

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 2004. Based on orbital data in ESA's DISCOS database 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 0.1 and inclination below 20 deg) is analysed. From 869 objects for which Two-Line-Elements (TLE) are available, 304 are controlled inside their longitude slots, 416 are drifting above, below or through GEO, 143 are in a libration orbit and 6 whose status could not be determined (status of Dec. 2004). Furthermore, there are 42 controlled satellites and 213 uncontrolled objects without TLEs (of which 65 have not been catalogued and 60 not even identified). Thus the total number of known objects in the geostationary region is 1124, out of which 346 are controlled, 712 are uncontrolled, 6 could not be classified and 60 are not identified.

During 2004 thirteen spacecraft reached end-of-life. Five of them were reorbited following the IADC recommendations. Five were reorbited with an insufficient increase in altitude. Three spacecraft were abandoned without a proper end-of-life disposal manoeuvre.

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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 0.1
- mean motion between 0.9 and 1.1 revolution per sidereal day, corresponding approximately to a semi-major axis of 42164 ± 2800 km
- inclination lower than 20 degrees

The basic source of information are the NASA Two-Line Elements (TLE). The DISCOS Database is updated at regular intervals by ESOC's Mission Analysis 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 classification of objects for which no TLEs are available at all is following the classification made by Vladimir Agapov, Keldysh Institute for Applied Mathematics, Moscow (KIAM), supported by Space Informatics and Analytical Systems, Moscow, Russia.
- 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: available TLEs are older than 6 months.
- 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 4.9 (Uncontrolled uncatalogued objects) and 4.10 (Unidentified objects) are not included in this list.

COSPAR	NAME	TABLE	STATUS	No
64047A	Syncom 3	2	D	2
65028A	Intelsat I F-1	1	L2	21
66053A	GGTS 1	1	D	390
66053B	IDCSP 1	1	D	389
66053C	IDCSP 2	1	D	387
66053D	IDCSP 3	1	D	384
66053E	IDCSP 4	2	D	11
66053F	IDCSP 5	1	D	381
66053G	IDCSP 6	2	D	9
66053H	IDCSP 7	2	D	8
66053J	Titan IIIC stage 3 (Transtage)	1	D	377
66110A	ATS 1	1	D	301
67001A	Intelsat II F-2	1	D	299
67003A	IDCSP 8	1	D	391
67003B	IDCSP 9	2	D	17
67003C	IDCSP 10	2	D	16
67003D	IDCSP 11	2	D	15
67003E	IDCSP 12	2	D	14
67003F	IDCSP 13	2	D	13
67003G	IDCSP 14	1	D	383
67003H	IDCSP 15	1	D	380
67003J	Titan IIIC stage 3 (Transtage)	2	D	18
67026A	Intelsat II F-3	1	L1	87
67066A	IDCSP 16	1	D	398
67066B	IDCSP 17	1	D	397
67066C	IDCSP 18	1	D	396
67066D	IDCSP 19	1	D	395
67066E	LES 5	1	D	394
67066F	DODGE 1	1	D	393
67066G	Titan IIIC stage 3 (Transtage)	1	D	392
67094A	Intelsat II F-4	1	L2	24
67111A	ATS 3	1	C2	51
68050A	OPS 9341 (IDSCS 20)	1	D	388
68050B	OPS 9342 (IDSCS 21)	1	D	386
68050C	OPS 9343 (IDSCS 22)	1	D	385
68050D	OPS 9344 (IDSCS 23)	2	D	12
68050E	OPS 9345 (IDSCS 24)	1	D	382
68050F	OPS 9346 (IDSCS 25)	2	D	10
68050G	OPS 9347 (IDSCS 26)	1	D	379
68050H	OPS 9348 (IDSCS 27)	1	D	378
68050J	Titan IIIC stage 3 (Transtage)	1	D	376
68063A	OPS 2222 (CANYON 1)	2	U	1
68063B	Atlas SLV-3A Agena D stage 2	2	U	2
68081A	OV2 5	1	D	360
68081C	OV5 4	2	L1	3
68081D	LES 6	1	L2	19
68081E	Titan IIIC stage 3 (Transtage)	1	D	359
68081G	LES 6 operational debris	1	D	338
68081H	LES 6 operational debris	2	D	7
68116A	Intelsat III F-2	1	D	42
69011A	Intelsat III F-3	2	L1	1
69013A	TACSAT 1	2	D	6
69013B	Titan IIIC stage 3 (Transtage)	1	D	307
69036A	OPS 3148 (CANYON 2)	2	U	3
69036B	Atlas SLV-3A Agena D stage 2	2	U	4

COSPAR	NAME	TABLE	STATUS	No
69069A	ATS 5	1	D	184
69069D	JPL SR-28-3 (ATS 5 AKM)	1	D	83
69101A	Skynet 1A	1	L2	6
70003A	Intelsat III F-6	1	D	146
70021A	NATO I	1	L2	9
70032A	Intelsat III F-7	2	L2	1
70046A	OPS 5346 (Rhyolite 1)	2	U	5
70055A	Intelsat III F-8	1	D	364
70069A	OPS 7329 (CANYON 3)	2	U	6
70069B	Atlas SLV-3A Agena D stage 2	2	U	7
71006A	Intelsat IV F-2	1	D	126
71009A	NATO IIB	1	L2	5
71039A	OPS 3811 (DSP F2)	2	U	8
71039B	Titan IIIC stage 3 (Transtage)	2	U	9
71095A	OPS 9431 (DSCS II F-1)	1	L2	10
71095B	OPS 9432 (DSCS II F-2)	1	L3	1
71095C	Titan IIIC stage 3 (Transtage)	1	D	31
71116A	Intelsat IV F-3	1	D	198
72003A	Intelsat IV F-4	1	D	226
72010A	OPS 1570 (DSP F3)	2	U	10
72010B	Titan IIIC stage 3 (Transtage)	2	U	11
72041A	Intelsat IV F-5	1	D	276
72090A	Anik A1	1	D	125
72101A	OPS 9390 (CANYON 5)	2	U	12
73013A	OPS 6063 (Rhyolite 2)	2	U	13
73023A	Anik A2	1	D	220
73040A	OPS 6157 (DSP F4)	2	U	14
73040B	Titan IIIC stage 3 (Transtage)	2	U	15
73058A	Intelsat IV F-7	1	D	145
73100A	OPS 9433 (DSCS II F-3)	1	D	44
73100B	OPS 9434 (DSCS II F-4)	1	D	36
73100D	Titan IIIC stage 3 (Transtage)	1	D	6
74017A	Cosmos 637	1	D	328
74017F	Proton-K fourth stage (Block DM)	1	D	336
74022A	Westar I	1	D	239
74033A	SMS 1	1	D	107
74039A	ATS 6	1	D	363
74039C	Titan IIIC stage 3 (Transtage)	1	D	324
74060A	Molniya 1-S	1	L1	52
74060F	Proton-K fourth stage (Block DM)	1	L1	69
74075A	Westar II	1	D	231
74093A	Intelsat IV F-8	1	D	217
74094A	Skynet 2B	1	L1	84
74101A	Symphonie A	1	D	248
75011A	SMS 2	1	D	185
75011F	Aerojet SVM-5 (SMS 2 AKM)	1	D	104
75038A	Anik A3	1	D	268
75042A	Intelsat IV F-1	1	D	161
75055A	OPS 4966 (CANYON 6)	2	U	16
75055B	Atlas SLV-3A Agena D stage 2	2	U	17
75077A	Symphonie B	1	D	252
75091A	Intelsat IVA F-1	1	D	243
75097A	Cosmos 775	1	L1	58
75097F	Proton-K fourth stage (Block DM)	1	D	275
75100A	GOES 1	1	L2	15

COSPAR	NAME	TABLE	STATUS	No
75100F	Aerojet SVM-5 (GOES 1 AKM)	1	D	362
75117A	RCA Satcom I	1	D	196
75118A	OPS 3165 (DSP F5)	2	U	18
75118C	Titan IIIC stage 3 (Transtage)	2	U	19
75118D	OPS 3165 debris (Telescope aperture sun	2	U	20
75123A	Raduga 1	1	L1	18
75123F	Proton-K fourth stage (Block DM)	1	D	313
76004A	Hermes	1	L2	18
76010A	Intelsat IVA F-2	1	D	204
76017A	Marisat 1	1	D	152
76023A	LES 8 (RTGPP)	1	L2	12
76023B	LES 9 (RTGPP)	1	L2	3
76023F	Titan IIIC stage 3 (Transtage)	1	D	87
76023J	LES 8, LES 9 operational debris	1	D	86
76023K	LES 8, LES 9 operational debris	1	D	352
76029A	RCA Satcom II	1	D	109
76035A	NATO IIIA	1	D	229
76042A	Comstar 1A	1	D	224
76053A	Marisat 2	1	D	17
76059A	OPS 2112 (DSP F6)	2	U	21
76059C	Titan IIIC stage 3 (Transtage)	2	U	22
76059D	OPS 2112 debris (Telescope aperture sun	2	U	23
76066A	Palapa 1	1	D	272
76073A	Comstar 2	1	D	254
76092A	Raduga 2	1	L1	20
76092F	Proton-K fourth stage (Block DM)	1	L1	32
76101A	Marisat 3	1	C2	64
76107A	Ekran 1	1	L1	31
76107F	Proton-K fourth stage (Block DM)	1	D	357
77005A	NATO IIIB	1	D	11
77007A	OPS 3151 (DSP F7)	2	U	24
77007C	Titan IIIC stage 3 (Transtage)	2	U	25
77007D	OPS 3151 debris (Telescope aperture sun	2	U	26
77014A	Kiku-2	1	D	258
77018A	Palapa 2	1	D	264
77034A	OPS 9437 (DSCS II F-7)	1	D	25
77034B	OPS 9438 (DSCS II F-8)	1	D	13
77034C	Titan IIIC stage 3 (Transtage)	1	D	14
77038A	OPS 9751 (CANYON 7)	2	U	27
77038C	Atlas SLV-3A Agena D stage 2	2	U	28
77041A	Intelsat IVA F-4	1	D	179
77048A	GOES 2	1	D	171
77048G	Aerojet SVM-5 (GOES 2 AKM)	1	D	318
77065A	Himawari	1	D	159
77071A	Raduga 3	1	L1	60
77071F	Proton-K fourth stage (Block DM)	1	D	53
77080A	SIRIO 1	1	L1	2
77092A	Ekran 2	1	L1	39
77092G	Proton-K fourth stage (Block DM)	1	D	349
77092H	Ekran 2 fragmentation debris	1	L1	75
77092J	Ekran 2 fragmentation debris	1	D	262
77108A	Meteosat 1	1	L1	79
77108D	Mage 1 (Meteosat 1 AKM)	1	D	58
77114A	OPS 4258 (AQUACADE 3)	2	U	29
77118A	Sakura	1	D	133

COSPAR	NAME	TABLE	STATUS	No
78002A	Intelsat IVA F-3	1	D	241
78016A	OPS 6391 (FLTSATCOM F1)	2	D	5
78035A	Intelsat IVA F-6	1	L1	85
78038A	OPS 8790 (AQUACADE 4)	2	U	30
78039A	Yuri	1	L1	53
78044A	OTS 2	1	D	143
78058A	OPS 9454 (VORTEX 1) (CHALET 1)	2	U	31
78058B	Titan IIIC stage 3 (Transtage)	2	U	32
78062A	GOES 3	1	L2	8
78062D	Aerobet SVM-5 (GOES 3 AKM)	1	D	183
78068A	Comstar 3	1	D	151
78071A	ESA GEOS 2	1	D	168
78073A	Raduga 4	1	L1	57
78073F	Proton-K fourth stage (Block DM)	1	D	37
78106A	NATO IIIC	1	D	98
78113A	OPS 9441 (DSCS II F-11)	1	D	3
78113B	OPS 9442 (DSCS II F-12)	1	D	95
78113D	Titan IIIC stage 3 (Transtage)	1	D	2
78116A	Anik B1	1	D	222
79015A	Ekran 3	1	L1	40
79015D	Proton-K fourth stage (Block DM)	1	D	350
79035A	Raduga 5	1	L1	17
79035E	Proton-K fourth stage (Block DM)	1	D	291
79038A	OPS 6392 (FLTSATCOM F2)	1	D	101
79053A	OPS 7484 (DSP F8)	2	U	33
79053C	Titan IIIC stage 3 (Transtage)	2	U	34
79053D	OPS 7484 debris (Telescope aperture sun)	2	U	35
79062A	Gorizont 2	1	L1	22
79062D	Proton-K fourth stage (Block DM)	1	D	47
79072A	Westar III	1	D	247
79086A	OPS 1948 (VORTEX 2) (CHALET 2)	2	U	36
79086C	Titan IIIC stage 3 (Transtage)	2	U	37
79087A	Ekran 4	1	L1	30
79087C	Proton-K fourth stage (Block DM)	1	D	311
79098A	OPS 9443 (DSCS II F-13)	1	D	15
79098B	OPS 9444 (DSCS II F-14)	1	D	92
79098C	Titan IIIC stage 3 (Transtage)	1	D	12
79105A	Gorizont 3	1	L1	55
79105E	Proton-K fourth stage (Block DM)	1	D	114
80004A	OPS 6393 (FLTSATCOM F3)	1	L2	33
80016A	Raduga 6	1	L1	51
80016D	Proton-K fourth stage (Block DM)	1	D	43
80049A	Gorizont 4	1	D	111
80049F	Proton-K fourth stage (Block DM)	1	D	66
80060A	Ekran 5	2	L1	2
80060F	Proton-K fourth stage (Block DM)	1	D	361
80074A	GOES 4	1	D	157
80081A	Raduga 7	1	L2	28
80081F	Proton-K fourth stage (Block DM)	1	D	250
80087A	OPS 6394 (FLTSATCOM F4)	2	D	4
80091A	SBS I	1	D	223
80098A	Intelsat V F-2	1	D	129
80104A	Ekran 6	1	L1	35
80104E	Proton-K fourth stage (Block DM)	1	D	351
81018A	Comstar 4	1	L1	7

COSPAR	NAME	TABLE	STATUS	No
81025A	OPS 7350 (DSP F9)	2	U	38
81025C	Titan IIIC stage 3 (Transtage)	2	U	39
81027A	Raduga 8	1	D	304
81027F	Proton-K fourth stage (Block DM)	1	D	46
81049A	GOES 5	1	L2	17
81050A	Intelsat V F-1	1	D	127
81057A	Meteosat 2	1	D	118
81057B	APPLE	1	D	261
81057F	Mage 1 (Meteosat 2 AKM)	1	D	167
81061A	Ekran 7	1	L1	41
81061F	Proton-K fourth stage (Block DM)	1	D	337
81069A	Raduga 9	1	L1	61
81069F	Proton-K fourth stage (Block DM)	1	D	51
81073A	FLTSATCOM F5	1	D	105
81076A	Himawari-2	1	D	191
81096A	SBS II	1	D	287
81102A	Raduga 10	1	L1	16
81102F	Proton-K fourth stage (Block DM)	1	D	298
81107A	OPS 4029 (VORTEX 3)	2	C	1
81107C	Titan IIIC stage 3 (Transtage)	2	U	40
81114A	RCA Satcom IIIR	1	D	277
81119A	Intelsat V F-3	1	D	182
81122A	Marecs A	1	D	8
82004A	RCA Satcom IV	1	D	195
82009A	Ekran 8	1	D	245
82009F	Proton-K fourth stage (Block DM)	1	D	335
82014A	Westar IV	1	D	214
82017A	Intelsat V F-4	1	D	156
82019A	OPS 8701 (DSP F10)	2	U	41
82019B	Titan IIIC stage 3 (Transtage)	2	U	42
82020A	Gorizont 5	1	D	99
82020F	Proton-K fourth stage (Block DM)	1	D	112
82031A	Insat-IA	1	L1	68
82044A	Cosmos 1366	1	L1	13
82044F	Proton-K fourth stage (Block DM)	1	L1	89
82058A	Westar V	1	D	154
82082A	Anik D1	1	D	279
82093A	Ekran 9	1	L1	48
82093F	Proton-K fourth stage (Block DM)	1	D	347
82097A	Intelsat V F-5	1	D	94
82103A	Gorizont 6	1	L2	26
82103E	Proton-K fourth stage (Block DM)	1	D	303
82105A	Aurora I	1	L2	4
82106A	DSCS II F-16	1	D	9
82106B	DSCS III A-01	2	D	3
82106D	IUS stage 2	1	D	169
82110B	SBS III	1	D	244
82110C	Anik C3	1	D	240
82113A	Raduga 11	1	D	52
82113F	Proton-K fourth stage (Block DM)	1	D	38
83006A	Sakura 2A	1	D	174
83016A	Ekran 10	1	D	7
83016F	Proton-K fourth stage (Block DM)	1	D	342
83026B	TDRS-East	1	C2	56
83028A	Raduga 12	1	L1	15

COSPAR	NAME	TABLE	STATUS	No
83028F	Proton-K fourth stage (Block DM)	1	D	266
83030A	RCA Satcom IR	1	D	232
83041A	GOES 6	1	L2	16
83047A	Intelsat V F-6	1	D	147
83058A	Eutelsat I F-1 (ECS 1)	1	D	128
83059B	Anik C2	1	D	142
83059C	Palapa Pacific System	1	D	293
83065A	Galaxy I	1	D	283
83066A	Gorizont 7	1	D	91
83066F	Proton-K fourth stage (Block DM)	1	D	41
83077A	Arabsat 1D-R	1	D	186
83081A	Sakura 2B	1	D	123
83088A	Raduga 13	1	D	82
83088F	Proton-K fourth stage (Block DM)	1	D	40
83089B	Insat-IB	1	L1	77
83094A	RCA Satcom IIR	1	D	175
83098A	Galaxy II	1	D	296
83100A	Ekran 11	1	L1	44
83100F	Proton-K fourth stage (Block DM)	1	D	339
83105A	Intelsat V F-7	1	D	205
83118A	Gorizont 8	1	D	88
83118F	Proton-K fourth stage (Block DM)	1	L1	23
84005A	Yuri 2A	1	D	136
84009A	OPS 0441 (VORTEX 4)	2	U	43
84009C	Titan 34D stage 3 (Transtage)	2	U	44
84016A	Raduga 14	1	L1	19
84016F	Proton-K fourth stage (Block DM)	1	L1	38
84022A	Cosmos 1540	1	L1	8
84022F	Proton-K fourth stage (Block DM)	1	D	234
84023A	Intelsat V F-8	1	D	32
84028A	Ekran 12	1	D	21
84028F	Proton-K fourth stage (Block DM)	1	D	356
84031A	Cosmos 1546	1	L1	11
84031F	Proton-K fourth stage (Block DM)	1	D	176
84035A	STW F-2	1	L1	81
84037A	OPS 7641 (DSP F11)	2	U	45
84037B	Titan 34D stage 3 (Transtage)	2	U	46
84041A	Gorizont 9	1	L1	29
84041D	Proton-K fourth stage (Block DM)	1	D	110
84049A	Chinasat 5 (Spacenet 1)	1	D	255
84063A	Raduga 15	1	L1	74
84063F	Proton-K fourth stage (Block DM)	1	D	370
84078A	Gorizont 10	1	L2	23
84078F	Proton-K fourth stage (Block DM)	1	L1	64
84080A	Himawari-3	1	D	227
84080E	Star 27 (Himawari-3 AKM)	2	D	1
84081A	Eutelsat I F-2 (ECS 2)	1	D	121
84081B	Telecom 1A	1	D	93
84090A	Ekran 13	1	D	20
84090F	Proton-K fourth stage (Block DM)	1	D	348
84093B	SBS IV	1	C2	48
84093C	Leasat 2	1	D	34
84093D	Telstar 3C	1	D	215
84101A	Galaxy III	1	D	228
84113B	Arabsat 1D	1	D	131

