300	3.3098	73.8909	302.4734	45.0378
D . 197	<b>76017A</b>	<b>Marisat 1</b>					
	31-DEC-09	-3.84	301.710	260.628	342.793	50	896
	21914.593808	42466.24050	0.0008531	14.2119	353.0569	22.9696	39.2091
D . 198	<b>90074A</b>	<b>Thor I</b>					
	26-DEC-09	-3.83	300.751	286.942	314.560	52	843
	21909.944595	42464.12429	0.0003819	7.7139	64.0038	163.8487	348.3043
D . 199	<b>82058A</b>	<b>Westar V</b>					
	24-DEC-09	-3.81	299.229	230.885	367.573	51	814
	21907.239757	42463.60755	0.0012379	12.7941	34.2717	121.5401	215.1986
D . 200	<b>94013A</b>	<b>Galaxy IR-A</b>					
	21-DEC-09	-3.79	297.365	283.114	311.616	51	795
	21904.875590	42461.37442	0.0004582	3.6072	70.8580	193.8771	24.8100

D . 201	<b>88086A</b>	<b>Sakura 3B</b>					
	25-DEC-09	-3.78	296.613	272.914	320.311	49	839
	21908.084514	42461.23234	0.0007748	10.5894	52.8847	205.1700	288.6725
D . 202	<b>82017A</b>	<b>Intelsat V F-4</b>					
	29-DEC-09	-3.76	295.238	173.746	416.730	53	895
	21912.521956	42460.17480	0.0031234	13.4739	22.9465	56.8127	97.2672
D . 203	<b>96040A</b>	<b>Arabsat 2A</b>					
	28-DEC-09	-3.76	295.209	252.008	338.409	53	664
	21911.042697	42459.11761	0.0011309	7.0331	64.8664	242.6748	312.6096
D . 204	<b>80074A</b>	<b>GOES 4</b>					
	24-DEC-09	-3.76	295.040	145.531	444.549	49	763
	21907.252199	42458.40820	0.0037604	14.8079	2.2221	299.6529	178.1675
D . 205	<b>06022A</b>	<b>KAZSAT</b>					
	31-DEC-09	-3.74	294.050	282.284	305.816	52	178
	21914.938125	42458.76476	0.0002031	0.5620	81.8095	266.6485	281.7649
D . 206	<b>04015A</b>	<b>Ekspress AM-11</b>					
	30-DEC-09	-3.73	293.083	265.052	321.115	51	279
	21913.767280	42458.12153	0.0009126	3.4910	73.2892	158.6360	57.4189
D . 207	<b>92043A</b>	<b>Gorizont 26</b>					
	30-DEC-09	-3.71	291.414	164.295	418.533	52	873
	21913.598438	42456.61953	0.0029425	11.7533	41.7460	111.3296	87.4671
D . 208	<b>90030A</b>	<b>AsiaSat 1</b>					
	31-DEC-09	-3.71	291.230	276.122	306.338	50	888
	21914.375463	42454.61489	0.0005499	9.5156	57.9175	221.0781	182.7428
D . 209	<b>77065A</b>	<b>Himawari</b>					
	31-DEC-09	-3.69	289.544	223.344	355.744	51	786
	21914.908009	42454.13722	0.0013520	14.8531	354.4959	63.9050	287.3241
D . 210	<b>93015A</b>	<b>USA 98 (UFO F1)</b>					
	25-DEC-09	-3.68	288.949	259.408	318.490	50	725
	21908.407662	42452.72197	0.0009446	17.3811	191.5327	64.8703	310.8919
D . 211	<b>75042A</b>	<b>Intelsat IV F-1</b>					
	31-DEC-09	-3.65	286.349	234.739	337.958	50	843
	21914.855775	42450.17979	0.0008116	14.6206	4.1256	112.5587	315.7635
D . 212	<b>96007A</b>	<b>N-Star 2</b>					
	31-DEC-09	-3.65	286.264	257.348	315.179	52	662
	21914.140671	42451.05024	0.0009185	2.8963	75.0633	171.6880	284.3140
D . 213	<b>02029D</b>	<b>Proton-K fourth stage (Block DM-2M)</b>					
	30-DEC-09	-3.62	284.341	224.893	343.789	52	370
	21913.366782	42448.57586	0.0015118	6.7839	65.6831	219.2454	194.4705
D . 214	<b>92013A</b>	<b>Galaxy V</b>					
	25-DEC-09	-3.55	278.436	220.473	336.400	53	899
	21908.974502	42441.74192	0.0014439	4.7080	71.0805	278.2027	345.2941
D . 215	<b>86016A</b>	<b>Yuri 2B</b>					
	30-DEC-09	-3.54	277.665	202.092	353.239	51	862
	21913.650451	42442.73875	0.0013678	13.1758	28.5481	55.3577	55.3205
D . 216	<b>91083A</b>	<b>Eutelsat II F-3</b>					
	30-DEC-09	-3.52	276.008	262.554	289.462	53	824
	21913.679410	42441.43388	0.0003522	8.8846	60.0251	192.5377	76.1216
D . 217	<b>95016B</b>	<b>Hot Bird 1</b>					
	27-DEC-09	-3.45	270.668	258.989	282.347	50	519
	21910.154109	42435.60435	0.0003077	3.6437	73.9512	145.2755	282.4226



D . 218	<b>92060A</b>	<b>Hispasat 1A</b>					
	31-DEC-09	-3.44	270.180	247.028	293.331	53	773
	21914.479549	42433.36664	0.0008208	6.7481	66.1431	195.1583	153.3364
D . 219	<b>91055A</b>	<b>Intelsat VI F-5</b>					
	30-DEC-09	-3.41	267.969	254.534	281.404	51	895
	21913.707801	42433.39199	0.0003880	4.9251	70.8729	190.0976	76.5679
D . 220	<b>87070A</b>	<b>Kiku-5</b>					
	26-DEC-09	-3.38	265.471	228.758	302.184	51	923
	21909.549549	42430.35462	0.0010928	12.9246	32.1502	251.6031	99.0420
D . 221	<b>90079B</b>	<b>Eutelsat II F-1</b>					
	31-DEC-09	-3.34	261.916	237.506	286.327	51	790
	21914.373021	42425.14067	0.0004828	9.7039	56.9936	208.1278	182.7208
D . 222	<b>06053C</b>	<b>FengYun 2D AKM (FG-36 AKM)</b>					
	20-DEC-09	-3.30	259.190	-181.965	700.346	49	150
	21903.610752	42424.17334	0.0102643	0.2048	135.2819	197.5549	50.2825
D . 223	<b>81057F</b>	<b>Mage 1 (Meteosat 2 AKM)</b>					
	31-DEC-09	-3.24	254.192	-55.642	564.026	48	626
	21914.572975	42419.73252	0.0072008	14.9887	359.5974	41.6701	53.7705
D . 224	<b>78071A</b>	<b>ESA GEOS 2</b>					
	31-DEC-09	-3.22	253.024	228.126	277.922	53	791
	21914.399201	42417.71203	0.0004660	14.6331	350.2611	262.2199	106.5728
D . 225	<b>82106D</b>	<b>IUS stage 2</b>					
	30-DEC-09	-3.21	251.733	59.965	443.502	52	811
	21913.284896	42414.71445	0.0048829	14.8001	9.1873	266.5385	167.2376
D . 226	<b>88051C</b>	<b>PAS 1</b>					
	25-DEC-09	-3.17	248.949	227.776	270.122	46	905
	21908.208079	42414.16109	0.0007154	8.0981	62.3496	204.5122	253.4871
D . 227	<b>77048A</b>	<b>GOES 2</b>					
	27-DEC-09	-3.15	247.372	180.210	314.534	52	955
	21910.691644	42410.83930	0.0018459	14.6775	354.7206	261.5375	9.2359
D . 228	<b>89052A</b>	<b>Gorizont 18</b>					
	26-DEC-09	-3.14	246.587	101.279	391.894	49	894
	21909.991076	42410.93601	0.0036653	12.8283	30.3992	196.9434	297.8902
D . 229	<b>85016F</b>	<b>Proton-K fourth stage (Block DM)</b>					
	24-DEC-09	-3.13	245.423	139.003	351.842	50	873
	21907.143773	42410.61373	0.0022353	14.1383	12.6040	84.8305	228.3243
D . 230	<b>97071A</b>	<b>Sirius 2</b>					
	31-DEC-09	-3.13	245.159	233.845	256.473	51	597
	21914.976574	42410.29289	0.0004015	0.9937	80.4010	190.3173	267.8695
D . 231	<b>95011B</b>	<b>Himawari-5</b>					
	30-DEC-09	-3.12	245.068	219.137	270.998	52	671
	21913.653021	42410.48261	0.0006173	7.9911	60.5687	323.5031	86.1494
D . 232	<b>83006A</b>	<b>Sakura 2A</b>					
	21-DEC-09	-3.12	244.902	202.239	287.564	52	812
	21904.691377	42409.42055	0.0009413	13.9126	16.4570	194.8589	37.1701
D . 233	<b>83094A</b>	<b>RCA Satcom IIR</b>					
	26-DEC-09	-3.10	242.799	172.629	312.968	49	946
	21909.524248	42407.11433	0.0018797	11.7882	44.7719	259.9056	120.6527
D . 234	<b>84031F</b>	<b>Proton-K fourth stage (Block DM)</b>					
	31-DEC-09	-3.06	239.652	173.725	305.580	51	853
	21914.191690	42403.82065	0.0012030	14.2943	9.3121	77.7467	200.7229

<b>D . 235</b>	<b>94038D</b>	<b>Proton-K fourth stage (Block DM-2)</b>					
	31-DEC-09	-3.04	238.049	136.199	339.899	52	686
	21914.455961	42400.96738	0.0025214	10.1003	50.6297	338.4010	146.3588
<b>D . 236</b>	<b>00031D</b>	<b>Proton-K fourth stage (Block DM-2)</b>					
	31-DEC-09	-3.01	235.647	180.232	291.063	53	466
	21914.597315	42400.25926	0.0013460	8.4000	61.2700	299.3744	105.8931
<b>D . 237</b>	<b>77041A</b>	<b>Intelsat IVA F-4</b>					
	31-DEC-09	-2.99	234.577	181.364	287.790	50	861
	21914.603426	42399.61768	0.0007726	14.3740	8.2133	104.9276	50.9360
<b>D . 238</b>	<b>04011A</b>	<b>Superbird A2 (Superbird 6)</b>					
	31-DEC-09	-2.92	229.004	204.013	253.996	52	282
	21914.496412	42391.80299	0.0007720	4.8359	70.3481	204.9953	151.3517
<b>D . 239</b>	<b>85048B</b>	<b>Morelos 1</b>					
	30-DEC-09	-2.90	227.178	212.597	241.758	50	877
	21913.594479	42392.58662	0.0004865	12.1447	41.3658	295.4398	88.1552
<b>D . 240</b>	<b>94002D</b>	<b>Proton-K fourth stage (Block DM-2M)</b>					
	23-DEC-09	-2.90	227.134	65.134	389.135	46	711
	21906.311481	42390.84892	0.0043063	11.9008	42.1953	339.2409	197.9081
<b>D . 241</b>	<b>81119A</b>	<b>Intelsat V F-3</b>					
	31-DEC-09	-2.89	226.554	128.061	325.046	52	913
	21914.305637	42389.49434	0.0017976	13.4365	22.7462	69.9380	173.0824
<b>D . 242</b>	<b>78062D</b>	<b>Aerojet SVM-5 (GOES 3 AKM)</b>					
	25-DEC-09	-2.86	224.646	-252.689	701.982	49	708
	21908.173600	42388.46796	0.0117461	15.3755	352.2458	279.1549	194.6198
<b>D . 243</b>	<b>69069A</b>	<b>ATS 5</b>					
	31-DEC-09	-2.81	220.607	198.548	242.666	49	748
	21914.342396	42385.46078	0.0003408	11.5788	328.3230	255.4805	105.1883
<b>D . 244</b>	<b>75011A</b>	<b>SMS 2</b>					
	24-DEC-09	-2.75	215.323	159.081	271.564	51	736
	21907.218067	42378.32771	0.0008703	14.7506	349.3290	77.5551	178.0658
<b>D . 245</b>	<b>83077A</b>	<b>Arabsat 1D-R</b>					
	31-DEC-09	-2.70	211.236	106.892	315.581	50	919
	21914.950625	42374.92750	0.0024138	12.2319	40.2064	359.1292	317.4926
<b>D . 246</b>	<b>90034A</b>	<b>Palapa B-2R</b>					
	25-DEC-09	-2.68	210.109	172.099	248.118	51	877
	21908.049398	42373.99226	0.0008803	8.5498	61.8042	313.2819	310.1977
<b>D . 247</b>	<b>92021A</b>	<b>Telecom 2B</b>					
	30-DEC-09	-2.67	209.416	192.970	225.862	50	835
	21913.712303	42374.89968	0.0006957	8.2723	61.5350	301.6885	65.6777
<b>D . 248</b>	<b>89020A</b>	<b>JC-Sat 1</b>					
	31-DEC-09	-2.66	208.426	191.673	225.179	52	881
	21914.257326	42373.05338	0.0004286	10.6366	52.7984	280.7597	220.2826
<b>D . 249</b>	<b>90063B</b>	<b>DFS-Kopernikus 2</b>					
	30-DEC-09	-2.61	204.409	188.331	220.486	51	852
	21913.673299	42370.30688	0.0004907	8.3009	61.6504	203.4785	79.9254
<b>D . 250</b>	<b>85015B</b>	<b>Brazilsat 1</b>					
	27-DEC-09	-2.61	204.272	185.314	223.229	51	969
	21910.854838	42367.32930	0.0006758	11.8447	43.5429	205.2955	359.3017
<b>D . 251</b>	<b>81076A</b>	<b>Himawari-2</b>					
	31-DEC-09	-2.59	203.321	156.685	249.957	49	787
	21914.556192	42368.92159	0.0007818	14.6082	3.0111	182.3390	62.6995

D . 252	<b>86003B</b>	<b>Satcom Ku-1</b>					
	27-DEC-09	-2.59	202.994	186.820	219.168	52	948
	21910.872627	42365.91333	0.0003027	10.9466	50.5534	191.2434	359.9025
D . 253	<b>00019D</b>	<b>Proton-K fourth stage (Block DM-2M)</b>					
	26-DEC-09	-2.58	201.975	143.299	260.652	50	468
	21909.936262	42364.80498	0.0015885	8.7482	60.7197	167.0751	348.0907
D . 254	<b>85109B</b>	<b>Morelos 2</b>					
	26-DEC-09	-2.55	200.058	181.170	218.946	51	1002
	21909.538264	42363.77755	0.0004732	9.8369	55.8248	296.6478	126.8018
D . 255	<b>91028A</b>	<b>Spacenet 4</b>					
	22-DEC-09	-2.53	198.531	183.915	213.147	49	911
	21905.997604	42361.56546	0.0005845	5.7230	68.3538	197.7918	337.4022
D . 256	<b>01014A</b>	<b>Ekran 21 (Ekran-M)</b>					
	30-DEC-09	-2.47	193.328	64.602	322.054	52	443
	21913.493843	42355.89345	0.0030470	6.4154	73.8590	257.3575	156.5120
D . 257	<b>82004A</b>	<b>RCA Satcom IV</b>					
	31-DEC-09	-2.46	193.002	174.094	211.910	48	859
	21914.113495	42358.41701	0.0001573	12.8272	32.7516	336.0164	252.2374
D . 258	<b>75117A</b>	<b>RCA Satcom I</b>					
	31-DEC-09	-2.43	190.159	92.150	288.169	49	807
	21914.002662	42354.75145	0.0014914	14.5523	3.2650	113.4349	262.9315
D . 259	<b>85109D</b>	<b>Satcom Ku-2</b>					
	31-DEC-09	-2.40	188.152	152.773	223.530	48	987
	21914.144653	42353.50464	0.0007652	10.6988	51.8505	150.2462	260.1045
D . 260	<b>71116A</b>	<b>Intelsat IV F-3</b>					
	24-DEC-09	-2.35	183.741	130.391	237.090	50	836
	21907.211285	42346.79929	0.0015859	14.8207	354.2085	304.9578	185.1422
D . 261	<b>97070D</b>	<b>Proton-K fourth stage (Block DM-2)</b>					
	25-DEC-09	-2.30	180.409	118.074	242.744	50	567
	21908.890324	42343.01074	0.0014984	10.3137	53.6853	341.3545	358.5622
D . 262	<b>86026B</b>	<b>Brazilsat 2</b>					
	31-DEC-09	-2.28	178.187	161.438	194.936	50	993
	21914.444988	42340.79881	0.0005991	10.9835	49.5483	228.7832	149.2992
D . 263	<b>00002A</b>	<b>Galaxy 10R</b>					
	30-DEC-09	-2.28	178.148	167.655	188.641	52	507
	21913.845799	42342.53422	0.0001795	1.5555	78.0637	158.9560	33.3079
D . 264	<b>93069A</b>	<b>Gorizont 28</b>					
	31-DEC-09	-2.23	174.914	39.147	310.680	51	832
	21914.246887	42340.32774	0.0031428	11.2061	46.0801	0.6979	99.3089
D . 265	<b>88018A</b>	<b>Spacenet 3R</b>					
	31-DEC-09	-2.20	172.252	157.298	187.207	52	907
	21914.727060	42337.86522	0.0002356	9.1799	58.5586	195.0613	56.4935
D . 266	<b>85028B</b>	<b>Anik C1</b>					
	26-DEC-09	-2.20	171.843	113.647	230.039	50	934
	21909.835972	42335.15952	0.0014689	10.7677	52.0073	327.1214	15.5039
D . 267	<b>95041A</b>	<b>Mugunghwa 1 (Koreasat 1)</b>					
	30-DEC-09	-2.18	170.437	156.019	184.855	51	657
	21913.656435	42336.39790	0.0000574	9.4090	57.6412	101.6053	82.0630
D . 268	<b>88109A</b>	<b>Skynet 4B</b>					
	31-DEC-09	-2.12	165.787	147.825	183.749	51	890
	21914.515069	42331.16379	0.0005324	12.7551	34.8056	214.6840	109.3064

D . 269	<b>76010A</b>	<b>Intelsat IVA F-2</b>					
	31-DEC-09	-2.11	165.162	141.362	188.962	51	826
	21914.098912	42330.22191	0.0001371	14.5532	2.8576	204.0837	227.6164
D . 270	<b>83105A</b>	<b>Intelsat V F-7</b>					
	31-DEC-09	-2.08	162.736	134.710	190.762	50	893
	21914.971910	42327.23099	0.0009204	13.1177	27.6232	279.3721	297.1458
D . 271	<b>92072A</b>	<b>Galaxy VII</b>					
	21-DEC-09	-2.07	161.972	132.142	191.803	49	824
	21904.143299	42327.12145	0.0011718	8.2985	61.4974	235.3970	279.8877
D . 272	<b>97078A</b>	<b>Galaxy VIII-i</b>					
	22-DEC-09	-2.06	161.461	134.001	188.921	51	602
	21905.853345	42325.53620	0.0010044	6.6766	66.0383	235.9181	27.1123
D . 273	<b>91074D</b>	<b>Proton-K fourth stage (Block DM-2)</b>					
	31-DEC-09	-2.04	159.861	147.424	172.298	52	730
	21914.180822	42325.23026	0.0002804	12.1099	38.9504	292.2158	234.1031
D . 274	<b>93048A</b>	<b>Hispasat 1B</b>					
	25-DEC-09	-1.98	154.701	130.954	178.449	48	727
	21908.091215	42319.03797	0.0010064	5.8495	67.6280	187.1798	300.9121
D . 275	<b>92066A</b>	<b>DFS-Kopernikus 3</b>					
	25-DEC-09	-1.95	152.839	136.560	169.117	51	781
	21908.361192	42316.45323	0.0004768	7.3672	64.0733	258.3052	199.9028
D . 276	<b>89041A</b>	<b>Superbird A</b>					
	30-DEC-09	-1.89	148.244	122.201	174.286	52	811
	21913.642662	42313.80667	0.0010828	13.0221	29.0792	241.6538	58.4070
D . 277	<b>84080E</b>	<b>Star 27 (Himawari-3 AKM)</b>					
	31-DEC-09	-1.89	147.626	-436.329	731.580	51	442
	21914.572975	42314.78866	0.0138835	14.0065	12.6074	303.0931	64.9071
D . 278	<b>84114A</b>	<b>Spacenet 2</b>					
	31-DEC-09	-1.86	145.512	105.744	185.280	50	928
	21914.340729	42308.32989	0.0011280	10.7214	51.6816	266.3455	188.9877
D . 279	<b>90091B</b>	<b>Galaxy VI</b>					
	24-DEC-09	-1.84	143.953	127.646	160.260	50	883
	21907.076863	42307.92813	0.0001885	6.6368	66.1877	137.0024	305.7085
D . 280	<b>85076B</b>	<b>Optus A1</b>					
	27-DEC-09	-1.84	143.758	124.129	163.387	51	788
	21910.771725	42307.50236	0.0006868	12.4801	36.8988	229.6783	22.6463
D . 281	<b>82014A</b>	<b>Westar IV</b>					
	24-DEC-09	-1.81	141.392	123.388	159.396	51	872
	21907.261933	42305.32814	0.0003399	12.8024	32.2868	223.5525	205.0605
D . 282	<b>84093D</b>	<b>Telstar 3C</b>					
	31-DEC-09	-1.78	138.956	121.298	156.613	51	950
	21914.259421	42303.31586	0.0004393	11.7291	44.4162	297.3461	211.1701
D . 283	<b>95067B</b>	<b>Insat-IIC</b>					
	24-DEC-09	-1.77	138.281	118.199	158.364	51	654
	21907.375764	42301.77438	0.0006832	7.1518	66.0149	203.4836	197.5905
D . 284	<b>74093A</b>	<b>Intelsat IV F-8</b>					
	31-DEC-09	-1.75	136.980	115.722	158.237	49	831
	21914.893009	42301.23233	0.0006213	14.5021	3.4350	334.0059	301.5131
D . 285	<b>88081B</b>	<b>SBS V</b>					
	31-DEC-09	-1.73	135.636	110.007	161.265	51	942
	21914.416586	42297.58507	0.0008653	8.8484	59.6807	186.7396	169.6784

D . 286	<b>86026A</b>	<b>Gstar 2</b>					
	31-DEC-09	-1.72	134.804	117.620	151.988	52	931
	21914.745382	42299.16120	0.0005604	11.6719	45.0595	264.2510	36.3812
D . 287	<b>73023A</b>	<b>Anik A2</b>					
	24-DEC-09	-1.71	133.774	74.726	192.822	49	776
	21907.159769	42297.80009	0.0016342	14.7046	357.5363	273.3220	207.0403
D . 288	<b>92059D</b>	<b>Proton-K fourth stage (Block DM-2)</b>					
	30-DEC-09	-1.71	133.493	81.992	184.993	51	736
	21913.743067	42298.52711	0.0012750	11.9076	41.9458	183.4778	35.1289
D . 289	<b>78116A</b>	<b>Anik B1</b>					
	29-DEC-09	-1.65	128.722	98.616	158.828	51	853
	21912.484525	42294.62392	0.0013795	13.9957	12.6384	192.2100	100.1508
D . 290	<b>80091A</b>	<b>SBS I</b>					
	24-DEC-09	-1.62	126.904	99.855	153.952	50	901
	21907.109375	42293.01572	0.0007792	14.0391	15.0030	337.2596	242.8471
D . 291	<b>76042A</b>	<b>Comstar 1A</b>					
	31-DEC-09	-1.62	126.829	107.518	146.141	52	831
	21914.261424	42288.61960	0.0005302	14.4839	3.5291	240.8593	169.5769
D . 292	<b>94067A</b>	<b>Ekspress 1</b>					
	31-DEC-09	-1.61	125.940	106.941	144.939	52	762
	21914.205058	42292.09630	0.0001569	8.5680	60.4352	115.2452	246.8098
D . 293	<b>72003A</b>	<b>Intelsat IV F-4</b>					
	27-DEC-09	-1.60	124.736	105.977	143.495	51	846
	21910.694259	42287.60920	0.0006891	14.7103	356.5316	310.5178	10.2500
D . 294	<b>84080A</b>	<b>Himawari-3</b>					
	19-DEC-09	-1.59	123.995	95.688	152.303	49	792
	21902.737859	42287.90966	0.0009226	13.5228	19.7280	313.4894	25.5826
D . 295	<b>00020A</b>	<b>Galaxy IVR</b>					
	31-DEC-09	-1.57	123.228	112.837	133.618	52	493
	21914.312384	42288.25389	0.0003186	3.1745	74.1021	154.2448	221.4247
D . 296	<b>84101A</b>	<b>Galaxy III</b>					
	30-DEC-09	-1.56	122.317	90.732	153.901	52	963
	21913.641921	42289.16633	0.0009718	11.7474	44.2341	234.6862	73.8476
D . 297	<b>76035A</b>	<b>NATO IIIA</b>					
	27-DEC-09	-1.55	120.843	15.628	226.059	48	848
	21910.708113	42283.17665	0.0020958	13.3147	351.7963	169.9530	0.6257
D . 298	<b>89062A</b>	<b>TV-Sat 2</b>					
	26-DEC-09	-1.52	119.125	85.677	152.574	51	842
	21909.798669	42283.94200	0.0001578	9.9410	55.3792	161.8991	32.4055
D . 299	<b>92017A</b>	<b>Gorizont 25</b>					
	31-DEC-09	-1.52	119.130	8.247	230.013	53	918
	21914.288090	42282.21936	0.0027099	11.8851	40.3525	303.4770	196.5510
D . 300	<b>74075A</b>	<b>Westar II</b>					
	30-DEC-09	-1.51	117.956	99.105	136.806	50	741
	21913.041088	42284.13144	0.0004126	14.5431	359.7646	330.1959	246.3607
D . 301	<b>83030A</b>	<b>RCA Satcom IR</b>					
	26-DEC-09	-1.49	116.510	75.095	157.925	48	869
	21909.846898	42279.66621	0.0008406	12.4717	36.5844	312.3400	356.1724
D . 302	<b>99047A</b>	<b>Yamal-100 No. 1</b>					
	26-DEC-09	-1.47	114.689	-274.291	503.669	51	488
	21909.929132	42276.73643	0.0088155	9.1259	58.5791	252.2190	347.5240