COSPAR	NAME	TABLE	STATUS	No
84113C	Leasat 1	1	D	102
84114A	Spacenet 2	1	D	211
84114B	Marecs B2	1	D	18
84115A	NATO IIID	1	D	5
84129A	USA 7 (DSP F12)	2	U	47
84129B	Titan 34D stage 3 (Transtage)	2	U	48
85007A	Gorizont 11	1	L3	10
85007D	Proton-K fourth stage (Block DM)	1	D	367
85010B	USA 8 (MAGNUM 1)	2	C	2
85010D	IUS stage 2	2	U	49
85015A	Arabsat 1A	1	D	306
85015B	Brazilsat 1	1	D	189
85016A	Cosmos 1629	1	L2	31
85016F	Proton-K fourth stage (Block DM)	1	D	173
85024A	Ekran 14	1	D	4
85024D	Proton-K fourth stage (Block DM)	1	D	345
85025A	Intelsat VA F-10	1	D	89
85028B	Anik C1	1	D	202
85028C	Leasat 3	1	D	28
85035A	Gstar 1	1	C2	52
85035B	Telecom 1B	1	L1	88
85048B	Morelos 1	1	D	180
85048C	Arabsat 1B	1	D	305
85048D	Telstar 3D	1	D	236
85055A	Intelsat VA F-11	1	D	273
85070A	Raduga 16	1	L2	27
85070F	Proton-K fourth stage (Block DM)	1	D	57
85076B	Optus A1	1	D	213
85076C	ASC 1	1	L2	14
85076D	Leasat 4	1	D	55
85087A	Intelsat VA F-12	1	D	141
85092B	USA 11 (DSCS III B-04)	2	C	3
85092C	USA 12 (DSCS III B-05)	2	C	4
85092E	IUS stage 2	2	U	50
85102A	Cosmos 1700	1	L1	25
85102D	Proton-K fourth stage (Block DM-2)	1	D	321
85107A	Raduga 17	1	D	289
85107F	Proton-K fourth stage (Block DM)	1	D	35
85109B	Morelos 2	1	D	194
85109C	Optus A2	1	D	246
85109D	Satcom Ku-2	1	D	197
86003B	Satcom Ku-1	1	D	192
86007A	Raduga 18	1	D	124
86007F	Proton-K fourth stage (Block DM)	1	D	56
86010A	STTW-1	1	L1	45
86016A	Yuri 2B	1	D	163
86026A	Gstar 2	1	D	219
86026B	Brazilsat 2	1	D	200
86027A	Cosmos 1738	1	L3	12
86027F	Proton-K fourth stage (Block DM)	1	D	50
86038A	Ekran 15	1	D	23
86038D	Proton-K fourth stage (Block DM)	1	D	354
86044A	Gorizont 12	1	L1	54
86044F	Proton-K fourth stage (Block DM)	1	D	48
86082A	Raduga 19	1	D	97

COSPAR	NAME	TABLE	STATUS	No
86082F	Proton-K fourth stage (Block DM)	1	D	39
86090A	Gorizont 13	1	D	26
86090D	Proton-K fourth stage (Block DM)	1	L1	72
86096A	USA 20 (FLTSATCOM F7)	2	C2	6
87022A	GOES 7	1	C2	42
87022F	Star 27 (GOES 7 AKM)	2	U	51
87028A	Raduga 20	1	D	19
87028D	Proton-K fourth stage (Block DM)	1	D	235
87029A	Agila 1	1	D	242
87040A	Gorizont 14	1	D	45
87040D	Proton-K fourth stage (Block DM)	1	D	366
87070A	Kiku-5	1	D	165
87073A	Ekran 16	1	D	22
87073D	Proton-K fourth stage (Block DM)	1	D	355
87078A	Optus A3	1	C2	40
87078B	Eutelsat I F-4 (ECS 4)	1	D	116
87084A	Cosmos 1888	1	L3	11
87084D	Proton-K fourth stage (Block DM)	1	D	265
87091A	Cosmos 1894	1	L2	32
87091D	Proton-K fourth stage (Block DM)	1	L3	5
87095A	TV-Sat 1	1	D	134
87096A	Cosmos 1897	1	L1	28
87096D	Proton-K fourth stage (Block DM)	1	D	317
87097A	USA 28 (DSP F13)	2	U	52
87097B	Titan 34D stage 3 (Transtage)	2	U	53
87100A	Raduga 21	1	L2	20
87100D	Proton-K fourth stage (Block DM)	1	D	371
87109A	Ekran 17	1	D	16
87109D	Proton-K fourth stage (Block DM)	1	D	331
88012A	Sakura 3A	1	D	80
88014A	STTW-2	1	L1	21
88018A	Spacenet 3R	1	D	201
88018B	Telecom 1C	1	D	70
88028A	Gorizont 15	1	D	59
88028D	Proton-K fourth stage (Block DM)	1	D	54
88034A	Cosmos 1940	1	D	325
88034D	Proton-K fourth stage (Block DM)	1	D	274
88036A	Ekran 18	1	D	10
88036E	Proton-K fourth stage (Block DM)	1	D	343
88040A	Intelsat VA F-13 (NSS 513)	1	D	103
88051A	Meteosat 3	1	D	27
88051C	PAS 1	1	D	170
88063A	Insat-IC	1	L1	24
88063B	Eutelsat I F-5 (ECS 5)	1	D	81
88066A	Cosmos 1961	1	L1	5
88066D	Proton-K fourth stage (Block DM-2)	1	D	113
88071A	Gorizont 16	1	D	253
88071D	Proton-K fourth stage (Block DM)	1	D	316
88081A	Gstar 3	1	L2	2
88081B	SBS V	1	D	218
88086A	Sakura 3B	1	D	155
88091B	TDRS-West	1	C2	23
88091D	IUS stage 2	1	D	309
88095A	Raduga 22	1	L1	80
88095F	Proton-K fourth stage (Block DM)	1	D	67

COSPAR	NAME	TABLE	STATUS	No
88098A	TDF 1	1	D	150
88108A	Ekran 19	1	D	24
88108D	Proton-K fourth stage (Block DM)	1	D	358
88109A	Skynet 4B	1	D	203
88109B	Astra 1A	1	D	90
88111A	STTW-3	1	L1	56
89004A	Gorizont 17	1	D	138
89004F	Proton-K fourth stage (Block DM)	1	D	73
89006A	Intelsat VA F-15	1	D	140
89020A	JC-Sat 1	1	D	188
89020B	Meteosat 4	1	D	29
89020E	Mage 1 (Meteosat 4 AKM)	1	D	308
89021B	TDRS 4	1	C2	58
89021D	IUS stage 2	1	D	320
89027A	Tele-X	1	D	148
89030A	Raduga 23	1	L1	67
89030D	Proton-K fourth stage (Block DM)	1	D	65
89035A	USA 37 (VORTEX 6)	2	C	5
89035C	Titan 34D stage 3 (Transtage)	2	U	54
89041A	Superbird A	1	D	210
89041B	DFS-Kopernikus 1	1	D	323
89046A	USA 39 (DSP F14)	2	C	6
89046D	IUS stage 2	2	U	55
89046E	USA 39 debris (Telescope aperture sunco	2	U	56
89048A	Raduga 1-1	1	D	117
89048D	Proton-K fourth stage (Block DM)	1	D	64
89052A	Gorizont 18	1	D	172
89052D	Proton-K fourth stage (Block DM)	1	D	368
89053A	Olympus 1	1	D	353
89062A	TV-Sat 2	1	D	230
89067A	Sirius 1	1	D	149
89069A	USA 43 (DSCS II F-15)	2	U	57
89069B	USA 44 (DSCS III A-02)	2	C	7
89069D	Titan 34D stage 3 (Transtage)	2	U	58
89070A	Himawari-4	1	D	33
89070C	Star 27 (Himawari-4 AKM)	1	D	119
89077A	USA 46 (FLTSATCOM F8)	2	C2	7
89081A	Gorizont 19	1	L1	59
89081D	Proton-K fourth stage (Block DM)	1	D	319
89087A	Intelsat VI F-2	1	C2	17
89090B	USA 48 (MAGNUM 2)	2	C	8
89090D	IUS stage 2	2	U	59
89098A	Raduga 24	1	L1	49
89098D	Proton-K fourth stage (Block DM)	1	D	62
89101A	Cosmos 2054	1	L2	34
89101D	Proton-K fourth stage (Block DM)	1	D	85
89101G	Cosmos 2054 debris	1	D	61
90001A	Skynet 4A	1	C2	63
90001B	JC-Sat 2	1	D	100
90002B	Leasat 5	1	C2	29
90011A	DFH-2A	1	L1	34
90016A	Raduga 25	1	L2	25
90016D	Proton-K fourth stage (Block DM)	1	D	259
90021A	Intelsat VI F-3	1	C2	68
90030A	AsiaSat 1	1	D	158

COSPAR	NAME	TABLE	STATUS	No
90034A	Palapa B-2R	1	C2	12
90051A	Insat-ID	1	L1	12
90054A	Gorizont 20	1	L1	27
90054D	Proton-K fourth stage (Block DM)	1	D	315
90056A	Intelsat VI F-4	1	C2	39
90061A	Cosmos 2085	1	L1	4
90061D	Proton-K fourth stage (Block DM-2)	1	L1	70
90063A	TDF 2	1	D	106
90063B	DFS-Kopernikus 2	1	D	190
90074A	Thor I	1	D	153
90077A	Yuri 3A	1	D	122
90079A	Skynet 4C	1	C2	74
90079B	Eutelsat II F-1	1	D	166
90091A	SBS VI	1	C1	180
90091B	Galaxy VI	1	D	212
90093A	Inmarsat 2-F1	1	C2	36
90094A	Gorizont 21	1	L3	4
90094D	Proton-K fourth stage (Block DM-2)	1	D	332
90095A	USA 65 (DSP F15)	2	C	9
90095D	IUS stage 2	2	U	60
90097B	USA 67 (SDS 2)	2	C	10
90097D	AKM ?	2	U	61
90100A	Satcom C-1	1	C2	61
90100B	Gstar 4	1	D	144
90102A	Gorizont 22	1	L1	83
90102D	Proton-K fourth stage (Block DM-2)	1	D	63
90112A	Raduga 26	1	L1	33
90112D	Proton-K fourth stage (Block DM-2)	1	D	260
90116A	Raduga 1-2	1	L1	43
90116D	Proton-K fourth stage (Block DM-2)	1	D	68
91001A	NATO IVA	1	C2	69
91003A	Italsat 1	1	D	249
91003B	Eutelsat II F-2	1	C2	16
91010A	Cosmos 2133	1	L1	9
91010F	Proton-K fourth stage (Block DM-2)	1	D	282
91014A	Raduga 27	1	L1	73
91014D	Proton-K fourth stage (Block DM-2)	1	D	372
91015A	Astra 1B	1	C1	13
91015B	Meteosat 5	1	C2	19
91015E	Mage 1 (Meteosat 5 AKM)	1	D	285
91018A	Inmarsat 2-F2	1	C2	54
91026A	Anik E2	1	C2	49
91028A	Spacenet 4	1	C2	41
91037A	Aurora II	1	D	135
91046A	Gorizont 23	1	D	132
91046D	Proton-K fourth stage (Block DM-2)	1	D	333
91054B	TDRS 5	1	C2	44
91054D	IUS stage 2	1	L3	2
91055A	Intelsat VI F-5	3	Ind	1
91060A	Yuri 3B	1	D	120
91064A	Cosmos 2155	1	L3	3
91064B	Proton-K fourth stage (Block DM-2)	1	D	238
91067A	Anik E1	1	C2	50
91074A	Gorizont 24	1	D	96
91074D	Proton-K fourth stage (Block DM-2)	1	D	208

COSPAR	NAME	TABLE	STATUS	No
91075A	Intelsat VI F-1	1	C1	52
91079A	Cosmos 2172	1	L3	9
91079D	Proton-K fourth stage (Block DM-2)	1	D	108
91080B	USA 75 (DSP F16)	2	C	11
91080D	IUS stage 2	2	U	62
91083A	Eutelsat II F-3	1	C2	8
91084A	Telecom 2A	1	C2	2
91084B	Inmarsat 2-F3	1	C2	47
91087A	Raduga 28	1	L1	66
91087D	Proton-K fourth stage (Block DM-2)	1	D	75
92006A	USA 78 (DSCS III B-14)	2	C	12
92006C	IABS	2	U	63
92010A	Superbird B1	1	D	137
92010B	Insat-IIDT (Arabsat 1C)	1	D	115
92013A	Galaxy V	1	C1	141
92017A	Gorizont 25	1	C2	34
92017D	Proton-K fourth stage (Block DM-2)	1	D	341
92021A	Telecom 2B	1	D	187
92021B	Inmarsat 2-F4	1	C2	31
92027A	Palapa B4	1	C1	97
92032A	Intelsat K (NSS K)	1	D	30
92037A	USA 82 (DSCS III B-12)	2	C	13
92037C	IABS	2	U	64
92041A	Insat-IIA	1	D	297
92041B	Eutelsat II F-4	1	D	139
92043A	Gorizont 26	1	C2	71
92043D	Proton-K fourth stage (Block DM-2)	1	D	60
92054A	Optus B1	1	C1	121
92057A	Satcom C-4	1	D	302
92059A	Cosmos 2209	1	L2	29
92059D	Proton-K fourth stage (Block DM-2)	1	D	221
92060A	Hispasat 1A	1	D	164
92060B	Satcom C-3	1	C1	137
92066A	DFS-Kopernikus 3	1	D	209
92072A	Galaxy VII	1	D	206
92074A	Ekran 20	1	L1	37
92074D	Proton-K fourth stage (Block DM-2)	1	D	344
92082A	Gorizont 27	1	D	295
92082D	Proton-K fourth stage (Block DM-2)	1	D	76
92084A	Superbird A1	1	C1	119
92088A	Cosmos 2224	1	L1	90
92088D	Proton-K fourth stage (Block DM-2)	1	D	269
93003B	TDRS 6	1	C2	57
93003D	IUS stage 2	1	D	280
93013A	Raduga 29	1	C2	5
93013D	Proton-K fourth stage (Block DM-2)	1	D	74
93015A	USA 98 (UFO F1)	1	D	160
93031A	Astra 1C	1	C1	12
93039A	Galaxy IV	1	L1	3
93046A	USA 93 (DSCS III B-09)	2	C	14
93046C	IABS	2	U	65
93048A	Hispasat 1B	1	C2	65
93048B	Insat-IIB	1	D	251
93056A	USA 95 (UFO F2)	2	C	15
93058B	ACTS	1	L2	1

COSPAR	NAME	TABLE	STATUS	No
93062A	Raduga 30	1	C2	21
93062D	Proton-K fourth stage (Block DM-2)	1	L1	86
93066A	Intelsat VII F-1	1	C1	127
93069A	Gorizont 28	3	Ind	2
93069D	Proton-K fourth stage (Block DM-2)	1	D	312
93072A	Gorizont 29	1	D	288
93072D	Proton-K fourth stage (Block DM-2)	1	D	369
93073A	Solidaridad 1	1	L2	7
93073B	Meteosat 6	1	C2	4
93073E	Mage 1 (Meteosat 6 AKM)	1	D	256
93074A	USA 97 (DSCS III B-10)	2	C	16
93074B	IABS	2	U	66
93076A	NATO IVB	1	C2	67
93077A	Telstar 4A	1	L2	11
93078A	DirecTV-1	1	C1	161
93078B	Thaicom 1	1	C1	98
94002A	Gals 1	1	L1	63
94002D	Proton-K fourth stage (Block DM-2M)	1	D	181
94008A	Raduga 1-3	1	L1	42
94008D	Proton-K fourth stage (Block DM-2)	1	D	72
94009A	USA 99 (Milstar DFS-1)	2	C	17
94009B	Titan IVA stage 3 (Centaur)	2	U	67
94012A	Raduga 31	1	L1	50
94012D	Proton-K fourth stage (Block DM-2)	1	D	79
94013A	Galaxy IR-A	1	C1	135
94022A	GOES 8	1	D	130
94030A	Gorizont 30	1	L3	13
94030D	Proton-K fourth stage (Block DM-2)	1	D	374
94034A	Intelsat VII F-2	1	C1	44
94035A	USA 104 (UFO F3)	2	C2	9
94038A	Cosmos 2282	1	L2	30
94038D	Proton-K fourth stage (Block DM-2)	1	D	177
94040A	PAS 2	1	C1	124
94040B	BS-3N	1	C1	87
94043A	Apstar 1	1	C2	32
94047A	DirecTV-2	1	C1	164
94049A	Brazilsat B1	1	C1	184
94049B	Turksat 2	1	C2	10
94054A	USA 105 (MERCURY 1)	2	C	18
94054B	Titan IVA stage 3 (Centaur)	2	U	68
94055A	Optus B3	1	C1	116
94060A	Cosmos 2291	1	L2	36
94060D	Proton-K fourth stage (Block DM-2)	1	D	270
94064A	Intelsat VII F-3 (NSS 703)	1	C1	47
94065A	Solidaridad 2	1	C1	149
94065B	Thaicom 2	1	C1	64
94067A	Ekspress 1	1	D	225
94067D	Proton-K fourth stage (Block DM-2M)	1	L3	8
94069A	Elektro 1	1	L1	14
94069D	Proton-K fourth stage (Block DM-2)	1	D	281
94070A	Astra 1D	1	C1	21
94079A	Orion I	1	C2	60
94080A	Zongxing 6 (A)	1	D	334
94082A	Luch 1	1	L2	35
94082D	Proton-K fourth stage (Block DM-2)	1	D	330