D . 303	<b>84022F</b>	<b>Proton-K fourth stage (Block DM)</b>					
	31-DEC-09	-1.46	113.781	15.147	212.415	53	846
	21914.543843	42280.70098	0.0024598	15.4161	7.9801	334.0339	71.9897
D . 304	<b>87028D</b>	<b>Proton-K fourth stage (Block DM)</b>					
	27-DEC-09	-1.45	113.431	-2.073	228.935	51	853
	21910.961377	42277.76678	0.0029180	14.2788	19.9980	303.6275	297.0798
D . 305	<b>85048D</b>	<b>Telstar 3D</b>					
	22-DEC-09	-1.43	111.620	99.639	123.600	48	951
	21905.914792	42273.50722	0.0002118	11.5538	45.6512	206.4485	344.7357
D . 306	<b>95063A</b>	<b>Gals 2</b>					
	30-DEC-09	-1.39	108.732	79.087	138.377	52	721
	21913.668449	42275.77753	0.0009100	8.4178	61.0132	192.6950	81.0231
D . 307	<b>96005A</b>	<b>Gorizont 31</b>					
	31-DEC-09	-1.38	107.454	20.669	194.239	51	714
	21914.566539	42272.69324	0.0018711	10.0119	53.1081	74.6813	109.2241
D . 308	<b>91064B</b>	<b>Proton-K fourth stage (Block DM-2)</b>					
	23-DEC-09	-1.36	106.250	88.413	124.086	50	737
	21906.995521	42270.43463	0.0005860	12.2562	38.0200	252.1890	306.9270
D . 309	<b>74022A</b>	<b>Westar I</b>					
	25-DEC-09	-1.35	105.404	75.746	135.063	50	766
	21908.300556	42266.59911	0.0009038	14.6014	358.8499	258.6848	156.6252
D . 310	<b>82110C</b>	<b>Anik C3</b>					
	26-DEC-09	-1.32	103.271	87.546	118.995	52	949
	21909.880463	42265.15770	0.0006192	12.8230	31.5106	262.0930	338.9980
D . 311	<b>78002A</b>	<b>Intelsat IVA F-3</b>					
	24-DEC-09	-1.31	102.374	85.199	119.550	50	824
	21907.216088	42265.67576	0.0001640	14.1198	9.8606	256.0145	199.2005
D . 312	<b>87029A</b>	<b>Agila 1</b>					
	31-DEC-09	-1.30	101.807	81.267	122.346	52	937
	21914.191840	42268.15911	0.0006835	11.2901	47.7482	251.7740	238.8618
D . 313	<b>96063B</b>	<b>MEASAT 2</b>					
	22-DEC-09	-1.29	102.362	96.386	108.338	52	661
	21905.867975	42263.84754	0.0001969	2.0301	76.6687	236.7182	27.9110
D . 314	<b>75091A</b>	<b>Intelsat IVA F-1</b>					
	31-DEC-09	-1.24	96.742	73.836	119.649	50	840
	21914.177269	42260.09331	0.0002389	14.4350	3.2535	21.1103	199.7323
D . 315	<b>82110B</b>	<b>SBS III</b>					
	31-DEC-09	-1.22	95.134	60.040	130.227	50	969
	21914.966748	42260.17535	0.0010394	12.8085	31.7040	286.6293	303.0784
D . 316	<b>92027A</b>	<b>Palapa B4</b>					
	30-DEC-09	-1.20	93.735	74.630	112.840	51	807
	21913.865938	42256.73959	0.0006709	4.7406	69.6560	216.6689	18.2253
D . 317	<b>82009A</b>	<b>Ekran 8</b>					
	26-DEC-09	-1.19	93.323	-25.184	211.831	50	878
	21909.877384	42257.40848	0.0026318	14.7113	358.2533	186.1632	306.8857
D . 318	<b>85109C</b>	<b>Optus A2</b>					
	26-DEC-09	-1.18	92.470	75.573	109.367	51	968
	21909.859873	42253.98343	0.0005593	12.2405	38.3568	208.3660	353.3084
D . 319	<b>79072A</b>	<b>Westar III</b>					
	31-DEC-09	-1.17	91.729	73.280	110.179	47	798
	21914.676262	42256.41235	0.0005140	13.6815	17.4528	253.5728	33.7528

D . 320	<b>74101A</b>	<b>Symphonie A</b>						
	27-DEC-09	-1.13	88.053	68.748	107.359	49	755	
	21910.719282	42250.66699	0.0004589	14.3735	345.7929	261.1139	350.5062	
D . 321	<b>91003A</b>	<b>Italsat 1</b>						
	22-DEC-09	-1.11	86.352	23.062	149.641	51	804	
	21905.778889	42252.28103	0.0017147	10.7022	51.3715	245.9885	39.3255	
D . 322	<b>80081F</b>	<b>Proton-K fourth stage (Block DM)</b>						
	31-DEC-09	-1.10	86.324	61.155	111.492	51	845	
	21914.104363	42251.48357	0.0007999	14.6365	353.7832	278.5041	216.4880	
D . 323	<b>93048B</b>	<b>Insat-IIB</b>						
	21-DEC-09	-1.09	85.047	19.669	150.425	49	736	
	21904.154502	42251.43059	0.0011671	8.3639	61.2037	50.0937	275.7633	
D . 324	<b>75077A</b>	<b>Symphonie B</b>						
	31-DEC-09	-1.09	85.017	61.017	109.016	53	789	
	21914.318206	42248.06169	0.0007472	14.0876	343.7634	281.8522	129.2823	
D . 325	<b>88071A</b>	<b>Gorizont 16</b>						
	24-DEC-09	-1.07	83.831	22.707	144.955	50	875	
	21907.315116	42244.80387	0.0016711	13.0176	25.9965	277.4717	179.4123	
D . 326	<b>76073A</b>	<b>Comstar 2</b>						
	25-DEC-09	-1.06	82.976	68.189	97.763	51	940	
	21908.165451	42247.31401	0.0004752	14.3587	3.8197	305.4677	210.4247	
D . 327	<b>84049A</b>	<b>Chinasat 5 (Spacenet 1)</b>						
	28-DEC-09	-1.03	80.839	60.173	101.505	52	965	
	21911.094016	42247.46896	0.0003551	11.2321	47.9856	192.8017	277.4179	
D . 328	<b>93073E</b>	<b>Mage 1 (Meteosat 6 AKM)</b>						
	31-DEC-09	-1.03	80.737	-202.315	363.789	50	538	
	21914.717975	42246.98103	0.0066364	11.3899	46.4494	299.3968	47.0515	
D . 329	<b>97041D</b>	<b>Proton-K fourth stage (Block DM-2)</b>						
	26-DEC-09	-0.97	75.683	-1383.658	1535.024	50	586	
	21909.988426	42237.17011	0.0342505	9.2953	57.2780	137.9438	328.4767	
D . 330	<b>09010B</b>	<b>Proton-K fourth stage (Block DM-2)</b>						
	23-DEC-09	-0.95	75.014	50.653	99.374	37	37	
	21906.280775	42234.41264	0.0004645	0.9920	202.8145	51.4568	166.9345	
D . 331	<b>77014A</b>	<b>Kiku-2</b>						
	22-DEC-09	-0.95	74.241	55.138	93.345	48	716	
	21905.639780	42238.22199	0.0006307	14.5063	349.3958	292.8588	27.7093	
D . 332	<b>90016D</b>	<b>Proton-K fourth stage (Block DM)</b>						
	30-DEC-09	-0.88	69.122	-100.164	238.408	52	772	
	21913.296748	42230.71615	0.0037542	12.6134	32.2343	73.9334	186.9728	
D . 333	<b>90112D</b>	<b>Proton-K fourth stage (Block DM-2)</b>						
	29-DEC-09	-0.88	69.021	-40.985	179.028	51	798	
	21912.511794	42234.25162	0.0025707	12.3373	35.5106	9.9974	113.2362	
D . 334	<b>81057B</b>	<b>APPLE</b>						
	30-DEC-09	-0.85	66.579	-30.500	163.659	51	797	
	21913.031204	42234.60715	0.0020179	14.6310	358.4081	48.0389	248.7687	
D . 335	<b>77092J</b>	<b>Ekran 2 fragmentation debris</b>						
	31-DEC-09	-0.83	65.256	3.794	126.718	50	286	
	21914.034039	42232.21458	0.0006673	14.2569	344.6411	60.2457	232.8893	
D . 336	<b>03053E</b>	<b>Proton-K fourth stage (Block DM-2M)</b>						
	31-DEC-09	-0.83	65.093	-827.111	957.297	50	289	
	21914.793056	42231.66490	0.0219928	5.7420	68.6707	143.8255	44.1663	

D . 337	<b>77018A</b>	<b>Palapa 2</b>						
	26-DEC-09	-0.83	64.913	42.067	87.759	50	773	
	21909.905752	42228.66181	0.0008705	14.1927	8.0917	293.9573	306.4260	
D . 338	<b>87084D</b>	<b>Proton-K fourth stage (Block DM)</b>						
	22-DEC-09	-0.81	63.683	-56.377	183.743	51	861	
	21905.836620	42223.95914	0.0027174	13.1859	22.5738	79.6958	350.2310	
D . 339	<b>83028F</b>	<b>Proton-K fourth stage (Block DM)</b>						
	24-DEC-09	-0.81	63.441	-39.675	166.558	50	850	
	21907.345509	42223.52788	0.0023845	14.3926	5.3081	48.8449	148.1543	
D . 340	<b>98025D</b>	<b>Proton-K fourth stage (Block DM-2)</b>						
	31-DEC-09	-0.81	63.257	-67.893	194.408	50	559	
	21914.152130	42231.11354	0.0031539	7.8386	60.0257	324.9133	265.2716	
D . 341	<b>75038A</b>	<b>Anik A3</b>						
	25-DEC-09	-0.80	62.900	43.477	82.323	48	792	
	21908.389977	42225.38044	0.0005788	14.4616	2.4226	276.9844	127.9586	
D . 342	<b>92088D</b>	<b>Proton-K fourth stage (Block DM-2)</b>						
	26-DEC-09	-0.75	58.534	17.661	99.407	50	742	
	21909.472153	42219.11941	0.0009582	10.8193	45.8340	336.5901	140.7049	
D . 343	<b>94060D</b>	<b>Proton-K fourth stage (Block DM-2)</b>						
	28-DEC-09	-0.71	55.482	23.902	87.062	50	657	
	21911.540567	42220.27817	0.0008001	10.8015	49.2142	318.4664	117.4033	
D . 344	<b>94087D</b>	<b>Proton-K fourth stage (Block DM-2)</b>						
	24-DEC-09	-0.70	54.779	11.422	98.137	51	666	
	21907.193438	42223.65166	0.0010428	10.6521	50.3062	312.8546	247.7169	
D . 345	<b>00032A</b>	<b>FengYun 2B</b>						
	26-DEC-09	-0.67	52.253	33.216	71.289	50	480	
	21909.912025	42212.64901	0.0006242	4.8091	70.0630	205.4548	5.9739	
D . 346	<b>76066A</b>	<b>Palapa 1</b>						
	14-DEC-09	-0.65	50.989	33.877	68.101	50	745	
	21897.760359	42211.58917	0.0000986	14.3206	3.9531	8.6684	6.6666	
D . 347	<b>85055A</b>	<b>Intelsat VA F-11</b>						
	23-DEC-09	-0.63	49.075	-1.906	100.056	52	926	
	21906.917326	42208.84908	0.0015648	12.3698	37.2199	281.1595	334.2389	
D . 348	<b>88034D</b>	<b>Proton-K fourth stage (Block DM)</b>						
	25-DEC-09	-0.60	47.229	-55.300	149.759	48	853	
	21908.018634	42215.48757	0.0023271	13.2132	24.1868	17.5194	283.9140	
D . 349	<b>75097F</b>	<b>Proton-K fourth stage (Block DM)</b>						
	31-DEC-09	-0.58	45.687	-48.599	139.973	53	824	
	21914.559803	42211.43315	0.0022812	13.2027	337.0057	36.4167	35.5620	
D . 350	<b>72041A</b>	<b>Intelsat IV F-5</b>						
	27-DEC-09	-0.58	45.522	27.861	63.184	51	823	
	21910.573519	42214.31593	0.0002378	14.5602	351.7514	340.5649	49.1151	
D . 351	<b>81114A</b>	<b>RCA Satcom IIIR</b>						
	18-DEC-09	-0.56	44.078	25.201	62.956	50	810	
	21901.801806	42205.35883	0.0005230	12.9438	29.3645	217.8400	13.1490	
D . 352	<b>04010F</b>	<b>Proton-K fourth stage (Block DM-2)</b>						
	26-DEC-09	-0.56	43.846	-86.054	173.745	53	276	
	21909.953194	42203.29295	0.0032427	4.2869	81.7175	199.8982	2.6146	
D . 353	<b>82082A</b>	<b>Anik D1</b>						
	31-DEC-09	-0.56	43.754	16.721	70.787	52	859	
	21914.252188	42206.39467	0.0007960	12.8519	30.2370	215.4450	199.6143	



D . 354	<b>93003D</b>	<b>IUS stage 2</b>					
	30-DEC-09	-0.55	43.251	-244.692	331.194	50	717
	21913.729190	42208.93621	0.0066749	10.5557	35.1185	323.0740	32.8671
D . 355	<b>94069D</b>	<b>Proton-K fourth stage (Block DM-2)</b>					
	26-DEC-09	-0.55	43.113	-51.418	137.645	48	655
	21909.999063	42205.69548	0.0022323	11.0788	49.6197	337.5977	314.2360
D . 356	<b>91010F</b>	<b>Proton-K fourth stage (Block DM-2)</b>					
	31-DEC-09	-0.52	41.048	-25.993	108.090	53	792
	21914.577326	42212.06398	0.0014010	11.6573	39.3638	58.6803	91.5442
D . 357	<b>83065A</b>	<b>Galaxy I</b>					
	31-DEC-09	-0.52	40.449	25.984	54.914	51	924
	21914.435822	42198.98274	0.0003584	12.0595	40.5960	228.6132	143.6951
D . 358	<b>77092K</b>	<b>Ekran 2 fragmentation debris</b>					
	27-DEC-09	-0.51	40.339	-33.948	114.626	47	181
	21910.702095	42198.73302	0.0020299	14.1401	344.1917	166.1708	355.2202
D . 359	<b>04043D</b>	<b>Proton-K fourth stage (Block DM-2M)</b>					
	31-DEC-09	-0.50	39.894	13.401	66.388	52	253
	21914.297442	42207.33249	0.0005858	4.8706	69.0479	325.5035	221.8819
D . 360	<b>91015E</b>	<b>Mage 1 (Meteosat 5 AKM)</b>					
	31-DEC-09	-0.49	38.620	-638.841	716.081	49	526
	21914.334792	42194.50401	0.0156647	11.8929	33.5529	68.8492	174.8352
D . 361	<b>99047E</b>	<b>Proton-K fourth stage (Block DM-2M)</b>					
	30-DEC-09	-0.49	38.455	-416.256	493.167	50	486
	21913.726863	42209.91493	0.0102688	9.0980	58.4994	251.4878	56.3662
D . 362	<b>81096A</b>	<b>SBS II</b>					
	31-DEC-09	-0.48	37.942	15.512	60.373	51	953
	21914.462894	42205.12980	0.0002423	13.5906	17.9285	326.4597	111.2896
D . 363	<b>93072A</b>	<b>Gorizont 29</b>					
	30-DEC-09	-0.47	37.564	-15.281	90.410	52	815
	21913.746458	42205.00195	0.0014059	11.1797	46.1546	211.6570	38.0307
D . 364	<b>99009A</b>	<b>Arabsat 3A</b>					
	23-DEC-09	-0.44	30.591	1.518	59.664	51	527
	21906.008438	42192.77586	0.0008274	1.1567	79.9006	187.5888	344.2688
D . 365	<b>85107A</b>	<b>Raduga 17</b>					
	22-DEC-09	-0.41	32.386	-14.774	79.546	51	864
	21905.711227	42197.48053	0.0009050	13.6470	14.5447	45.9774	27.2126
D . 366	<b>95045D</b>	<b>Proton-K fourth stage (Block DM-2)</b>					
	26-DEC-09	-0.40	31.973	-58.736	122.682	52	640
	21909.496713	42190.85472	0.0022635	10.2815	52.5224	247.8375	138.3219
D . 367	<b>79035E</b>	<b>Proton-K fourth stage (Block DM)</b>					
	31-DEC-09	-0.38	30.002	-94.531	154.535	52	823
	21914.248646	42184.54221	0.0026013	14.5085	349.0588	70.6221	160.0524
D . 368	<b>00032C</b>	<b>FengYun 2B AKM</b>					
	30-DEC-09	-0.37	30.403	-78.417	139.223	46	403
	21913.249248	42202.35480	0.0026950	7.6023	65.5467	231.6708	236.6520
D . 369	<b>83059C</b>	<b>Palapa Pacific System</b>					
	24-DEC-09	-0.33	26.745	6.038	47.451	52	871
	21907.229190	42194.17994	0.0006491	13.0540	26.4514	281.8122	211.0041
D . 370	<b>00036D</b>	<b>Proton-K fourth stage (Block DM-2)</b>					
	31-DEC-09	-0.30	24.339	-59.175	107.852	52	454
	21914.599618	42196.73200	0.0020955	7.0921	64.0174	265.5370	107.6597

<b>D . 371</b>	<b>92082A</b>	<b>Gorizont 27</b>					
	30-DEC-09	-0.30	23.709	-34.666	82.085	51	863
	21913.600822	42201.62206	0.0015661	11.6626	42.7859	229.6210	87.1840
<b>D . 372</b>	<b>87091D</b>	<b>Proton-K fourth stage (Block DM)</b>					
	31-DEC-09	-0.29	2.567	-83.962	89.095	53	860
	21914.413160	42181.95888	0.0016919	13.2070	21.7982	94.7130	133.3268
<b>D . 373</b>	<b>83098A</b>	<b>Galaxy II</b>					
	31-DEC-09	-0.27	21.947	-4.436	48.329	52	961
	21914.432778	42178.45146	0.0007598	11.9918	41.0361	273.7755	145.1767
<b>D . 374</b>	<b>92041A</b>	<b>Insat-IIA</b>					
	31-DEC-09	-0.25	20.290	1.341	39.239	52	810
	21914.699213	42200.05528	0.0004444	10.5738	51.9231	162.6344	59.9642
<b>D . 375</b>	<b>81102F</b>	<b>Proton-K fourth stage (Block DM)</b>					
	27-DEC-09	-0.23	20.046	-28.292	68.385	47	833
	21910.813565	42181.57303	0.0010793	14.5248	356.6738	17.5849	327.4323
<b>D . 376</b>	<b>64047A</b>	<b>Syncom 3</b>					
	29-DEC-09	-0.21	10.698	0.003	21.394	53	94
	21912.154167	42175.66793	0.0002175	5.9898	298.4124	318.2713	145.3613
<b>D . 377</b>	<b>67001A</b>	<b>Intelsat II F-2</b>					
	27-DEC-09	-0.21	16.682	-52.255	85.620	50	563
	21910.319514	42195.13955	0.0014265	9.0479	316.8783	239.5937	105.8620
<b>D . 378</b>	<b>00029B</b>	<b>Proton-M fourth stage (Briz-M)</b>					
	27-DEC-09	0.24	-21.344	-1115.301	1072.613	53	459
	21910.012315	42144.09882	0.0276862	6.9202	61.3914	176.3598	321.4113
<b>D . 379</b>	<b>66110A</b>	<b>ATS 1</b>					
	31-DEC-09	0.26	-17.224	-49.710	15.261	52	769
	21914.125752	42160.55646	0.0003391	7.5722	309.6735	217.9935	164.8529
<b>D . 380</b>	<b>82103E</b>	<b>Proton-K fourth stage (Block DM)</b>					
	30-DEC-09	0.30	-24.707	-77.207	27.793	50	841
	21913.635347	42135.12014	0.0013399	14.2418	1.2956	6.1310	33.4082
<b>D . 381</b>	<b>81027A</b>	<b>Raduga 8</b>					
	31-DEC-09	0.37	-29.797	-389.767	330.173	51	848
	21914.389456	42131.31776	0.0082942	14.6918	354.4399	97.6433	115.2548
<b>D . 382</b>	<b>85048C</b>	<b>Arabsat 1B</b>					
	26-DEC-09	0.50	-39.120	-101.979	23.738	52	872
	21909.918738	42129.06455	0.0018820	12.6700	32.0918	238.6343	325.6417
<b>D . 383</b>	<b>85015A</b>	<b>Arabsat 1A</b>					
	28-DEC-09	0.53	-41.706	-67.146	-16.265	52	780
	21911.008704	42119.01915	0.0005055	12.8763	28.5459	242.0377	288.7628
<b>D . 384</b>	<b>69013A</b>	<b>TACSAT 1</b>					
	27-DEC-09	0.54	-42.035	-120.826	36.755	51	647
	21910.733125	42124.74363	0.0016122	9.1809	319.5498	188.7021	319.3450
<b>D . 385</b>	<b>89020E</b>	<b>Mage 1 (Meteosat 4 AKM)</b>					
	31-DEC-09	0.60	-47.703	-609.282	513.875	52	505
	21914.119132	42110.80746	0.0125804	12.3677	25.5506	88.2991	244.4659
<b>D . 386</b>	<b>03015A</b>	<b>Cosmos-2397</b>					
	21-DEC-09	0.71	-55.327	-244.082	133.427	51	334
	21904.079479	42109.72689	0.0046708	3.8507	69.9124	206.1655	311.0337
<b>D . 387</b>	<b>88091D</b>	<b>IUS stage 2</b>					
	27-DEC-09	0.71	-55.597	-137.795	26.602	49	858
	21910.780220	42111.41358	0.0016066	13.1093	29.8362	144.9948	12.7039

<b>D . 388</b>	<b>79087C</b>	<b>Proton-K fourth stage (Block DM)</b>					
	31-DEC-09	0.73	-56.605	-225.792	112.582	51	821
	21914.059491	42104.04076	0.0037970	14.4375	350.1153	190.0211	229.0331
<b>D . 389</b>	<b>93069D</b>	<b>Proton-K fourth stage (Block DM-2)</b>					
	25-DEC-09	0.76	-59.555	-86.439	-32.671	53	693
	21908.962361	42107.38437	0.0007805	11.1595	45.9636	249.9471	324.8283
<b>D . 390</b>	<b>75123F</b>	<b>Proton-K fourth stage (Block DM)</b>					
	31-DEC-09	0.80	-61.988	-124.587	0.611	51	851
	21914.485787	42097.45408	0.0015093	13.2137	338.2808	24.1861	63.4677
<b>D . 391</b>	<b>95035D</b>	<b>IUS stage 2</b>					
	26-DEC-09	0.80	-62.418	-104.814	-20.021	51	633
	21909.509421	42103.74551	0.0011114	13.3637	48.0703	345.1990	129.5028
<b>D . 392</b>	<b>90054D</b>	<b>Proton-K fourth stage (Block DM)</b>					
	22-DEC-09	0.84	-65.228	-131.835	1.380	51	803
	21905.904398	42102.71372	0.0017637	12.4851	33.6015	293.3629	336.2665
<b>D . 393</b>	<b>88071D</b>	<b>Proton-K fourth stage (Block DM)</b>					
	31-DEC-09	0.99	-77.076	-156.205	2.053	52	874
	21914.935150	42087.88377	0.0016724	12.8729	25.5835	61.0391	308.6428
<b>D . 394</b>	<b>87096D</b>	<b>Proton-K fourth stage (Block DM)</b>					
	28-DEC-09	1.07	-83.060	-174.639	8.518	49	883
	21911.473785	42081.09364	0.0018609	13.0834	22.7146	72.8170	115.3022
<b>D . 395</b>	<b>77048G</b>	<b>Aerojet SVM-5 (GOES 2 AKM)</b>					
	26-DEC-09	1.08	-84.402	-1010.563	841.760	50	544
	21909.741019	42083.45175	0.0228941	13.9737	344.9074	288.6354	340.3076
<b>D . 396</b>	<b>89081D</b>	<b>Proton-K fourth stage (Block DM)</b>					
	31-DEC-09	1.21	-94.329	-214.665	26.008	50	804
	21914.509178	42068.52168	0.0028504	12.5669	29.9294	312.4984	106.3503
<b>D . 397</b>	<b>89021D</b>	<b>IUS stage 2</b>					
	29-DEC-09	1.21	-94.391	-196.980	8.199	52	829
	21912.505671	42067.19047	0.0024342	12.7735	12.7210	27.3559	92.7471
<b>D . 398</b>	<b>85102D</b>	<b>Proton-K fourth stage (Block DM-2)</b>					
	31-DEC-09	1.27	-98.974	-186.389	-11.559	51	834
	21914.124479	42063.76342	0.0021961	13.5104	14.5017	343.9413	229.9695
<b>D . 399</b>	<b>97049E</b>	<b>Mage 1 (Meteosat 7 AKM)</b>					
	24-DEC-09	1.34	-104.210	-415.830	207.409	50	466
	21907.126285	42058.10421	0.0080269	8.7925	58.2423	172.3339	280.0692
<b>D . 400</b>	<b>89041B</b>	<b>DFS-Kopernikus 1</b>					
	30-DEC-09	1.40	-108.709	-160.911	-56.507	51	799
	21913.727766	42053.99139	0.0013747	11.2486	46.6993	162.5135	45.4593
<b>D . 401</b>	<b>74039C</b>	<b>Titan IIIC stage 3 (Transtage)</b>					
	26-DEC-09	1.41	-109.636	-214.609	-4.662	52	835
	21909.792731	42055.85827	0.0020714	13.4535	338.2658	185.9047	317.4629
<b>D . 402</b>	<b>88034A</b>	<b>Cosmos 1940</b>					
	27-DEC-09	1.42	-110.009	-197.273	-22.745	53	800
	21910.969201	42054.49576	0.0015928	13.0828	23.5988	130.4506	298.2701
<b>D . 403</b>	<b>04015D</b>	<b>Proton-K fourth stage (Block DM-2M)</b>					
	31-DEC-09	1.58	-122.648	-202.194	-43.103	51	279
	21914.508171	42043.73349	0.0020805	5.2837	69.3209	179.4613	146.1465
<b>D . 404</b>	<b>00013D</b>	<b>Proton-K fourth stage (Block DM-2M)</b>					
	24-DEC-09	1.76	-136.283	-170.227	-102.339	52	463
	21907.145903	42026.55848	0.0008926	8.5587	60.8523	254.0310	275.3768

D . 405	<b>68081M</b>	<b>Transtage 5 debris</b>					
	25-NOV-09	1.79	-139.402	-756.333	477.528	37	37
	21878.866308	42025.35932	0.0157110	9.6018	330.7959	274.4901	312.1696
D . 406	<b>74017A</b>	<b>Cosmos 637</b>					
	31-DEC-09	1.82	-141.233	-308.478	26.013	50	850
	21914.115648	42024.29535	0.0040955	11.9523	332.7543	257.5735	191.0363
D . 407	<b>96044A</b>	<b>Italsat 2</b>					
	26-DEC-09	1.84	-142.807	-245.908	-39.705	52	610
	21909.923785	42023.15806	0.0023385	7.0319	64.1337	337.1066	355.8189
D . 408	<b>94082D</b>	<b>Proton-K fourth stage (Block DM-2)</b>					
	30-DEC-09	1.89	-146.440	-263.322	-29.558	50	671
	21913.714850	42015.97663	0.0028172	10.0846	55.5965	325.1170	58.7607
D . 409	<b>05023H</b>	<b>Proton-K fourth stage (Block DM-2)</b>					
	30-DEC-09	1.94	-150.210	-212.797	-87.623	50	220
	21913.756736	42012.13829	0.0016200	4.1807	71.9344	181.7987	59.9200
D . 410	<b>87109D</b>	<b>Proton-K fourth stage (Block DM)</b>					
	24-DEC-09	2.02	-156.795	-430.228	116.638	51	862
	21907.282488	42009.17074	0.0061077	12.9814	23.6884	110.6186	189.7325
D . 411	<b>90094D</b>	<b>Proton-K fourth stage (Block DM-2)</b>					
	31-DEC-09	2.12	-164.143	-311.030	-17.257	52	826
	21914.286597	42001.24429	0.0035352	12.3100	34.4307	343.1603	191.3195
D . 412	<b>68081J</b>	<b>Transtage 5 debris</b>					
	31-DEC-09	2.26	-175.168	-730.933	380.596	41	114
	21914.472940	41987.36480	0.0144699	9.3621	329.5793	279.1980	57.7123
D . 413	<b>91046D</b>	<b>Proton-K fourth stage (Block DM-2)</b>					
	31-DEC-09	2.37	-183.446	-252.177	-114.715	52	795
	21914.996481	41980.75184	0.0014726	12.0314	37.3119	87.5698	298.2296
D . 414	<b>68081N</b>	<b>Transtage 5 debris</b>					
	19-DEC-09	2.39	-185.685	-1070.761	699.390	36	36
	21902.620671	41979.60197	0.0290458	9.3232	329.3437	275.5745	14.0213
D . 415	<b>94080A</b>	<b>Zongxing 6 (A)</b>					
	31-DEC-09	2.50	-193.194	-588.545	202.158	52	702
	21914.408657	41972.79389	0.0102307	11.3956	44.6719	214.9251	156.9169
D . 416	<b>82009F</b>	<b>Proton-K fourth stage (Block DM)</b>					
	25-DEC-09	2.55	-197.468	-355.546	-39.389	51	839
	21908.111944	41966.18888	0.0037744	14.3046	357.0519	23.8429	223.1891
D . 417	<b>74017F</b>	<b>Proton-K fourth stage (Block DM)</b>					
	30-DEC-09	2.62	-202.949	-397.476	-8.422	51	847
	21913.092720	41961.64619	0.0048169	11.8211	332.4038	267.3428	199.8486
D . 418	<b>06022D</b>	<b>Proton-K fourth stage (Block DM3)</b>					
	23-DEC-09	2.64	-204.054	-429.673	21.566	51	178
	21906.263970	41958.88859	0.0053743	3.2442	73.8388	234.1851	246.0965
D . 419	<b>81061F</b>	<b>Proton-K fourth stage (Block DM)</b>					
	24-DEC-09	2.64	-204.648	-222.854	-186.442	51	872
	21907.845058	41960.43780	0.0006525	14.2513	354.8041	291.8931	317.0413
D . 420	<b>68081G</b>	<b>LES 6 operational debris</b>					
	31-DEC-09	2.74	-211.708	-697.885	274.469	50	549
	21914.436412	41950.92716	0.0118238	9.3525	329.4088	257.2503	71.0732
D . 421	<b>83100F</b>	<b>Proton-K fourth stage (Block DM)</b>					
	27-DEC-09	2.80	-216.830	-299.743	-133.917	51	860
	21910.720081	41948.58286	0.0021570	13.9723	2.3065	343.3094	6.7045