COSPAR	NAME	TABLE	STATUS	No
94084A	USA 107 (DSP F17)	2	C	19
94084D	IUS stage 2	2	U	69
94087A	Raduga 32	1	L1	6
94087D	Proton-K fourth stage (Block DM-2)	1	D	271
95001A	Intelsat VII F-4	1	C1	53
95003A	USA 108 (UFO F4)	2	C2	4
95011B	Himawari-5	1	C2	33
95011D	Star 27 (Himawari-5 AKM)	1	D	346
95013A	Intelsat VII F-5	1	C1	194
95016A	Brazilsat B2	1	C1	185
95016B	Hot Bird 1	1	C1	9
95019A	AMSC-1	1	C2	53
95022A	USA 110 (Advanced ORION 1)	2	C	20
95022B	Titan IVA stage 3 (Centaur)	2	U	70
95023A	Intelsat VIIA F-1	1	C1	42
95025A	GOES 9	1	C2	38
95027A	USA 111 (UFO F5)	2	C2	2
95029A	DirecTV-3	1	C1	170
95035B	TDRS 7	1	C2	46
95035D	IUS stage 2	1	D	314
95038A	USA 113 (DSCS III B-07)	2	C	21
95038C	IABS	2	U	71
95040A	PAS 4	1	C1	57
95041A	Mugunghwa 1 (Koreasat 1)	1	C2	15
95043A	JC-Sat 3	1	C1	104
95044A	N-Star 1	1	C1	105
95045A	Cosmos 2319	1	L3	7
95045D	Proton-K fourth stage (Block DM-2)	1	D	290
95049A	Telstar 402R	1	L2	13
95054A	Luch 1-1	1	L1	1
95054D	Proton-K fourth stage (Block DM-2)	1	L1	78
95055A	Astra 1E	1	C1	17
95057A	USA 114 (UFO F6)	2	C2	5
95060A	USA 115 (Milstar DFS-2)	2	C	22
95060B	Titan IVA stage 3 (Centaur)	2	U	72
95063A	Gals 2	1	D	237
95063D	Proton-K fourth stage (Block DM-2M)	1	L1	82
95064A	AsiaSat 2	1	C1	79
95067A	Telecom 2C	1	C2	72
95067B	Insat-IIC	1	D	216
95069A	Galaxy IIIR	1	C1	150
95073A	EchoStar 1	1	C1	129
96002A	PAS 3R	1	C1	197
96002B	MEASAT 1	1	C1	74
96003A	Mugunghwa 2 (Koreasat 2)	1	C1	94
96005A	Gorizont 31	1	C2	35
96005D	Proton-K fourth stage (Block DM-2)	1	D	49
96006A	Palapa C1	1	C1	34
96007A	N-Star 2	1	C1	108
96015A	Intelsat VIIA F-2	1	C1	193
96020A	Inmarsat 3-F1	1	C1	50
96021A	Astra 1F	1	C1	16
96022A	MSAT	1	C1	156
96026A	USA 118 (MERCURY 2)	2	C	23
96026B	Titan IVA stage 3 (Centaur)	2	U	73

COSPAR	NAME	TABLE	STATUS	No
96030A	Palapa C2	1	C1	95
96030B	AMOS 1	1	C1	217
96033A	Galaxy IX	1	C1	173
96034A	Gorizont 32	1	C2	70
96034D	Proton-K fourth stage (Block DM-2)	1	D	69
96035A	Intelsat VII F-6	1	C1	69
96039A	Apstar 1A	1	C1	106
96040A	Arabsat 2A	1	C2	6
96040B	Turksat 3	1	C1	37
96042A	USA 127 (UFO F7)	2	C	24
96044A	Italsat 2	1	D	329
96044B	Telecom 2D	1	C1	212
96053A	Inmarsat 3-F2	1	C1	207
96053D	Proton-K fourth stage (Block DM1)	1	D	78
96054A	GE 1	1	C1	159
96055A	EchoStar 2	1	C1	130
96058A	Ekspress 2	1	L1	46
96058D	Proton-K fourth stage (Block DM-2M)	1	L1	62
96063A	Arabsat 2B	1	C1	29
96063B	MEASAT 2	1	C1	114
96067A	Hot Bird 2	1	C1	8
96070A	Inmarsat 3-F3	1	C1	126
97002A	GE 2	1	C1	157
97002B	Nahuel 1A	1	C1	183
97007A	JC-Sat 4	1	C1	103
97008A	USA 130 (DSP F18)	2	C	25
97008D	IUS stage 2	2	U	74
97008E	USA 130 debris (Telescope aperture sunc	2	U	75
97009A	Intelsat VIII F-1	1	C1	200
97011A	Tempo 2	1	C1	154
97016A	Thaicom 3	1	C1	63
97016B	BSAT-1a	1	C1	86
97019A	GOES 10	1	C1	133
97021A	Zhongxing 6 (B)	1	L1	71
97025A	Thor II	1	C1	220
97026A	Telstar 5	1	C1	166
97027A	Inmarsat 3-F4	1	C1	192
97027B	Insat-IID	1	D	375
97029A	Fengyun-2 1R	1	C2	25
97029C	Feng Yun-2 AKM	1	D	365
97031A	Intelsat VIII F-2	1	C1	30
97036A	Superbird C	1	C1	111
97040A	PAS 6	1	D	1
97041A	Cosmos 2345	1	L3	6
97041D	Proton-K fourth stage (Block DM-2)	1	D	257
97042A	Agila 2	1	C1	113
97046A	PAS 5	1	C1	24
97049A	Hot Bird 3	1	C1	5
97049B	Meteosat 7	1	C2	1
97049E	Mage 1 (Meteosat 7 AKM)	1	D	322
97050A	GE 3	1	C1	174
97053A	Intelsat VIII F-3 (NSS 803)	1	C1	128
97059A	EchoStar 3	1	C1	188
97062A	Apstar 2R	1	C1	62
97065A	USA 134 (DSCS III B-13)	2	C	26

COSPAR	NAME	TABLE	STATUS	No
97065C	IABS	1	D	340
97070A	Kupon 1	1	L1	26
97070D	Proton-K fourth stage (Block DM-2)	1	D	199
97071A	Sirius 2	1	C1	1
97071B	Cakrawatra 1	1	C1	83
97075A	JC-Sat 5	1	C1	115
97076A	Astra 1G	2	C1	1
97078A	Galaxy VIII-i	1	D	207
97083A	Intelsat 804	1	C1	125
97086A	HGS-1	1	L2	22
98002A	Skynet 4D	1	C2	62
98006A	Brazilsat B-3A	1	C1	177
98006B	Inmarsat-3 F5	1	C2	9
98013A	Hot Bird 4	1	C1	6
98014A	Intelsat 806 (NSS 806)	1	C1	198
98016A	USA 138 (UFO F8)	2	C2	3
98024A	Nilesat 101	1	C1	214
98024B	BSAT-1b	1	C1	88
98025A	Cosmos 2350	1	L1	10
98025D	Proton-K fourth stage (Block DM-2)	1	D	267
98028A	EchoStar 4	1	C2	45
98029A	USA 139 (Advanced ORION 2)	2	C	27
98029B	Titan IVB stage 3 (Centaur)	2	U	76
98033A	Zhongwei 1	1	C1	70
98035A	Thor III	1	C1	219
98037A	Intelsat 805	1	C1	191
98044A	Sinosat 1	1	C1	93
98049A	ST-1	1	C1	71
98050A	Astra 2A	1	C1	27
98052A	PAS 7	1	C1	55
98056A	Eutelsat W2	1	C1	10
98056B	Sirius 3	1	C1	2
98057A	Hot Bird 5	1	C1	22
98058A	USA 140 (UFO F9)	2	C2	8
98063A	AfriStar 1	1	C1	18
98063B	GE 5	1	C1	179
98065A	PAS 8	1	C1	123
98068A	Bonum 1	1	C1	46
98070A	Satmex 5	1	C1	147
98075A	PAS 6B	1	C1	196
99005A	Telstar 6	1	C1	168
99006A	JCSAT 6	1	C1	102
99009A	Arabsat 3A	1	C1	23
99009B	Skynet 4E	1	C2	18
99010A	Raduga 1-4	1	C2	11
99010D	Proton-K fourth stage (Block DM-2)	1	D	77
99013A	Asiasat 3S	1	C1	82
99016A	Insat 2E	1	C1	67
99018A	Eutelsat W3	1	C1	19
99027A	Nimiq	1	C1	171
99033A	Astra 1H	1	C1	14
99042A	Telkom 1	1	C1	84
99046A	Mugunghwa 3 (Koreasat 3)	1	C1	96
99047A	Yamal-100 No. 1	1	D	233
99047B	Yamal-100 No. 2	1	C2	26

COSPAR	NAME	TABLE	STATUS	No
99047E	Proton-K fourth stage (Block DM-2M)	1	D	286
99050A	Echostar 5	1	C1	145
99052A	Telstar 7	1	C1	138
99053A	LMI 1	1	C1	61
99056A	DirecTV-1R	1	C1	163
99059A	Orion 2	1	C1	208
99060A	GE 4	1	C1	162
99063A	USA 146 (UFO F10)	2	C2	1
99071A	Galaxy 11	1	C1	172
00001A	USA 148 (DSCS III B-08)	2	C	28
00001C	IABS	2	U	77
00002A	Galaxy 10R	1	C1	142
00003A	Zhongxing-22	1	C1	78
00007A	Hispasat 1C	1	C1	201
00011A	Garuda 1	1	C1	100
00012A	Superbird 4	1	C1	122
00013A	Ekspress 2A	1	C1	65
00013D	Proton-K fourth stage (Block DM-2M)	1	D	327
00016A	Asiastar	1	C1	81
00016B	Insat 3B	1	C1	68
00019A	Sesat	1	C1	32
00019D	Proton-K fourth stage (Block DM-2M)	1	D	193
00020A	Galaxy IVR	1	C1	165
00022A	GOES 11	1	C1	158
00024A	USA 149 (DSP F20)	2	C	29
00024D	IUS stage 2	2	U	78
00028A	Eutelsat W4	1	C1	33
00029A	Gorizont	1	C2	37
00029B	Proton-K fourth stage (Briz M)	1	D	300
00031A	Ekspress 3A	1	C1	210
00031D	Proton-K fourth stage (Block DM-2)	1	D	178
00032A	Feng Yun 2	1	C1	101
00032C	Feng Yun 2 AKM	1	D	292
00034A	TDRS 8	1	C2	43
00036A	Cosmos-2371	1	C2	22
00036D	Proton-K fourth stage (Block DM-2)	1	D	294
00038A	Echostar VI	1	C1	152
00043A	PAS 9	1	C1	190
00046A	Brasilsat B4	1	C1	169
00046B	Nilesat 102	1	C1	213
00049A	Raduga 1-5	1	C2	14
00049D	Proton-K fourth stage (Block DM-2)	1	D	84
00052A	Eutelsat W1	1	C1	4
00054A	Astra 2B	1	C1	25
00054B	GE 7	1	C1	132
00059A	GE-1A	1	C1	85
00060A	N-SAT-110	1	C1	91
00065A	USA 153 (DSCS III B-11)	2	C	30
00065C	IABS	2	U	79
00066A	Thuraya 1	1	C2	27
00067A	GE 6	1	C1	182
00068A	Europe*Star F1	1	C1	39
00069A	Beidou	1	C1	110
00072A	PAS 1R	1	C1	195
00076A	Anik F1	1	C1	155

COSPAR	NAME	TABLE	STATUS	No
00080A	USA 155 (SDS 3)	2	C	31
00081A	Astra 2D	1	C1	26
00081B	GE 8 (Aurora 3)	1	C1	131
00082A	Beidou 1B	1	C1	66
01002A	Turksat 2A (Eurasiasat 1)	1	C1	38
01005A	Sicral	1	C1	11
01005B	Skynet 4F	1	C2	3
01009A	USA 157 (Milstar-2 F2)	2	C	32
01009B	Titan IVB stage 3 (Centaur)	2	U	80
01011A	Eurobird	1	C1	28
01011B	BSAT-2A	1	C1	89
01012A	XM-Rock (XM 2)	1	C1	148
01014A	Ekran 21 (Ekran-M)	1	C2	28
01014C	Proton-M fourth stage (Briz M)	1	D	71
01015A	GSAT-1	1	D	373
01018A	XM-Roll (XM 1)	1	C1	175
01019A	PAS 10	1	C1	54
01020A	USA 158 (GeoLITE)	2	C	33
01024A	Intelsat 901	1	C1	206
01025A	Astra 2C	1	C1	15
01029A	Artemis	1	C2	7
01031A	GOES 12	1	C2	55
01033A	USA 159 (DSP F21)	2	C	34
01033D	IUS stage 2	2	U	81
01033E	USA 159 debris (Telescope aperture sunc	2	U	82
01037A	Cosmos-2379	1	C2	66
01037D	Proton-K fourth stage (Block DM-2)	1	L1	65
01039A	Intelsat 902	1	C1	49
01042A	Atlantic Bird 2	1	C1	211
01045A	Raduga 1-6	1	C2	20
01045D	Proton-K fourth stage (Block DM-2)	1	L1	47
01046A	USA 162 (SDS 3 F3)	2	C	35
01052A	DirecTV-4S	1	C1	160
02001A	USA 164 (Milstar-2 F3)	2	C	36
02001B	Titan IVB stage 3 (Centaur)	2	U	83
02002A	Insat 3C	1	C1	58
02006A	Echostar 7	1	C1	146
02007A	Intelsat 904	1	C1	48
02011A	TDRS 9	3	Ind	3
02015A	JCSAT-8	1	C1	117
02015B	Astra 3A	1	C1	20
02016A	Intelsat 903	1	C1	199
02019A	NSS-7	1	C1	205
02023A	DirecTV-5	1	C1	181
02027A	Intelsat 905	1	C1	204
02029A	Ekspress A1R (Express 4A)	1	C1	36
02029D	Proton-K fourth stage (Block DM-2M)	1	D	162
02030A	Galaxy 3C	1	C1	167
02035A	Stellat 5	1	C1	215
02035B	N-Star 3 (N-Star c)	1	C1	107
02038A	Hot Bird 6	1	C1	7
02039A	Echostar VIII	1	C1	153
02040A	Atlantic Bird 1	1	C1	209
02040B	MSG 1	1	C2	73
02041A	Intelsat 906	1	C1	51

COSPAR	NAME	TABLE	STATUS	No
02042B	DRTS (Kodama)	1	C1	73
02043A	KALPANA-1 (METSAT-1)	1	C1	59
02044A	Hispasat 1D	1	C1	202
02051A	Eutelsat W5	1	C1	56
02055A	TDRS 10	1	C2	59
02057A	NSS 6	1	C1	76
02062A	Nimiq 2	1	C1	178
03007A	Intelsat 907	1	C1	203
03008A	USA 167 (DSCS III A-3)	2	C	37
03008C	IABS	2	U	84
03012A	USA 169 (Milstar-2 F4)	2	C	38
03012B	Titan IVB stage 3 (Centaur)	2	U	85
03013A	Insat 3A	1	C1	75
03013B	Galaxy XII	1	C1	140
03014A	Asiasat 4	1	C1	99
03015A	Cosmos-2397	1	D	310
03015F	Proton-K fourth stage (Block DM-2)	1	L1	76
03018A	GSAT-2	1	C1	40
03020A	Hellas Sat 2	1	C1	35
03021A	Beidou 3	1	C1	92
03024A	AMC-9 (GE-12)	1	C1	176
03026A	Thuraya 2	1	C2	13
03028A	B-SAT 2C	1	C1	90
03028B	Optus C1 (Defense C1)	1	C1	118
03033A	Rainbow 1	1	C1	187
03034A	Echostar IX (Telstar 13)	1	C1	143
03040A	USA 170 (DSCS III B-6)	2	C	39
03040C	IABS	2	U	86
03041A	USA 171 (Advanced ORION 3)	2	C	40
03041B	Titan IVB stage 3 (Centaur)	2	U	87
03043A	e-Bird	1	C1	31
03043E	Insat 3E	1	C1	45
03044A	Galaxy 13/Horizons-1	1	C1	139
03052A	Zhongxing-20	1	C1	80
03053A	Yamal 200 N2 (Yamal 202)	1	C1	41
03053B	Yamal 200 N1 (Yamal 201)	1	C1	72
03053E	Proton-K fourth stage (Block DM-2M)	1	D	263
03057A	USA 174 (UFO F11)	2	C	41
03059A	Amos 2	1	C1	216
03060A	Express AM-22	1	C1	43
03060D	Proton-K fourth stage (Block DM-2M)	1	L1	36
04001A	Estrela do Sul 1 (Telstar 14)	1	C1	186
04003A	AMC-10 (GE 10)	1	C1	134
04004A	USA 176 (DSP F22)	2	C	42
04004D	IUS stage 2	2	U	88
04007A	MBSAT	1	C1	112
04008A	Eutelsat W3A	1	C1	3
04010A	Raduga-1	1	C2	24
04010F	Proton-K fourth stage (Block DM-2)	1	D	278
04011A	Superbird A2 (Superbird 6)	1	C1	120
04015A	Ekspress AM-11	1	C1	77
04015D	Proton-K fourth stage (Block DM-2M)	1	D	326
04016A	DirecTV 7S	1	C1	144
04017A	AMC-11 (GE-11)	1	C1	136
04022A	Intelsat 10-02	1	C1	218

COSPAR	NAME	TABLE	STATUS	No
04024A	Telstar 18 (APstar 5)	1	C1	109
04027A	Anik F2	1	C1	151
04031A	Amazonas	1	C1	189
04036A	EDUSAT	1	C1	60
04041A	AMC-15	3	Ind	4
04042A	Feng Yun 2C	1	C2	30
04042C	Feng Yun 2C AKM	3	Ind	5
04043A	Ekspress AM-1	3	Ind	6
04043D	Proton-K fourth stage (Block DM-2M)	1	D	284

3 Table 1: objects with recently updated orbital elements

This table contains all objects with recently updated orbital 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): $\Delta\lambda = \lambda_{max} - \lambda_{min}$
- λ_{min} : is the minimum longitude of the libration (in degrees).
- λ_{max} : is the maximum longitude of the libration (in degrees).
- N_{ly} : is the number of Two-Line Elements stored during the last 52 weeks.
- N_{tot} : is the total number of Two-Line Elements available for this object.
- MJD: is the Modified Julian Date (number of days since 01-Jan-1950) corresponding to "Date"
- a, e, i, Ω , ω and λ 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					
	Date	$\bar{\lambda}$				N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ

For explanation, see definition at the beginning of Chapter 3 on page 28.

C1 . 1	97071A	Sirius 2					
	29-DEC-04	4.80				50	352
	20086.949120	42164.62166	0.0000981	0.0096	12.2806	53.2929	4.7721
C1 . 2	98056B	Sirius 3					
	31-DEC-04	5.00				51	312
	20088.037708	42164.19948	0.0000634	0.0355	188.1821	71.4050	5.0137
C1 . 3	04008A	Eutelsat W3A					
	29-DEC-04	7.00				41	41
	20086.949734	42164.16248	0.0003762	0.0147	4.2669	267.6360	7.0265
C1 . 4	00052A	Eutelsat W1					
	30-DEC-04	9.98				51	222
	20087.810602	42164.33881	0.0004311	0.0202	4.2695	261.3764	10.0030
C1 . 5	97049A	Hot Bird 3					
	13-DEC-04	13.01				26	231
	20070.949502	42164.29115	0.0007035	0.0721	228.0174	293.8267	13.1205
C1 . 6	98013A	Hot Bird 4					
	23-DEC-04	13.02				28	204
	20080.992882	42164.38002	0.0006010	0.0327	177.2526	112.5766	12.9662
C1 . 7	02038A	Hot Bird 6					
	24-DEC-04	13.02				29	61
	20081.086169	42163.96822	0.0005018	0.0456	348.4851	298.7523	13.0283
C1 . 8	96067A	Hot Bird 2					
	16-DEC-04	13.02				29	240
	20073.793218	42163.88664	0.0004586	0.0759	86.0328	84.6429	13.0846
C1 . 9	95016B	Hot Bird 1					
	23-DEC-04	13.12				28	291
	20080.779201	42164.27181	0.0005878	0.0510	35.1876	202.7820	13.0436
C1 . 10	98056A	Eutelsat W2					
	29-DEC-04	16.01				51	312
	20086.874155	42164.36964	0.0004426	0.0257	16.8269	182.7269	16.0617
C1 . 11	01005A	Sicral					
	29-DEC-04	16.17				51	194
	20086.875509	42164.19444	0.0004428	0.1050	98.2208	267.4949	16.1512
C1 . 12	93031A	Astra 1C					
	16-DEC-04	19.18				22	406
	20073.251898	42164.65726	0.0011666	0.0913	190.3754	108.5991	19.1022
C1 . 13	91015A	Astra 1B					
	02-DEC-04	19.18				24	466
	20059.512836	42166.41534	0.0010115	0.0242	230.8665	113.2962	19.2969

C1 . 14	99033A	Astra 1H					
	19-AUG-04	19.19				20	215
	19954.681551	42164.03017	0.0004849	0.0666	251.8131	286.2619	19.2219
C1 . 15	01025A	Astra 2C					
	02-DEC-04	19.20				22	127
	20059.066563	42163.91299	0.0006525	0.1050	121.2931	83.0036	19.3563
C1 . 16	96021A	Astra 1F					
	16-DEC-04	19.20				22	331
	20073.083461	42163.97214	0.0005998	0.0356	159.4411	171.5548	19.2479
C1 . 17	95055A	Astra 1E					
	22-AUG-04	19.24				22	322
	19957.447766	42163.73275	0.0008491	0.0857	157.4807	284.5101	19.3078
C1 . 18	98063A	AfriStar 1					
	28-DEC-04	21.01				50	317
	20085.055590	42163.76246	0.0003747	0.0359	18.6260	271.2815	21.0130
C1 . 19	99018A	Eutelsat W3					
	28-DEC-04	21.69				47	288
	20085.069306	42163.77059	0.0003794	0.0245	7.9318	270.6495	21.7127
C1 . 20	02015B	Astra 3A					
	28-DEC-04	23.53				50	143
	20085.808160	42163.55362	0.0006258	0.0573	210.1376	359.4883	23.5440
C1 . 21	94070A	Astra 1D					
	28-DEC-04	23.90				51	424
	20085.955301	42164.47028	0.0002167	0.0572	118.0481	157.1474	23.4852
C1 . 22	98057A	Hot Bird 5					
	29-DEC-04	25.82				51	266
	20086.794954	42163.89337	0.0003202	0.0155	26.8668	319.4173	25.9022
C1 . 23	99009A	Arabsat 3A					
	30-DEC-04	25.96				51	280
	20087.150278	42163.01598	0.0004280	0.0272	26.0427	221.2999	25.9396
C1 . 24	97046A	PAS 5					
	29-DEC-04	26.16				51	351
	20086.792303	42163.69658	0.0000353	0.0153	49.1234	164.8869	26.1660
C1 . 25	00054A	Astra 2B					
	16-DEC-04	28.19				18	155
	20073.648194	42164.50084	0.0002096	0.0062	313.6242	326.9601	28.2413
C1 . 26	00081A	Astra 2D					
	02-DEC-04	28.20				23	156
	20059.239479	42164.06493	0.0004901	0.0433	168.8242	67.8780	28.2669
C1 . 27	98050A	Astra 2A					
	15-DEC-04	28.23				26	273
	20072.839479	42164.87705	0.0001109	0.0300	96.8633	304.0548	28.2282
C1 . 28	01011A	Eurobird					
	29-DEC-04	28.52				51	194
	20086.636181	42163.54437	0.0005757	0.0142	17.9245	125.2190	28.5989
C1 . 29	96063A	Arabsat 2B					
	28-DEC-04	30.50				51	364
	20085.028299	42162.91115	0.0002356	0.0109	161.6714	115.9775	30.6073
C1 . 30	97031A	Intelsat VIII F-2					
	29-DEC-04	32.94				50	371
	20086.876412	42163.99653	0.0002173	0.0109	330.2430	304.6611	32.9192

C1 . 31	03043A	e-Bird					
	29-DEC-04	33.15				51	65
	20086.752928	42163.79946	0.0001548	0.0177	314.2144	225.2813	33.1663
C1 . 32	00019A	Sesat					
	28-DEC-04	35.95				51	239
	20085.755266	42164.08455	0.0006010	0.0582	16.7378	248.3297	35.9299
C1 . 33	00028A	Eutelsat W4					
	29-DEC-04	36.09				50	228
	20086.862755	42163.65285	0.0003364	0.0596	4.5922	251.6331	36.1212
C1 . 34	96006A	Palapa C1					
	30-DEC-04	38.00				50	442
	20087.070775	42164.68137	0.0002949	0.0419	260.4569	13.0180	37.9805
C1 . 35	03020A	Hellas Sat 2					
	30-DEC-04	39.01				49	82
	20087.069988	42163.80563	0.0003333	0.0063	250.9906	28.9155	39.0182
C1 . 36	02029A	Ekspress A1R (Express 4A)					
	30-DEC-04	40.00				51	133
	20087.726447	42164.73464	0.0002406	0.0633	99.1774	255.0879	39.9892
C1 . 37	96040B	Turksat 3					
	29-DEC-04	42.00				49	410
	20086.633183	42164.00550	0.0002211	0.0550	83.2512	193.1073	42.0047
C1 . 38	01002A	Turksat 2A (Eurasiasat 1)					
	29-DEC-04	42.00				51	195
	20086.634606	42163.98027	0.0005865	0.0587	259.9969	34.9655	41.9870
C1 . 39	00068A	Europe*Star F1					
	30-DEC-04	45.00				49	212
	20087.049282	42163.64949	0.0004060	0.0565	117.3878	163.4277	45.0180
C1 . 40	03018A	GSAT-2					
	30-DEC-04	48.01				51	86
	20087.042338	42164.28470	0.0005150	0.0669	97.7407	213.9710	47.9895
C1 . 41	03053A	Yamal 200 N2 (Yamal 202)					
	30-DEC-04	48.97				51	57
	20087.723877	42165.15375	0.0003540	0.0378	65.5949	216.7019	48.9683
C1 . 42	95023A	Intelsat VIIA F-1					
	30-DEC-04	50.27				51	469
	20087.719178	42164.51822	0.0002625	0.0207	341.5709	287.1641	50.2369
C1 . 43	03060A	Express AM-22					
	30-DEC-04	53.02				48	51
	20087.735475	42164.69006	0.0002340	0.0106	206.4987	101.4105	52.9646
C1 . 44	94034A	Intelsat VII F-2					
	30-DEC-04	54.93				49	513
	20087.732870	42164.03185	0.0002386	0.0247	67.0798	55.5443	54.8943
C1 . 45	03043E	Insat 3E					
	27-DEC-04	55.06				49	61
	20084.689120	42164.07586	0.0005891	0.0366	78.7828	69.1766	55.1328
C1 . 46	98068A	Bonum 1					
	30-DEC-04	56.00				51	318
	20087.725625	42164.47841	0.0003143	0.0298	251.4483	333.5718	55.9427
C1 . 47	94064A	Intelsat VII F-3 (NSS 703)					
	28-DEC-04	57.01				50	443
	20085.978264	42164.16725	0.0003801	0.0341	264.0286	37.7394	56.9981

C1 . 48	02007A	Intelsat 904					
	29-DEC-04	60.01				51	144
	20086.672824	42164.23509	0.0002890	0.0364	38.7403	231.2799	60.0015
C1 . 49	01039A	Intelsat 902					
	29-DEC-04	62.09				51	170
	20086.991748	42164.67885	0.0003280	0.0142	17.7774	253.6534	61.9872
C1 . 50	96020A	Inmarsat 3-F1					
	30-DEC-04	63.93				51	409
	20087.689329	42164.07614	0.0004930	0.0514	27.6015	255.3114	63.9192
C1 . 51	02041A	Intelsat 906					
	30-DEC-04	64.16				51	120
	20087.690613	42164.93592	0.0003190	0.0286	59.4608	196.4247	64.1567
C1 . 52	91075A	Intelsat VI F-1					
	30-DEC-04	64.25				50	600
	20087.691817	42164.37245	0.0002163	0.2969	92.5557	175.3668	64.2380
C1 . 53	95001A	Intelsat VII F-4					
	28-DEC-04	66.04				48	473
	20085.704884	42164.36936	0.0003187	0.0102	314.8008	312.4856	66.0077
C1 . 54	01019A	PAS 10					
	30-DEC-04	68.63				50	180
	20087.736458	42164.48766	0.0003752	0.0588	140.3802	91.6805	68.5111
C1 . 55	98052A	PAS 7					
	30-DEC-04	68.66				50	317
	20087.700914	42164.28779	0.0002654	0.0822	117.8726	109.5970	68.7156
C1 . 56	02051A	Eutelsat W5					
	22-DEC-04	70.50				46	105
	20079.641331	42164.64016	0.0005202	0.0685	58.1182	211.6888	70.4734
C1 . 57	95040A	PAS 4					
	29-DEC-04	72.01				48	427
	20086.858345	42164.39375	0.0003753	0.0212	55.4315	222.4425	72.0181
C1 . 58	02002A	Insat 3C					
	29-DEC-04	74.00				51	152
	20086.849618	42164.52383	0.0001824	0.0630	130.0782	217.5888	74.0048
C1 . 59	02043A	KALPANA-1 (METSAT-1)					
	29-DEC-04	74.00				49	114
	20086.850347	42164.66091	0.0009104	0.0345	126.5182	142.5078	74.0055
C1 . 60	04036A	EDUSAT					
	29-DEC-04	74.04				14	14
	20086.780938	42164.76295	0.0005200	0.0499	233.3411	309.7817	74.0936
C1 . 61	99053A	LMI 1					
	29-DEC-04	74.99				51	272
	20086.989363	42164.39459	0.0002876	0.0268	251.7915	34.2214	75.0109
C1 . 62	97062A	Apstar 2R					
	30-DEC-04	76.50				51	376
	20087.738067	42164.98554	0.0003974	0.0193	295.2228	336.0544	76.4994
C1 . 63	97016A	Thaicom 3					
	29-DEC-04	78.51				48	374
	20086.630278	42164.95582	0.0002818	0.0633	178.2288	322.4013	78.5213
C1 . 64	94065B	Thaicom 2					
	29-DEC-04	78.53				48	437
	20086.628229	42164.48542	0.0008137	0.0657	64.2746	234.8618	78.5123

C1 . 65	00013A	Ekspress 2A					
	30-DEC-04	80.01				51	250
	20087.686713	42164.20649	0.0005699	0.0939	97.2325	95.9812	80.0816
C1 . 66	00082A	Beidou 1B					
	30-DEC-04	80.32				51	208
	20087.687917	42164.78061	0.0001636	0.0119	355.4563	248.9486	80.3880
C1 . 67	99016A	Insat 2E					
	28-DEC-04	82.99				50	285
	20085.662604	42164.61353	0.0000812	0.0727	89.7246	119.7068	83.0902
C1 . 68	00016B	Insat 3B					
	28-DEC-04	83.01				50	240
	20085.661470	42164.92779	0.0007397	0.0693	266.6143	13.6819	83.0056
C1 . 69	96035A	Intelsat VII F-6					
	29-DEC-04	85.15				51	422
	20086.659630	42165.31158	0.0002568	0.0063	355.6964	279.2238	85.1201
C1 . 70	98033A	Zhongwei 1					
	30-DEC-04	87.44				51	345
	20087.635532	42164.32759	0.0001368	0.0356	229.7230	17.3040	87.5341
C1 . 71	98049A	ST-1					
	29-DEC-04	88.00				51	324
	20086.919630	42164.83444	0.0003809	0.0070	26.3853	259.3111	87.9959
C1 . 72	03053B	Yamal 200 N1 (Yamal 201)					
	30-DEC-04	89.99				50	50
	20087.747014	42165.54427	0.0003448	0.0194	34.7896	228.9794	89.9933
C1 . 73	02042B	DRTS (Kodama)					
	30-DEC-04	90.74				50	119
	20087.721806	42165.42764	0.0005566	0.0193	301.1526	312.2659	90.7494
C1 . 74	96002B	MEASAT 1					
	29-DEC-04	91.48				51	443
	20086.852211	42164.29003	0.0001248	0.0094	62.1325	212.8565	91.5098
C1 . 75	03013A	Insat 3A					
	30-DEC-04	93.51				50	88
	20087.738762	42165.16384	0.0003367	0.0585	267.5417	11.1064	93.4923
C1 . 76	02057A	NSS 6					
	31-DEC-04	95.00				51	105
	20088.433970	42165.38026	0.0003125	0.0503	145.6185	152.0843	94.9814
C1 . 77	04015A	Ekspress AM-11					
	29-DEC-04	96.49				35	35
	20086.484028	42165.31943	0.0001795	0.0223	277.5248	74.7565	96.4697
C1 . 78	00003A	Zhongxing-22					
	31-DEC-04	97.99				51	259
	20088.415035	42165.77584	0.0005041	0.0137	35.8583	274.9777	97.9757
C1 . 79	95064A	AsiaSat 2					
	31-DEC-04	100.51				51	446
	20088.399421	42164.76519	0.0002352	0.0141	319.1325	315.7970	100.5622
C1 . 80	03052A	Zhongxing-20					
	30-DEC-04	102.97				51	58
	20087.734178	42164.42066	0.0004572	0.0177	37.3723	296.9491	102.9696
C1 . 81	00016A	Asiastar					
	30-DEC-04	105.00				51	247
	20087.245845	42165.30261	0.0003558	0.0226	17.2971	252.7255	105.0164

C1 . 82	99013A	Asiasat 3S					
	30-DEC-04	105.50				51	293
	20087.243854	42165.42540	0.0001595	0.0546	122.2123	160.0816	105.4957
C1 . 83	97071B	Cakrawatra 1					
	30-DEC-04	107.67				51	345
	20087.282338	42165.27766	0.0004721	0.0661	305.1441	317.8930	107.6099
C1 . 84	99042A	Telkom 1					
	30-DEC-04	108.00				51	276
	20087.278229	42165.40746	0.0003509	0.0830	120.2945	159.1536	108.0154
C1 . 85	00059A	GE-1A					
	30-DEC-04	108.19				51	218
	20087.279213	42165.86780	0.0001785	0.0383	223.5331	309.4684	108.1950
C1 . 86	97016B	BSAT-1a					
	28-DEC-04	109.77				51	371
	20085.818947	42165.40886	0.0001178	0.0688	263.4928	56.7907	109.6759
C1 . 87	94040B	BS-3N					
	29-DEC-04	109.80				51	462
	20086.877801	42165.33849	0.0002332	0.0247	273.5012	91.1590	109.8609
C1 . 88	98024B	BSAT-1b					
	29-DEC-04	109.85				49	332
	20086.667025	42165.60426	0.0002472	0.0345	219.8056	318.6449	109.8891
C1 . 89	01011B	BSAT-2A					
	28-DEC-04	109.86				51	191
	20085.821563	42165.51735	0.0005233	0.0865	261.0628	348.6928	109.8592
C1 . 90	03028A	B-SAT 2C					
	29-DEC-04	109.87				46	70
	20086.668252	42165.98667	0.0004683	0.0475	273.0638	35.1863	109.8214
C1 . 91	00060A	N-SAT-110					
	28-DEC-04	110.05				51	215
	20085.747083	42165.33429	0.0001262	0.0405	248.6655	32.8548	110.0630
C1 . 92	03021A	Beidou 3					
	30-DEC-04	110.50				51	83
	20087.611505	42164.44505	0.0003905	0.1539	205.2933	33.2909	110.5516
C1 . 93	98044A	Sinosat 1					
	29-DEC-04	110.50				51	337
	20086.930741	42164.47757	0.0004168	0.0309	42.0100	314.7992	110.5427
C1 . 94	96003A	Mugunghwa 2 (Koreasat 2)					
	29-DEC-04	112.98				51	408
	20086.227095	42164.74557	0.0001237	0.0128	98.4905	145.3994	112.9837
C1 . 95	96030A	Palapa C2					
	29-DEC-04	112.99				51	409
	20086.609421	42164.89471	0.0000686	0.0297	71.5021	196.0760	113.0787
C1 . 96	99046A	Mugunghwa 3 (Koreasat 3)					
	30-DEC-04	116.01				49	264
	20087.606331	42165.35027	0.0001068	0.0055	331.3863	352.2040	116.0746
C1 . 97	92027A	Palapa B4					
	29-DEC-04	118.01				48	559
	20086.604248	42164.71333	0.0001002	0.0047	9.2242	263.3559	118.0211
C1 . 98	93078B	Thaicom 1					
	29-DEC-04	120.00				48	499
	20086.604444	42166.12572	0.0001335	0.0880	56.4608	221.3044	119.9526