D . 422	<b>97065C</b>	<b>IABS</b>						
	25-DEC-09	2.84	-219.591	-306.661	-132.522	49	567	
	21908.194977	41943.77323	0.0033369	10.1735	52.8844	330.8377	248.6453	
D . 423	<b>92017D</b>	<b>Proton-K fourth stage (Block DM-2)</b>						
	31-DEC-09	2.94	-227.156	-323.745	-130.566	52	759	
	21914.581655	41936.11597	0.0024052	11.7639	39.8350	257.9269	90.0465	
D . 424	<b>83016F</b>	<b>Proton-K fourth stage (Block DM)</b>						
	31-DEC-09	2.97	-229.574	-289.288	-169.861	51	830	
	21914.571215	41933.54203	0.0010933	14.1122	358.4791	162.1817	52.7944	
D . 425	<b>88036E</b>	<b>Proton-K fourth stage (Block DM)</b>						
	31-DEC-09	3.04	-235.153	-327.877	-142.430	51	853	
	21914.578785	41928.18607	0.0022201	13.1328	19.7155	10.9011	71.3092	
D . 426	<b>92074D</b>	<b>Proton-K fourth stage (Block DM-2)</b>						
	26-DEC-09	3.13	-242.378	-330.850	-153.905	51	723	
	21909.914722	41922.87548	0.0022086	11.4391	42.2557	332.0890	337.3014	
D . 427	<b>05049E</b>	<b>MSG-2 debris (SEVIRI Cooler Cover)</b>						
	09-DEC-09	3.23	-249.836	-279.117	-220.554	40	116	
	21892.203565	41914.35634	0.0010978	2.2765	98.7996	111.6131	307.1881	
D . 428	<b>85024D</b>	<b>Proton-K fourth stage (Block DM)</b>						
	31-DEC-09	3.43	-265.414	-323.603	-207.226	50	860	
	21914.961088	41898.18530	0.0011147	13.8077	7.6350	75.4590	281.2945	
D . 429	<b>95011D</b>	<b>Star 27 (Himawari-5 AKM)</b>						
	21-DEC-09	3.53	-272.757	-1237.743	692.229	48	499	
	21904.591458	41890.52622	0.0237416	10.5574	47.9222	205.4328	103.5015	
D . 430	<b>82093F</b>	<b>Proton-K fourth stage (Block DM)</b>						
	31-DEC-09	3.53	-272.848	-298.369	-247.327	52	864	
	21914.516088	41890.44238	0.0001354	13.9880	358.2376	163.9890	72.4104	
D . 431	<b>84090F</b>	<b>Proton-K fourth stage (Block DM)</b>						
	31-DEC-09	3.57	-275.558	-345.420	-205.697	52	870	
	21914.585255	41887.96147	0.0017948	13.8191	5.5249	348.1568	54.6929	
D . 432	<b>77092G</b>	<b>Proton-K fourth stage (Block DM)</b>						
	24-DEC-09	3.63	-280.719	-325.674	-235.764	49	882	
	21907.223877	41884.84431	0.0013635	13.6578	342.7769	349.8594	169.2906	
D . 433	<b>79015D</b>	<b>Proton-K fourth stage (Block DM)</b>						
	30-DEC-09	3.84	-296.213	-334.533	-257.894	50	838	
	21913.995880	41866.93787	0.0004971	13.9317	346.8369	149.5781	248.8258	
D . 434	<b>80104E</b>	<b>Proton-K fourth stage (Block DM)</b>						
	31-DEC-09	3.85	-296.840	-428.087	-165.593	51	868	
	21914.095972	41867.40360	0.0032325	14.1150	352.6482	18.3059	218.5881	
D . 435	<b>04042C</b>	<b>FengYun 2C AKM</b>						
	31-DEC-09	3.85	-297.039	-396.429	-197.648	53	247	
	21914.286169	41866.79796	0.0025671	3.9401	69.3455	183.2718	226.2055	
D . 436	<b>76023K</b>	<b>LES 8, LES 9 operational debris</b>						
	31-DEC-09	3.85	-297.502	-314.754	-280.251	51	838	
	21914.018507	41866.21135	0.0005376	14.0541	348.9799	281.7335	242.7078	
D . 437	<b>89053A</b>	<b>Olympus 1</b>						
	30-DEC-09	3.95	-304.589	-371.496	-237.683	50	909	
	21913.225521	41860.30257	0.0017124	12.4296	33.3006	193.3806	213.2892	
D . 438	<b>86038D</b>	<b>Proton-K fourth stage (Block DM)</b>						
	31-DEC-09	3.96	-305.423	-391.171	-219.675	53	801	
	21914.540231	41858.11157	0.0020996	13.5047	11.5388	5.9459	77.0235	

D . 439	<b>87073D</b>	<b>Proton-K fourth stage (Block DM)</b>					
	27-DEC-09	4.00	-308.398	-383.555	-233.241	53	874
	21910.893912	41856.45013	0.0018148	13.1785	16.8947	338.1245	318.5307
D . 440	<b>68081P</b>	<b>Transtage 5 debris</b>					
	31-DEC-09	4.04	-311.667	-686.675	63.342	39	39
	21914.778843	41852.77223	0.0090864	9.1886	328.2470	262.8569	306.5986
D . 441	<b>84028F</b>	<b>Proton-K fourth stage (Block DM)</b>					
	31-DEC-09	4.15	-320.402	-405.459	-235.344	51	858
	21914.613970	41843.34007	0.0022428	13.8803	1.5152	255.1028	40.0993
D . 442	<b>76107F</b>	<b>Proton-K fourth stage (Block DM)</b>					
	31-DEC-09	4.27	-329.274	-374.960	-283.588	53	867
	21914.393322	41834.70295	0.0013130	13.2604	339.4197	4.0638	97.9185
D . 443	<b>88108D</b>	<b>Proton-K fourth stage (Block DM)</b>					
	25-DEC-09	4.47	-344.740	-405.277	-284.203	52	878
	21908.937986	41820.21163	0.0013380	12.7949	26.4794	22.2883	314.3073
D . 444	<b>68081E</b>	<b>Titan IIIC stage 3 (Transtage)</b>					
	31-DEC-09	4.48	-345.494	-745.466	54.479	52	839
	21914.766574	41819.15043	0.0096334	9.2469	328.4078	253.4239	311.1573
D . 445	<b>79007A</b>	<b>Scatha</b>					
	28-DEC-09	4.52	-348.305	-7920.934	7224.324	48	878
	21911.915197	41815.59082	0.1804144	18.0998	2.9695	300.3417	279.2882
D . 446	<b>68081A</b>	<b>OV2 5</b>					
	23-DEC-09	4.62	-356.261	-702.441	-10.081	48	638
	21906.161539	41808.81418	0.0083736	9.2099	328.3976	259.6750	177.5206
D . 447	<b>79007C</b>	<b>Scatha AKM</b>					
	23-DEC-09	4.74	-364.975	-7853.131	7123.182	47	176
	21906.281493	41801.28585	0.1785862	18.0266	3.0479	299.9567	153.1555
D . 448	<b>80060F</b>	<b>Proton-K fourth stage (Block DM)</b>					
	31-DEC-09	4.80	-369.487	-442.906	-296.068	51	831
	21914.822234	41795.19015	0.0014551	14.0359	350.8430	109.0023	314.6567
D . 449	<b>68081H</b>	<b>LES 6 operational debris</b>					
	22-DEC-09	5.17	-397.630	-704.861	-90.400	46	358
	21905.396759	41767.21508	0.0081103	9.1801	327.8990	313.4339	93.3711
D . 450	<b>68081L</b>	<b>Transtage 5 debris</b>					
	24-DEC-09	5.53	-425.004	-721.336	-128.671	28	28
	21907.813669	41738.38512	0.0079946	9.1649	327.7491	282.4069	300.5264
D . 451	<b>75100F</b>	<b>Aerojet SVM-5 (GOES 1 AKM)</b>					
	31-DEC-09	5.97	-458.696	-1635.641	718.250	52	667
	21914.070671	41705.72482	0.0289604	13.0125	337.4241	261.5978	209.0859
D . 452	<b>74039A</b>	<b>ATS 6</b>					
	31-DEC-09	6.15	-472.074	-598.616	-345.532	52	892
	21914.166840	41693.04615	0.0025533	12.7462	335.9383	146.0095	176.3545
D . 453	<b>68081K</b>	<b>Transtage 5 debris</b>					
	31-DEC-09	6.37	-488.917	-699.761	-278.072	44	44
	21914.362836	41674.13427	0.0063200	9.2867	328.0882	339.4005	97.3846
D . 454	<b>08066C</b>	<b>FengYun 2E AKM (FG-36 AKM)</b>					
	31-DEC-09	6.55	-502.730	-663.374	-342.085	52	54
	21914.416331	41661.36587	0.0039680	1.8725	285.3271	330.5418	35.9641
D . 455	<b>05049F</b>	<b>MSG-2 debris (entry baffle cover)</b>					
	29-DEC-09	7.05	-540.078	-792.896	-287.260	43	84
	21912.463345	41624.59860	0.0056082	2.3168	99.3467	232.9682	193.3520

D . 456	<b>70055A</b>	<b>Intelsat III F-8</b>					
	27-DEC-09	7.16	-548.608	-1937.166	839.951	50	836
	21910.499630	41615.28523	0.0341188	7.0701	306.8555	125.0115	34.2674
D . 457	<b>97029C</b>	<b>FengYun 2A AKM</b>					
	28-DEC-09	9.38	-714.632	-1662.711	233.447	52	475
	21911.128160	41449.34604	0.0217584	9.4532	57.0042	260.7472	271.6189
D . 458	<b>87040D</b>	<b>Proton-K fourth stage (Block DM)</b>					
	21-DEC-09	9.88	-752.302	-816.322	-688.281	52	854
	21904.672836	41411.84543	0.0012402	13.1670	8.6443	157.9479	36.1317
D . 459	<b>85007D</b>	<b>Proton-K fourth stage (Block DM)</b>					
	30-DEC-09	9.90	-754.003	-820.359	-687.647	52	884
	21913.636296	41410.58031	0.0012857	12.9050	9.5992	130.9474	41.4683
D . 460	<b>89052D</b>	<b>Proton-K fourth stage (Block DM)</b>					
	31-DEC-09	10.04	-764.183	-892.759	-635.606	52	845
	21914.678565	41400.09559	0.0027684	12.0694	27.6983	100.0908	43.5351
D . 461	<b>93072D</b>	<b>Proton-K fourth stage (Block DM-2)</b>					
	31-DEC-09	10.41	-791.744	-866.481	-717.007	51	701
	21914.233611	41372.39486	0.0018296	10.7161	44.6980	347.1140	220.7657
D . 462	<b>84063F</b>	<b>Proton-K fourth stage (Block DM)</b>					
	30-DEC-09	10.86	-825.176	-894.035	-756.316	52	877
	21913.046829	41339.06913	0.0014198	13.0070	6.0663	77.2828	250.7741
D . 463	<b>87100D</b>	<b>Proton-K fourth stage (Block DM)</b>					
	30-DEC-09	11.26	-854.697	-918.977	-790.418	52	869
	21913.375139	41310.35481	0.0012463	12.8125	20.8300	88.1133	147.0067
D . 464	<b>91014D</b>	<b>Proton-K fourth stage (Block DM-2)</b>					
	31-DEC-09	11.38	-863.257	-967.955	-758.558	52	830
	21914.957523	41301.45045	0.0025731	12.2178	34.5255	326.0211	309.1695
D . 465	<b>01015A</b>	<b>GSAT-1</b>					
	21-DEC-09	12.78	-966.683	-1902.429	-30.938	52	441
	21904.943657	41198.06682	0.0224147	6.6550	63.6598	122.5637	355.3913
D . 466	<b>94030D</b>	<b>Proton-K fourth stage (Block DM-2)</b>					
	28-DEC-09	12.84	-971.340	-1153.000	-789.680	51	698
	21911.109699	41192.72733	0.0045352	10.4920	45.6620	12.7601	269.5581
D . 467	<b>08003B</b>	<b>Proton-M fourth stage (Briz-M)</b>					
	31-DEC-09	13.43	-1014.132	-1772.457	-255.808	52	77
	21914.544560	41150.28650	0.0181846	1.6243	77.6080	70.8293	142.6646
D . 468	<b>07058C</b>	<b>Proton-M fourth stage (Briz-M)</b>					
	31-DEC-09	14.96	-1126.068	-2141.209	-110.926	52	101
	21914.475810	41038.45917	0.0242469	1.8820	76.4922	45.3955	166.5045
D . 469	<b>97027B</b>	<b>Insat-IID</b>					
	31-DEC-09	16.26	-1220.656	-2557.348	116.035	52	596
	21914.601030	40943.37017	0.0317561	9.9196	50.1751	309.3418	90.8799
D . 470	<b>68050J</b>	<b>Titan IIIC stage 3 (Transtage)</b>					
	19-DEC-09	19.16	-1429.285	-2127.720	-730.851	51	826
	21902.825069	40735.11745	0.0177814	4.0832	297.0744	359.0648	271.7179
D . 471	<b>66053J</b>	<b>Titan IIIC stage 3 (Transtage)</b>					
	30-DEC-09	23.21	-1715.560	-2373.716	-1057.404	52	845
	21913.839722	40448.44118	0.0168524	3.0359	290.1406	163.5092	249.4696
D . 472	<b>68050H</b>	<b>OPS 9348 (IDSCS 27)</b>					
	31-DEC-09	23.38	-1727.423	-2035.858	-1418.987	49	292
	21914.120023	40437.02813	0.0077532	4.5949	301.5445	124.5480	159.6659

D . 473	<b>66053H</b>	<b>IDCSP 7</b>					
	26-DEC-09	23.74	-1753.110	-2089.641	-1416.579	51	267
	21909.786435	40410.80500	0.0080820	2.9089	290.3976	166.4325	272.4435
D . 474	<b>68050G</b>	<b>OPS 9347 (IDSCS 26)</b>					
	25-DEC-09	24.34	-1794.973	-2043.242	-1546.705	52	288
	21908.780000	40369.12511	0.0061088	4.4855	301.4326	125.7655	286.9777
D . 475	<b>66053G</b>	<b>IDCSP 6</b>					
	29-DEC-09	24.78	-1825.284	-2094.226	-1556.342	50	270
	21912.956701	40338.80791	0.0063789	2.7731	290.2177	172.1256	207.8455
D . 476	<b>67003H</b>	<b>IDCSP 15</b>					
	21-DEC-09	25.04	-1843.802	-2136.492	-1551.111	50	346
	21904.936019	40320.33063	0.0071902	3.2116	294.5460	25.4880	227.6102
D . 477	<b>68050F</b>	<b>OPS 9346 (IDSCS 25)</b>					
	31-DEC-09	25.24	-1857.847	-2041.560	-1674.133	51	303
	21914.142384	40306.13873	0.0045412	4.3215	300.6755	128.2522	150.4221
D . 478	<b>66053F</b>	<b>IDCSP 5</b>					
	25-DEC-09	25.65	-1886.189	-2105.447	-1666.930	50	250
	21908.757060	40278.05287	0.0049789	2.6270	289.3442	180.5120	282.7785
D . 479	<b>68050E</b>	<b>OPS 9345 (IDSCS 24)</b>					
	21-DEC-09	25.93	-1905.591	-2059.314	-1751.868	51	296
	21904.894063	40258.12700	0.0034197	4.2636	300.7278	128.6509	248.8021
D . 480	<b>67003G</b>	<b>IDCSP 14</b>					
	31-DEC-09	26.05	-1913.821	-2148.215	-1679.427	53	308
	21914.138600	40250.21631	0.0055840	3.0421	293.4937	37.1393	144.7297
D . 481	<b>66053E</b>	<b>IDCSP 4</b>					
	28-DEC-09	26.32	-1932.455	-2101.573	-1763.336	48	219
	21911.898356	40231.46608	0.0039300	2.5452	289.7389	187.6159	229.2736
D . 482	<b>68050D</b>	<b>OPS 9344 (IDSCS 23)</b>					
	27-DEC-09	26.51	-1945.917	-2046.043	-1845.791	50	292
	21910.877778	40217.73083	0.0024060	4.1435	300.1033	130.2864	248.0755
D . 483	<b>67003F</b>	<b>IDCSP 13</b>					
	31-DEC-09	26.91	-1973.045	-2158.394	-1787.697	50	257
	21914.766424	40190.73063	0.0044562	2.9178	293.5258	50.4514	278.1533
D . 484	<b>66053D</b>	<b>IDCSP 3</b>					
	29-DEC-09	26.93	-1974.437	-2121.459	-1827.415	52	313
	21912.851736	40189.28842	0.0031571	2.4266	288.7660	201.2961	244.1377
D . 485	<b>68050C</b>	<b>OPS 9343 (IDSCS 22)</b>					
	29-DEC-09	26.94	-1975.230	-2050.667	-1899.792	52	323
	21912.916400	40188.58998	0.0016609	4.0786	299.9031	130.9542	231.9474
D . 486	<b>68050B</b>	<b>OPS 9342 (IDSCS 21)</b>					
	26-DEC-09	27.16	-1990.803	-2050.520	-1931.085	51	279
	21909.818009	40173.25327	0.0013173	4.0521	299.8143	132.2166	270.2332
D . 487	<b>66053C</b>	<b>IDCSP 2</b>					
	26-DEC-09	27.27	-1998.318	-2133.223	-1863.412	51	312
	21909.798021	40165.38371	0.0027402	2.3837	288.5075	210.8586	266.0865
D . 488	<b>68050A</b>	<b>OPS 9341 (IDSCS 20)</b>					
	31-DEC-09	27.29	-1999.507	-2054.775	-1944.239	52	428
	21914.159248	40164.82484	0.0011614	4.0521	300.1221	133.7293	143.4862
D . 489	<b>66053B</b>	<b>IDCSP 1</b>					
	21-DEC-09	27.49	-2013.243	-2130.844	-1895.642	48	466
	21904.862234	40150.85865	0.0026415	2.3609	288.4874	218.4148	247.7457



<b>D . 490</b>	<b>67003E</b>	<b>IDCSP 12</b>					
	24-DEC-09	27.60	-2021.270	-2231.332	-1811.209	49	274
	21907.846343	40142.46080	0.0037682	2.8272	292.3953	67.2329	254.9330
<b>D . 491</b>	<b>66053A</b>	<b>GGTS 1</b>					
	31-DEC-09	27.75	-2031.416	-2141.159	-1921.673	52	321
	21914.937431	40133.52866	0.0024751	2.3277	288.8498	234.5310	211.2464
<b>D . 492</b>	<b>67003D</b>	<b>IDCSP 11</b>					
	30-DEC-09	28.19	-2061.657	-2200.403	-1922.910	51	200
	21913.934421	40102.41429	0.0034019	2.7331	293.1106	83.7814	218.0942
<b>D . 493</b>	<b>67003C</b>	<b>IDCSP 10</b>					
	27-DEC-09	28.61	-2090.243	-2229.726	-1950.759	50	199
	21910.859144	40073.47807	0.0033550	2.6798	292.9195	97.0117	247.9442
<b>D . 494</b>	<b>67003B</b>	<b>IDCSP 9</b>					
	22-DEC-09	28.83	-2105.399	-2238.427	-1972.371	50	283
	21905.882454	40058.69756	0.0033723	2.6599	292.6591	104.9149	244.1286
<b>D . 495</b>	<b>67003A</b>	<b>IDCSP 8</b>					
	27-DEC-09	28.96	-2114.034	-2251.317	-1976.751	51	303
	21910.962407	40050.18907	0.0034569	2.6262	291.7721	109.7348	209.5186
<b>D . 496</b>	<b>67066G</b>	<b>Titan IIC stage 3 (Transtage)</b>					
	29-DEC-09	31.08	-2258.738	-2573.238	-1944.238	53	872
	21912.985347	39905.34932	0.0074896	9.1337	323.9887	185.5060	230.7113
<b>D . 497</b>	<b>67066F</b>	<b>DODGE 1</b>					
	29-DEC-09	32.02	-2322.457	-2529.495	-2115.419	53	849
	21912.968773	39841.61164	0.0048227	9.0731	323.2735	208.7706	235.7958
<b>D . 498</b>	<b>67066E</b>	<b>LES 5</b>					
	29-DEC-09	32.92	-2383.477	-2596.239	-2170.715	52	863
	21912.022674	39780.65829	0.0051825	8.9656	322.6983	229.5917	216.5558
<b>D . 499</b>	<b>67066D</b>	<b>IDCSP 19</b>					
	31-DEC-09	33.66	-2433.056	-2655.711	-2210.401	51	505
	21914.913102	39731.04231	0.0053547	8.8846	322.2099	241.6837	252.5968
<b>D . 500</b>	<b>67066C</b>	<b>IDCSP 18</b>					
	30-DEC-09	34.24	-2472.038	-2708.926	-2235.150	52	483
	21913.016991	39692.94631	0.0059254	8.8579	321.9218	251.3860	216.6518
<b>D . 501</b>	<b>67066B</b>	<b>IDCSP 17</b>					
	27-DEC-09	34.64	-2498.782	-2750.671	-2246.893	52	331
	21910.978044	39665.31416	0.0064080	8.7819	321.6111	257.2847	232.2924
<b>D . 502</b>	<b>67066A</b>	<b>IDCSP 16</b>					
	27-DEC-09	34.85	-2512.816	-2771.314	-2254.317	52	533
	21910.938819	39651.24769	0.0065568	8.7981	321.5294	259.9021	246.3458

### 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), the following data are given:

L1.nn	COSPAR	NAME					
	Date	$P_{lib}$	$\Delta\lambda$	$\lambda_{min}$	$\lambda_{max}$	$N_{ly}$	$N_{tot}$
	MJD	a	e	i	$\Omega$	$\omega$	$\lambda$

For explanation, see definition at the beginning of Chapter 3 on page 29.

<b>L1 . 1</b>	<b>95054A</b>	<b>Luch 1-1</b>					
	30-DEC-09	740	5.0	72.5	77.5	52	703
	21913.687419	42166.12656	0.0006085	9.4360	60.8097	303.2913	73.9805
<b>L1 . 2</b>	<b>77080A</b>	<b>SIRIO 1</b>					
	31-DEC-09	740	6.0	72.0	78.0	49	657
	21914.511493	42164.89835	0.0007883	14.5092	359.7574	331.2003	75.5440
<b>L1 . 3</b>	<b>93039A</b>	<b>Galaxy IV</b>					
	30-DEC-09	741	6.4	71.9	78.3	52	793
	21913.669259	42166.53477	0.0011751	9.9739	54.8144	159.9606	74.6586
<b>L1 . 4</b>	<b>94087A</b>	<b>Raduga 32</b>					
	30-DEC-09	742	10.2	69.9	80.2	52	750
	21913.642465	42165.94601	0.0003870	10.6584	50.1591	145.9544	79.6760
<b>L1 . 5</b>	<b>90061A</b>	<b>Cosmos 2085</b>					
	30-DEC-09	742	10.3	69.9	80.2	53	835
	21913.622535	42165.77079	0.0003676	12.4860	33.8530	272.9687	70.5291
<b>L1 . 6</b>	<b>88066A</b>	<b>Cosmos 1961</b>					
	31-DEC-09	742	10.4	69.9	80.2	51	943
	21914.573484	42166.60711	0.0004670	12.9773	25.8461	301.9850	79.2484
<b>L1 . 7</b>	<b>84022A</b>	<b>Cosmos 1540</b>					
	21-DEC-09	742	10.8	69.7	80.5	51	741
	21904.558461	42161.03769	0.0003343	15.3028	7.8176	84.3699	76.5796
<b>L1 . 8</b>	<b>91010A</b>	<b>Cosmos 2133</b>					
	30-DEC-09	742	11.1	69.5	80.6	51	902
	21913.614028	42166.52104	0.0003166	11.6432	39.9100	337.8919	79.6642
<b>L1 . 9</b>	<b>81018A</b>	<b>Comstar 4</b>					
	31-DEC-09	742	11.2	69.4	80.7	49	908
	21914.552650	42164.56447	0.0007040	14.0861	8.5593	284.8819	69.4567
<b>L1 . 10</b>	<b>98025A</b>	<b>Cosmos 2350</b>					
	30-DEC-09	743	12.2	69.0	81.2	52	569
	21913.678657	42160.77199	0.0004488	7.8346	60.0022	328.9778	76.3360
<b>L1 . 11</b>	<b>84031A</b>	<b>Cosmos 1546</b>					
	31-DEC-09	743	12.7	68.7	81.4	52	755
	21914.547419	42167.70562	0.0023020	14.0405	8.5769	225.1958	71.2612
<b>L1 . 12</b>	<b>90051A</b>	<b>Insat-ID</b>					
	31-DEC-09	744	14.0	68.0	82.1	52	878
	21914.645880	42165.47166	0.0012242	10.2420	53.9365	42.3915	81.3002
<b>L1 . 13</b>	<b>82044A</b>	<b>Cosmos 1366</b>					
	31-DEC-09	744	14.6	67.8	82.3	53	758
	21914.500567	42162.41081	0.0008922	15.4200	2.1337	300.0951	81.8069