C1 . 99	03014A	Asiasat 4					
	30-DEC-04	122.04				51	89
	20087.636690	42164.59195	0.0001153	0.0179	305.9818	160.7834	122.2375
C1 . 100	00011A	Garuda 1					
	30-DEC-04	123.00				48	245
	20087.676238	42163.68257	0.0001876	0.0467	91.8304	207.4225	123.0138
C1 . 101	00032A	Feng Yun 2					
	30-DEC-04	123.41				49	232
	20087.677604	42163.76666	0.0001955	0.1534	90.8561	49.1403	123.6515
C1 . 102	99006A	JCSAT 6					
	30-DEC-04	123.89				50	297
	20087.206053	42164.59643	0.0001706	0.0363	73.2959	224.8826	124.0259
C1 . 103	97007A	JC-Sat 4					
	30-DEC-04	127.18				50	393
	20087.596181	42164.70969	0.0000478	0.0119	263.8838	326.8904	127.5355
C1 . 104	95043A	JC-Sat 3					
	29-DEC-04	128.00				51	453
	20086.599884	42164.49467	0.0002037	0.0169	282.6622	291.4223	128.0469
C1 . 105	95044A	N-Star 1					
	28-DEC-04	132.00				49	445
	20085.592431	42165.43886	0.0003007	0.0345	242.2752	341.6579	132.0281
C1 . 106	96039A	Apstar 1A					
	30-DEC-04	134.00				51	447
	20087.542234	42164.21238	0.0000989	0.0231	89.9840	166.1020	134.0230
C1 . 107	02035B	N-Star 3 (N-Star c)					
	29-DEC-04	135.96				51	129
	20086.726389	42164.79239	0.0001853	0.0197	89.9521	121.0369	135.9347
C1 . 108	96007A	N-Star 2					
	29-DEC-04	136.01				51	416
	20086.727905	42165.07245	0.0002715	0.0326	214.7918	52.6295	136.0549
C1 . 109	04024A	Telstar 18 (APstar 5)					
	30-DEC-04	137.97				26	26
	20087.536863	42164.86584	0.0003781	0.0578	41.8709	124.7607	138.0521
C1 . 110	00069A	Beidou					
	30-DEC-04	140.00				51	216
	20087.226956	42166.15572	0.0003069	0.0063	104.3376	205.1524	139.9221
C1 . 111	97036A	Superbird C					
	29-DEC-04	144.04				50	367
	20086.557407	42164.72791	0.0002474	0.0158	287.2000	337.5744	143.9816
C1 . 112	04007A	MBSAT					
	30-DEC-04	144.08				41	41
	20087.531690	42165.14057	0.0002121	0.0075	193.9114	74.6860	144.0630
C1 . 113	97042A	Agila 2					
	29-DEC-04	145.97				50	369
	20086.529606	42165.54595	0.0004018	0.0107	236.8154	38.2930	145.9719
C1 . 114	96063B	MEASAT 2					
	30-DEC-04	147.99				51	413
	20087.558009	42164.64297	0.0000939	0.0155	65.0595	187.0409	148.0197
C1 . 115	97075A	JC-Sat 5					
	31-DEC-04	149.99				51	355
	20088.401042	42164.74165	0.0002219	0.0140	46.2315	244.2993	149.9948

C1 . 116	94055A	Optus B3					
	30-DEC-04	152.00				51	506
	20087.403785	42164.77949	0.0003519	0.0105	284.1822	346.2184	152.0001
C1 . 117	02015A	JCSAT-8					
	31-DEC-04	154.00				51	144
	20088.205255	42164.62222	0.0001946	0.0028	1.5920	271.8420	154.0119
C1 . 118	03028B	Optus C1 (Defense C1)					
	30-DEC-04	156.01				51	81
	20087.519248	42164.90256	0.0003769	0.0334	41.8133	240.6101	156.0037
C1 . 119	92084A	Superbird A1					
	30-DEC-04	158.01				51	590
	20087.603472	42164.80668	0.0005380	0.0118	300.6161	346.3563	157.9902
C1 . 120	04011A	Superbird A2 (Superbird 6)					
	29-DEC-04	158.07				35	35
	20086.546921	42164.79827	0.0001074	0.1359	93.4774	152.6805	157.9510
C1 . 121	92054A	Optus B1					
	30-DEC-04	160.02				51	595
	20087.466875	42164.75931	0.0003766	0.0531	117.9507	160.5181	159.9924
C1 . 122	00012A	Superbird 4					
	30-DEC-04	162.05				51	253
	20087.467488	42164.73211	0.0002172	0.0216	51.3526	216.8913	162.0158
C1 . 123	98065A	PAS 8					
	30-DEC-04	166.02				51	302
	20087.461898	42164.76351	0.0002899	0.0395	237.8960	31.9416	166.0094
C1 . 124	94040A	PAS 2					
	29-DEC-04	169.01				51	531
	20086.460231	42164.53616	0.0002324	0.0097	301.8802	332.0270	168.9989
C1 . 125	97083A	Intelsat 804					
	30-DEC-04	175.66				48	351
	20087.570231	42164.38646	0.0003652	0.0172	283.1593	352.4347	174.0127
C1 . 126	96070A	Inmarsat 3-F3					
	30-DEC-04	178.04				51	413
	20087.247211	42164.37105	0.0004988	0.1133	78.0909	203.4973	178.0723
C1 . 127	93066A	Intelsat VII F-1					
	29-DEC-04	180.01				51	529
	20086.450081	42164.49719	0.0003311	0.0222	45.6990	234.7765	180.0060
C1 . 128	97053A	Intelsat VIII F-3 (NSS 803)					
	30-DEC-04	183.02				50	364
	20087.446794	42164.39151	0.0003412	0.0174	325.1044	305.7316	183.0024
C1 . 129	95073A	EchoStar 1					
	30-DEC-04	211.97				51	426
	20087.275764	42164.45627	0.0002062	0.0168	13.1883	238.7008	211.9091
C1 . 130	96055A	EchoStar 2					
	30-DEC-04	212.08				51	402
	20087.275903	42163.94467	0.0002287	0.0202	19.0941	243.2428	212.0857
C1 . 131	00081B	GE 8 (Aurora 3)					
	30-DEC-04	221.05				50	207
	20087.811215	42164.27882	0.0002684	0.0349	255.4662	30.0269	221.0418
C1 . 132	00054B	GE 7					
	29-DEC-04	223.02				50	221
	20086.465498	42164.23929	0.0003031	0.0163	255.1238	29.4502	223.0266

C1 . 133	97019A	GOES 10					
	30-DEC-04	224.86				51	387
	20087.361123	42162.68634	0.0004326	0.0595	108.2429	178.5569	224.6528
C1 . 134	04003A	AMC-10 (GE 10)					
	30-DEC-04	225.01				47	47
	20087.525023	42164.32619	0.0003460	0.0204	11.5136	259.7934	225.0155
C1 . 135	94013A	Galaxy IR-A					
	31-DEC-04	227.01				51	549
	20088.141586	42163.93962	0.0000954	0.0202	260.6651	2.2707	227.0287
C1 . 136	04017A	AMC-11 (GE-11)					
	30-DEC-04	229.01				32	32
	20087.401157	42164.39179	0.0002532	0.0491	98.0437	189.6335	228.9982
C1 . 137	92060B	Satcom C-3					
	29-DEC-04	229.07				51	612
	20086.519363	42164.64437	0.0000779	0.2066	92.4144	175.1835	229.1241
C1 . 138	99052A	Telstar 7					
	31-DEC-04	231.02				51	267
	20088.381782	42165.01694	0.0002525	0.0107	51.9539	224.3586	230.9751
C1 . 139	03044A	Galaxy 13/Horizons-1					
	30-DEC-04	233.02				50	63
	20087.418426	42164.14818	0.0001572	0.0234	50.4145	238.0480	233.0248
C1 . 140	03013B	Galaxy XII					
	28-DEC-04	234.76				49	89
	20085.741956	42163.89842	0.0002105	0.0247	23.3465	212.0676	234.8136
C1 . 141	92013A	Galaxy V					
	30-DEC-04	234.97				51	653
	20087.368866	42165.59725	0.0001221	0.0319	186.1574	73.4436	234.9183
C1 . 142	00002A	Galaxy 10R					
	29-DEC-04	237.01				51	257
	20086.529965	42164.66932	0.0002301	0.0094	23.1686	249.2791	236.9915
C1 . 143	03034A	Echostar IX (Telstar 13)					
	30-DEC-04	239.01				51	73
	20087.434201	42164.40609	0.0002248	0.0201	356.1632	270.7359	238.9992
C1 . 144	04016A	DirecTV 7S					
	30-DEC-04	240.81				34	34
	20087.348762	42164.24237	0.0002760	0.0107	269.3256	8.5665	240.8150
C1 . 145	99050A	Echostar 5					
	30-DEC-04	240.96				51	272
	20087.348762	42164.60260	0.0001313	0.0243	15.2290	214.2804	240.9180
C1 . 146	02006A	Echostar 7					
	31-DEC-04	241.11				51	147
	20088.284803	42164.66063	0.0001668	0.0114	7.3564	251.8495	241.0926
C1 . 147	98070A	Satmex 5					
	30-DEC-04	243.21				51	311
	20087.500984	42164.22948	0.0002369	0.0207	49.0280	220.1640	243.2264
C1 . 148	01012A	XM-Rock (XM 2)					
	31-DEC-04	245.01				51	196
	20088.395972	42164.58970	0.0001258	0.1584	261.7895	307.7593	245.0056
C1 . 149	94065A	Solidaridad 2					
	30-DEC-04	247.02				51	513
	20087.353657	42164.60344	0.0002531	0.0224	343.5818	287.8671	247.0090

C1 . 150	95069A	Galaxy IIIR					
	29-DEC-04	248.92				51	457
	20086.425058	42164.24742	0.0002339	0.2969	90.7694	184.5224	249.0250
C1 . 151	04027A	Anik F2					
	31-DEC-04	248.93				23	23
	20088.137789	42164.57176	0.0000680	0.0451	186.7928	96.2805	248.9004
C1 . 152	00038A	Echostar VI					
	30-DEC-04	249.81				51	227
	20087.381736	42164.63932	0.0002860	0.0088	343.6858	279.5686	249.8027
C1 . 153	02039A	Echostar VIII					
	30-DEC-04	250.00				51	122
	20087.381736	42164.61886	0.0003060	0.0200	11.3018	246.1730	249.9895
C1 . 154	97011A	Tempo 2					
	30-DEC-04	250.21				51	387
	20087.477315	42164.74641	0.0003116	0.0129	38.0178	241.6903	250.2073
C1 . 155	00076A	Anik F1					
	30-DEC-04	252.70				51	213
	20087.567720	42164.42935	0.0000670	0.0547	139.6476	181.8841	252.6807
C1 . 156	96022A	MSAT					
	30-DEC-04	253.51				51	446
	20087.384803	42164.62839	0.0005509	0.0204	290.7833	330.9943	253.5120
C1 . 157	97002A	GE 2					
	29-DEC-04	255.00				51	401
	20086.275556	42164.77697	0.0002983	0.0148	287.4760	359.8788	254.9934
C1 . 158	00022A	GOES 11					
	28-DEC-04	255.00				51	242
	20085.374178	42169.96484	0.0005684	0.0518	164.7778	117.1929	254.1494
C1 . 159	96054A	GE 1					
	31-DEC-04	256.99				50	414
	20088.516424	42164.82210	0.0003073	0.0072	257.8659	13.6154	256.9766
C1 . 160	01052A	DirecTV-4S					
	30-DEC-04	258.81				51	159
	20087.304410	42164.20145	0.0001919	0.0487	93.8402	218.4630	258.8674
C1 . 161	93078A	DirecTV-1					
	30-DEC-04	258.85				51	568
	20087.304410	42164.94601	0.0000867	0.0404	83.9611	204.8873	258.8668
C1 . 162	99060A	GE 4					
	30-DEC-04	258.92				51	262
	20087.304410	42164.62615	0.0001202	0.0139	239.5399	62.7814	258.9576
C1 . 163	99056A	DirecTV-1R					
	30-DEC-04	258.96				51	269
	20087.304410	42164.46187	0.0002707	0.0162	4.5903	262.9790	259.1586
C1 . 164	94047A	DirecTV-2					
	30-DEC-04	259.21				51	531
	20087.513009	42164.76435	0.0001946	0.0217	109.5192	181.9831	259.2226
C1 . 165	00020A	Galaxy IVR					
	30-DEC-04	261.00				49	244
	20087.078218	42164.71277	0.0002965	0.0075	274.0306	1.7142	261.0192
C1 . 166	97026A	Telstar 5					
	30-DEC-04	263.00				51	384
	20087.503310	42164.81874	0.0002942	0.0243	26.7149	244.8833	262.9924

C1 . 167	02030A	Galaxy 3C					
	31-DEC-04	264.95				50	130
	20088.384097	42164.50757	0.0000348	0.0462	180.7217	62.6318	264.9671
C1 . 168	99005A	Telstar 6					
	31-DEC-04	266.98				50	295
	20088.098079	42164.98526	0.0002435	0.0134	356.1819	273.9811	266.9951
C1 . 169	00046A	Brasilsat B4					
	31-DEC-04	268.00				51	225
	20088.478773	42164.85714	0.0002333	0.0763	152.0019	129.7100	268.0021
C1 . 170	95029A	DirecTV-3					
	30-DEC-04	268.88				51	459
	20087.356632	42164.57120	0.0000941	0.0099	265.3762	345.4395	268.8366
C1 . 171	99027A	Nimiq					
	30-DEC-04	268.94				51	284
	20087.356632	42164.91658	0.0001087	0.0170	87.2221	214.1706	268.8812
C1 . 172	99071A	Galaxy 11					
	30-DEC-04	269.01				51	260
	20087.407604	42164.80640	0.0000800	0.0503	174.8625	150.4986	269.0249
C1 . 173	96033A	Galaxy IX					
	30-DEC-04	269.12				51	424
	20087.323623	42164.63428	0.0002588	0.0336	197.7271	62.8937	269.1292
C1 . 174	97050A	GE 3					
	29-DEC-04	272.92				51	371
	20086.283171	42165.06207	0.0002320	0.0376	256.4569	93.2583	272.9095
C1 . 175	01018A	XM-Roll (XM 1)					
	30-DEC-04	274.89				51	185
	20087.303113	42164.82519	0.0000775	0.1645	267.1010	321.0113	274.9095
C1 . 176	03024A	AMC-9 (GE-12)					
	30-DEC-04	275.03				51	81
	20087.303310	42164.53980	0.0002019	0.0167	42.3498	272.9771	275.0419
C1 . 177	98006A	Brazilsat B-3A					
	30-DEC-04	275.99				49	342
	20087.270347	42165.35251	0.0001981	0.0578	181.7691	102.2404	275.9684
C1 . 178	02062A	Nimiq 2					
	31-DEC-04	278.00				51	104
	20088.447917	42164.94713	0.0002427	0.0029	308.0787	342.6627	278.0128
C1 . 179	98063B	GE 5					
	31-DEC-04	280.97				51	300
	20088.137963	42165.16664	0.0001074	0.0350	212.8244	328.9217	280.9911
C1 . 180	90091A	SBS VI					
	30-DEC-04	285.93				51	665
	20087.080694	42164.30124	0.0001398	0.0221	280.3214	356.6588	285.9722
C1 . 181	02023A	DirecTV-5					
	30-DEC-04	287.52				51	137
	20087.267326	42165.13412	0.0002126	0.0464	237.8508	28.5796	287.5108
C1 . 182	00067A	GE 6					
	30-DEC-04	287.99				51	214
	20087.267326	42165.50922	0.0000337	0.0432	255.4958	55.0930	287.9541
C1 . 183	97002B	Nahuel 1A					
	30-DEC-04	288.18				51	392
	20087.267326	42165.08394	0.0004210	0.0451	221.1170	46.9098	288.2149

C1 . 184	94049A	Brazilsat B1					
	31-DEC-04	289.96				51	498
	20088.223611	42164.23116	0.0001876	0.0503	168.3161	108.6378	290.0240
C1 . 185	95016A	Brazilsat B2					
	29-DEC-04	295.01				49	466
	20086.313299	42164.72847	0.0001526	0.0591	204.2041	78.6550	295.0195
C1 . 186	04001A	Estrela do Sul 1 (Telstar 14)					
	31-DEC-04	296.96				50	50
	20088.156933	42165.37550	0.0001919	0.0124	350.6574	280.0028	296.9213
C1 . 187	03033A	Rainbow 1					
	30-DEC-04	298.35				51	75
	20087.316678	42164.50841	0.0001687	0.0338	23.8205	259.2907	298.3724
C1 . 188	97059A	EchoStar 3					
	30-DEC-04	298.53				50	364
	20087.314502	42165.79126	0.0001448	0.0354	31.2879	269.9823	298.4807
C1 . 189	04031A	Amazonas					
	28-DEC-04	299.01				21	21
	20085.361632	42164.54429	0.0003050	0.0120	324.3185	307.3686	299.0271
C1 . 190	00043A	PAS 9					
	31-DEC-04	302.00				51	228
	20088.259722	42164.45683	0.0001543	0.0211	38.3811	232.9354	302.0088
C1 . 191	98037A	Intelsat 805					
	30-DEC-04	304.50				51	330
	20087.963542	42165.42820	0.0003313	0.0131	348.3090	279.6410	304.4835
C1 . 192	97027A	Inmarsat 3-F4					
	30-DEC-04	306.00				50	383
	20087.099005	42164.14230	0.0004805	0.0459	51.7831	242.6474	306.0335
C1 . 193	96015A	Intelsat VIIA F-2					
	30-DEC-04	307.02				51	432
	20087.299294	42164.83304	0.0002945	0.0022	343.6041	293.8669	307.0035
C1 . 194	95013A	Intelsat VII F-5					
	29-DEC-04	310.00				50	492
	20086.969097	42165.06067	0.0002979	0.0099	24.1236	250.8322	310.0077
C1 . 195	00072A	PAS 1R					
	29-DEC-04	314.99				51	211
	20086.964734	42164.98947	0.0000168	0.0304	136.0247	150.1270	315.0170
C1 . 196	98075A	PAS 6B					
	30-DEC-04	316.82				50	299
	20087.048299	42165.47867	0.0002043	0.0071	341.0490	264.2486	316.8813
C1 . 197	96002A	PAS 3R					
	30-DEC-04	316.99				51	432
	20087.048299	42165.01217	0.0002720	0.0211	248.9977	40.5350	317.0113
C1 . 198	98014A	Intelsat 806 (NSS 806)					
	30-DEC-04	319.50				51	347
	20087.042512	42165.32532	0.0000853	0.0401	26.8057	192.1737	319.4945
C1 . 199	02016A	Intelsat 903					
	30-DEC-04	325.48				51	143
	20087.037338	42165.24318	0.0003829	0.0094	357.2152	290.8480	325.4841
C1 . 200	97009A	Intelsat VIII F-1					
	28-DEC-04	328.50				50	376
	20085.046644	42165.18206	0.0006684	0.0613	247.8480	42.5517	328.4989