L1 . 14	<b>94069A</b>	<b>Elektro 1</b>					
	30-DEC-09	744	14.6	67.7	82.4	52	732
	21913.638032	42161.64786	0.0003711	11.1060	49.4698	117.2530	80.6058
L1 . 15	<b>00036A</b>	<b>Cosmos-2371</b>					
	31-DEC-09	744	15.6	67.2	82.8	53	484
	21914.597176	42165.50137	0.0002293	7.1097	64.0592	272.9563	70.3054
L1 . 16	<b>93062A</b>	<b>Raduga 30</b>					
	31-DEC-09	746	17.8	66.1	83.9	51	839
	21914.627465	42166.94636	0.0004329	11.2499	45.9793	208.8503	79.8977
L1 . 17	<b>83028A</b>	<b>Raduga 12</b>					
	31-DEC-09	747	20.0	65.0	85.0	52	829
	21914.555012	42165.62361	0.0004477	14.3656	5.1773	291.7178	65.2440
L1 . 18	<b>81102A</b>	<b>Raduga 10</b>					
	31-DEC-09	748	20.8	64.6	85.4	52	735
	21914.499132	42157.78121	0.0002976	14.5731	356.8636	29.7757	77.1588
L1 . 19	<b>79035A</b>	<b>Raduga 5</b>					
	31-DEC-09	748	21.1	64.4	85.6	50	817
	21914.456944	42161.26779	0.0002661	14.5390	349.2214	287.3568	84.7080
L1 . 20	<b>75123A</b>	<b>Raduga 1</b>					
	31-DEC-09	748	21.6	64.2	85.8	52	769
	21914.470405	42170.53635	0.0004523	13.4082	338.9231	54.3344	69.6302
L1 . 21	<b>84016A</b>	<b>Raduga 14</b>					
	31-DEC-09	750	23.1	63.4	86.6	51	727
	21914.508900	42160.17054	0.0003526	14.0566	7.9939	316.7038	84.7262
L1 . 22	<b>76092A</b>	<b>Raduga 2</b>					
	31-DEC-09	750	23.4	63.3	86.7	51	815
	21914.481921	42158.78078	0.0025786	13.8276	341.3046	230.1573	67.5893
L1 . 23	<b>06053D</b>	<b>FengYun 2D debris</b>					
	22-DEC-09	751	24.8	62.6	87.4	46	49
	21905.566863	42164.92162	0.0070088	0.2450	120.5030	140.9479	63.8994
L1 . 24	<b>88014A</b>	<b>STTW-2</b>					
	31-DEC-09	753	27.0	61.5	88.5	52	896
	21914.581030	42162.20451	0.0005314	12.2435	37.9742	339.3845	88.6696
L1 . 25	<b>79062A</b>	<b>Gorizont 2</b>					
	31-DEC-09	757	30.7	59.6	90.3	53	849
	21914.532060	42165.18879	0.0003760	14.6201	351.4216	263.2553	59.7801
L1 . 26	<b>08033D</b>	<b>Proton-K fourth stage (Block DM-2M)</b>					
	31-DEC-09	759	32.1	58.9	91.0	53	81
	21914.347836	42155.01341	0.0036377	1.0751	294.2351	337.2935	70.2161
L1 . 27	<b>83118F</b>	<b>Proton-K fourth stage (Block DM)</b>					
	31-DEC-09	761	33.8	58.0	91.9	51	787
	21914.580984	42161.51696	0.0043096	14.0131	7.9813	183.7521	58.6962
L1 . 28	<b>88063A</b>	<b>Insat-IC</b>					
	31-DEC-09	767	38.2	55.8	94.0	51	758
	21914.633924	42162.74325	0.0005499	13.2162	24.4207	309.6236	56.0117
L1 . 29	<b>97070A</b>	<b>Kupon 1</b>					
	30-DEC-09	767	38.6	55.6	94.2	51	572
	21913.677049	42175.53441	0.0005187	10.0652	54.3263	189.0489	71.3060
L1 . 30	<b>85102A</b>	<b>Cosmos 1700</b>					
	31-DEC-09	768	39.1	55.3	94.5	52	839
	21914.508183	42170.76042	0.0002148	13.6552	14.8974	14.7339	91.9290

L1 . 31	<b>90054A</b>	<b>Gorizont 20</b>					
	31-DEC-09	775	44.0	52.9	96.8	52	946
	21914.565127	42174.54534	0.0003887	12.5657	33.6698	54.2833	90.1676
L1 . 32	<b>87096A</b>	<b>Cosmos 1897</b>					
	31-DEC-09	776	44.5	52.6	97.1	52	816
	21914.568113	42178.67844	0.0005043	13.1835	22.9685	286.3008	78.2909
L1 . 33	<b>84041A</b>	<b>Gorizont 9</b>					
	31-DEC-09	776	44.5	52.6	97.1	52	747
	21914.554711	42178.06148	0.0001670	13.9656	9.1682	118.2603	69.4145
L1 . 34	<b>79087A</b>	<b>Ekran 4</b>					
	31-DEC-09	777	44.7	52.5	97.2	52	762
	21914.525556	42175.57284	0.0012846	14.5936	350.7359	339.3519	61.4428
L1 . 35	<b>90112A</b>	<b>Raduga 26</b>					
	30-DEC-09	777	45.1	52.3	97.4	52	897
	21913.596806	42151.12980	0.0007273	12.3188	35.3534	292.0310	81.2698
L1 . 36	<b>76092F</b>	<b>Proton-K fourth stage (Block DM)</b>					
	31-DEC-09	777	45.2	52.2	97.4	51	798
	21914.509502	42155.43900	0.0016583	13.7942	341.3973	9.0530	57.9798
L1 . 37	<b>76107A</b>	<b>Ekran 1</b>					
	31-DEC-09	778	45.4	52.1	97.5	51	832
	21914.522558	42159.62040	0.0065857	13.8743	341.6882	3.8011	53.5733
L1 . 38	<b>90011A</b>	<b>DFH-2A</b>					
	30-DEC-09	780	46.5	51.6	98.0	51	924
	21913.685093	42175.63567	0.0004636	11.4758	46.0440	312.1316	60.1279
L1 . 39	<b>80104A</b>	<b>Ekran 6</b>					
	31-DEC-09	780	46.9	51.3	98.3	52	840
	21914.444491	42156.31628	0.0010694	14.6121	354.2691	273.1885	94.1597
L1 . 40	<b>03060D</b>	<b>Proton-K fourth stage (Block DM-2M)</b>					
	29-DEC-09	783	48.1	50.8	98.8	52	288
	21912.647188	42159.37238	0.0013131	5.6080	68.5297	66.1726	97.2818
L1 . 41	<b>92074A</b>	<b>Ekran 20</b>					
	31-DEC-09	785	49.1	50.2	99.3	51	850
	21914.572373	42171.66345	0.0002096	11.6060	42.7055	21.8662	96.5376
L1 . 42	<b>84016F</b>	<b>Proton-K fourth stage (Block DM)</b>					
	31-DEC-09	785	49.2	50.2	99.4	52	825
	21914.490382	42175.54647	0.0035657	14.0413	8.0710	59.6162	91.8758
L1 . 43	<b>77092A</b>	<b>Ekran 2</b>					
	19-DEC-09	785	49.4	50.1	99.5	49	811
	21902.572280	42165.24430	0.0034927	14.1899	344.5648	208.6351	50.0676
L1 . 44	<b>79015A</b>	<b>Ekran 3</b>					
	31-DEC-09	786	50.0	49.8	99.8	51	836
	21914.475313	42180.15345	0.0034943	14.4582	348.5751	203.2354	77.3002
L1 . 45	<b>81061A</b>	<b>Ekran 7</b>					
	31-DEC-09	788	50.9	49.3	100.2	52	848
	21914.565035	42157.19219	0.0005964	14.6040	355.8349	272.5727	52.2689
L1 . 46	<b>94008A</b>	<b>Raduga 1-3</b>					
	31-DEC-09	790	51.8	48.8	100.7	53	791
	21914.671829	42179.71573	0.0002763	11.1240	47.4741	267.3117	65.3705
L1 . 47	<b>90116A</b>	<b>Raduga 1-2</b>					
	30-DEC-09	790	51.9	48.8	100.7	51	928
	21913.630914	42148.72578	0.0006519	12.3368	35.5419	305.7857	69.1687

L1 . 48	<b>83100A</b>	<b>Ekran 11</b>						
	31-DEC-09	795	54.3	47.5	101.9	50	746	
	21914.597986	42161.78604	0.0003586	14.2931	3.2873	260.5906	47.8577	
L1 . 49	<b>86010A</b>	<b>STTW-1</b>						
	31-DEC-09	800	56.6	46.4	103.0	51	797	
	21914.551586	42147.33109	0.0000451	13.4744	20.0041	241.8611	81.3596	
L1 . 50	<b>96058A</b>	<b>Ekspress 2</b>						
	27-DEC-09	802	57.3	46.0	103.3	52	663	
	21910.753218	42167.10252	0.0009064	10.1208	54.2466	197.2835	46.6599	
L1 . 51	<b>01045D</b>	<b>Proton-K fourth stage (Block DM-2)</b>						
	30-DEC-09	802	57.7	45.8	103.5	52	395	
	21913.639433	42155.47403	0.0029896	6.1223	68.9902	220.6422	99.2097	
L1 . 52	<b>00049A</b>	<b>Raduga 1-5</b>						
	31-DEC-09	802	57.7	45.8	103.5	53	477	
	21914.613669	42150.84997	0.0001740	6.9758	64.6899	255.8074	95.7710	
L1 . 53	<b>05010F</b>	<b>Proton-K fourth stage (Block DM-2M)</b>						
	30-DEC-09	805	58.6	45.3	104.0	53	237	
	21913.632662	42165.41363	0.0019407	4.4482	70.9475	119.2957	103.9374	
L1 . 54	<b>82093A</b>	<b>Ekran 9</b>						
	31-DEC-09	808	60.2	44.5	104.7	50	751	
	21914.486065	42146.77297	0.0025122	14.3658	359.5798	210.9057	84.4339	
L1 . 55	<b>89098A</b>	<b>Raduga 24</b>						
	30-DEC-09	809	60.6	44.3	104.9	53	849	
	21913.642384	42148.01134	0.0002541	12.8689	31.7725	247.1373	61.3008	
L1 . 56	<b>94012A</b>	<b>Raduga 31</b>						
	31-DEC-09	810	60.8	44.2	105.0	52	726	
	21914.563843	42169.46850	0.0003455	11.0983	47.3901	281.2210	104.2528	
L1 . 57	<b>80016A</b>	<b>Raduga 6</b>						
	31-DEC-09	821	65.3	41.9	107.2	51	760	
	21914.431875	42179.51315	0.0001111	14.5475	351.6275	258.0834	96.1800	
L1 . 58	<b>07018A</b>	<b>Nigcomsat 1</b>						
	31-DEC-09	822	65.5	41.8	107.3	53	135	
	21914.640660	42159.04393	0.0003519	1.0938	78.6186	280.1803	106.5460	
L1 . 59	<b>74060A</b>	<b>Molniya 1-S</b>						
	31-DEC-09	826	66.9	41.0	108.0	51	835	
	21914.465787	42144.99734	0.0007798	12.5381	333.3282	61.9981	65.7588	
L1 . 60	<b>78039A</b>	<b>Yuri</b>						
	31-DEC-09	828	67.6	40.7	108.3	52	785	
	21914.458021	42183.90427	0.0012408	14.5580	350.2093	154.9842	85.3739	
L1 . 61	<b>86044A</b>	<b>Gorizont 12</b>						
	31-DEC-09	834	69.8	39.5	109.4	51	802	
	21914.521563	42145.30311	0.0003331	13.5118	17.0695	228.6547	89.2302	
L1 . 62	<b>79105A</b>	<b>Gorizont 3</b>						
	31-DEC-09	835	70.0	39.4	109.4	52	780	
	21914.468773	42184.93880	0.0009672	14.6075	352.5792	82.7507	83.9351	
L1 . 63	<b>88111A</b>	<b>STTW-3</b>						
	21-DEC-09	846	73.6	37.6	111.2	51	978	
	21904.753762	42176.09881	0.0005018	11.5547	45.1954	344.1574	43.3774	
L1 . 64	<b>78073A</b>	<b>Raduga 4</b>						
	27-DEC-09	846	73.6	37.5	111.2	51	824	
	21910.414306	42178.96911	0.0011099	14.3891	346.9619	239.9950	101.6951	

<b>L1 . 65</b>	<b>75097A</b>	<b>Cosmos 775</b>					
	31-DEC-09	863	78.6	34.9	113.5	49	841
	21914.561250	42164.60512	0.0015782	13.1944	336.9795	348.4774	34.8162
<b>L1 . 66</b>	<b>89081A</b>	<b>Gorizont 19</b>					
	31-DEC-09	864	79.0	34.8	113.7	50	935
	21914.688507	42176.91825	0.0003518	12.6654	30.1569	218.8591	42.0575
<b>L1 . 67</b>	<b>99010A</b>	<b>Raduga 1-4</b>					
	30-DEC-09	864	79.0	34.7	113.8	52	552
	21913.724942	42187.40272	0.0004056	9.3452	66.2154	164.2416	65.8883
<b>L1 . 68</b>	<b>77071A</b>	<b>Raduga 3</b>					
	31-DEC-09	866	79.5	34.5	114.0	51	827
	21914.416794	42144.15985	0.0005752	14.1486	343.9210	104.5440	93.9993
<b>L1 . 69</b>	<b>81069A</b>	<b>Raduga 9</b>					
	31-DEC-09	866	79.6	34.4	114.0	50	761
	21914.598542	42175.96557	0.0004093	14.5967	356.2346	318.1976	40.6371
<b>L1 . 70</b>	<b>96058D</b>	<b>Proton-K fourth stage (Block DM-2M)</b>					
	30-DEC-09	872	81.1	33.7	114.7	51	576
	21913.668507	42140.77814	0.0010693	10.6698	50.6766	302.7641	70.6645
<b>L1 . 71</b>	<b>94002A</b>	<b>Gals 1</b>					
	28-DEC-09	873	81.5	33.4	114.9	52	801
	21911.581817	42150.99310	0.0006444	10.1961	53.7245	82.6354	107.1255
<b>L1 . 72</b>	<b>84078F</b>	<b>Proton-K fourth stage (Block DM)</b>					
	31-DEC-09	885	84.4	31.9	116.3	50	762
	21914.547176	42189.26564	0.0021221	13.9042	10.5296	38.9315	73.6256
<b>L1 . 73</b>	<b>01037D</b>	<b>Proton-K fourth stage (Block DM-2)</b>					
	30-DEC-09	894	86.8	30.6	117.4	52	402
	21913.801019	42151.31803	0.0021583	5.2842	67.0737	272.1904	38.9177
<b>L1 . 74</b>	<b>91087A</b>	<b>Raduga 28</b>					
	31-DEC-09	901	88.4	29.8	118.2	51	891
	21914.519641	42176.16670	0.0004947	12.0262	39.3956	322.0852	112.2327
<b>L1 . 75</b>	<b>89030A</b>	<b>Raduga 23</b>					
	31-DEC-09	913	91.0	28.4	119.4	52	939
	21914.686898	42148.39894	0.0017838	12.7682	28.4027	27.9849	41.0141
<b>L1 . 76</b>	<b>82031A</b>	<b>Insat-IA</b>					
	31-DEC-09	925	93.7	27.0	120.6	51	423
	21914.641586	42168.42455	0.0023665	14.5024	359.3983	266.2282	27.9955
<b>L1 . 77</b>	<b>74060F</b>	<b>Proton-K fourth stage (Block DM)</b>					
	31-DEC-09	933	95.2	26.1	121.4	51	724
	21914.564792	42155.89599	0.0017936	12.5370	333.1791	33.7992	29.8999
<b>L1 . 78</b>	<b>90061D</b>	<b>Proton-K fourth stage (Block DM-2)</b>					
	31-DEC-09	941	97.0	25.2	122.2	50	815
	21914.629375	42137.50710	0.0031722	12.4700	33.8596	45.1767	67.4049
<b>L1 . 79</b>	<b>97021A</b>	<b>Zhongxing 6 (B)</b>					
	31-DEC-09	983	104.4	21.2	125.6	52	644
	21914.581968	42178.15014	0.0006841	5.5490	68.4230	305.6972	118.5611
<b>L1 . 80</b>	<b>86090D</b>	<b>Proton-K fourth stage (Block DM)</b>					
	31-DEC-09	1007	108.3	19.1	127.4	51	853
	21914.489722	42188.36896	0.0008988	13.4238	18.8733	351.4399	102.5418
<b>L1 . 81</b>	<b>91014A</b>	<b>Raduga 27</b>					
	31-DEC-09	1024	110.9	17.6	128.5	50	912
	21914.488796	42178.19503	0.0003795	12.7989	36.6519	273.5177	120.6274

<b>L1 . 82</b>	<b>84063A</b>	<b>Raduga 15</b>					
	30-DEC-09	1033	112.1	16.9	129.1	52	756
	21913.701678	42161.44549	0.0002902	14.0053	9.1115	11.0952	17.2908
<b>L1 . 83</b>	<b>77092H</b>	<b>Ekran 2 fragmentation debris</b>					
	26-DEC-09	1048	114.2	15.8	130.0	52	509
	21909.330081	42165.97321	0.0006928	14.1318	344.2317	114.0352	130.5183
<b>L1 . 84</b>	<b>03015F</b>	<b>Proton-K fourth stage (Block DM-2)</b>					
	26-DEC-09	1079	118.2	13.6	131.7	52	322
	21909.888160	42166.60374	0.0014207	3.8483	69.9637	233.3034	14.3309
<b>L1 . 85</b>	<b>83089B</b>	<b>Insat-IB</b>					
	30-DEC-09	1079	118.2	13.5	131.8	50	832
	21913.638900	42136.41167	0.0003776	13.2248	23.7531	116.8053	54.6158
<b>L1 . 86</b>	<b>95054D</b>	<b>Proton-K fourth stage (Block DM-2)</b>					
	31-DEC-09	1105	121.2	11.8	133.0	52	570
	21914.551308	42148.79384	0.0020877	9.4235	60.8447	285.8771	121.9980
<b>L1 . 87</b>	<b>01037A</b>	<b>Cosmos-2379</b>					
	31-DEC-09	1108	121.5	11.7	133.2	53	425
	21914.697442	42155.68557	0.0002023	5.3256	66.9729	202.3815	17.2223
<b>L1 . 88</b>	<b>93013A</b>	<b>Raduga 29</b>					
	30-DEC-09	1112	121.9	11.4	133.3	51	863
	21913.766238	42146.31231	0.0005373	11.5124	44.1438	294.1675	28.9137
<b>L1 . 89</b>	<b>77108A</b>	<b>Meteosat 1</b>					
	22-DEC-09	1127	123.6	10.5	134.0	49	843
	21905.636111	42182.39329	0.0016725	14.4377	348.5906	295.9742	28.1217
<b>L1 . 90</b>	<b>88095A</b>	<b>Raduga 22</b>					
	31-DEC-09	1132	124.1	10.1	134.3	53	965
	21914.470671	42184.46026	0.0003262	12.9224	26.6482	354.8211	117.2045
<b>L1 . 91</b>	<b>84035A</b>	<b>STW F-2</b>					
	31-DEC-09	1139	124.9	9.7	134.6	49	741
	21914.397778	42154.78703	0.0008227	13.6098	13.7961	14.1243	130.7446
<b>L1 . 92</b>	<b>95063D</b>	<b>Proton-K fourth stage (Block DM-2M)</b>					
	27-DEC-09	1175	128.2	7.7	136.0	51	579
	21910.818981	42153.10805	0.0041825	11.0918	47.7034	20.0098	16.5959
<b>L1 . 93</b>	<b>90102A</b>	<b>Gorizont 22</b>					
	27-DEC-09	1322	139.1	1.0	140.0	46	920
	21910.818900	42159.55902	0.0017842	12.3315	34.8859	272.9926	3.4617
<b>L1 . 94</b>	<b>74094A</b>	<b>Skynet 2B</b>					
	26-DEC-09	1372	141.8	359.1	140.9	46	646
	21909.693993	42165.36036	0.0003067	13.4134	344.0453	160.6094	358.8948
<b>L1 . 95</b>	<b>78035A</b>	<b>Intelsat IVA F-6</b>					
	31-DEC-09	1427	144.3	357.4	141.7	50	787
	21914.388310	42149.08764	0.0003703	14.0340	9.2604	198.2338	129.5452
<b>L1 . 96</b>	<b>93062D</b>	<b>Proton-K fourth stage (Block DM-2)</b>					
	30-DEC-09	1562	148.6	354.1	142.7	48	610
	21913.454676	42166.26562	0.0012821	11.2219	45.9595	277.1328	143.1044
<b>L1 . 97</b>	<b>85035B</b>	<b>Telecom 1B</b>					
	19-DEC-09	1664	150.7	352.4	143.1	47	844
	21902.822060	42167.12636	0.0006674	13.5505	17.6493	269.1230	353.1094
<b>L1 . 98</b>	<b>92088A</b>	<b>Cosmos 2224</b>					
	26-DEC-09	1683	151.0	352.2	143.2	46	848
	21909.885081	42163.71789	0.0003089	10.8232	45.5626	158.8229	351.4318

<b>L1 . 99</b>	<b>67026A</b>	<b>Intelsat II F-3</b>					
	27-DEC-09	1788	152.3	351.0	143.3	46	380
	21910.359398	42197.50974	0.0023740	8.0714	315.4604	234.5895	89.9787



### 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), the following data are given:

L2.nn	COSPAR	NAME					
	Date	$P_{lib}$	$\Delta\lambda$	$\lambda_{min}$	$\lambda_{max}$	$N_{ly}$	$N_{tot}$
	MJD	a	e	i	$\Omega$	$\omega$	$\lambda$

For explanation, see definition at the beginning of Chapter 3 on page 29.

<b>L2 . 1</b>	<b>93058B</b>	<b>ACTS</b>					
	24-DEC-09	900	0.5	254.5	255.0	51	815
	21907.187361	42164.40973	0.0004089	9.8603	55.5220	348.8179	255.1897
<b>L2 . 2</b>	<b>88081A</b>	<b>Gstar 3</b>					
	24-DEC-09	900	0.6	254.6	255.2	51	896
	21907.088160	42164.46608	0.0005926	14.5518	19.2159	330.3494	254.7220
<b>L2 . 3</b>	<b>76023B</b>	<b>LES 9 (RTGPP)</b>					
	29-DEC-09	900	0.6	254.6	255.2	53	995
	21912.422766	42164.71557	0.0022317	11.0959	142.9437	334.3756	252.4872
<b>L2 . 4</b>	<b>82105A</b>	<b>Aurora I</b>					
	31-DEC-09	902	0.8	254.5	255.3	52	994
	21914.097500	42164.67829	0.0007997	12.8516	29.6957	259.7654	254.8699
<b>L2 . 5</b>	<b>71009A</b>	<b>NATO IIB</b>					
	31-DEC-09	902	0.9	254.2	255.1	53	809
	21914.937685	42164.69399	0.0005748	12.3741	332.4803	359.2112	254.4745
<b>L2 . 6</b>	<b>69101A</b>	<b>Skynet 1A</b>					
	31-DEC-09	910	4.2	252.6	256.8	53	725
	21914.932141	42164.54962	0.0020256	11.0255	328.5092	157.7312	252.6307
<b>L2 . 7</b>	<b>78062A</b>	<b>GOES 3</b>					
	31-DEC-09	911	8.1	250.7	258.8	53	1002
	21914.019861	42165.77023	0.0004036	14.4231	358.4702	335.6043	251.7499
<b>L2 . 8</b>	<b>93073A</b>	<b>Solidaridad 1</b>					
	31-DEC-09	911	8.2	250.7	258.8	53	802
	21914.185174	42166.75038	0.0002736	8.3666	61.0587	173.2176	254.5897
<b>L2 . 9</b>	<b>70021A</b>	<b>NATO I</b>					
	31-DEC-09	912	10.6	249.5	260.1	53	732
	21914.930405	42166.90907	0.0002336	11.3502	332.3337	0.6004	256.9822
<b>L2 . 10</b>	<b>71095A</b>	<b>OPS 9431 (DSCS II F-1)</b>					
	30-DEC-09	913	13.1	248.2	261.3	52	932
	21913.962535	42164.54513	0.0001287	12.6752	334.2164	276.4660	248.2076
<b>L2 . 11</b>	<b>76023A</b>	<b>LES 8 (RTGPP)</b>					
	27-DEC-09	913	15.2	247.2	262.4	52	985
	21910.424317	42163.30190	0.0010595	11.1350	142.9507	333.9817	253.9983
<b>L2 . 12</b>	<b>93077A</b>	<b>Telstar 4A</b>					
	30-DEC-09	914	16.5	246.5	263.1	52	821
	21913.148067	42168.37464	0.0008080	10.7543	50.8514	316.0447	258.7439
<b>L2 . 13</b>	<b>95049A</b>	<b>Telstar 402R</b>					
	23-DEC-09	925	32.3	238.8	271.1	52	712
	21906.267847	42165.88798	0.0005881	5.8044	67.6423	201.4731	239.1329

<b>L2 . 14</b>	<b>85076C</b>	<b>ASC 1</b>					
	31-DEC-09	940	45.6	232.3	277.9	52	940
	21914.192731	42168.49577	0.0007565	11.8494	42.6075	249.3344	233.4030
<b>L2 . 15</b>	<b>75100A</b>	<b>GOES 1</b>					
	31-DEC-09	943	48.4	231.0	279.4	53	962
	21914.928090	42173.51706	0.0004663	14.3130	346.2094	284.7905	271.5989
<b>L2 . 16</b>	<b>83041A</b>	<b>GOES 6</b>					
	24-DEC-09	962	60.0	225.4	285.4	51	993
	21907.045810	42178.02501	0.0001774	13.5605	17.7419	305.0891	268.5473
<b>L2 . 17</b>	<b>95069A</b>	<b>Galaxy IIR</b>					
	23-DEC-09	965	61.7	224.6	286.3	52	706
	21906.313495	42164.77136	0.0004733	4.9351	69.8029	221.4986	224.7682
<b>L2 . 18</b>	<b>81049A</b>	<b>GOES 5</b>					
	25-DEC-09	995	75.3	218.1	293.4	51	932
	21908.094352	42182.80021	0.0002726	13.8655	12.6772	247.3326	244.9644
<b>L2 . 19</b>	<b>76004A</b>	<b>Hermes</b>					
	24-DEC-09	1006	79.6	216.1	295.7	51	928
	21907.062488	42178.76850	0.0010908	14.0643	343.2403	96.6151	228.1681
<b>L2 . 20</b>	<b>96055A</b>	<b>EchoStar 2</b>					
	31-DEC-09	1031	88.0	212.2	300.1	53	652
	21914.104259	42167.83012	0.0002565	1.3609	77.9811	201.5424	299.7926
<b>L2 . 21</b>	<b>68081D</b>	<b>LES 6</b>					
	31-DEC-09	1038	90.2	211.1	301.3	52	862
	21914.851956	42147.12358	0.0011297	9.8354	329.7980	282.1971	282.6466
<b>L2 . 22</b>	<b>87100A</b>	<b>Raduga 21</b>					
	31-DEC-09	1099	105.9	203.8	309.8	52	1001
	21914.182975	42181.07438	0.0003018	13.5857	23.3669	301.5516	217.7581
<b>L2 . 23</b>	<b>65028A</b>	<b>Intelsat I F-1</b>					
	27-DEC-09	1123	111.0	201.5	312.5	52	320
	21910.698148	42157.93953	0.0002670	5.8062	297.3465	117.7286	309.9186
<b>L2 . 24</b>	<b>97086A</b>	<b>HGS-1</b>					
	30-DEC-09	1285	135.5	190.8	326.2	51	565
	21913.367928	42193.19230	0.0047608	2.1369	110.5187	210.5755	238.1460
<b>L2 . 25</b>	<b>84078A</b>	<b>Gorizont 10</b>					
	31-DEC-09	1305	137.7	189.8	327.6	53	879
	21914.863252	42153.73979	0.0004309	13.8891	10.2764	271.8251	319.0799
<b>L2 . 26</b>	<b>90016A</b>	<b>Raduga 25</b>					
	27-DEC-09	1324	139.6	189.1	328.7	52	955
	21910.066169	42135.77191	0.0002024	12.5639	31.9701	357.8574	272.4737
<b>L2 . 27</b>	<b>67094A</b>	<b>Intelsat II F-4</b>					
	30-DEC-09	1324	139.6	189.1	328.7	24	622
	21913.824317	42192.51219	0.0013499	8.3902	313.2961	182.5251	277.2778
<b>L2 . 28</b>	<b>82103A</b>	<b>Gorizont 6</b>					
	31-DEC-09	1338	141.0	188.5	329.5	47	833
	21914.841262	42176.77181	0.0003090	14.2766	1.2941	336.3127	318.0678
<b>L2 . 29</b>	<b>85070A</b>	<b>Raduga 16</b>					
	30-DEC-09	1349	142.0	188.1	330.1	51	829
	21913.908461	42182.89366	0.0003022	13.7339	13.3707	283.4394	306.8528
<b>L2 . 30</b>	<b>80081A</b>	<b>Raduga 7</b>					
	31-DEC-09	1455	150.2	185.0	335.2	52	819
	21914.897581	42138.69749	0.0003254	14.4977	353.2432	220.6792	289.6749

<b>L2 . 31</b>	<b>94038A</b>	<b>Cosmos 2282</b>					
	30-DEC-09	1491	152.4	184.3	336.7	53	782
	21913.353472	42166.70804	0.0009039	10.0018	50.1696	297.4643	183.8816
<b>L2 . 32</b>	<b>92059A</b>	<b>Cosmos 2209</b>					
	25-DEC-09	1493	152.5	184.2	336.8	51	835
	21908.073981	42192.96344	0.0002925	11.8177	41.6190	229.0959	281.2412
<b>L2 . 33</b>	<b>85016A</b>	<b>Cosmos 1629</b>					
	24-DEC-09	1502	153.0	184.1	337.1	51	835
	21907.200220	42144.18057	0.0001860	13.8757	11.5999	17.3062	206.6934
<b>L2 . 34</b>	<b>87091A</b>	<b>Cosmos 1894</b>					
	31-DEC-09	1505	153.2	184.0	337.2	52	945
	21914.250995	42176.70532	0.0005160	13.2075	21.7426	238.5632	191.5581
<b>L2 . 35</b>	<b>80004A</b>	<b>OPS 6393 (FLTSATCOM F3)</b>					
	31-DEC-09	1544	155.2	183.4	338.6	53	913
	21914.174259	42179.70227	0.0022794	13.1391	358.6754	86.9162	196.5051
<b>L2 . 36</b>	<b>89101A</b>	<b>Cosmos 2054</b>					
	26-DEC-09	1670	160.0	182.1	342.1	51	934
	21909.910914	42154.13565	0.0004620	12.5978	31.4492	280.0680	327.9441
<b>L2 . 37</b>	<b>94082A</b>	<b>Luch 1</b>					
	25-DEC-09	1883	164.3	181.3	345.5	51	751
	21908.182465	42196.73817	0.0002742	10.1460	55.6945	354.2298	256.1464
<b>L2 . 38</b>	<b>94060A</b>	<b>Cosmos 2291</b>					
	22-DEC-09	2103	166.1	181.1	347.2	45	760
	21905.940324	42159.24683	0.0003199	10.7734	49.0144	12.4028	338.8785

### 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, the following data are given:

L3.nn	COSPAR	NAME					
	Date	$P_{lib}$	$\Delta\lambda$	$\lambda_{min}$	$\lambda_{max}$	$N_{ly}$	$N_{tot}$
	MJD	a	e	i	$\Omega$	$\omega$	$\lambda$

For explanation, see definition at the beginning of Chapter 3 on page 29.

It is important to note that this category is special and only a very small 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.

The longitude history of these objects is plotted in Figures 1 to 5.

<b>L3 . 1</b>	<b>82044F</b>	<b>Proton-K fourth stage (Block DM)</b>					
	31-DEC-09	2936	334.9	174.6	149.5	51	766
	21914.136759	42140.46993	0.0015420	15.3839	1.8994	15.9576	213.0470
<b>L3 . 2</b>	<b>71095B</b>	<b>OPS 9432 (DSCS II F-2)</b>					
	31-DEC-09	2936	335.0	174.6	149.6	50	825
	21914.251238	42173.22003	0.0005586	12.6077	334.4292	306.4747	144.1663
<b>L3 . 3</b>	<b>91054D</b>	<b>IUS stage 2</b>					
	26-DEC-09	2937	334.3	174.9	149.2	49	703
	21909.899780	42153.78881	0.0036344	13.7724	35.6468	188.0075	336.1669
<b>L3 . 4</b>	<b>97083A</b>	<b>Intelsat 804</b>					
	30-DEC-09	2940	333.3	175.4	148.7	51	598
	21913.699803	42200.04404	0.0006568	4.5910	70.6192	227.7784	79.1417
<b>L3 . 5</b>	<b>91064A</b>	<b>Cosmos 2155</b>					
	31-DEC-09	2941	333.1	175.5	148.6	52	895
	21914.313345	42175.97819	0.0004349	12.1988	37.6418	249.4388	184.9407
<b>L3 . 6</b>	<b>77092L</b>	<b>Ekran 2 fragmentation debris</b>					
	16-JUL-09	3010	342.6	170.7	153.3	13	13
	21746.098623	42183.41426	0.0119022	14.2126	345.5979	267.8340	14.7050
<b>L3 . 7</b>	<b>90094A</b>	<b>Gorizont 21</b>					
	27-DEC-09	3082	326.6	178.9	145.5	53	949
	21910.767940	42184.08193	0.0002724	12.4226	34.7152	158.8804	21.8994
<b>L3 . 8</b>	<b>00029A</b>	<b>Gorizont 33</b>					
	22-DEC-09	3097	326.3	179.0	145.3	47	482
	21905.942361	42169.81958	0.0002473	7.1293	63.2645	268.7639	352.3177
<b>L3 . 9</b>	<b>97041A</b>	<b>Cosmos 2345</b>					
	31-DEC-09	3163	325.3	179.5	144.9	53	605
	21914.475938	42164.66427	0.0160323	9.2851	56.9963	138.8200	146.8073
<b>L3 . 10</b>	<b>94067D</b>	<b>Proton-K fourth stage (Block DM-2M)</b>					
	31-DEC-09	3444	323.4	180.5	143.9	52	664
	21914.131470	42132.39775	0.0007306	11.5686	44.2000	310.6885	257.1220
<b>L3 . 11</b>	<b>85007A</b>	<b>Gorizont 11</b>					
	31-DEC-09	3505	323.2	180.6	143.8	52	853
	21914.196505	42145.42520	0.0004278	13.7578	12.0631	315.2484	201.5640

<b>L3 . 12</b>	<b>95045A</b>	<b>Cosmos 2319</b>					
	24-DEC-09	3572	323.0	180.7	143.8	52	719
	21907.260069	42136.35178	0.0002713	10.2765	52.3913	86.1050	225.8611
<b>L3 . 13</b>	<b>91079A</b>	<b>Cosmos 2172</b>					
	27-DEC-09	3611	322.9	180.8	143.7	53	859
	21910.999109	42141.67061	0.0007616	12.0622	38.8161	246.9957	302.4516
<b>L3 . 14</b>	<b>94030A</b>	<b>Gorizont 30</b>					
	26-DEC-09	3705	322.8	180.9	143.6	52	797
	21909.902153	42163.21332	0.0002809	11.0231	47.4616	196.5859	347.1475
<b>L3 . 15</b>	<b>87084A</b>	<b>Cosmos 1888</b>					
	24-DEC-09	3748	322.7	180.9	143.6	52	973
	21907.899063	42151.72504	0.0001834	13.1399	22.1983	305.8930	324.9975
<b>L3 . 16</b>	<b>86027A</b>	<b>Cosmos 1738</b>					
	31-DEC-09	3847	322.6	180.9	143.5	52	898
	21914.882523	42148.44880	0.0015843	14.1015	16.5685	314.1627	318.3335

Figure 1: Longitude history of the objects librating around the two stable points

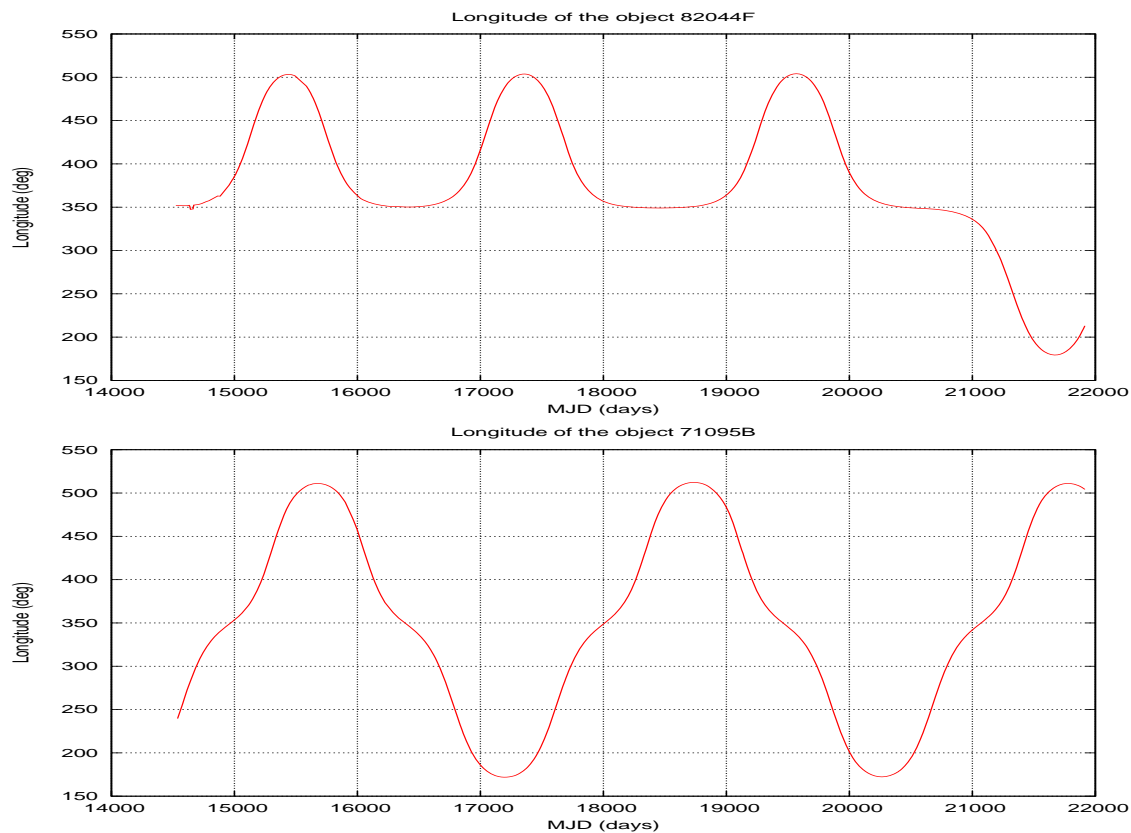


Figure 2: Longitude history of the objects librating around the two stable points

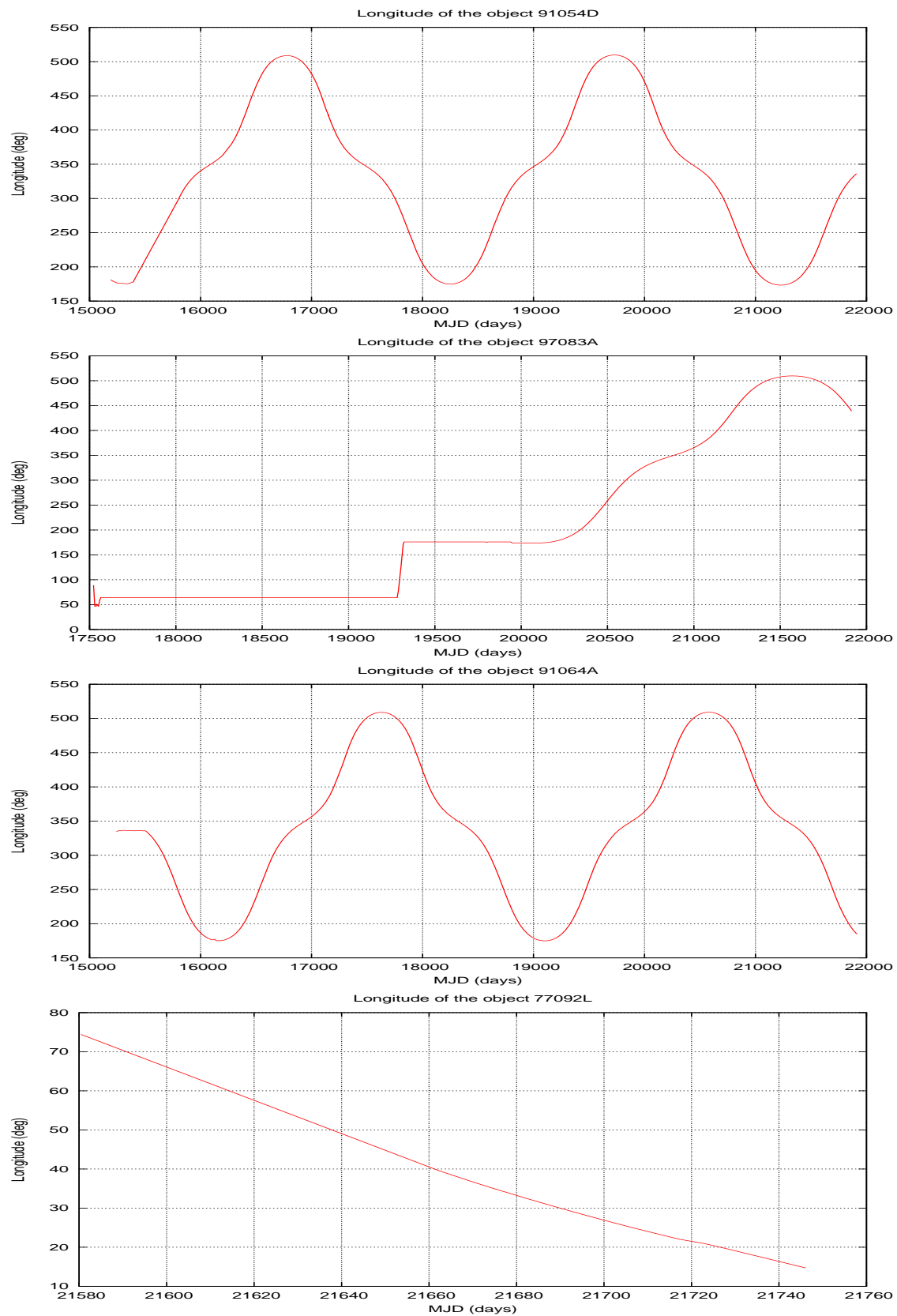


Figure 3: Longitude history of the objects librating around the two stable points

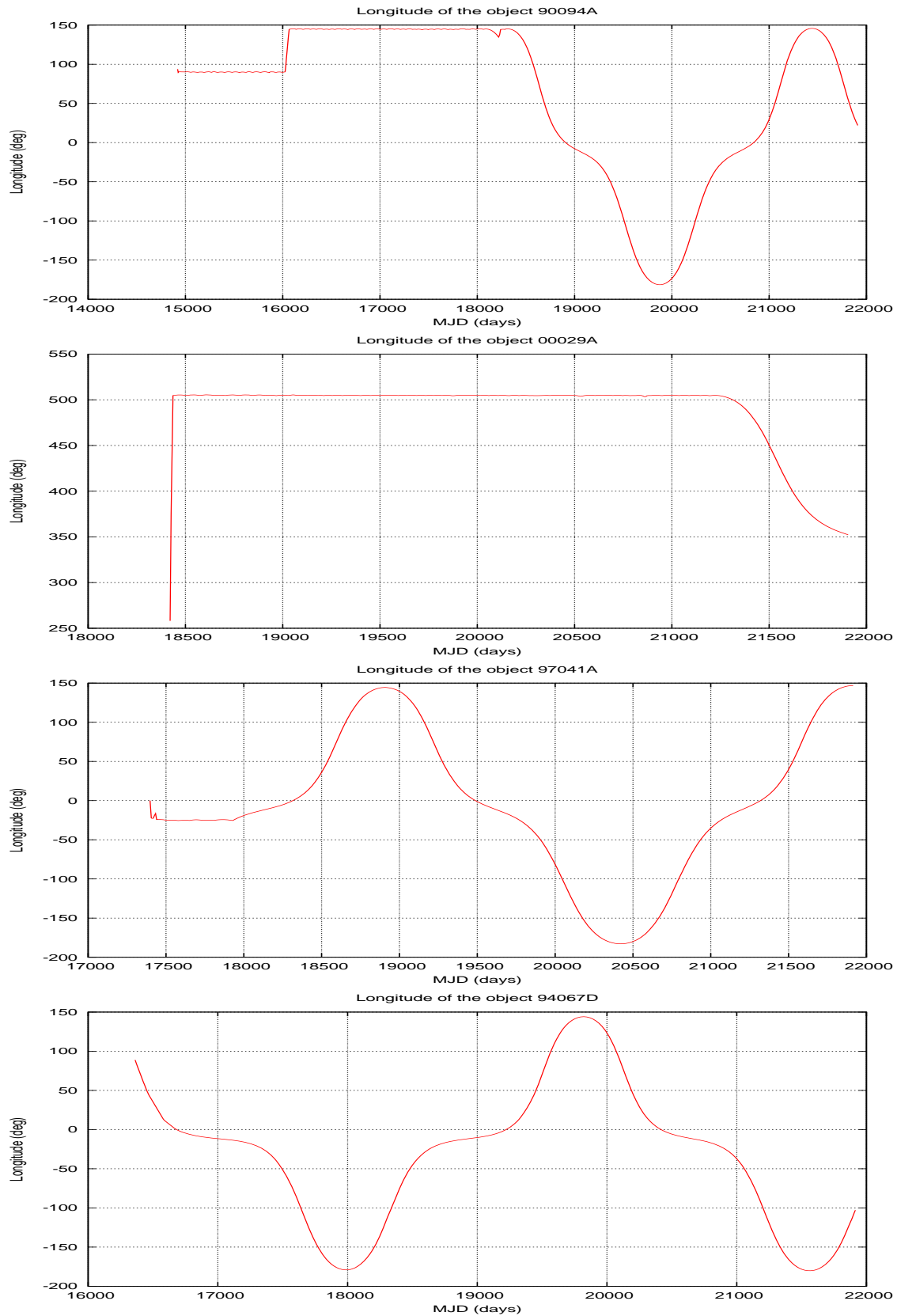


Figure 4: Longitude history of the objects librating around the two stable points

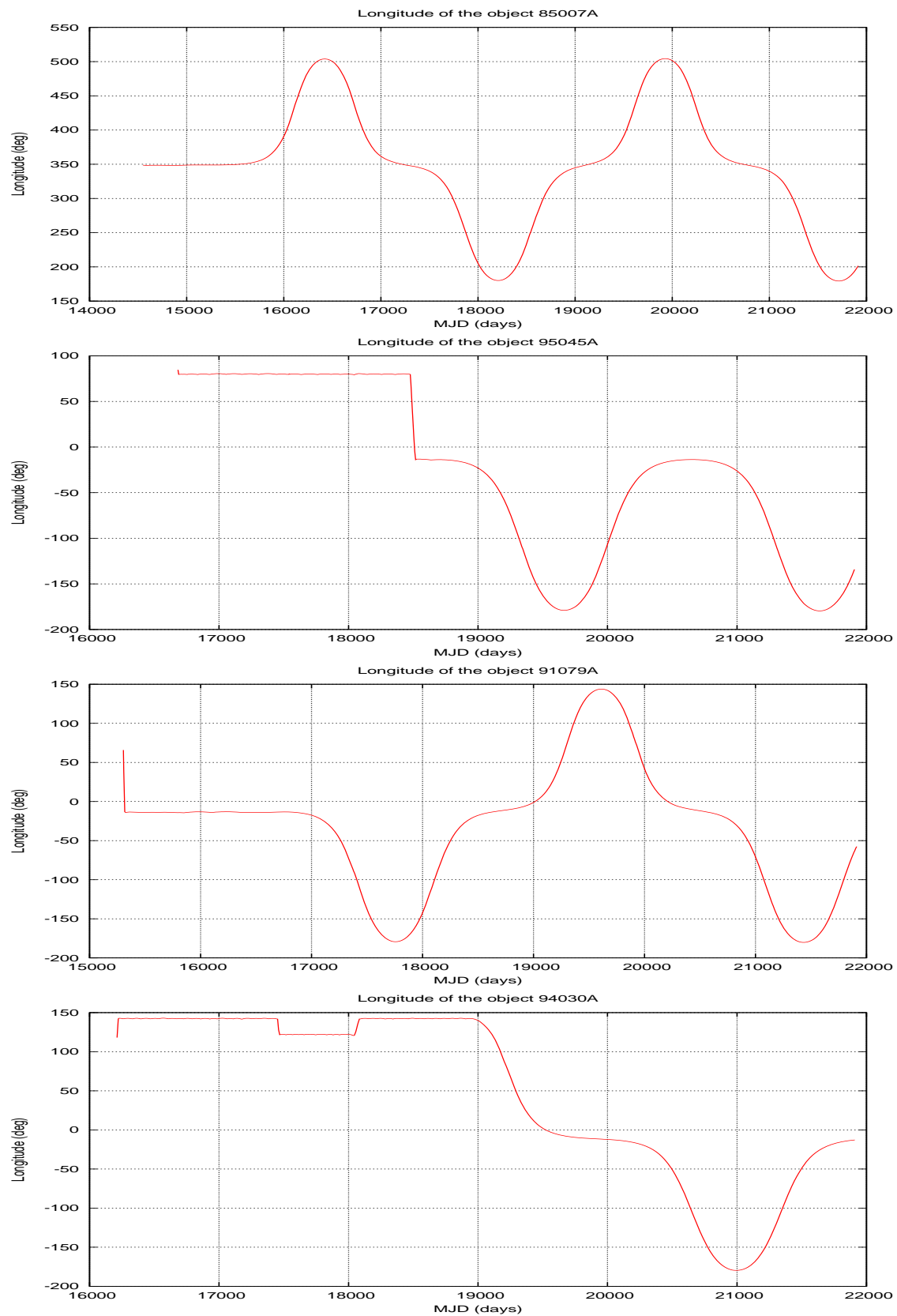
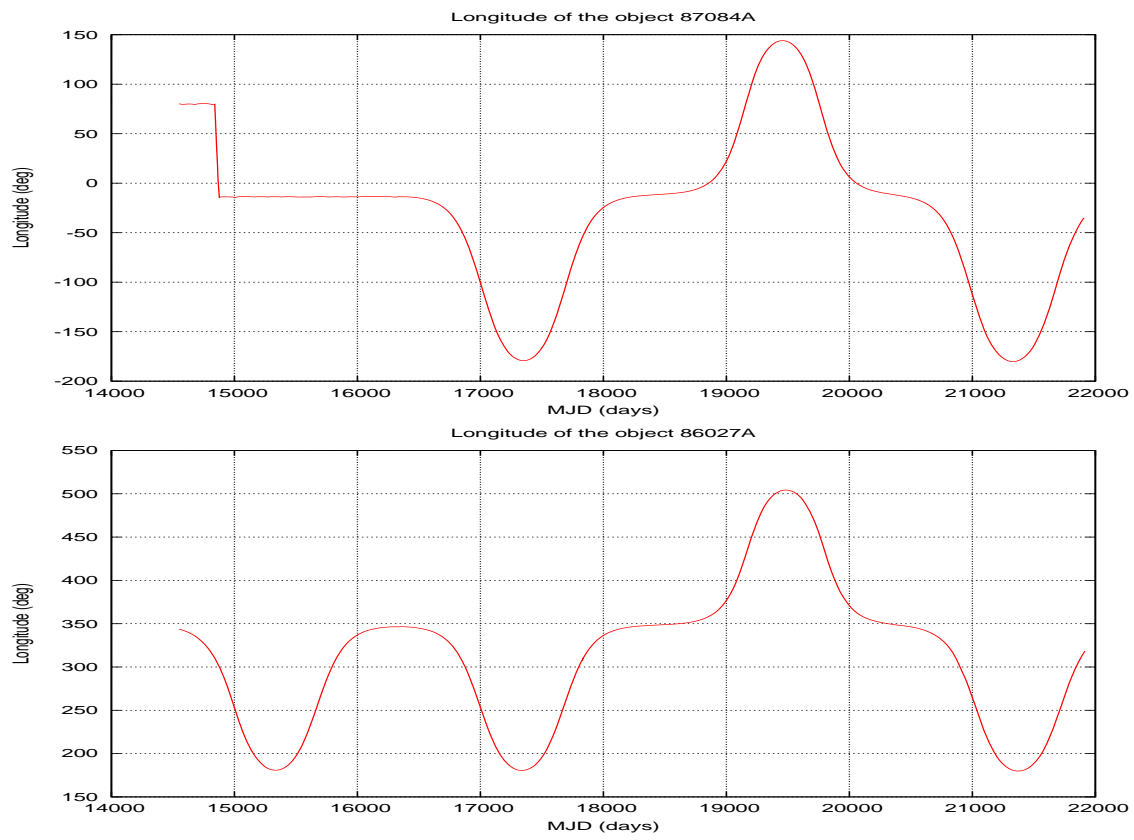




Figure 5: Longitude history of the objects librating around the two stable points



## 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 2009 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, 2010 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 Lambertian 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 2009. 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 facility, Uzbekistan),
  - Observation facilities operated by "NPP "Proekt-tehnika", JSC:

- \* Blagoveshchensk (Amur region, Russia),
- \* Milkovo (Kamchatka peninsula, Russia),
- \* Artem (Primorsky region, Russia),
- Andrushivka Observatory (Ukraine),
- National Astronomical Observatory (Abastumani, Georgia),
- National observatory of Bolivia (Tarija),
- Observation facility of the PGU (Tiraspol),
- Observatory of the Institute for Astrophysics of Tajikistan (Gissar),
- Odessa State University Astronomical Observatory (Mayaki, Ukraine),
- Central (Pulkovo) Astronomical Observatory of the RAS (St.Petersburg, Russia),
- Astronomical Institute of the University of Bern, partner of ISON, operating the following facilities:
  - Zimmerwald observatory (Switzerland)
  - ESOC space debris telescope(Tenerife, Spain)
- Joint Italian-Russian telescope FIRST at Collepardo observation facility (Italy)

The following data are given:

TYPE	COSPAR	NAME				
UInnn	YYYYMMDD	HHMMSS.SS	Tosc	Hp	Ha	Longit
	Inclin	RAAN	AoP	SemiAxis	Eccentr	M

where:

- 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 identification
- NAME - the object's common name
- UInnn - number of object (used by KIAM before identification)
- YYYYMMDD HHMMSS.SS - date and time of ascending node crossing, UTC
- Tosc - osculating period, min
- Hp - perigee height, km
- Ha - apogee heigh, km
- Longit - geodetic longitude at given ascending node, degrees East
- Inclin - inclination, degrees

- RAAN - right ascension of ascending node, degrees
- AoP - argument of perigee, degrees
- SemiAxis - semimajor axis, km
- Eccentr - 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, the following data are given:

<b>C1.nn</b>	<b>COSPAR</b>	<b>NAME</b>				
UIinn	YYYYMMDD	HHMMSS.SS	Tosc	Hp	Ha	Longit
	Inclin	RAAN	AoP	SemiAxis	Eccentr	M

For explanation, see definition at the beginning of Chapter 4 on page 99.