C1 . 201	00007A	Hispasat 1C					
	30-DEC-04	329.92				51	253
	20087.289815	42165.23701	0.0003162	0.0628	33.5847	264.4913	330.0179
C1 . 202	02044A	Hispasat 1D					
	30-DEC-04	330.00				51	119
	20087.286065	42165.16272	0.0005959	0.0343	318.8111	336.3348	330.0084
C1 . 203	03007A	Intelsat 907					
	31-DEC-04	332.58				51	97
	20088.003657	42164.35366	0.0002739	0.0031	338.2290	283.0684	332.5225
C1 . 204	02027A	Intelsat 905					
	30-DEC-04	335.45				51	134
	20087.275289	42164.80024	0.0003472	0.0137	23.5546	265.6387	335.5073
C1 . 205	02019A	NSS-7					
	31-DEC-04	338.06				51	141
	20088.002859	42164.90060	0.0003188	0.0088	18.9888	269.8455	337.9889
C1 . 206	01024A	Intelsat 901					
	29-DEC-04	342.00				51	183
	20086.975602	42164.79799	0.0004057	0.0106	14.7319	266.3031	341.9980
C1 . 207	96053A	Inmarsat 3-F2					
	28-DEC-04	344.51				49	422
	20085.200093	42164.98190	0.0005746	0.0239	342.5130	291.7194	344.4842
C1 . 208	99059A	Orion 2					
	29-DEC-04	345.00				51	269
	20086.970012	42164.84930	0.0001939	0.0124	334.0719	294.4733	344.9967
C1 . 209	02040A	Atlantic Bird 1					
	29-DEC-04	347.53				49	119
	20086.970428	42165.03768	0.0002605	0.0966	104.5193	239.9271	347.4825
C1 . 210	00031A	Ekspress 3A					
	30-DEC-04	349.00				51	234
	20087.661007	42165.17561	0.0001819	0.0181	301.5509	12.4816	348.9691
C1 . 211	01042A	Atlantic Bird 2					
	30-DEC-04	351.91				51	163
	20087.256238	42164.64016	0.0004178	0.0137	76.8600	199.2795	351.9141
C1 . 212	96044B	Telecom 2D					
	29-DEC-04	352.08				51	402
	20086.965127	42164.68306	0.0004519	0.0491	269.0894	356.4513	352.0944
C1 . 213	00046B	Nilesat 102					
	23-DEC-04	353.01				50	223
	20080.957928	42164.32703	0.0005807	0.0213	259.4044	16.9839	352.9943
C1 . 214	98024A	Nilesat 101					
	30-DEC-04	353.01				51	338
	20087.967535	42164.58914	0.0002334	0.0766	74.8537	184.6270	353.0119
C1 . 215	02035A	Stellat 5					
	28-DEC-04	354.98				51	129
	20085.963368	42164.28386	0.0004502	0.0539	38.5154	224.5003	355.0402
C1 . 216	03059A	Amos 2					
	29-DEC-04	356.01				49	50
	20086.959664	42164.32283	0.0003769	0.0083	327.4380	271.0638	356.0125
C1 . 217	96030B	AMOS 1					
	28-DEC-04	356.01				50	442
	20085.963368	42164.94181	0.0004499	0.0188	250.9942	50.6560	356.0000

C1 . 218	04022A	Intelsat 10-02					
	29-DEC-04	359.04				27	27
	20086.960278	42164.60933	0.0001031	0.0121	307.9921	350.6414	359.0080
C1 . 219	98035A	Thor III					
	29-DEC-04	359.17				49	328
	20086.960278	42164.77977	0.0001963	0.0279	226.8174	70.6259	359.1300
C1 . 220	97025A	Thor II					
	29-DEC-04	359.26				51	369
	20086.960278	42164.56700	0.0002192	0.0073	244.9506	1.5502	359.2420

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					
	Date	$\bar{\lambda}$				N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ

For explanation, see definition at the beginning of Chapter 3 on page 28.

C2 . 1	97049B	Meteosat 7					
	30-DEC-04	0.15				51	380
	20087.893252	42164.17650	0.0000832	1.0439	85.7073	121.8468	359.5895
C2 . 2	91084A	Telecom 2A					
	30-DEC-04	3.01				51	623
	20087.968715	42164.54065	0.0005941	3.1923	85.0571	178.2241	2.9913
C2 . 3	01005B	Skynet 4F					
	30-DEC-04	5.99				51	198
	20087.954549	42163.64529	0.0002696	1.1327	338.5878	299.5466	6.0527
C2 . 4	93073B	Meteosat 6					
	30-DEC-04	9.41				50	534
	20087.951817	42164.96227	0.0000594	4.3603	77.6151	212.4202	9.3049
C2 . 5	93013A	Raduga 29					
	31-DEC-04	11.86				51	614
	20088.044144	42167.21832	0.0002253	7.5035	61.6719	300.4953	12.6031
C2 . 6	96040A	Arabsat 2A					
	28-DEC-04	20.04				51	415
	20085.059456	42163.88188	0.0007535	2.3418	88.5841	175.4185	19.9778
C2 . 7	01029A	Artemis					
	28-DEC-04	21.41				50	176
	20085.056389	42165.89275	0.0030491	3.2686	94.1893	302.7179	21.0171
C2 . 8	91083A	Eutelsat II F-3					
	09-DEC-04	21.60				47	572
	20066.811053	42163.21388	0.0005399	4.2425	81.7776	202.5192	22.1181
C2 . 9	98006B	Inmarsat-3 F5					
	29-DEC-04	25.02				51	354
	20086.953588	42163.34086	0.0004860	0.4085	358.3187	282.5267	25.0470
C2 . 10	94049B	Turksat 2					
	30-DEC-04	31.29				51	470
	20087.092396	42163.75013	0.0004145	0.5311	93.3362	172.2799	31.3185
C2 . 11	99010A	Raduga 1-4					
	30-DEC-04	34.89				51	304
	20087.800463	42163.56624	0.0000760	4.7164	95.5707	284.5681	34.7188
C2 . 12	90034A	Palapa B-2R					
	23-DEC-04	42.52				50	640
	20080.954491	42163.88216	0.0000092	3.9782	83.2606	262.5661	42.5139
C2 . 13	03026A	Thuraya 2					
	28-DEC-04	44.05				51	81
	20085.616273	42164.12380	0.0005096	5.1655	317.0037	319.0809	44.0497

C2 . 14	00049A	Raduga 1-5					
	30-DEC-04	44.77				51	225
	20087.723704	42164.64016	0.0001149	2.3632	86.8003	251.9675	44.5065
C2 . 15	95041A	Mugunghwa 1 (Koreasat 1)					
	27-DEC-04	47.30				49	415
	20084.760613	42163.48270	0.0001685	4.8991	78.6726	253.9538	47.2876
C2 . 16	91003B	Eutelsat II F-2					
	30-DEC-04	48.50				51	590
	20087.050069	42164.91714	0.0003648	4.4293	80.7723	186.3469	48.5404
C2 . 17	89087A	Intelsat VI F-2					
	18-DEC-04	50.44				50	634
	20075.851921	42153.18313	0.0003485	2.7523	86.3841	92.3453	50.7233
C2 . 18	99009B	Skynet 4E					
	29-DEC-04	53.04				51	275
	20086.944248	42165.24093	0.0003594	2.0923	35.6542	248.3053	52.9163
C2 . 19	91015B	Meteosat 5					
	29-DEC-04	62.98				44	650
	20086.676701	42165.56305	0.0001980	7.1791	64.7248	203.5319	62.9107
C2 . 20	01045A	Raduga 1-6					
	29-DEC-04	69.90				51	168
	20086.030174	42165.80640	0.0001838	1.4897	97.5367	176.1651	69.8406
C2 . 21	93062A	Raduga 30					
	31-DEC-04	70.00				51	591
	20088.036458	42163.63575	0.0000745	7.1634	63.7786	98.0094	69.1429
C2 . 22	00036A	Cosmos-2371					
	30-DEC-04	79.83				51	232
	20087.710278	42165.42176	0.0001318	2.5164	85.6816	178.8008	79.7891
C2 . 23	88091B	TDRS-West					
	30-DEC-04	85.01				51	677
	20087.013090	42164.89247	0.0003399	8.5664	54.4698	309.0582	84.8693
C2 . 24	04010A	Raduga-1					
	30-DEC-04	85.02				38	38
	20087.639537	42162.35615	0.0003148	0.8947	220.5858	6.7533	84.8282
C2 . 25	97029A	Fengyun-2 1R					
	30-DEC-04	86.00				51	380
	20087.688275	42165.31242	0.0000272	4.2719	81.2856	13.4826	86.2352
C2 . 26	99047B	Yamal-100 No. 2					
	30-DEC-04	89.81				51	278
	20087.822870	42164.91854	0.0003720	1.2627	90.9305	189.5234	89.7757
C2 . 27	00066A	Thuraya 1					
	30-DEC-04	98.51				44	209
	20087.396794	42164.87088	0.0005267	3.7729	332.1202	300.5820	98.5158
C2 . 28	01014A	Ekran 21 (Ekran-M)					
	31-DEC-04	99.16				51	193
	20088.445984	42167.30748	0.0004251	1.8025	116.0883	206.3392	99.1235
C2 . 29	90002B	Leasat 5					
	30-DEC-04	100.03				49	671
	20087.672512	42165.55492	0.0001038	5.5376	37.4017	296.7834	100.0103
C2 . 30	04042A	Feng Yun 2C					
	30-DEC-04	104.62				11	11
	20087.250949	42162.91619	0.0001603	0.6546	293.7193	181.1215	104.4477

C2 . 31	92021B	Inmarsat 2-F4					
	30-DEC-04	109.00				51	596
	20087.671632	42164.80444	0.0004119	2.1491	25.3028	244.5639	109.0501
C2 . 32	94043A	Apstar 1					
	30-DEC-04	138.11				51	548
	20087.450289	42165.26364	0.0002705	0.3380	94.5872	171.4012	142.0273
C2 . 33	95011B	Himawari-5					
	30-DEC-04	140.00				51	434
	20087.232859	42163.97214	0.0000574	3.4573	80.1440	286.0122	140.2360
C2 . 34	92017A	Gorizont 25					
	30-DEC-04	140.03				51	667
	20087.237928	42164.22135	0.0002765	8.0739	56.7348	268.0835	139.4465
C2 . 35	96005A	Gorizont 31					
	30-DEC-04	140.08				51	470
	20087.235833	42166.56674	0.0004092	5.6484	72.2808	205.8183	139.5196
C2 . 36	90093A	Inmarsat 2-F1					
	30-DEC-04	143.50				47	597
	20087.548380	42165.47558	0.0002862	2.8652	58.8913	214.8990	143.4744
C2 . 37	00029A	Gorizont					
	30-DEC-04	144.92				51	236
	20087.672836	42165.19271	0.0001200	2.5741	83.5271	206.4415	144.8704
C2 . 38	95025A	GOES 9					
	30-DEC-04	155.07				51	487
	20087.519248	42164.83051	0.0003499	0.9952	92.7758	150.8800	155.2836
C2 . 39	90056A	Intelsat VI F-4					
	30-DEC-04	157.01				51	591
	20087.425926	42164.80781	0.0001936	2.5034	87.2481	185.9525	157.0004
C2 . 40	87078A	Optus A3					
	31-DEC-04	164.00				51	618
	20088.143044	42164.56560	0.0000978	6.6638	65.6976	177.5359	163.9974
C2 . 41	91028A	Spacenet 4					
	30-DEC-04	172.00				51	666
	20087.474873	42164.39627	0.0003836	1.0661	91.3122	152.4107	171.9776
C2 . 42	87022A	GOES 7					
	29-DEC-04	185.00				39	733
	20086.466944	42172.93254	0.0003781	8.9239	51.1941	102.7306	184.6800
C2 . 43	00034A	TDRS 8					
	30-DEC-04	185.50				50	232
	20087.414572	42164.79323	0.0002732	3.1219	268.0657	349.1291	185.5142
C2 . 44	91054B	TDRS 5					
	30-DEC-04	185.79				51	660
	20087.339826	42166.40020	0.0002755	5.9267	73.6164	180.7977	188.7185
C2 . 45	98028A	EchoStar 4					
	30-DEC-04	203.00				51	334
	20087.409005	42164.52327	0.0002160	1.2934	89.5173	169.3963	202.9868
C2 . 46	95035B	TDRS 7					
	30-DEC-04	209.41				51	477
	20087.438762	42166.01386	0.0003376	7.3415	64.3816	214.8978	209.1979
C2 . 47	91084B	Inmarsat 2-F3					
	30-DEC-04	218.00				51	583
	20087.668333	42164.44281	0.0044011	1.9642	60.0870	246.0750	217.9227

C2 . 48	84093B	SBS IV					
	30-DEC-04	235.00				51	754
	20087.551875	42163.97494	0.0001887	8.5728	53.0304	221.2331	235.0056
C2 . 49	91026A	Anik E2					
	31-DEC-04	241.33				51	664
	20088.126794	42165.08002	0.0004496	1.4777	91.3064	174.6066	241.2808
C2 . 50	91067A	Anik E1					
	30-DEC-04	250.77				51	645
	20087.419109	42164.58522	0.0003668	1.4845	90.0939	182.9178	250.7627
C2 . 51	67111A	ATS 3					
	30-DEC-04	254.69				51	706
	20087.556806	42164.43804	0.0013276	11.9923	328.9566	12.9026	254.8366
C2 . 52	85035A	Gstar 1					
	30-DEC-04	255.82				49	754
	20087.204120	42164.69819	0.0006290	6.9047	67.5406	234.1873	254.9372
C2 . 53	95019A	AMSC-1					
	30-DEC-04	259.04				51	491
	20087.304410	42164.70829	0.0002624	0.3326	95.6196	174.6276	259.0555
C2 . 54	91018A	Inmarsat 2-F2					
	31-DEC-04	262.01				51	624
	20088.366400	42164.68474	0.0004899	2.2578	51.7215	223.0421	262.0178
C2 . 55	01031A	GOES 12					
	31-DEC-04	284.92				50	175
	20088.166505	42163.65145	0.0002353	0.4196	272.4418	338.3525	284.8023
C2 . 56	83026B	TDRS-East					
	30-DEC-04	311.12				48	745
	20087.379838	42166.51206	0.0007184	12.0282	20.3030	210.3370	310.9496
C2 . 57	93003B	TDRS 6					
	31-DEC-04	313.02				50	577
	20088.307095	42165.28747	0.0003270	5.2035	77.4223	243.7794	313.0674
C2 . 58	89021B	TDRS 4					
	29-DEC-04	319.05				51	704
	20086.245671	42165.67099	0.0003053	6.6994	68.8361	204.4758	318.6537
C2 . 59	02055A	TDRS 10					
	31-DEC-04	319.17				51	107
	20088.008102	42163.64809	0.0003015	5.1887	289.0827	338.9986	319.1982
C2 . 60	94079A	Orion I					
	29-DEC-04	322.48				51	464
	20086.371586	42165.16468	0.0002627	0.6141	92.0475	197.7147	322.5031
C2 . 61	90100A	Satcom C-1					
	29-DEC-04	322.53				50	695
	20086.367986	42165.59361	0.0002059	0.6013	91.8092	111.9434	322.4830
C2 . 62	98002A	Skynet 4D					
	29-DEC-04	325.84				46	324
	20086.962002	42166.41253	0.0004507	1.9067	46.7203	255.9467	325.5985
C2 . 63	90001A	Skynet 4A					
	30-DEC-04	325.94				51	632
	20087.128113	42164.74613	0.0002686	6.5011	48.7530	250.5096	326.0320
C2 . 64	76101A	Marisat 3					
	30-DEC-04	326.13				46	691
	20087.964317	42164.39291	0.0005369	13.3316	7.5601	0.7511	326.1547

C2 . 65	93048A	Hispasat 1B					
	30-DEC-04	329.98				51	485
	20087.293727	42165.12543	0.0001832	1.1869	91.7285	324.0172	330.0161
C2 . 66	01037A	Cosmos-2379					
	30-DEC-04	336.04				51	174
	20087.592674	42163.22117	0.0001995	0.7214	77.1997	209.9459	336.0009
C2 . 67	93076A	NATO IVB					
	29-DEC-04	339.81				51	516
	20086.956921	42165.27177	0.0003011	4.0562	61.6215	207.3256	339.7251
C2 . 68	90021A	Intelsat VI F-3					
	29-DEC-04	340.05				50	691
	20086.975185	42164.90929	0.0003488	2.2325	87.9664	227.4173	340.0304
C2 . 69	91001A	NATO IVA					
	29-DEC-04	342.21				51	650
	20086.944086	42164.66399	0.0003269	5.6382	52.9240	216.9155	342.2248
C2 . 70	96034A	Gorizont 32					
	30-DEC-04	345.99				47	448
	20087.832002	42164.07614	0.0001784	5.4930	74.1584	148.3724	345.7988
C2 . 71	92043A	Gorizont 26					
	30-DEC-04	346.00				51	626
	20087.831412	42165.42232	0.0001983	7.8581	58.2249	195.6974	345.9099
C2 . 72	95067A	Telecom 2C					
	29-DEC-04	354.87				51	461
	20086.955359	42164.88153	0.0004940	1.0190	91.8253	188.9537	354.7893
C2 . 73	02040B	MSG 1					
	30-DEC-04	356.54				51	120
	20087.962164	42165.03712	0.0000588	0.6221	12.9540	280.7120	356.4277
C2 . 74	90079A	Skynet 4C					
	30-DEC-04	359.00				51	664
	20087.967894	42164.87565	0.0002410	6.2533	60.4674	221.8145	358.8842

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	Ω	ω	λ

For explanation, see definition at the beginning of Chapter 3 on page 28.