<b>C1. 1</b>	<b>09047A</b>	<b>USA 207 (PAN)</b>				
<b>UI158</b>	20100101	00:00:00.0	1436.1565	35778.0	35797.5	032.906
	00.0767	058.4856	120.6815	42165.898	0.0002311	314.1674
<b>C1. 2</b>	<b>09017A</b>	<b>USA 204 (WGS F2)</b>				
<b>UI156</b>	20100101	00:00:00.0	1436.1401	35783.7	35791.2	060.118
	00.0658	088.1755	267.9211	42165.578	0.0000887	164.4175
<b>C1. 3</b>	<b>07046A</b>	<b>USA 195 (WGS F1)</b>				
<b>UI152</b>	20100101	00:00:00.0	1436.1726	35760.4	35815.7	175.088
	00.0644	092.5338	238.9491	42166.214	0.0006557	303.9370
<b>C1. 4</b>	<b>00001A</b>	<b>USA 148 (DSCS III B-08)(DSCS III F11)</b>				
<b>UI104</b>	20100101	00:00:00.0	1440.4832	35868.4	35876.4	194.950
	01.2450	079.0132	210.5112	42250.545	0.0000943	005.1674
<b>C1. 5</b>	<b>03040A</b>	<b>USA 170 (DSCS III B-6)(DSCS III F14)</b>				
<b>UI107</b>	20100101	00:00:00.0	1436.0284	35726.3	35844.2	307.640
	00.0498	275.9602	356.9565	42163.391	0.0013981	135.1285
<b>C1. 6</b>	<b>00065A</b>	<b>USA 153 (DSCS III B-11)(DSCS III F12)</b>				
<b>UI105</b>	20100101	00:00:00.0	1436.2483	35780.5	35798.6	347.753
	00.5721	078.4608	081.4498	42167.695	0.0002151	288.2757

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

In the case where the satellite is only under longitude control, the following data are given:

Cn.nn	COSPAR	NAME				
UInnn	YYYYMMDD	HHMMSS.SS	Tosc	Hp	Ha	Longit
	Inclin	RAAN	AoP	SemiAxis	Eccentr	M

For explanation, see definition at the beginning of Chapter 4 on page 99.

<b>C2. 1</b>	<b>84009A</b>	<b>OPS 0441 (VORTEX 4)</b>				
<b>UI026</b>	20100101	00:00:00.0	1436.2319	31248.6	40329.9	003.277
	07.7268	357.0116	290.4072	42167.375	0.1076823	165.0273
<b>C2. 2</b>	<b>96026A</b>	<b>USA 118 (MERCURY 2)</b>				
<b>UI073</b>	20100101	00:00:00.0	1436.2488	33616.1	37963.0	015.758
	08.0338	015.1508	184.1880	42167.706	0.0515425	276.3685
<b>C2. 3</b>	<b>97008A</b>	<b>USA 130 (DSP F18)</b>				
<b>UI125</b>	20100101	00:00:00.0	1436.3338	35788.9	35793.5	020.268
	08.2636	061.9608	116.4995	42169.368	0.0000548	302.2128
<b>C2. 4</b>	<b>98029A</b>	<b>USA 139 (Advanced ORION 2)</b>				
<b>UI074</b>	20100101	00:00:00.0	1436.5924	35585.3	36007.3	027.130
	08.0631	010.4096	243.2600	42174.430	0.0050026	233.3146
<b>C2. 5</b>	<b>93056A</b>	<b>USA 95 (UFO F2)</b>				
<b>UI069</b>	20100101	00:00:00.0	1435.9761	35777.5	35790.9	029.511
	06.9334	046.0339	275.0673	42162.368	0.0001592	168.8072
<b>C2. 6</b>	<b>02001A</b>	<b>USA 164 (Milstar-2 F3)</b>				
<b>UI063</b>	20100101	00:00:00.0	1436.2148	35783.9	35793.9	029.965
	03.1233	046.9218	258.8636	42167.039	0.0001182	184.5674
<b>C2. 7</b>	<b>89035A</b>	<b>USA 37 (VORTEX 6)</b>				
<b>UI018</b>	20100101	00:00:00.0	1436.2319	31698.9	39879.5	043.973
	06.1595	013.5667	224.3756	42167.375	0.0970013	258.2342
<b>C2. 8</b>	<b>09001A</b>	<b>USA 202</b>				
<b>UI155</b>	20100101	00:00:00.0	1436.1321	35763.9	35810.7	043.985
	02.7885	348.7939	062.5945	42165.421	0.0005547	093.0565
<b>C2. 9</b>	<b>93074A</b>	<b>USA 97 (DSCS III B-10)(DSCS III F8)</b>				
<b>UI066</b>	20100101	00:00:00.0	1436.0158	35780.5	35789.5	056.881
	05.6741	068.4955	169.8873	42163.144	0.0001069	278.9135
<b>C2. 10</b>	<b>01033A</b>	<b>USA 159 (DSP F21)</b>				
<b>UI001</b>	20100101	00:00:00.0	1435.9812	35778.1	35790.5	070.448
	04.7541	065.3791	268.5631	42162.468	0.0001468	196.9056
<b>C2. 11</b>	<b>03057A</b>	<b>USA 174 (UFO F11)</b>				
<b>UI117</b>	20100101	00:00:00.0	1436.0554	35765.5	35806.1	071.439
	02.1371	001.6593	291.5199	42163.920	0.0004821	238.6195
<b>C2. 12</b>	<b>99063A</b>	<b>USA 146 (UFO F10)</b>				
<b>UI065</b>	20100101	00:00:00.0	1436.0592	35765.9	35805.8	072.709
	02.6989	042.1707	249.4055	42163.993	0.0004731	241.4926
<b>C2. 13</b>	<b>85010B</b>	<b>USA 8 (MAGNUM 1)</b>				
<b>UI097</b>	20100101	00:00:00.0	1436.0343	35571.6	35999.1	073.117
	16.4996	020.2716	253.1012	42163.506	0.0050698	259.6010
<b>C2. 14</b>	<b>90097B</b>	<b>USA 67 (SDS 2 F2)(QUASAR 2)</b>				
<b>UI092</b>	20100101	00:00:00.0	1436.0621	35265.4	36306.4	074.252
	14.0640	034.5573	148.0196	42164.050	0.0123440	352.8409

<b>C2. 15</b>	<b>89090B</b>	<b>USA 48 (MAGNUM 2)</b>					
<b>UI136</b>	20100101	00:00:00.0	1436.0423	34653.1	36918.0	090.740	
	14.4738	050.8703	293.3380	42163.663	0.0268586	204.1412	
<b>C2. 16</b>	<b>03041A</b>	<b>USA 171 (Advanced ORION 3)</b>					
<b>UI118</b>	20100101	00:00:00.0	1436.0880	35594.5	35978.3	095.583	
	03.8700	127.2836	162.6637	42164.557	0.0045513	266.2003	
<b>C2. 17</b>	<b>01020A</b>	<b>USA 158 (GeoLITE)</b>					
<b>UI114</b>	20100101	00:00:00.0	1436.0546	35652.4	35919.1	100.161	
	02.9512	029.1361	184.3140	42163.904	0.0031627	347.0956	
<b>C2. 18</b>	<b>86096A</b>	<b>USA 20 (FLTSATCOM F7)</b>					
<b>UI134</b>	20100101	00:00:00.0	1436.1217	35692.3	35881.9	100.743	
	12.1132	035.5003	053.8428	42165.217	0.0022480	112.0120	
<b>C2. 19</b>	<b>04004A</b>	<b>USA 176 (DSP F22)</b>					
<b>UI108</b>	20100101	00:00:00.0	1435.9383	35774.7	35792.2	103.342	
	02.5582	067.2824	158.1946	42161.627	0.0002076	338.2960	
<b>C3. 20</b>	<b>95022A</b>	<b>USA 110 (Advanced ORION 1)</b>					
<b>UI128</b>	20100101	00:00:00.0	1436.1306	35233.3	36341.2	127.071	
	08.7307	077.8960	359.1422	42165.391	0.0131378	150.4139	
<b>C2. 21</b>	<b>92037A</b>	<b>USA 82 (DSCS III B-12)(DSCS III F6)</b>					
<b>UI123</b>	20100101	00:00:00.0	1436.1367	35770.7	35804.1	149.874	
	07.0582	065.0060	228.0292	42165.512	0.0003960	317.2062	
<b>C2. 22</b>	<b>01009A</b>	<b>USA 157 (Milstar-2 F2)</b>					
<b>UI112</b>	20100101	00:00:00.0	1436.1955	35776.7	35800.3	152.166	
	03.7052	051.9395	226.4101	42166.661	0.0002794	334.1857	
<b>C2. 23</b>	<b>98016A</b>	<b>USA 138 (UFO F8)</b>					
<b>UI111</b>	20100101	00:00:00.0	1436.3556	35767.7	35815.6	172.298	
	03.3784	049.9524	221.2931	42169.796	0.0005680	001.3745	
<b>C2. 24</b>	<b>95038A</b>	<b>USA 113 (DSCS III B-07)(DSCS III F9)</b>					
<b>UI115</b>	20100101	00:00:00.0	1436.1755	35775.9	35800.4	179.768	
	05.3316	069.1093	205.7084	42166.271	0.0002903	005.3301	
<b>C2. 25</b>	<b>95003A</b>	<b>USA 108 (UFO F4)</b>					
<b>UI121</b>	20100101	00:00:00.0	1436.3737	35767.0	35817.0	183.169	
	05.5740	047.2204	243.0400	42170.149	0.0005927	353.2081	
<b>C2. 26</b>	<b>00024A</b>	<b>USA 149 (DSP F20)</b>					
<b>UI004</b>	20100101	00:00:00.0	1436.0649	35772.4	35799.6	194.917	
	05.7767	063.4967	236.1045	42164.105	0.0003227	355.6954	
<b>C4. 27</b>	<b>06024A</b>	<b>USA 187 (MITEx OSC satellite)</b>					
<b>UI149</b>	20100101	00:00:00.0	1434.0484	35725.1	35767.8	195.701	
	01.5480	260.4936	022.3163	42124.626	0.0005067	013.3732	
<b>C2. 28</b>	<b>95060A</b>	<b>USA 115 (Milstar DFS-2)</b>					
<b>UI124</b>	20100101	00:00:00.0	1436.2154	35771.9	35805.9	209.971	
	07.9382	060.9891	171.4856	42167.052	0.0004037	077.8881	
<b>C2. 29</b>	<b>89046A</b>	<b>USA 39 (DSP F14)</b>					
<b>UI150</b>	20100101	00:00:00.0	1436.1950	35780.2	35796.8	214.935	
	11.8867	035.9525	298.8571	42166.651	0.0001969	340.4906	
<b>C2. 30</b>	<b>01046A</b>	<b>USA 162 (SDS 3 F3)</b>					
<b>UI151</b>	20100101	00:00:00.0	1436.1972	35755.6	35821.5	216.029	
	03.6294	099.1683	168.6078	42166.695	0.0007811	048.6608	
<b>C2. 31</b>	<b>97065A</b>	<b>USA 134 (DSCS III B-13)(DSCS III F10)</b>					
<b>UI110</b>	20100101	00:00:00.0	1436.1485	35758.6	35816.6	230.033	
	03.6964	072.1863	262.8877	42165.741	0.0006875	355.2763	

<b>C2. 32</b>	<b>95057A</b>	<b>USA 114 (UFO F6)</b>				
<b>UI119</b>	20100101	00:00:00.0	1436.0484	35772.7	35798.6	254.366
	04.9667	046.7401	101.9019	42163.782	0.0003064	206.1728
<b>C2. 33</b>	<b>95027A</b>	<b>USA 111 (UFO F5)</b>				
<b>UI122</b>	20100101	00:00:00.0	1436.1609	35754.2	35821.5	260.341
	05.9440	047.7140	233.7371	42165.984	0.0007989	079.2062
<b>C2. 34</b>	<b>03012A</b>	<b>USA 169 (Milstar-2 F4)</b>				
<b>UI109</b>	20100101	00:00:00.0	1433.9966	35735.8	35755.2	281.401
	01.9132	084.3084	082.6503	42123.612	0.0002305	215.3085
<b>C2. 35</b>	<b>94084A</b>	<b>USA 107 (DSP F17)</b>				
<b>UI131</b>	20100101	00:00:00.0	1436.0292	35758.9	35811.6	310.473
	10.1154	054.3568	239.5411	42163.407	0.0006244	116.9328
<b>C2. 36</b>	<b>94009A</b>	<b>USA 99 (Milstar DFS-1)</b>				
<b>UI142</b>	20100101	00:00:00.0	1436.2065	35769.0	35808.5	321.047
	06.7671	119.3827	163.7244	42166.878	0.0004689	138.3359
<b>C2. 37</b>	<b>91080B</b>	<b>USA 75 (DSP F16)</b>				
<b>UI133</b>	20100101	00:00:00.0	1436.0738	35733.9	35838.4	321.510
	11.7973	043.8330	132.9339	42164.279	0.0012394	245.2570
<b>C2. 38</b>	<b>94054A</b>	<b>USA 105 (MERCURY 1)</b>				
<b>UI008</b>	20100101	00:00:00.0	1436.2678	35576.8	36003.1	333.703
	06.2364	063.5208	212.1977	42168.078	0.0050556	158.0835
<b>C2. 39</b>	<b>96042A</b>	<b>USA 127 (UFO F7)</b>				
<b>UI116</b>	20100101	00:00:00.0	1436.1402	35777.8	35797.1	337.209
	04.5617	046.4749	152.3156	42165.579	0.0002282	238.8389
<b>C2. 40</b>	<b>89077A</b>	<b>USA 46 (FLTSATCOM F8)</b>				
<b>UI130</b>	20100101	00:00:00.0	1436.2729	35771.2	35808.9	344.444
	09.6145	042.1748	263.4193	42168.178	0.0004462	139.2032
<b>C4. 41</b>	<b>06024B</b>	<b>USA 188 (MITEx Lockheed satellite)</b>				
<b>UI148</b>	20100101	00:00:00.0	1456.4971	36181.4	36188.5	344.602
	00.2495	073.7554	035.1915	42563.102	0.0000839	335.9126
<b>C2. 42</b>	<b>00080A</b>	<b>USA 155 (SDS 3 F2)</b>				
<b>UI007</b>	20100101	00:00:00.0	1436.2169	35774.5	35803.4	349.934
	03.4907	049.1259	155.3047	42167.080	0.0003420	245.9259

### 4.3 Satellites under control

In this list there are objects for which no TLEs, or other consistent orbital data are available for the epoch close to Jan 1, 2010, but which are controlled according to information provided by KIAM. The following data are given:

C.mn	COSPAR	NAME	LONGITUDE
C . 1	03008A	USA 167 (DSCS III A-3)(DSCS III F13)	225.0
C . 2	09068A	USA 211 (WGS F3)	237.0

## 4.4 Objects in a drift orbit

In the case where the object is in a drift orbit, the following data are given:

<b>Dn.nn</b>	<b>COSPAR</b>	<b>NAME</b>				
UI <sub>nnn</sub>	YYYYMMDD	HHMMSS.SS	Tosc	Hp	Ha	Longit
	Inclin	RAAN	AoP	SemiAxis	Eccentr	M

For explanation, see definition at the beginning of Chapter 4 on page 99.

<b>D1. 1</b>	<b>92006C</b>	<b>IABS</b>				
<b>UI132</b>	20100101	00:00:00.0	1299.9605	30496.8	35659.1	021.271
	09.8101	026.2426	267.0497	39456.051	0.0654184	190.8808
<b>D1. 2</b>	<b>06024C</b>	<b>USA 189 (NRL Upper Stage/Satellite)</b>				
<b>UI140</b>	20100101	00:00:00.0	1384.5579	34765.6	34777.7	167.734
	02.9256	072.8632	203.0055	41149.787	0.0001474	359.5338
<b>D1. 3</b>	<b>69036B</b>	<b>Atlas SLV-3A stage 2 (Agena D)</b>				
<b>UI012</b>	20100101	00:00:00.0	1386.4688	30791.8	38827.2	276.373
	03.8918	122.8483	036.8076	41187.640	0.0975454	232.5312
<b>D1. 4</b>	<b>77038C</b>	<b>Atlas SLV-3A stage 2 (Agena D)</b>				
<b>UI082</b>	20100101	00:00:00.0	1407.2288	29107.0	41332.2	213.875
	10.3600	008.8454	027.2997	41597.764	0.1469458	291.4204
<b>D1. 5</b>	<b>72101B</b>	<b>Atlas SLV-3A stage 2 (Agena D)</b>				
<b>UI059</b>	20100101	00:00:00.0	1407.5501	29875.5	40576.4	000.061
	19.5239	334.8127	326.1979	41604.096	0.1286047	154.4282
<b>D1. 6</b>	<b>93046C</b>	<b>IABS</b>				
<b>UI028</b>	20100101	00:00:00.0	1410.0707	34928.0	35623.2	234.645
	11.9331	037.5012	326.0274	41653.750	0.0083456	336.4807
<b>D1. 7</b>	<b>75055B</b>	<b>Atlas SLV-3A stage 2 (Agena D)</b>				
<b>UI103</b>	20100101	00:00:00.0	1410.6335	29755.6	40817.7	181.337
	20.3840	340.1822	293.5403	41664.832	0.1327510	000.0837
<b>D1. 8</b>	<b>68063B</b>	<b>Atlas SLV-3A stage 2 (Agena D)</b>				
<b>UI055</b>	20100101	00:00:00.0	1415.0497	30836.7	39910.5	163.845
	14.5203	346.2927	077.1185	41751.746	0.1086642	216.8724
<b>D1. 9</b>	<b>70069B</b>	<b>Atlas SLV-3A stage 2 (Agena D)</b>				
<b>UI145</b>	20100101	00:00:00.0	1415.7783	30136.2	40639.7	089.203
	17.0094	288.0733	306.0643	41766.078	0.1257414	308.2109
<b>D1. 10</b>	<b>92037C</b>	<b>IABS</b>				
<b>UI085</b>	20100101	00:00:00.0	1416.8151	35295.3	35521.3	189.172
	12.2968	033.2913	273.2704	41786.464	0.0027037	346.1940
<b>D1. 11</b>	<b>81025C</b>	<b>Titan IIC stage 3 (Transtage)</b>				
<b>UI040</b>	20100101	00:00:00.0	1421.1436	35283.6	35703.1	024.551
	13.9328	359.7392	153.2018	41871.528	0.0050095	333.5949
<b>D1. 12</b>	<b>89046D</b>	<b>IUS stage 2</b>				
<b>UI080</b>	20100101	00:00:00.0	1421.4827	35299.2	35700.9	231.430
	11.6734	035.5093	211.1874	41878.190	0.0047960	087.8983
<b>D1. 13</b>	<b>91080D</b>	<b>IUS stage 2</b>				
<b>UI078</b>	20100101	00:00:00.0	1421.8348	35412.6	35601.4	044.342
	11.6378	043.3380	195.9156	41885.105	0.0022535	266.4429
<b>D1. 14</b>	<b>95038C</b>	<b>IABS</b>				
<b>UI022</b>	20100101	00:00:00.0	1421.9050	35441.9	35574.8	103.806
	11.2873	046.1070	163.8365	41886.484	0.0015864	355.8977



<b>D1. 15</b>	<b>89069D</b>	<b>Titan 34D stage 3 (Transtage)</b>				
<b>UI088</b>	20100101	00:00:00.0	1422.2672	35232.1	35798.9	111.502
	12.8827	025.5361	186.7625	41893.596	0.0067647	001.3304
<b>D1. 16</b>	<b>82019B</b>	<b>Titan IIIC stage 3 (Transtage)</b>				
<b>UI039</b>	20100101	00:00:00.0	1422.2820	35447.9	35583.6	184.707
	14.2106	003.2190	326.4529	41893.888	0.0016193	318.0751
<b>D1. 17</b>	<b>87097B</b>	<b>Titan 34D stage 3 (Transtage)</b>				
<b>UI029</b>	20100101	00:00:00.0	1422.3084	35500.0	35532.5	276.143
	11.7515	027.4495	103.9915	41894.406	0.0003886	248.5322
<b>D1. 18</b>	<b>00065C</b>	<b>IABS</b>				
<b>UI011</b>	20100101	00:00:00.0	1423.1085	35309.5	35754.4	063.684
	08.2071	060.7996	116.8383	41910.116	0.0053077	347.9400
<b>D1. 19</b>	<b>94084D</b>	<b>IUS stage 2</b>				
<b>UI019</b>	20100101	00:00:00.0	1423.1097	35517.8	35546.2	253.308
	10.0016	054.0471	291.6071	41910.139	0.0003381	010.7564
<b>D1. 20</b>	<b>00001C</b>	<b>IABS</b>				
<b>UI015</b>	20100101	00:00:00.0	1423.1297	35456.3	35608.5	241.230
	08.7081	059.5728	204.9057	41910.532	0.0018151	079.6384
<b>D1. 21</b>	<b>84037B</b>	<b>Titan 34D stage 3 (Transtage)</b>				
<b>UI095</b>	20100101	00:00:00.0	1423.3836	35414.2	35660.6	241.659
	13.9414	010.5211	163.5805	41915.515	0.0029395	171.0175
<b>D1. 22</b>	<b>84129B</b>	<b>Titan 34D stage 3 (Transtage)</b>				
<b>UI032</b>	20100101	00:00:00.0	1423.6134	35532.7	35551.1	324.997
	14.2350	017.3266	029.3410	41920.028	0.0002200	019.1725
<b>D1. 23</b>	<b>03008C</b>	<b>IABS</b>				
<b>UI006</b>	20100101	00:00:00.0	1423.9645	35527.9	35569.7	250.045
	06.1994	066.8989	114.3497	41926.920	0.0004991	171.6692
<b>D1. 24</b>	<b>85092E</b>	<b>IUS stage 2</b>				
<b>UI033</b>	20100101	00:00:00.0	1424.6577	35324.1	35800.6	329.079
	14.2500	015.9218	012.9396	41940.525	0.0056805	041.2013
<b>D1. 25</b>	<b>03041B</b>	<b>Titan IVB stage 3 (Centaur)</b>				
<b>UI072</b>	20100101	00:00:00.0	1427.8315	35474.1	35775.2	228.988
	04.3631	146.9855	259.4986	42002.791	0.0035840	283.5618
<b>D1. 26</b>	<b>85010D</b>	<b>IUS stage 2</b>				
<b>UI047</b>	20100101	00:00:00.0	1428.4913	35537.0	35738.2	330.864
	16.5451	021.3308	128.0648	42015.730	0.0023941	282.3591
<b>D1. 27</b>	<b>03040C</b>	<b>IABS</b>				
<b>UI002</b>	20100101	00:00:00.0	1429.4805	35576.2	35737.8	204.938
	05.7731	067.5047	148.0457	42035.124	0.0019219	091.0100
<b>D1. 28</b>	<b>72010B</b>	<b>Titan IIIC stage 3 (Transtage)</b>				
<b>UI038</b>	20100101	00:00:00.0	1430.2893	35394.8	35950.9	256.100
	10.7313	326.5692	347.4213	42050.978	0.0066128	042.4767
<b>D1. 29</b>	<b>95060B</b>	<b>Titan IVA stage 3 (Centaur)</b>				
<b>UI016</b>	20100101	00:00:00.0	1431.5606	35567.2	35828.3	122.524
	09.1033	058.7363	049.7468	42075.892	0.0031018	115.2385
<b>D1. 30</b>	<b>94009B</b>	<b>Titan IVA stage 3 (Centaur)</b>				
<b>UI014</b>	20100101	00:00:00.0	1431.6561	35660.0	35739.2	134.738
	06.6035	106.8644	061.4149	42077.764	0.0009408	067.3584
<b>D1. 31</b>	<b>77007D</b>	<b>OPS 3151 debris (Telescope aperture suncover)</b>				
<b>UI100</b>	20100101	00:00:00.0	1431.8315	34517.2	36888.9	325.415
	13.7735	338.6773	332.5221	42081.200	0.0281805	113.4213

<b>D1. 32</b>	<b>03012B</b>	<b>Titan IVB stage 3 (Centaur)</b>				
<b>UI064</b>	20100101	00:00:00.0	1431.8559	35616.1	35791.0	012.863
	02.8707	048.3285	154.1036	42081.678	0.0020785	271.1363
<b>D1. 33</b>	<b>95022B</b>	<b>Titan IVA stage 3 (Centaur)</b>				
<b>UI021</b>	20100101	00:00:00.0	1431.8954	35653.7	35754.9	067.709
	10.5658	082.3532	189.7026	42082.452	0.0012018	256.2903
<b>D1. 34</b>	<b>75118C</b>	<b>Titan IIIC stage 3 (Transtage)</b>				
<b>UI050</b>	20100101	00:00:00.0	1432.0002	35645.3	35767.4	083.938
	13.1033	336.8827	017.7580	42084.507	0.0014501	190.3468
<b>D1. 35</b>	<b>76059C</b>	<b>Titan IIIC stage 3 (Transtage)</b>				
<b>UI054</b>	20100101	00:00:00.0	1432.3482	35667.0	35759.4	161.019
	13.4110	338.4876	053.2155	42091.323	0.0010983	230.5619
<b>D1. 36</b>	<b>78038A</b>	<b>OPS 8790 (AQUACADE 4)</b>				
<b>UI091</b>	20100101	00:00:00.0	1433.0096	35679.0	35773.3	223.307
	10.9185	349.3704	170.7086	42104.280	0.0011191	164.3720
<b>D1. 37</b>	<b>75118A</b>	<b>OPS 3165 (DSP F5)</b>				
<b>UI052</b>	20100101	00:00:00.0	1433.5007	35623.7	35847.8	006.877
	13.1414	336.8197	207.2288	42113.900	0.0026611	283.3325
<b>D1. 38</b>	<b>01009B</b>	<b>Titan IVB stage 3 (Centaur)</b>				
<b>UI003</b>	20100101	00:00:00.0	1433.6792	35678.8	35799.7	338.773
	05.4746	059.7724	335.9205	42117.396	0.0014344	043.4557
<b>D1. 39</b>	<b>69036A</b>	<b>OPS 3148 (CANYON 2)</b>				
<b>UI070</b>	20100101	00:00:00.0	1434.0768	31669.9	39824.2	292.686
	02.0431	162.1855	316.2680	42125.181	0.0967871	267.6855
<b>D1. 40</b>	<b>71039B</b>	<b>Titan IIIC stage 3 (Transtage)</b>				
<b>UI093</b>	20100101	00:00:00.0	1434.3132	35589.3	35914.1	185.155
	10.1862	323.4502	317.3997	42129.810	0.0038551	004.8110
<b>D1. 41</b>	<b>79086A</b>	<b>OPS 1948 (VORTEX 2) (CHALET 2)</b>				
<b>UI023</b>	20100101	00:00:00.0	1436.6546	30604.8	40990.2	174.846
	06.7060	354.5686	337.7624	42175.647	0.1231211	297.8978
<b>D1. 42</b>	<b>02001B</b>	<b>Titan IVB stage 3 (Centaur)</b>				
<b>UI013</b>	20100101	00:00:00.0	1436.6651	35580.9	36014.5	161.430
	02.0121	016.2619	035.7872	42175.852	0.0051402	210.0319
<b>D1. 43</b>	<b>78058A</b>	<b>OPS 9454 (VORTEX 1) (CHALET 1)</b>				
<b>UI009</b>	20100101	00:00:00.0	1438.2348	29824.8	41832.1	003.213
	03.8193	034.7654	290.8193	42206.569	0.1422451	123.3006
<b>D1. 44</b>	<b>90095D</b>	<b>IUS stage 2</b>				
<b>UI081</b>	20100101	00:00:00.0	1441.2370	35557.3	36217.0	090.537
	12.1967	041.2348	288.7344	42265.283	0.0078045	219.5950
<b>D1. 45</b>	<b>01033D</b>	<b>IUS stage 2</b>				
<b>UI061</b>	20100101	00:00:00.0	1441.6419	35860.7	35929.4	072.726
	04.7802	065.4229	226.8288	42273.199	0.0008129	240.3998
<b>D1. 46</b>	<b>04004D</b>	<b>IUS stage 2</b>				
<b>UI062</b>	20100101	00:00:00.0	1442.6633	35889.5	35940.5	025.419
	02.5778	067.7936	239.1346	42293.164	0.0006027	178.5761
<b>D1. 47</b>	<b>73040A</b>	<b>OPS 6157 (DSP F4)</b>				
<b>UI048</b>	20100101	00:00:00.0	1442.7044	35892.8	35938.9	052.387
	12.3051	330.0014	268.6942	42293.966	0.0005457	273.1982
<b>D1. 48</b>	<b>72010A</b>	<b>OPS 1570 (DSP F3)</b>				
<b>UI144</b>	20100101	00:00:00.0	1443.2493	35896.1	35956.9	118.137
	11.2089	328.0419	253.2624	42304.616	0.0007188	355.9177

<b>D1. 49</b>	<b>00024D</b>	<b>IUS stage 2</b>					
<b>UI067</b>	20100101	00:00:00.0	1444.2173	35921.5	35969.3	313.995	
	05.8293	063.6042	358.7717	42323.528	0.0005644	350.0483	
<b>D1. 50</b>	<b>00024E</b>	<b>DSP F20 Aperture Cover</b>					
<b>UI005</b>	20100101	00:00:00.0	1444.2213	34922.0	36969.0	347.055	
	06.0600	063.4163	213.9241	42323.608	0.0241828	168.4192	
<b>D1. 51</b>	<b>79086C</b>	<b>Titan IIIC stage 3 (Transtage)</b>					
<b>UI024</b>	20100101	00:00:00.0	1444.7414	30507.0	41404.2	239.986	
	06.9529	352.5790	034.9671	42333.768	0.1287056	318.5816	
<b>D1. 52</b>	<b>78058B</b>	<b>Titan IIIC stage 3 (Transtage)</b>					
<b>UI010</b>	20100101	00:00:00.0	1445.3280	29793.0	42141.2	140.889	
	03.5483	025.6382	014.5058	42345.226	0.1458031	203.5517	
<b>D1. 53</b>	<b>81107C</b>	<b>Titan IIIC stage 3 (Transtage)</b>					
<b>UI076</b>	20100101	00:00:00.0	1445.7902	31918.3	40034.0	051.654	
	07.7027	351.9631	020.1857	42354.254	0.0958073	142.3854	
<b>D1. 54</b>	<b>94054B</b>	<b>Titan IVA stage 3 (Centaur)</b>					
<b>UI017</b>	20100101	00:00:00.0	1446.1071	35455.4	36509.2	213.260	
	09.0059	041.5363	201.3026	42360.442	0.0124381	068.4192	
<b>D1. 55</b>	<b>96026B</b>	<b>Titan IVA stage 3 (Centaur)</b>					
<b>UI075</b>	20100101	00:00:00.0	1446.3134	33967.0	38005.6	267.576	
	08.7141	006.4961	267.3988	42364.470	0.0476652	088.6171	
<b>D1. 56</b>	<b>73040B</b>	<b>Titan IIIC stage 3 (Transtage)</b>					
<b>UI049</b>	20100101	00:00:00.0	1446.3862	35858.9	36116.6	100.862	
	12.4736	330.5312	261.7363	42365.893	0.0030405	327.0138	
<b>D1. 57</b>	<b>89090D</b>	<b>IUS stage 2</b>					
<b>UI090</b>	20100101	00:00:00.0	1447.0415	34646.4	37354.7	048.593	
	14.5625	051.2289	290.3681	42378.687	0.0319536	163.2606	
<b>D1. 58</b>	<b>97008D</b>	<b>IUS stage 2</b>					
<b>UI071</b>	20100101	00:00:00.0	1447.3066	35913.3	36098.2	185.824	
	08.3534	062.1809	019.5843	42383.863	0.0021810	202.8128	
<b>D1. 59</b>	<b>76059A</b>	<b>OPS 2112 (DSP F6)</b>					
<b>UI056</b>	20100101	00:00:00.0	1447.6793	35987.6	36038.4	341.462	
	13.8919	340.2847	019.5637	42391.140	0.0005993	081.2312	
<b>D1. 60</b>	<b>84009C</b>	<b>Titan 34D stage 3 (Transtage)</b>					
<b>UI025</b>	20100101	00:00:00.0	1448.0106	31898.7	40140.2	078.420	
	07.7901	359.0734	353.1301	42397.607	0.0971935	183.9025	
<b>D1. 61</b>	<b>79053C</b>	<b>Titan IIIC stage 3 (Transtage)</b>					
<b>UI051</b>	20100101	00:00:00.0	1448.0345	35785.2	36254.7	100.935	
	14.8717	356.5090	131.8091	42398.073	0.0055370	071.8083	
<b>D1. 62</b>	<b>89035C</b>	<b>Titan 34D stage 3 (Transtage)</b>					
<b>UI020</b>	20100101	00:00:00.0	1448.2786	31636.0	40413.4	265.868	
	06.5425	013.6136	290.2892	42402.838	0.1035006	048.5872	
<b>D1. 63</b>	<b>85092C</b>	<b>USA 12 (DSCS III B-05)</b>					
<b>UI077</b>	20100101	00:00:00.0	1449.7713	36038.6	36069.0	099.723	
	11.6051	045.9589	287.1209	42431.968	0.0003581	225.5569	
<b>D1. 64</b>	<b>90095E</b>	<b>USA 65 debris (Telescope aperture suncover)</b>					
<b>UI143</b>	20100101	00:00:00.0	1450.2459	35389.3	36736.9	141.915	
	12.3619	040.1484	122.6256	42441.228	0.0158753	079.1160	
<b>D1. 65</b>	<b>93074B</b>	<b>IABS</b>					
<b>UI084</b>	20100101	00:00:00.0	1450.8285	36033.8	36115.1	258.372	
	12.3445	040.1041	250.8423	42452.594	0.0009570	064.4898	

<b>D1. 66</b>	<b>68063A</b>	<b>OPS 2222 (CANYON 1)</b>				
<b>UI102</b>	20100101	00:00:00.0	1450.9787	32157.5	39997.3	081.154
	15.3188	351.0662	059.9282	42455.524	0.0923296	137.4502
<b>D1. 67</b>	<b>89069B</b>	<b>USA 44 (DSCS III A-02)</b>				
<b>UI126</b>	20100101	00:00:00.0	1452.7885	36078.7	36146.6	087.334
	08.4317	061.7036	219.5604	42490.819	0.0007990	264.9706
<b>D2. 68</b>	<b>92006A</b>	<b>USA 78 (DSCS III B-14)</b>				
<b>UI127</b>	20100101	00:00:00.0	1453.9939	36108.5	36163.9	064.720
	08.7924	060.6027	208.4909	42514.321	0.0006517	254.7124
<b>D2. 69</b>	<b>93046A</b>	<b>USA 93 (DSCS III B-09)(DSCS III F7)</b>				
<b>UI120</b>	20100101	00:00:00.0	1454.3110	36123.1	36161.6	048.539
	05.8914	068.0541	268.2143	42520.500	0.0004530	171.6139
<b>D1. 70</b>	<b>78016A</b>	<b>OPS 6391 (FLTSATCOM F1)</b>				
<b>UI101</b>	20100101	00:00:00.0	1454.5732	36133.9	36161.0	209.658
	15.4130	355.5585	180.5757	42525.611	0.0003181	129.9326
<b>D2. 71</b>	<b>85092B</b>	<b>USA 11 (DSCS III B-04)</b>				
<b>UI079</b>	20100101	00:00:00.0	1454.7684	36120.7	36181.8	179.980
	11.8439	044.0994	275.8326	42529.416	0.0007184	317.3386
<b>D1. 72</b>	<b>80087A</b>	<b>OPS 6394 (FLTSATCOM F4)</b>				
<b>UI096</b>	20100101	00:00:00.0	1455.3428	36141.4	36183.6	016.911
	14.7255	002.4105	294.7756	42540.610	0.0004959	178.5615
<b>D1. 73</b>	<b>84129A</b>	<b>USA 7 (DSP F12)</b>				
<b>UI034</b>	20100101	00:00:00.0	1456.7101	36175.5	36202.7	053.753
	14.7469	019.5383	296.3355	42567.250	0.0003193	196.3484
<b>D1. 74</b>	<b>81025A</b>	<b>OPS 7350 (DSP F9)</b>				
<b>UI045</b>	20100101	00:00:00.0	1457.1063	36141.7	36251.9	153.308
	14.7628	002.7554	121.9210	42574.968	0.0012938	125.5441
<b>D1. 75</b>	<b>79053A</b>	<b>OPS 7484 (DSP F8)</b>				
<b>UI053</b>	20100101	00:00:00.0	1458.3275	36203.2	36238.0	057.726
	15.0484	357.3285	123.9508	42598.754	0.0004090	034.4408
<b>D1. 76</b>	<b>84037A</b>	<b>OPS 7641 (DSP F11)</b>				
<b>UI037</b>	20100101	00:00:00.0	1459.2306	36223.4	36253.0	276.197
	14.7248	013.0809	121.4607	42616.338	0.0003466	236.3292
<b>D1. 77</b>	<b>89069A</b>	<b>USA 43 (DSCS II F-15)</b>				
<b>UI087</b>	20100101	00:00:00.0	1460.3636	36211.1	36309.4	172.148
	12.9770	031.9786	105.9474	42638.394	0.0011519	130.7561
<b>D1. 78</b>	<b>90095A</b>	<b>USA 65 (DSP F15)</b>				
<b>UI083</b>	20100101	00:00:00.0	1463.5499	36280.4	36364.1	207.490
	12.2257	040.2157	271.3676	42700.392	0.0009808	351.1779
<b>D1. 79</b>	<b>87097A</b>	<b>USA 28 (DSP F13)</b>				
<b>UI030</b>	20100101	00:00:00.0	1463.5726	36235.4	36410.0	278.766
	12.2024	029.4467	125.1618	42700.835	0.0020437	218.1867
<b>D1. 80</b>	<b>82019A</b>	<b>OPS 8701 (DSP F10)</b>				
<b>UI046</b>	20100101	00:00:00.0	1466.5264	36370.1	36390.1	115.827
	15.1638	006.9275	281.9553	42758.267	0.0002340	282.9807
<b>D1. 81</b>	<b>98058A</b>	<b>USA 140 (UFO F9)</b>				
<b>UI113</b>	20100101	00:00:00.0	1466.7270	36316.3	36451.7	261.552
	03.6905	040.9364	258.6550	42762.167	0.0015829	055.4819
<b>D1. 82</b>	<b>71039A</b>	<b>OPS 3811 (DSP F2)</b>				
<b>UI042</b>	20100101	00:00:00.0	1467.0758	36324.2	36457.4	065.569
	11.3574	328.4357	246.2110	42768.947	0.0015569	306.9940

<b>D2. 83</b>	<b>82106B</b>	<b>DSCS III A-01</b>					
<b>UI135</b>	20100101	00:00:00.0	1471.9689	36419.0	36552.7	063.118	
	13.3376	027.3498	030.5724	42863.990	0.0015586	102.3756	
<b>D1. 84</b>	<b>77007A</b>	<b>OPS 3151 (DSP F7)</b>					
<b>UI057</b>	20100101	00:00:00.0	1476.5950	36237.4	36913.9	003.178	
	14.5912	345.2530	241.9771	42953.752	0.0078746	232.3112	
<b>D1. 85</b>	<b>09001B</b>	<b>Delta 4 second stage</b>					
<b>UI154</b>	20100101	00:00:00.0	1499.1405	35947.5	38076.0	239.168	
	02.7717	346.5477	007.6054	43389.876	0.0245280	330.9375	
<b>D1. 86</b>	<b>07054B</b>	<b>Delta 4 second stage</b>					
<b>UI147</b>	20100101	00:00:00.0	1502.0192	35921.7	38212.9	129.658	
	02.2595	258.7506	187.8140	43445.403	0.0263689	128.5372	

### 4.5 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), the following data are given:

<b>L1.nn</b>	<b>COSPAR</b>	<b>NAME</b>				
UI <sub>nnn</sub>	YYYYMMDD	HHMMSS.SS	Tosc	Hp	Ha	Longit
	Inclin	RAAN	AoP	SemiAxis	Eccentr	M

For explanation, see definition at the beginning of Chapter 4 on page 99.

<b>L1. 1</b>	<b>77038A</b>	<b>OPS 9751 (CANYON 7)</b>				
<b>UI086</b>	20100101	00:00:00.0	1436.1082	30624.7	40948.9	061.191
	10.8436	010.5163	338.6825	42164.954	0.1224269	167.7055
<b>L1. 2</b>	<b>70032A</b>	<b>Intelsat III F-7</b>				
<b>UI036</b>	20100101	00:00:00.0	1434.3303	35734.5	35769.5	074.115
	09.8994	319.4228	321.4863	42130.146	0.0004147	253.8466
<b>L1. 3</b>	<b>73013A</b>	<b>OPS 6063 (Rhyolite 2)</b>				
<b>UI043</b>	20100101	00:00:00.0	1436.0202	35703.3	35866.9	076.132
	11.6826	330.6064	100.0499	42163.231	0.0019392	106.1116
<b>L1. 4</b>	<b>70046A</b>	<b>OPS 5346 (Rhyolite 1)</b>				
<b>UI035</b>	20100101	00:00:00.0	1435.8535	35742.0	35821.7	083.129
	09.8649	320.5756	034.9304	42159.967	0.0009446	188.1288
<b>L1. 5</b>	<b>98029B</b>	<b>Titan IVB stage 3 (Centaur)</b>				
<b>UI027</b>	20100101	00:00:00.0	1437.7001	35619.0	36017.0	087.012
	09.5967	012.1387	034.5460	42196.107	0.0047165	140.8436
<b>L1. 6</b>	<b>75055A</b>	<b>OPS 4966 (CANYON 6)</b>				
<b>UI060</b>	20100101	00:00:00.0	1434.5279	30288.6	41223.1	102.738
	21.0868	344.0030	235.3023	42134.016	0.1297584	331.1651
<b>L1. 7</b>	<b>07054A</b>	<b>USA 197 (DSP F23)</b>				
<b>UI141</b>	20100101	00:00:00.0	1435.4794	35758.3	35790.7	127.872
	01.9372	260.4212	020.5939	42152.645	0.0003842	307.4173
<b>L1. 8</b>	<b>72101A</b>	<b>OPS 9390 (CANYON 5)</b>				
<b>UI138</b>	20100101	00:00:00.0	1436.7601	30198.0	41401.2	144.458
	20.3308	338.6734	272.7520	42177.712	0.1328090	338.2298

#### 4.6 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), the following data are given:

<b>L2.nn</b>	<b>COSPAR</b>	<b>NAME</b>				
UI <sub>nnn</sub>	YYYYMMDD	HHMMSS.SS	Tosc	Hp	Ha	Longit
	Inclin	RAAN	AoP	SemiAxis	Eccentr	M

For explanation, see definition at the beginning of Chapter 4 on page 99.

<b>L2. 1</b>	<b>81107A</b>	<b>OPS 4029 (VORTEX 3)</b>				
<b>UI129</b>	20100101	00:00:00.0	1435.6900	31802.6	39754.7	213.592
	07.4098	359.6014	272.0515	42156.768	0.0943165	031.6747
<b>L2. 2</b>	<b>77114A</b>	<b>OPS 4258 (AQUACADE 3)</b>				
<b>UI146</b>	20100101	00:00:00.0	1434.5971	35679.7	35834.8	233.812
	18.9858	355.9079	219.1365	42135.371	0.0018402	119.3916
<b>L2. 3</b>	<b>94035A</b>	<b>USA 104 (UFO F3)</b>				
<b>UI068</b>	20100101	00:00:00.0	1435.6804	35759.3	35797.6	331.272
	06.7048	051.4640	249.5287	42156.579	0.0004551	130.6458
<b>L2. 4</b>	<b>70069A</b>	<b>OPS 7329 (CANYON 3)</b>				
<b>UI157</b>	20100101	00:00:00.0	1436.1474	32108.0	39467.2	353.397
	18.5138	297.8997	233.4432	42165.720	0.0872659	274.1052

#### 4.7 Objects in a libration orbit around both stable points

In the case where the object is in a libration orbit around both stable points, the following data are given:

<b>L3.nn</b>	<b>COSPAR</b>	<b>NAME</b>				
UI <sub>nnn</sub>	YYYYMMDD	HHMMSS.SS	Tosc	Hp	Ha	Longit
	Inclin	RAAN	AoP	SemiAxis	Eccentr	M

For explanation, see definition at the beginning of Chapter 4 on page 99.

<b>L3. 1</b>	<b>80060A</b>	<b>Ekran 5</b>				
<b>UI098</b>	20100101	00:00:00.0	1436.2512	35717.6	35861.6	349.951
	14.5182	350.4749	021.4971	42167.751	0.0017077	078.4476

## 4.8 Unidentified objects

In this list there are 9 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) The following data are given:

UInnn	YYYYMMDD	HHMMSS.SS	Tosc	Hp	Ha	Longit
TYPE	Inclin	RAAN	AoP	SemiAxis	Eccentr	M

For explanation, see definition at the beginning of Chapter 4 on page 99.

<b>UI031</b>	20100101	00:00:00.0	1413.2083	34428.9	36245.8	000.035
D1	07.8172	319.9890	213.9407	41715.518	0.0217771	287.3750
<b>UI041</b>	20100101	00:00:00.0	1436.8941	35602.7	36001.7	050.298
L1	14.1417	359.7660	227.3282	42180.335	0.0047289	283.1274
<b>UI044</b>	20100101	00:00:00.0	1435.7823	35557.7	36003.2	101.652
L1	14.4326	359.6450	301.6245	42158.574	0.0052833	260.3182
<b>UI058</b>	20100101	00:00:00.0	1526.4956	37374.4	37701.5	268.361
D1	17.1303	000.3707	276.5531	43916.113	0.0037240	090.9255
<b>UI089</b>	20100101	00:00:00.0	1429.9334	34876.8	36454.9	315.512
D1	08.9335	327.9718	235.9570	42044.003	0.0187673	210.5746
<b>UI094</b>	20100101	00:00:00.0	1536.8462	34662.0	40810.5	311.941
D1	13.3518	006.2599	109.3509	44114.407	0.0696887	301.3793
<b>UI137</b>	20100101	00:00:00.0	1434.6274	35703.0	35812.6	115.938
D1	14.4471	350.2756	184.9167	42135.963	0.0013003	041.3703
<b>UI139</b>	20100101	00:00:00.0	1435.3050	35589.9	35952.3	267.839
L2	12.5294	035.5777	124.6686	42149.230	0.0042991	208.5857
<b>UI153</b>	20100101	00:00:00.0	1513.8878	36159.4	38432.3	251.736
D1	02.8751	041.6176	189.7148	43673.968	0.0260205	104.3379



### 4.9 Uncontrolled objects

In this list there are objects for which no orbital elements are available and which are no longer controlled according to information provided by KIAM. In this case, the following data are given:

U.nn	COSPAR	NAME	TYPE
U . 1	67003J	Titan IIC stage 3 (Transtage)	Rocket Body
U . 2	68081C	OV5 4	Payload
U . 3	75118D	OPS 3165 debris (Telescope aperture suncover)	Debris
U . 4	76059D	OPS 2112 debris (Telescope aperture suncover)	Debris
U . 5	77007C	Titan IIC stage 3 (Transtage)	Rocket Body
U . 6	79053D	OPS 7484 debris (Telescope aperture suncover)	Debris
U . 7	89046E	USA 39 debris (Telescope aperture suncover)	Debris
U . 8	90097D	AKM ?	Rocket Body
U . 9	97008E	USA 130 debris (Telescope aperture suncover)	Debris
U . 10	97040A	PAS 6	Payload
U . 11	01033E	USA 159 debris (Telescope aperture suncover)	Debris

For the following objects several years old TLEs are available:

D	COSPAR	NAME					
	Date	$\bar{\lambda}$	$\overline{\Delta a}$	$\overline{\Delta r_p}$	$\overline{\Delta r_a}$	$N_{ly}$	$N_{tot}$
	MJD	a	e	i	$\Omega$	$\omega$	$\lambda$

For explanation, see definition at the beginning of Chapter 3 on page 29.

<b>D.</b>	<b>97040A</b>	<b>PAS 6</b>					
	03-APR-04	-40.87	3516.222	456.875	6575.569	0	311
	19816.750000	45680.43954	0.0669728	14.6420	14.6970	359.1400	283.0074
<b>D.</b>	<b>67003J</b>	<b>Titan IIC stage 3 (Transtage)</b>					
	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	COSPAR	NAME					
	Date	$P_{lib}$	$\Delta\lambda$	$\lambda_{min}$	$\lambda_{max}$	$N_{ly}$	$N_{tot}$
	MJD	a	e	i	$\Omega$	$\omega$	$\lambda$

For explanation, see definition at the beginning of Chapter 3 on page 29.

<b>L1.</b>	<b>68081C</b>	<b>OV5 4</b>					
	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

### 4.10 Uncontrolled uncatalogued objects

In this list there are 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). The following data have been provided by KIAM for these objects:

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. 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 of indeterminate status

This table contains all the objects the status of which 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 objects are ordered according to their COSPAR designation. The following information is available:

Ind.nn	COSPAR	NAME						
	Date					$N_{ly}$	$N_{tot}$	
	MJD	a	e	i	$\Omega$	$\omega$	$\lambda$	
<b>Ind. 1</b>	<b>95064A</b>	<b>AsiaSat 2</b>						
	31-DEC-09					52	695	
	21914.773079	42241.26648	0.0007013	0.0406	286.5943	52.9353	23.9740	
<b>Ind. 2</b>	<b>04042A</b>	<b>FengYun 2C</b>						
	31-DEC-09					53	262	
	21914.604583	42141.21261	0.0002024	1.8773	75.2487	305.3962	116.9315	
<b>Ind. 3</b>	<b>09018A</b>	<b>Beidou DW 2 (Compass G2)</b>						
	31-DEC-09					37	37	
	21914.616782	42170.91635	0.0004919	0.3535	275.4890	353.3550	69.7098	
<b>Ind. 4</b>	<b>09054A</b>	<b>Amazonas 2</b>						
	28-DEC-09					14	14	
	21911.031111	42164.39151	0.0004509	0.0266	157.5919	31.0706	298.9837	
<b>Ind. 5</b>	<b>09064A</b>	<b>Intelsat IS-14</b>						
	27-DEC-09					5	5	
	21910.845069	42165.57174	0.0001848	0.0269	38.0157	203.8168	314.9951	
<b>Ind. 6</b>	<b>09065A</b>	<b>Eutelsat W7</b>						
	24-DEC-09					3	3	
	21907.596840	42163.52503	0.0000637	0.0563	288.6236	79.0179	50.1890	
<b>Ind. 7</b>	<b>09067A</b>	<b>Intelsat IS-15</b>						
	24-DEC-09					4	4	
	21907.591563	42164.65166	0.0000498	0.0744	165.1563	148.8369	63.1474	

The longitude histories of the first four objects in this category are plotted in Figures 6 to 7.

Figure 6: Longitude history of the objects of indeterminate status

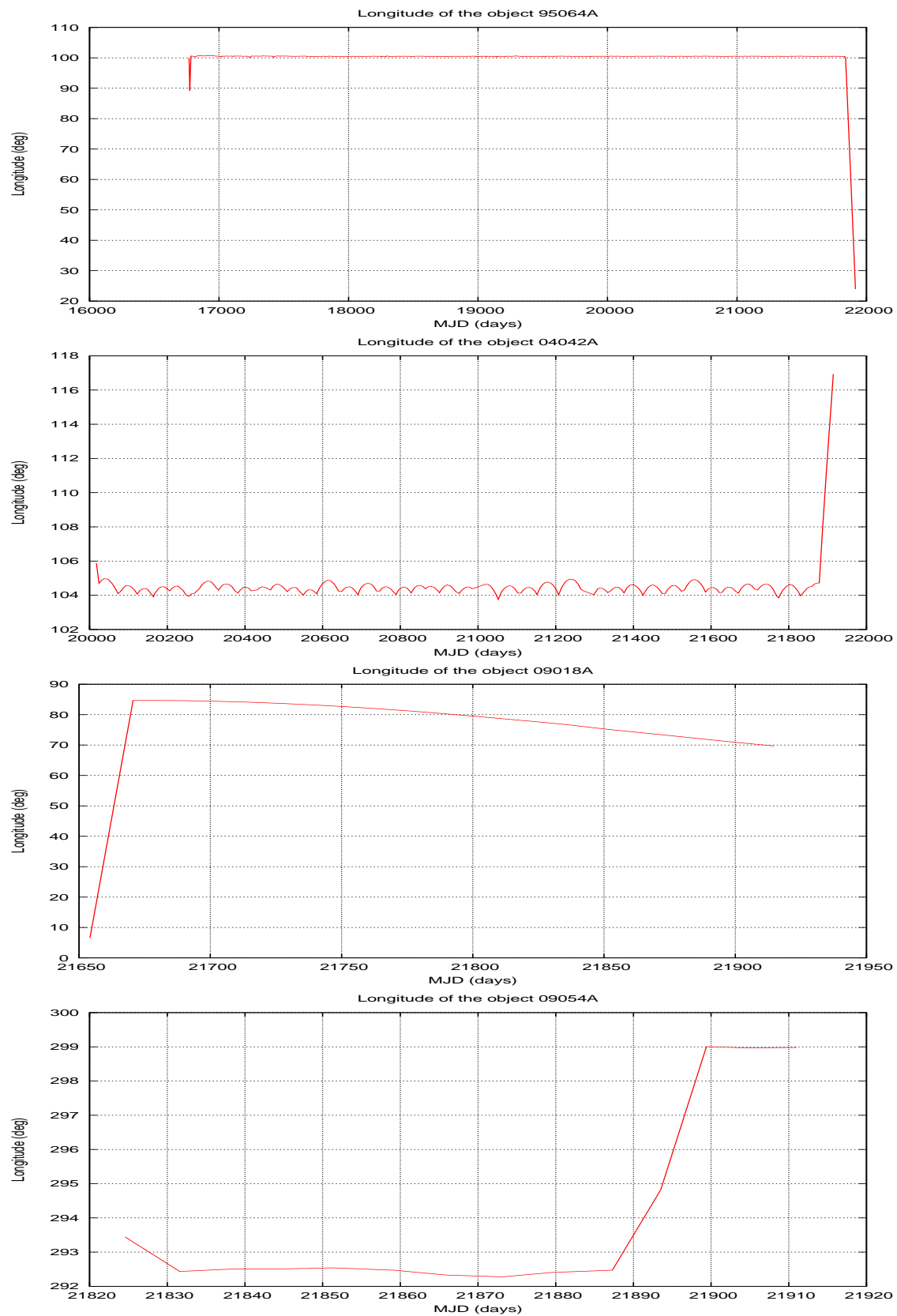
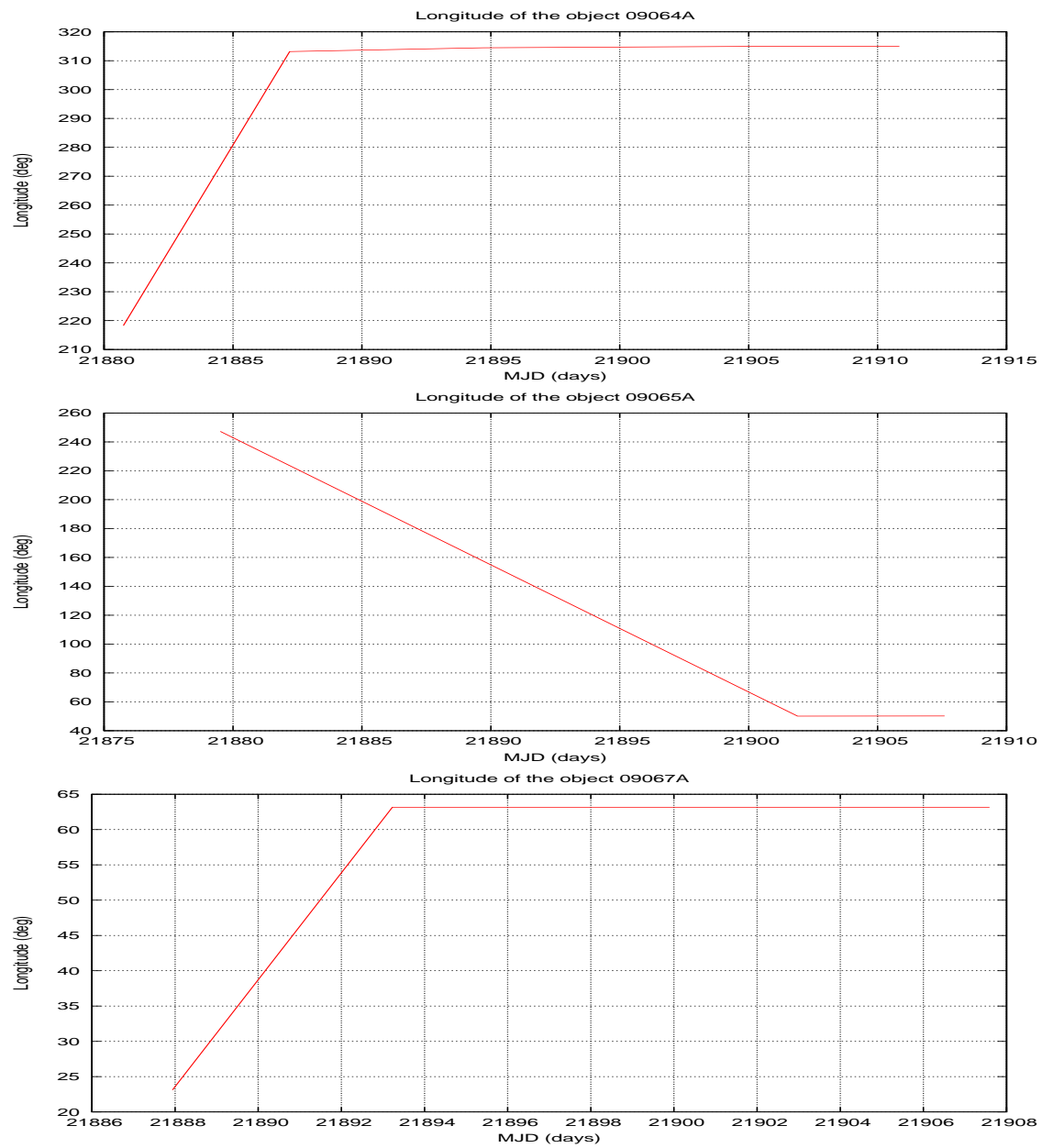