D . 1	97040A	PAS 6					
			3515.000	455.000	6575.000	15	312
		45679.00	0.066989				
D . 2	78113D	Titan IIIC stage 3 (Transtage)					
	30-DEC-04	-23.46	1931.723	730.376	3133.071	42	517
	20087.353681	44095.78543	0.0272122	16.4686	16.5116	230.7815	147.6346
D . 3	78113A	OPS 9441 (DSCS II F-11)					
	25-DEC-04	-22.47	1845.462	1731.307	1959.617	40	641
	20082.288889	44009.60626	0.0026519	14.7431	19.8027	13.4967	181.7489
D . 4	85024A	Ekran 14					
	24-DEC-04	-19.72	1608.708	1534.516	1682.901	45	623
	20081.344479	43772.73083	0.0018595	13.7095	27.4065	166.6626	170.2356
D . 5	84115A	NATO IIID					
	25-DEC-04	-19.15	1560.155	1148.164	1972.145	44	661
	20082.430405	43724.17757	0.0094488	6.6299	51.4134	301.4462	161.1529
D . 6	73100D	Titan IIIC stage 3 (Transtage)					
	25-DEC-04	-18.99	1546.878	359.737	2734.019	42	543
	20082.169861	43711.08118	0.0268671	16.8472	0.2784	283.4105	202.1183
D . 7	83016A	Ekran 10					
	29-DEC-04	-18.88	1537.354	1384.555	1690.153	44	619
	20086.274699	43701.41907	0.0032141	15.0340	19.0109	190.8674	182.0194
D . 8	81122A	Marecs A					
	26-DEC-04	-18.84	1534.074	1007.592	2060.555	42	654
	20083.274896	43698.15092	0.0119648	11.8984	28.8572	71.7920	196.0937
D . 9	82106A	DSCS II F-16					
	29-DEC-04	-18.66	1518.596	1500.792	1536.400	40	689
	20086.910336	43682.73714	0.0004392	12.4883	30.4475	38.5027	324.0912
D . 10	88036A	Ekran 18					
	29-DEC-04	-18.45	1500.912	1445.720	1556.105	44	608
	20086.023160	43665.18663	0.0009262	11.6744	38.1238	278.5527	291.8789
D . 11	77005A	NATO IIIB					
	23-DEC-04	-18.01	1463.704	1274.406	1653.001	44	625
	20080.276076	43627.96033	0.0044664	14.1487	11.5140	217.0910	179.6614
D . 12	79098C	Titan IIIC stage 3 (Transtage)					
	26-DEC-04	-17.84	1448.959	77.551	2820.367	45	613
	20083.269618	43612.92101	0.0316283	15.6195	17.5330	233.9017	182.3995
D . 13	77034B	OPS 9438 (DSCS II F-8)					
	31-DEC-04	-17.45	1416.040	1263.153	1568.928	42	603
	20088.018148	43580.33999	0.0032137	15.8988	11.3156	315.0006	264.7737

D . 14	77034C	Titan IIC stage 3 (Transtage)					
	25-DEC-04	-16.96	1375.015	69.284	2680.747	44	625
	20082.321933	43539.13967	0.0301122	16.4762	10.1619	259.0153	156.6880
D . 15	79098A	OPS 9443 (DSCS II F-13)					
	26-DEC-04	-16.83	1363.527	1323.025	1404.029	40	659
	20083.299479	43527.58428	0.0007263	14.3256	20.2202	294.5358	177.2201
D . 16	87109A	Ekran 17					
	29-DEC-04	-15.81	1277.489	1093.934	1461.043	44	598
	20086.339352	43441.45707	0.0044378	10.9539	41.2620	40.7923	181.3150
D . 17	76053A	Marisat 2					
	30-DEC-04	-15.75	1272.541	726.272	1818.810	40	626
	20087.180093	43436.67610	0.0126985	15.1341	8.9367	130.9755	206.2932
D . 18	84114B	Marecs B2					
	30-DEC-04	-15.64	1263.996	757.571	1770.421	40	696
	20087.439329	43428.00179	0.0119937	11.3979	40.5934	214.2947	142.4608
D . 19	87028A	Raduga 20					
	30-DEC-04	-15.52	1253.300	1130.930	1375.671	43	571
	20087.351146	43417.55846	0.0027115	12.3257	37.9403	331.7534	172.2837
D . 20	84090A	Ekran 13					
	27-DEC-04	-15.30	1235.404	1171.127	1299.681	45	644
	20084.773808	43399.44980	0.0015653	13.7168	24.3231	23.4840	9.2606
D . 21	84028A	Ekran 12					
	30-DEC-04	-15.17	1224.059	1179.428	1268.690	44	621
	20087.289757	43388.14042	0.0007154	14.2339	21.1350	305.7716	177.7273
D . 22	87073A	Ekran 16					
	30-DEC-04	-13.64	1096.810	1077.438	1116.183	46	546
	20087.318519	43260.77129	0.0003102	11.8793	34.4190	4.2679	180.6913
D . 23	86038A	Ekran 15					
	30-DEC-04	-13.42	1078.368	1017.168	1139.568	45	586
	20087.187662	43242.63960	0.0010997	12.7069	29.3563	182.6897	222.8618
D . 24	88108A	Ekran 19					
	29-DEC-04	-13.03	1046.151	923.090	1169.211	45	688
	20086.410995	43210.80973	0.0029291	10.3882	44.4108	16.5751	158.3579
D . 25	77034A	OPS 9437 (DSCS II F-7)					
	30-DEC-04	-12.96	1040.299	962.729	1117.868	44	580
	20087.067431	43204.72733	0.0018426	16.0796	9.2895	150.8633	246.3048
D . 26	86090A	Gorizont 13					
	30-DEC-04	-12.77	1025.018	959.760	1090.277	41	598
	20087.174063	43189.41505	0.0015419	11.6054	35.2713	165.9123	233.7289
D . 27	88051A	Meteosat 3					
	24-DEC-04	-11.97	958.903	933.749	984.056	45	657
	20081.459282	43122.79827	0.0004338	9.3200	52.0365	213.1985	153.2746
D . 28	85028C	Leasat 3					
	29-DEC-04	-11.92	954.392	620.402	1288.383	43	716
	20086.743727	43118.52249	0.0079234	15.3112	24.2054	93.4585	18.8729
D . 29	89020B	Meteosat 4					
	26-DEC-04	-11.39	910.929	827.272	994.586	44	626
	20083.403183	43074.84827	0.0020184	8.4407	58.3249	350.6327	177.8223
D . 30	92032A	Intelsat K (NSS K)					
	27-DEC-04	-11.14	890.348	511.048	1269.648	46	590
	20084.610463	43054.34799	0.0092034	2.1979	91.1289	152.7098	134.7053

D . 31	71095C	Titan IIIC stage 3 (Transtage)					
	29-DEC-04	-11.10	887.521	200.027	1575.015	46	608
	20086.607975	43051.82936	0.0154319	15.3070	351.5240	333.1576	33.4861
D . 32	84023A	Intelsat V F-8					
	22-DEC-04	-10.74	857.555	767.032	948.078	45	716
	20079.455370	43021.11364	0.0018905	9.9089	47.0247	10.1280	151.7265
D . 33	89070A	Himawari-4					
	30-DEC-04	-10.30	821.857	628.876	1014.837	49	675
	20087.213519	42986.31080	0.0043302	8.2164	59.1309	301.2346	242.8221
D . 34	84093C	Leasat 2					
	30-DEC-04	-10.14	808.769	675.917	941.622	43	698
	20087.091817	42973.32035	0.0033091	14.0181	25.4634	72.7616	253.9389
D . 35	85107F	Proton-K fourth stage (Block DM)					
	26-DEC-04	-10.00	797.130	708.416	885.845	45	587
	20083.390475	42960.89137	0.0016269	12.1421	29.9399	276.4321	153.9661
D . 36	73100B	OPS 9434 (DSCS II F-4)					
	24-DEC-04	-9.92	790.339	495.633	1085.045	40	634
	20081.328160	42954.28897	0.0068810	15.3112	357.6463	233.0962	145.6873
D . 37	78073F	Proton-K fourth stage (Block DM)					
	20-DEC-04	-9.73	775.507	707.451	843.562	45	613
	20077.367650	42939.65202	0.0012009	15.5805	4.4781	328.6546	142.7687
D . 38	82113F	Proton-K fourth stage (Block DM)					
	26-DEC-04	-9.72	774.694	677.686	871.703	46	604
	20083.329144	42938.44533	0.0024970	13.6424	19.5147	82.2175	166.1605
D . 39	86082F	Proton-K fourth stage (Block DM)					
	31-DEC-04	-9.63	766.636	648.622	884.650	39	553
	20088.054468	42931.16445	0.0025809	11.6167	33.5179	330.3372	273.9776
D . 40	83088F	Proton-K fourth stage (Block DM)					
	29-DEC-04	-9.57	761.838	691.141	832.535	44	611
	20086.645799	42926.33560	0.0012909	13.3875	22.4604	302.6769	51.4499
D . 41	83066F	Proton-K fourth stage (Block DM)					
	30-DEC-04	-9.56	761.073	714.527	807.619	48	607
	20087.964109	42925.41889	0.0009700	13.3805	22.0423	355.9289	295.2633
D . 42	68116A	Intelsat III F-2					
	29-DEC-04	-9.55	760.746	193.105	1328.387	43	550
	20086.568831	42924.95982	0.0127567	13.3192	335.3294	3.7025	32.3247
D . 43	80016D	Proton-K fourth stage (Block DM)					
	31-DEC-04	-9.54	759.732	695.556	823.909	44	633
	20088.040313	42924.58284	0.0016824	15.2228	8.7037	90.2735	254.6149
D . 44	73100A	OPS 9433 (DSCS II F-3)					
	30-DEC-04	-9.43	750.326	625.402	875.249	40	542
	20087.196690	42914.33137	0.0028352	15.9082	358.0801	24.2642	188.4606
D . 45	87040A	Gorizont 14					
	31-DEC-04	-9.42	749.649	627.467	871.830	42	643
	20088.084456	42914.16849	0.0029619	12.5733	27.8677	12.1054	257.7247
D . 46	81027F	Proton-K fourth stage (Block DM)					
	30-DEC-04	-9.40	747.983	673.299	822.667	42	611
	20087.122095	42912.70580	0.0016737	15.1314	11.9889	17.0481	229.2264
D . 47	79062D	Proton-K fourth stage (Block DM)					
	27-DEC-04	-9.37	746.033	725.349	766.718	42	574
	20084.687905	42910.42253	0.0005507	15.3054	8.4440	75.3002	24.3817

D . 48	86044F	Proton-K fourth stage (Block DM)					
	24-DEC-04	-9.37	745.752	702.062	789.443	42	624
	20081.756782	42910.00369	0.0009393	11.7304	32.3567	8.2276	26.3035
D . 49	96005D	Proton-K fourth stage (Block DM-2)					
	29-DEC-04	-9.35	744.533	694.074	794.993	43	395
	20086.360532	42908.69951	0.0013420	5.8353	73.0475	341.3769	204.9071
D . 50	86027F	Proton-K fourth stage (Block DM)					
	30-DEC-04	-9.30	739.942	582.226	897.659	42	608
	20087.248345	42904.38028	0.0032879	12.3404	33.0886	299.8849	204.3639
D . 51	81069F	Proton-K fourth stage (Block DM)					
	22-DEC-04	-9.26	737.245	643.140	831.350	42	612
	20079.357604	42901.19411	0.0019827	14.7948	13.0958	345.2985	153.0552
D . 52	82113A	Raduga 11					
	30-DEC-04	-9.24	735.003	554.749	915.256	44	550
	20087.108843	42899.49690	0.0044528	13.4933	19.6497	84.8330	242.1252
D . 53	77071F	Proton-K fourth stage (Block DM)					
	30-DEC-04	-9.12	725.777	676.482	775.073	44	594
	20087.309109	42889.70944	0.0008799	15.6028	1.2296	290.0143	150.8017
D . 54	88028D	Proton-K fourth stage (Block DM)					
	25-DEC-04	-8.96	712.841	619.828	805.854	43	626
	20082.749109	42877.11164	0.0019742	10.9857	40.7586	283.6478	36.2453
D . 55	85076D	Leasat 4					
	30-DEC-04	-8.91	708.242	683.990	732.495	44	601
	20087.233634	42872.37746	0.0005109	10.4255	27.0482	189.0008	203.9554
D . 56	86007F	Proton-K fourth stage (Block DM)					
	20-DEC-04	-8.90	707.889	575.173	840.604	45	611
	20077.435451	42871.91017	0.0028591	12.0815	30.4615	335.8344	144.1961
D . 57	85070F	Proton-K fourth stage (Block DM)					
	30-DEC-04	-8.89	706.496	655.902	757.091	44	616
	20087.315498	42870.26173	0.0010207	12.2809	28.8296	344.1501	176.1616
D . 58	77108D	Mage 1 (Meteosat 1 AKM)					
	29-DEC-04	-8.88	706.281	317.984	1094.577	37	220
	20086.224306	42870.24302	0.0087681	16.0533	3.0135	292.4470	183.3447
D . 59	88028A	Gorizont 15					
	29-DEC-04	-8.81	700.069	557.446	842.692	45	650
	20086.666331	42864.64811	0.0035507	10.9151	40.9191	354.3318	62.5665
D . 60	92043D	Proton-K fourth stage (Block DM-2)					
	24-DEC-04	-8.79	698.325	593.121	803.528	44	494
	20081.521481	42862.28447	0.0026028	8.0925	59.3132	349.7949	138.0361
D . 61	89101G	Cosmos 2054 debris					
	30-DEC-04	-8.72	693.303	539.891	846.715	25	276
	20087.366458	42857.06355	0.0028347	9.6580	47.4345	123.1260	176.6469
D . 62	89098D	Proton-K fourth stage (Block DM)					
	29-DEC-04	-8.71	691.802	615.935	767.669	45	581
	20086.344977	42855.88806	0.0017807	9.8501	48.3812	348.6770	186.0121
D . 63	90102D	Proton-K fourth stage (Block DM-2)					
	29-DEC-04	-8.66	687.968	608.273	767.663	44	542
	20086.395081	42851.81036	0.0019794	9.1345	51.5389	4.2299	171.1271
D . 64	89048D	Proton-K fourth stage (Block DM)					
	24-DEC-04	-8.57	681.065	586.131	776.000	43	546
	20081.433495	42844.84450	0.0020676	9.9417	45.2235	300.8792	155.6173

D . 65	89030D	Proton-K fourth stage (Block DM)					
	30-DEC-04	-8.45	671.352	596.806	745.899	41	613
	20087.271053	42835.78982	0.0017512	10.0182	43.9951	3.4789	207.3956
D . 66	80049F	Proton-K fourth stage (Block DM)					
	21-DEC-04	-8.41	667.536	541.254	793.818	42	623
	20078.554132	42832.47175	0.0028304	14.9806	10.9687	9.9668	81.0735
D . 67	88095F	Proton-K fourth stage (Block DM)					
	23-DEC-04	-8.40	667.337	605.462	729.213	45	608
	20080.433519	42831.00202	0.0016179	10.3004	42.3124	55.5461	154.0460
D . 68	90116D	Proton-K fourth stage (Block DM-2)					
	22-DEC-04	-8.38	665.460	516.793	814.126	48	597
	20079.484884	42829.43797	0.0032300	9.0440	52.2054	248.3032	145.8501
D . 69	96034D	Proton-K fourth stage (Block DM-2)					
	24-DEC-04	-8.37	664.857	525.485	804.229	46	401
	20081.572095	42828.84008	0.0029417	5.6207	74.6873	245.2730	134.7590
D . 70	88018B	Telecom 1C					
	30-DEC-04	-8.34	662.224	257.247	1067.200	43	584
	20087.278264	42826.61487	0.0094420	7.6136	64.7928	303.7769	224.6151
D . 71	01014C	Proton-M fourth stage (Briz M)					
	30-DEC-04	-8.31	659.454	-129.903	1448.810	47	179
	20087.216574	42823.69199	0.0183130	1.9813	116.3687	352.6743	298.4723
D . 72	94008D	Proton-K fourth stage (Block DM-2)					
	29-DEC-04	-8.30	658.760	562.573	754.947	48	465
	20086.330069	42823.02845	0.0021319	7.1657	66.5637	211.9095	209.4000
D . 73	89004F	Proton-K fourth stage (Block DM)					
	30-DEC-04	-8.20	650.755	548.047	753.464	45	622
	20087.996227	42814.94586	0.0021260	10.1390	43.2148	283.7148	304.5976
D . 74	93013D	Proton-K fourth stage (Block DM-2)					
	23-DEC-04	-8.14	645.733	575.869	715.597	48	455
	20080.595683	42810.04625	0.0013973	7.7142	62.7008	280.5785	115.4987
D . 75	91087D	Proton-K fourth stage (Block DM-2)					
	29-DEC-04	-8.11	643.534	564.773	722.296	46	500
	20086.761759	42808.15627	0.0016676	8.4999	56.8005	223.4075	43.8581
D . 76	92082D	Proton-K fourth stage (Block DM-2)					
	24-DEC-04	-8.10	642.463	597.018	687.908	46	494
	20081.768715	42806.98820	0.0008504	7.9273	60.8213	250.2675	50.2476
D . 77	99010D	Proton-K fourth stage (Block DM-2)					
	30-DEC-04	-8.02	636.245	552.349	720.142	42	266
	20087.193495	42800.63393	0.0019906	4.8058	96.0467	118.0722	287.3543
D . 78	96053D	Proton-K fourth stage (Block DM1)					
	27-DEC-04	-7.85	622.840	412.588	833.093	42	317
	20084.851019	42787.03940	0.0048818	4.3005	81.1232	101.7468	38.3321
D . 79	94012D	Proton-K fourth stage (Block DM-2)					
	29-DEC-04	-7.79	617.859	470.270	765.449	43	445
	20086.460231	42781.53322	0.0031854	7.1258	66.3157	270.3928	161.9334
D . 80	88012A	Sakura 3A					
	22-DEC-04	-7.69	609.842	576.740	642.944	38	611
	20079.482130	42773.56898	0.0008151	7.0428	68.5693	130.8008	163.5419
D . 81	88063B	Eutelsat I F-5 (ECS 5)					
	30-DEC-04	-7.59	601.738	543.647	659.829	45	574
	20087.323530	42765.80537	0.0011309	8.1318	59.5753	307.0162	203.8677