Figure 7: Longitude history of the objects of indeterminate status



## 6 Figures

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

- Figure 8: Number of objects in each category
- Figure 9: Number of objects under control, in drift orbit or in libration orbit according to the launch year
- Figure 10: Distribution of the longitude of the satellites (with TLEs) under control
- Figure 11: Distribution and altitude range of the objects (with TLEs) in drift orbit
- Figure 12: Zoom in the distribution and altitude range of the objects (with TLEs) in drift orbit
- Figure 13: Distribution of the perigee mean deviation from the geostationary altitude for the objects (with TLEs) in drift orbit
- Figure 14: Number of objects (with TLEs) librating through a given longitude

### Classification of geosynchronous objects

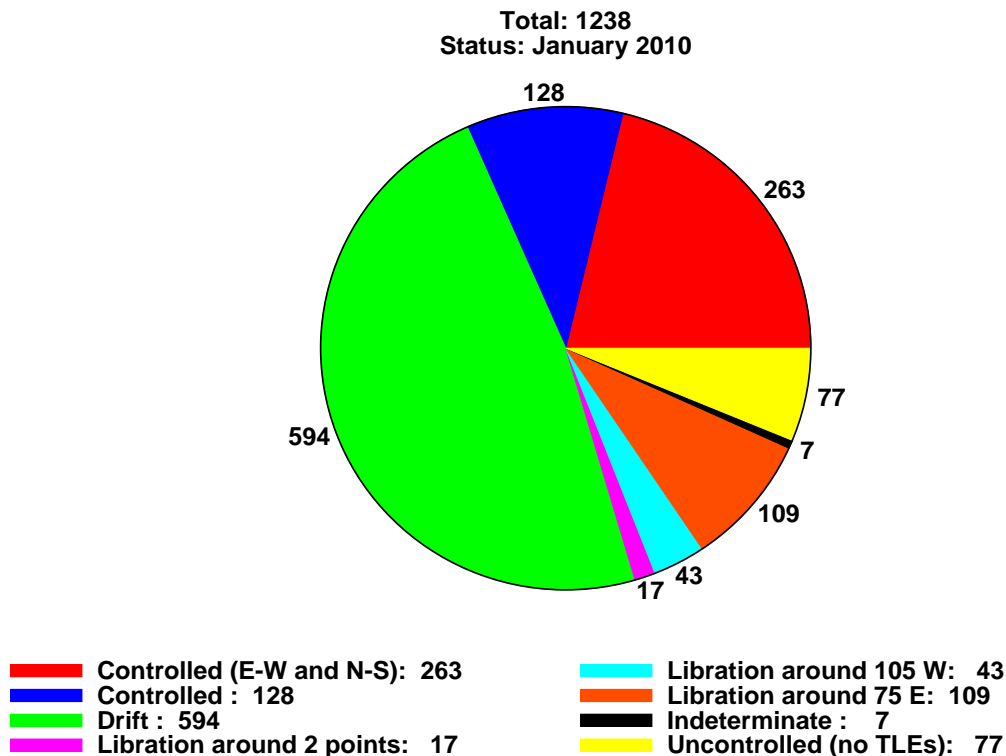


Figure 8: Number of objects in each category

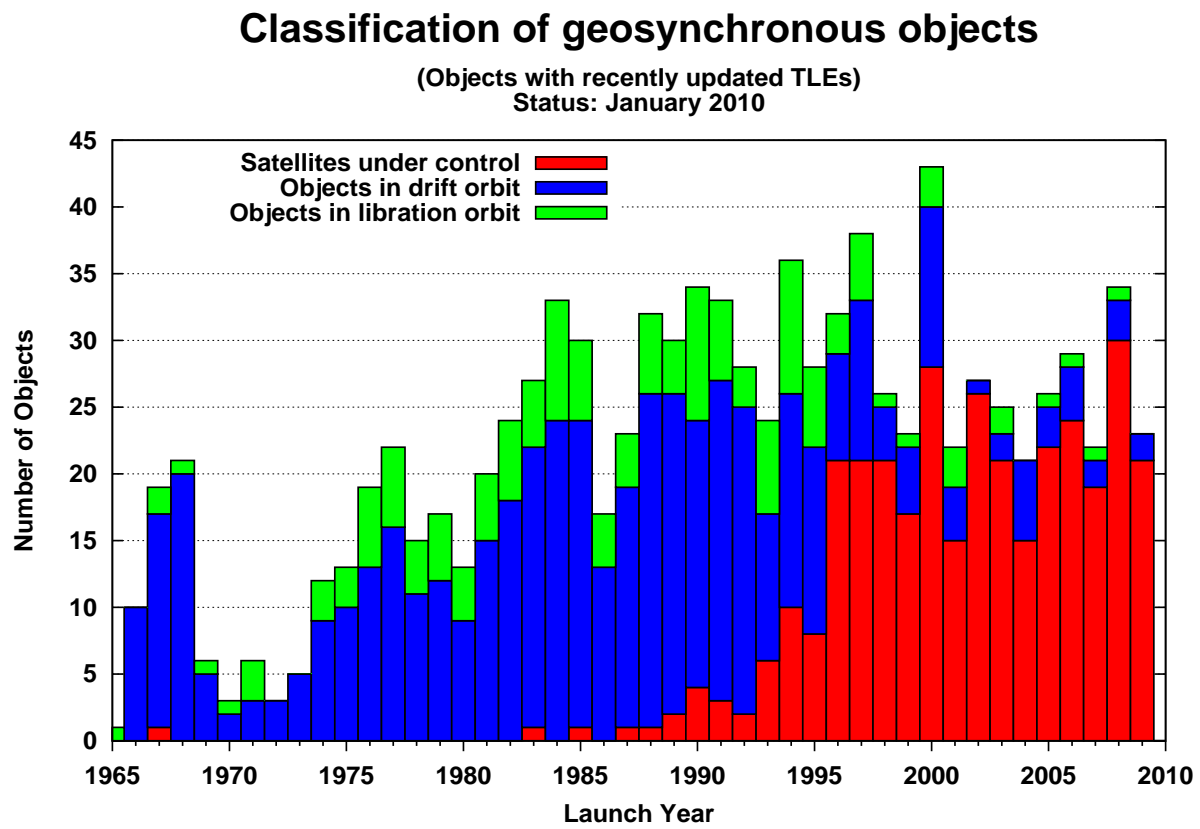


Figure 9: Number of objects in each category according to the launch year.



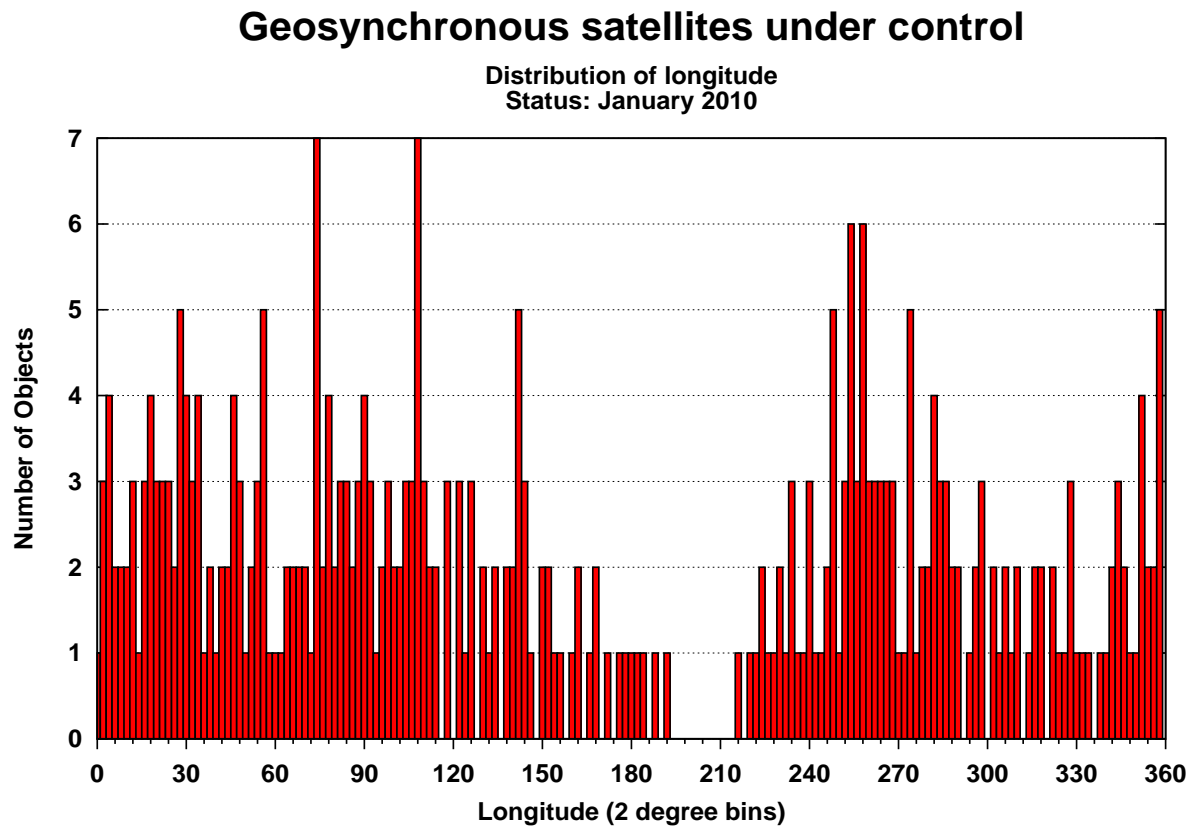


Figure 10: Distribution of the longitude of the 341 satellites under control (with updated TLEs).

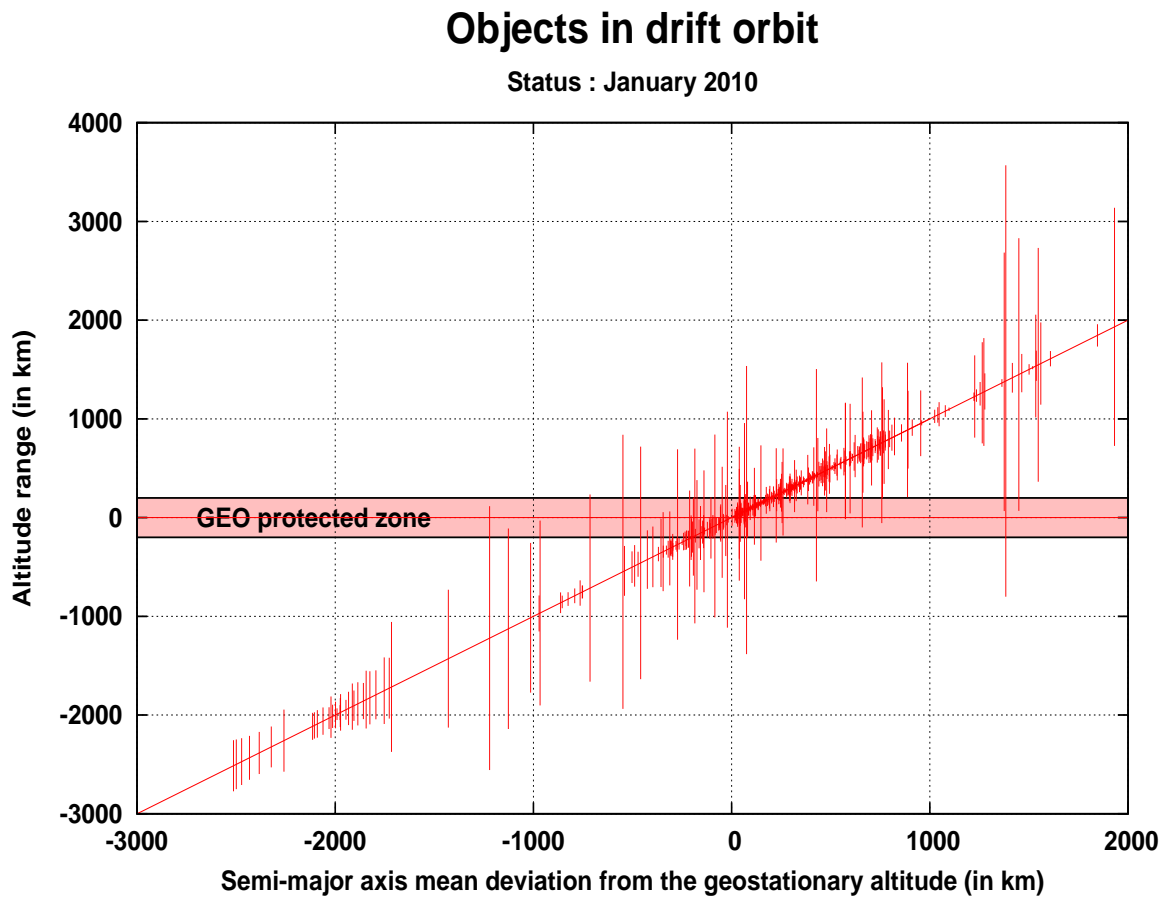


Figure 11: Distribution and altitude range of the objects in drift orbit.

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.

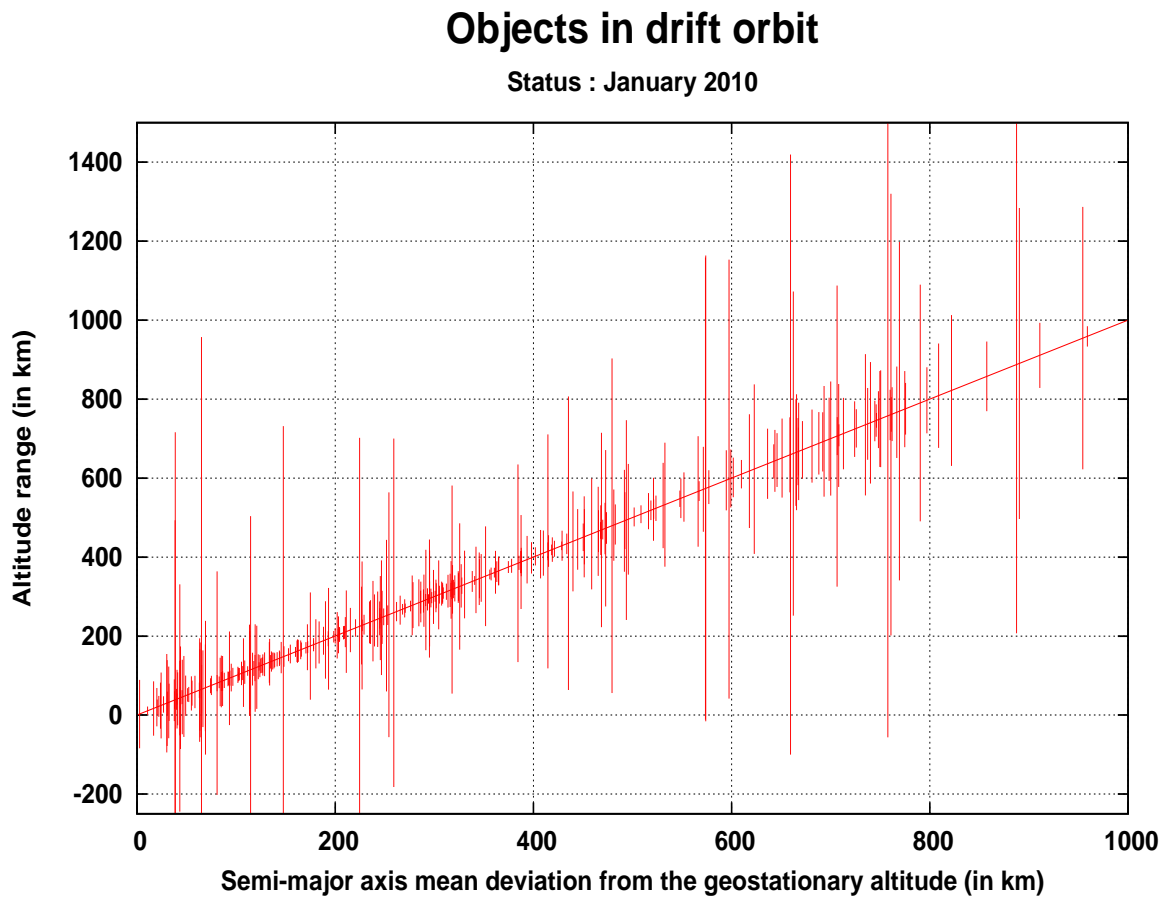


Figure 12: Zoom in the distribution and altitude range of the objects in drift orbit.

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.

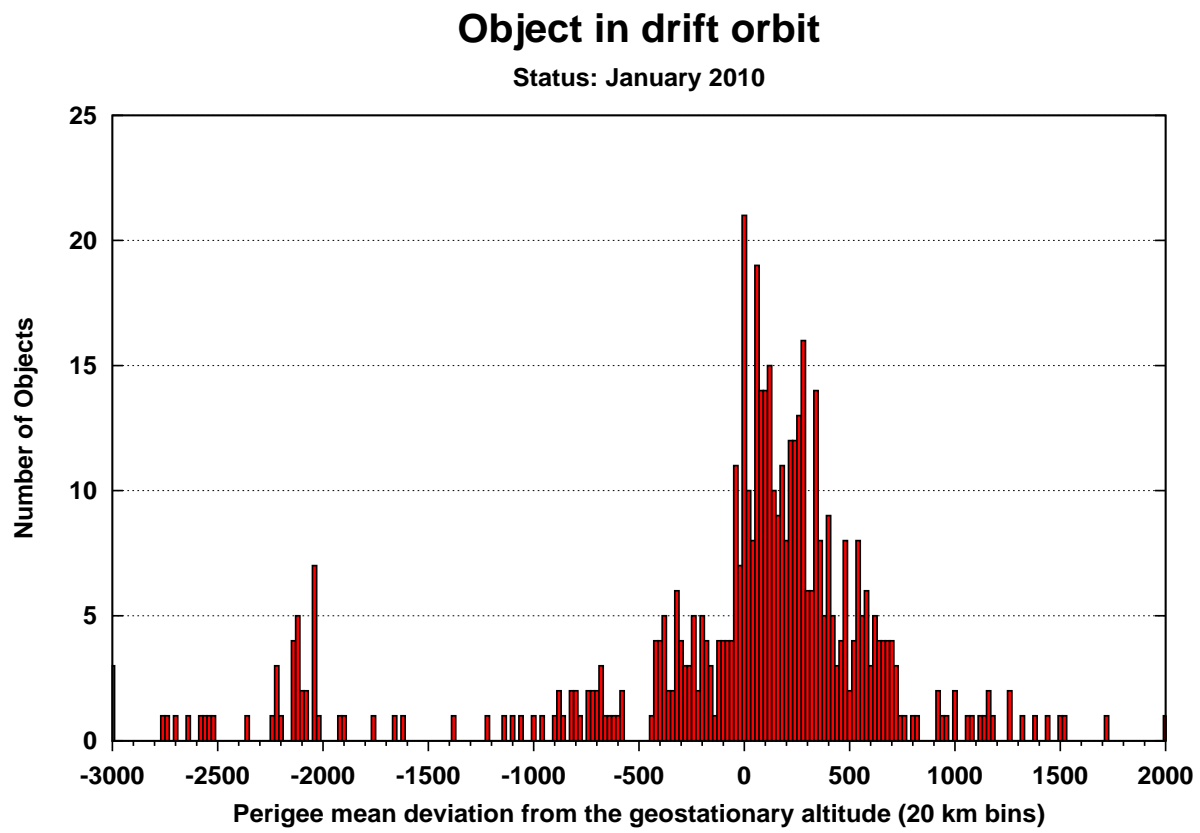


Figure 13: Distribution of the perigee mean deviation from the geostationary altitude.

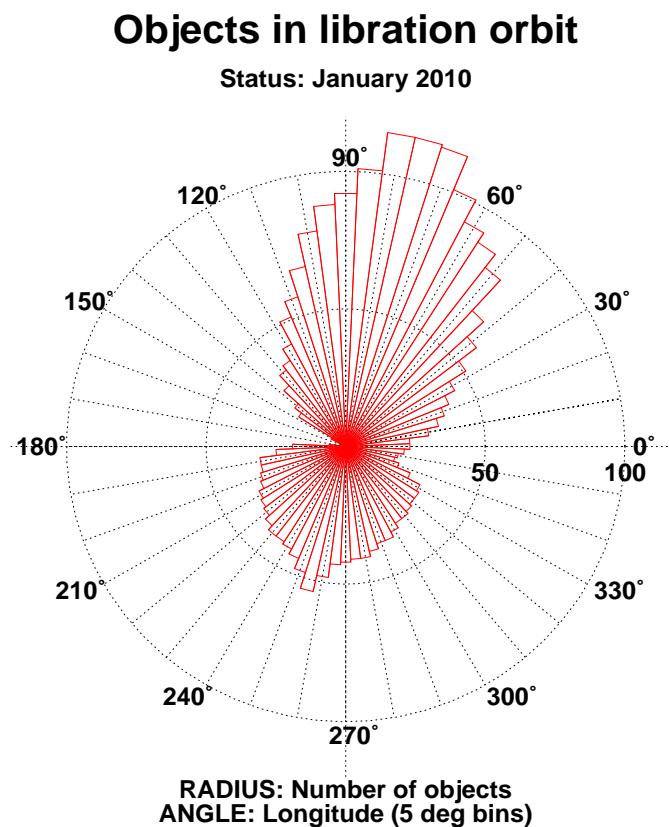


Figure 14: Distribution of the objects in libration orbit in 5-deg bins of geographic longitude (objects with updated TLEs only).

This figure illustrates the distribution of the objects in a libration orbit. 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.

## 7 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 sidereal day, corresponding to a semi-major axis between  $42164 - 2500$  km and  $42164 + 3150$  km.
- inclination lower than 30 degrees

1003 objects met these criteria as of 31 December 2009. 235 more objects are also known to be in this orbital region; for 156 of them KIAM provided orbital elements. Thus, the total number of known objects in the geostationary region is 1238. They can be classified as follows:

- 391 are controlled (263 under longitude and inclination control),
- 594 are in a drift orbit,
- 169 are in a libration orbit,
- 11 are uncontrolled with no recent orbital elements available,
- 66 are uncatalogued objects but which can be associated to a launch,
- 7 could not be classified (four of them were recently launched and are en route to their longitude slot).

Compared with the last issue of February 2009 the following changes can be observed: There were 33 new objects (30 payloads and 3 rocket bodies) launched into or near GEO during the last year.

21 spacecraft reached end of life as far as it can be inferred from the orbital elements stored in DISCOS or declared by spacecraft operators. Only 11 were reorbited more than 250 km above GEO and complied with the IADC reorbiting guidelines:

- SBS VI (90091A, USA, 347 x 380 km)
- Intelsat VI F-5 (91055A, Intelsat, 252 x 286 km)
- DirecTV-1 (93078A, USA, 346 x 383 km)
- Intelsat VII F-4 (95001A, Intelsat, 289 x 331 km)
- DirecTV-3 (95029A, USA, 355 x 366 km)
- Telecom 2C (95067A, France, 582 x 751 km)
- GOES 10 (97019A, USA, 331 x 349 km)
- EchoStar 5 (99050A, USA, 401 x 467 km)
- Ekspres 3A (00031A, Russia, 417 x 441 km)
- KAZSAT (06022A, Kazakhstan, 290 x 300 km)
- Xinnuo 2 (06048A, China, 2018 x 2412 km)

Sirius 2 (97071A, Sweden) was reorbited into a graveyard orbit with a perigee 225 km above GEO. A forward propagation over 200 years showed that the minimum perigee will be 200 km, i.e. the 200-km protected zone around GEO will be touched. Since the long-term area-to-mass ratio is not yet well determined, it remains to be seen if Sirius 2 will enter into the protected zone.

Six spacecraft were reorbited too low:

- Gorizont 28 (93069A, Russia, 40 x 310 km above GEO)
- MEASAT 2 (96063B, Malaysia, 85 x 112 km above GEO)
- Arabsat 3A (99009A, Saudi Arabia, -5 x 63 km above GEO)
- Galaxy IVR (00020A, USA, 111 x 136 km above GEO)
- Ekran 21 (00014A, Russia, 65 x 322 km above GEO)
- Beidou 4 (07003A, China, 51 x 585 km above GEO)

At the moment it is not clear if Arabsat 3A has reached its end-of-life or if it is only relocated. However it has not manoeuvred since 5 months. Galaxy 4R suffered malfunctions of its primary and secondary propulsion systems prior to 2004 and was not able to maneuver to the desired disposal orbit

3 spacecraft seem to be abandoned and have started librating around the libration point L1:

- Cosmos 2371 (00036A, Russia)
- Raduga 1-5 (00049A, Russia)
- Cosmos-2379 (01037A, Russia)

This analysis has shown that in 2009, twelve years after the IADC guidelines were established, there are still too many satellites that were not or could not be properly reorbited.

Besides the improper reorbiting of aging satellites, also the release of rocket bodies still is a concern in GEO. The Proton-M fourth stage (Briz M, 09007D, Russia) from the Ekspress AM-44 and MD-1 launch crosses the geostationary ring every day (perigee 50 km below and apogee 1600 km above GEO). Also the Proton-K fourth stage (Block DM-2, 09010B, Russia) from the Raduga 1-8 launch which ended up in a drift orbit 50 x 100 km above GEO and the Delta 4 second stage (09001B, US) from the USA 202 launch which ended up in a drift orbit 160 x 290 km above GEO clearly violate the IADC guidelines.

## 8 References

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

## 9 Acknowledgements

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