D . 82	83088A	Raduga 13					
	24-DEC-04	-7.56	599.177	527.731	670.622	43	532
	20081.772766	42763.05809	0.0015560	13.2144	22.1573	226.2817	10.2055
D . 83	69069D	JPL SR-28-3 (ATS 5 AKM)					
	28-DEC-04	-7.54	597.525	47.361	1147.689	31	393
	20085.904780	42761.85563	0.0133572	13.9623	342.8421	98.2415	280.9755
D . 84	00049D	Proton-K fourth stage (Block DM-2)					
	23-DEC-04	-7.50	594.632	520.110	669.154	46	207
	20080.590382	42758.36055	0.0016279	2.3947	86.9571	167.9984	141.3777
D . 85	89101D	Proton-K fourth stage (Block DM)					
	30-DEC-04	-7.28	576.892	532.012	621.772	42	567
	20087.435903	42740.61947	0.0011188	9.5717	47.4405	31.7670	151.3812
D . 86	76023J	LES 8, LES 9 operational debris					
	29-DEC-04	-7.25	573.953	-8.954	1156.859	39	400
	20086.143403	42738.54866	0.0127546	10.3569	206.0349	180.2381	56.5103
D . 87	76023F	Titan IIC stage 3 (Transtage)					
	21-DEC-04	-7.24	573.678	-10.208	1157.563	45	595
	20078.881019	42737.01913	0.0125818	10.3589	206.2069	181.2461	158.3538
D . 88	83118A	Gorizont 8					
	30-DEC-04	-7.22	571.526	462.435	680.618	42	542
	20087.143380	42735.99072	0.0025771	12.8886	23.0342	345.7933	232.4595
D . 89	85025A	Intelsat VA F-10					
	30-DEC-04	-7.15	566.122	431.602	700.641	43	696
	20087.293310	42730.29951	0.0033423	9.0671	51.8560	172.7805	207.2343
D . 90	88109B	Astra 1A					
	30-DEC-04	-7.00	550.000	485.000	620.000	51	583
	20087.531053	42715.64872	0.0015385	3.4425	82.4696	259.1507	187.6619
D . 91	83066A	Gorizont 7					
	30-DEC-04	-6.94	548.860	500.496	597.223	42	562
	20087.865463	42712.75950	0.0011335	13.1176	21.6198	133.1436	330.5375
D . 92	79098B	OPS 9444 (DSCS II F-14)					
	30-DEC-04	-6.92	547.701	526.345	569.057	41	638
	20087.234468	42711.65033	0.0002086	13.8784	16.7953	275.3429	193.3907
D . 93	84081B	Telecom 1A					
	26-DEC-04	-6.73	532.635	377.845	687.426	39	593
	20083.858750	42696.59029	0.0036669	10.1286	43.8141	200.2557	358.8101
D . 94	82097A	Intelsat V F-5					
	30-DEC-04	-6.71	530.764	424.255	637.273	44	662
	20087.410185	42694.45221	0.0026170	10.4849	39.6361	209.6773	152.6576
D . 95	78113B	OPS 9442 (DSCS II F-12)					
	23-DEC-04	-6.59	521.380	494.473	548.286	41	630
	20080.657905	42685.92888	0.0005079	14.1133	15.5016	350.6298	46.1185
D . 96	91074A	Gorizont 24					
	21-DEC-04	-6.59	521.129	440.430	601.828	45	635
	20078.610104	42685.62795	0.0020318	8.3998	55.7041	51.8632	105.6233
D . 97	86082A	Raduga 19					
	26-DEC-04	-6.53	516.060	467.449	564.670	47	635
	20083.410729	42679.76652	0.0011049	11.3583	33.1194	351.7944	149.9955
D . 98	78106A	NATO IIC					
	30-DEC-04	-6.43	508.455	487.338	529.572	42	627
	20087.173461	42673.12167	0.0004708	12.5599	21.6806	144.7183	220.3511

D . 99	82020A	Gorizont 5					
	30-DEC-04	-6.27	495.745	354.155	637.335	43	565
	20087.582731	42660.52207	0.0035035	14.3915	15.5082	43.7715	66.6862
D . 100	90001B	JC-Sat 2					
	29-DEC-04	-6.25	493.847	256.195	731.500	45	641
	20086.484491	42657.79310	0.0058050	3.1346	114.3898	90.7373	201.8691
D . 101	79038A	OPS 6392 (FLTSATCOM F2)					
	30-DEC-04	-6.23	492.093	420.542	563.644	42	712
	20087.982176	42656.71001	0.0015893	13.9760	13.5273	230.1756	280.1040
D . 102	84113C	Leasat 1					
	29-DEC-04	-6.23	491.801	360.521	623.082	42	602
	20086.257778	42655.98019	0.0031285	8.9119	37.4139	96.8655	206.9285
D . 103	88040A	Intelsat VA F-13 (NSS 513)					
	29-DEC-04	-6.11	482.477	442.290	522.664	46	753
	20086.474931	42646.03540	0.0010626	7.4039	63.9053	246.5093	154.4828
D . 104	75011F	Aerojet SVM-5 (SMS 2 AKM)					
	30-DEC-04	-6.07	479.264	56.881	901.648	37	423
	20087.926968	42643.92008	0.0098649	15.0710	354.8667	280.3939	280.3834
D . 105	81073A	FLTSATCOM F5					
	30-DEC-04	-6.00	473.692	431.706	515.678	41	624
	20087.403229	42637.46356	0.0007537	16.0706	35.5462	310.8840	151.1805
D . 106	90063A	TDF 2					
	29-DEC-04	-6.00	473.483	285.393	661.574	46	605
	20086.922222	42636.69883	0.0047401	5.3701	77.6097	116.5607	7.1911
D . 107	74033A	SMS 1					
	31-DEC-04	-5.98	472.237	412.130	532.344	45	546
	20088.106852	42636.47371	0.0015987	16.6655	351.2601	214.4950	212.8459
D . 108	91079D	Proton-K fourth stage (Block DM-2)					
	29-DEC-04	-5.95	469.929	443.664	496.195	42	499
	20086.687546	42634.79362	0.0004387	8.5114	55.9150	197.0864	69.8817
D . 109	76029A	RCA Satcom II					
	28-DEC-04	-5.94	468.652	221.153	716.152	42	567
	20085.936192	42632.86557	0.0060375	13.4384	19.6901	31.5208	305.3207
D . 110	84041D	Proton-K fourth stage (Block DM)					
	27-DEC-04	-5.93	467.925	402.841	533.009	45	623
	20084.801736	42631.93246	0.0018704	12.6898	23.8585	13.3739	358.6570
D . 111	80049A	Gorizont 4					
	30-DEC-04	-5.92	467.672	447.727	487.617	44	543
	20087.005058	42632.24282	0.0005036	14.6490	10.2316	139.7404	269.6974
D . 112	82020F	Proton-K fourth stage (Block DM)					
	23-DEC-04	-5.89	465.230	349.587	580.874	42	617
	20080.617164	42630.05919	0.0026058	14.4879	15.3332	1.0164	60.6726
D . 113	88066D	Proton-K fourth stage (Block DM-2)					
	29-DEC-04	-5.81	458.816	315.225	602.407	44	611
	20086.279086	42622.70988	0.0031189	10.3044	40.6815	296.0230	201.8309
D . 114	79105E	Proton-K fourth stage (Block DM)					
	21-DEC-04	-5.72	451.327	381.134	521.519	43	586
	20078.379884	42615.30155	0.0019233	14.8572	8.5667	92.7213	141.7465
D . 115	92010B	Insat-IIDT (Arabsat 1C)					
	25-DEC-04	-5.72	451.145	334.734	567.556	45	549
	20082.931597	42616.17588	0.0024382	1.9005	90.4190	71.4266	81.6041

D . 116	87078B	Eutelsat I F-4 (ECS 4)					
	28-DEC-04	-5.71	450.307	424.842	475.772	40	638
	20085.836956	42614.14285	0.0008235	8.5969	54.4517	174.4230	15.4854
D . 117	89048A	Raduga 1-1					
	23-DEC-04	-5.64	444.631	365.715	523.548	49	710
	20080.719375	42609.36811	0.0016333	9.7428	44.9600	316.6556	53.1967
D . 118	81057A	Meteosat 2					
	30-DEC-04	-5.58	439.815	317.320	562.309	44	623
	20087.763704	42603.78916	0.0028960	12.1198	28.0135	180.9923	13.5794
D . 119	89070C	Star 27 (Himawari-4 AKM)					
	09-DEC-04	-5.43	427.812	-645.473	1501.097	19	253
	20066.505799	42591.67189	0.0254440	9.2181	45.2459	213.6890	142.8447
D . 120	91060A	Yuri 3B					
	21-DEC-04	-5.34	421.213	397.623	444.804	40	547
	20078.513681	42584.84631	0.0003929	5.0107	58.6328	336.4561	143.0780
D . 121	84081A	Eutelsat I F-2 (ECS 2)					
	29-DEC-04	-5.32	419.053	386.623	451.484	40	630
	20086.890370	42582.64346	0.0007512	10.1456	43.0429	19.3565	343.8818
D . 122	90077A	Yuri 3A					
	29-DEC-04	-5.27	415.320	376.561	454.079	39	613
	20086.468113	42578.79074	0.0010390	5.7855	80.9167	63.6317	174.0686
D . 123	83081A	Sakura 2B					
	30-DEC-04	-5.26	414.670	392.010	437.331	41	578
	20087.091250	42579.48336	0.0003902	11.3945	33.3325	208.2555	261.6215
D . 124	86007A	Raduga 18					
	31-DEC-04	-5.26	414.530	120.515	708.545	41	604
	20088.073345	42579.30870	0.0070931	11.8344	29.7858	356.3859	263.5284
D . 125	72090A	Anik A1					
	20-DEC-04	-5.20	410.047	348.782	471.311	38	516
	20077.375845	42573.75250	0.0011918	14.4791	6.6273	348.5845	142.0019
D . 126	71006A	Intelsat IV F-2					
	30-DEC-04	-5.17	407.221	347.279	467.162	42	591
	20087.037245	42572.12252	0.0013353	15.0961	357.4832	233.7485	245.1656
D . 127	81050A	Intelsat V F-1					
	26-DEC-04	-5.10	401.884	379.530	424.238	46	697
	20083.407153	42565.28152	0.0006048	11.3057	32.9476	95.5031	151.2012
D . 128	83058A	Eutelsat I F-1 (ECS 1)					
	27-DEC-04	-5.05	397.982	356.412	439.551	44	656
	20084.900301	42561.57076	0.0010003	10.5625	38.7365	359.3547	337.9235
D . 129	80098A	Intelsat V F-2					
	30-DEC-04	-5.00	393.592	330.348	456.836	42	689
	20087.960683	42557.52140	0.0016629	10.9490	35.1768	117.2170	309.8099
D . 130	94022A	GOES 8					
	28-DEC-04	-4.93	387.930	363.725	412.136	49	538
	20085.809664	42552.94435	0.0006573	1.5087	105.6108	93.8967	75.6079
D . 131	84113B	Arabsat 1D					
	31-DEC-04	-4.92	387.536	272.946	502.126	43	678
	20088.025891	42551.66770	0.0028331	8.5553	53.4108	180.0064	304.2898
D . 132	91046A	Gorizont 23					
	27-DEC-04	-4.92	387.252	360.235	414.269	44	549
	20084.933241	42550.75997	0.0006303	8.6465	54.2817	114.7976	341.5847

D . 133	77118A	Sakura					
	29-DEC-04	-4.89	385.440	366.690	404.191	45	580
	20086.133056	42550.00141	0.0001589	14.4101	11.7728	187.3032	225.9751
D . 134	87095A	TV-Sat 1					
	26-DEC-04	-4.88	384.415	125.995	642.835	50	408
	20083.406806	42547.75833	0.0055925	10.7289	35.3698	283.3852	153.0487
D . 135	91037A	Aurora II					
	30-DEC-04	-4.54	357.277	342.825	371.729	49	648
	20087.111111	42521.46997	0.0002963	3.4732	84.6648	41.1031	27.8542
D . 136	84005A	Yuri 2A					
	21-DEC-04	-4.39	345.468	295.881	395.056	44	592
	20078.406863	42508.97941	0.0010731	11.2580	33.8255	46.6425	157.1094
D . 137	92010A	Superbird B1					
	27-DEC-04	-4.39	345.393	273.870	416.915	47	633
	20084.751632	42510.41795	0.0014466	3.1566	85.0358	262.3630	77.2707
D . 138	89004A	Gorizont 17					
	30-DEC-04	-4.35	342.032	255.100	428.964	47	731
	20087.605822	42507.12449	0.0019394	9.8972	42.6699	324.2491	85.0850
D . 139	92041B	Eutelsat II F-4					
	29-DEC-04	-4.30	338.263	305.837	370.688	42	513
	20086.072558	42502.04478	0.0007841	3.4384	85.9652	66.5609	321.6823
D . 140	89006A	Intelsat VA F-15					
	30-DEC-04	-4.20	330.483	245.437	415.530	46	704
	20087.182894	42495.41771	0.0020038	6.1238	72.5598	255.3504	267.4175
D . 141	85087A	Intelsat VA F-12					
	24-DEC-04	-4.17	327.753	307.445	348.061	43	702
	20081.531574	42491.33347	0.0003162	8.2031	58.5406	81.3572	133.7126
D . 142	83059B	Anik C2					
	28-DEC-04	-4.14	325.590	158.518	492.662	45	720
	20085.455463	42489.00153	0.0034409	9.4586	47.5343	267.2530	145.8968
D . 143	78044A	OTS 2					
	13-DEC-04	-4.08	320.671	288.870	352.472	32	530
	20070.468542	42484.64029	0.0008859	13.6599	16.0602	139.3692	124.9639
D . 144	90100B	Gstar 4					
	31-DEC-04	-4.07	319.959	309.597	330.321	46	700
	20088.144780	42484.37947	0.0003378	2.1651	88.7728	116.0758	296.2719
D . 145	73058A	Intelsat IV F-7					
	29-DEC-04	-4.06	319.211	292.570	345.853	40	576
	20086.677859	42483.45932	0.0004942	14.3049	11.5848	17.0035	29.3796
D . 146	70003A	Intelsat III F-6					
	26-DEC-04	-4.02	315.985	281.529	350.442	36	177
	20083.696644	42479.41908	0.0009228	13.1900	336.9932	246.0186	350.6031
D . 147	83047A	Intelsat V F-6					
	30-DEC-04	-3.99	313.731	293.512	333.950	46	657
	20087.151030	42478.86160	0.0011157	9.8592	44.0986	149.0975	250.8750
D . 148	89027A	Tele-X					
	25-DEC-04	-3.92	308.389	283.001	333.776	47	613
	20082.542106	42471.82820	0.0011088	6.5226	70.9572	90.6359	141.3573
D . 149	89067A	Sirius 1					
	30-DEC-04	-3.91	307.401	285.079	329.723	49	621
	20087.396933	42471.22958	0.0007195	4.6351	79.5718	183.9342	197.2984

D . 150	88098A	TDF 1					
	30-DEC-04	-3.88	305.040	284.302	325.778	47	622
	20087.393322	42468.58159	0.0002523	6.9257	67.9110	2.5640	187.0701
D . 151	78068A	Comstar 3					
	30-DEC-04	-3.87	304.449	217.488	391.411	44	606
	20087.145961	42469.20095	0.0021449	12.4401	24.6697	110.9425	233.4647
D . 152	76017A	Marisat 1					
	30-DEC-04	-3.84	301.662	255.870	347.454	40	657
	20087.155266	42465.99480	0.0008434	14.0153	6.0427	3.9553	211.2555
D . 153	90074A	Thor I					
	27-DEC-04	-3.83	300.710	284.513	316.907	42	596
	20084.625949	42464.70896	0.0003533	3.0629	86.8374	53.7879	124.6133
D . 154	82058A	Westar V					
	31-DEC-04	-3.81	299.211	229.786	368.635	41	569
	20088.037778	42463.61668	0.0016706	9.2920	49.4485	63.1005	296.2230
D . 155	88086A	Sakura 3B					
	30-DEC-04	-3.78	296.578	274.761	318.394	42	604
	20087.053056	42460.47976	0.0004796	6.2033	72.4911	138.0652	314.4772
D . 156	82017A	Intelsat V F-4					
	21-DEC-04	-3.76	295.228	169.411	421.045	42	650
	20078.453530	42458.72425	0.0023357	10.7298	36.6107	353.5086	142.9222
D . 157	80074A	GOES 4					
	29-DEC-04	-3.76	295.009	143.740	446.279	40	522
	20086.293380	42458.26358	0.0032018	13.7591	15.8287	252.3625	171.8094
D . 158	90030A	AsiaSat 1					
	23-DEC-04	-3.71	291.121	279.136	303.105	45	645
	20080.581400	42454.93002	0.0002773	4.9626	79.1506	126.2248	131.7562
D . 159	77065A	Himawari					
	30-DEC-04	-3.69	289.530	222.099	356.960	40	546
	20087.250764	42452.84117	0.0016314	14.4881	8.2861	41.5475	179.1421
D . 160	93015A	USA 98 (UFO F1)					
	29-DEC-04	-3.68	289.041	258.496	319.585	43	485
	20086.935544	42452.05503	0.0007335	19.5298	231.4526	9.2518	156.0773
D . 161	75042A	Intelsat IV F-1					
	26-DEC-04	-3.65	286.339	233.222	339.456	43	603
	20083.376076	42449.61843	0.0013994	13.4018	17.6218	70.6458	147.1935
D . 162	02029D	Proton-K fourth stage (Block DM-2M)					
	31-DEC-04	-3.62	284.483	229.705	339.260	45	123
	20088.103484	42448.40653	0.0013017	2.1171	87.6518	166.7452	310.0483
D . 163	86016A	Yuri 2B					
	23-DEC-04	-3.54	277.663	201.942	353.384	42	619
	20080.724363	42442.58315	0.0019439	10.0284	42.9802	17.2741	49.5984
D . 164	92060A	Hispasat 1A					
	31-DEC-04	-3.44	269.824	248.926	290.723	45	527
	20088.106539	42433.90154	0.0004646	2.0702	89.1078	91.9808	310.3973
D . 165	87070A	Kiku-5					
	25-DEC-04	-3.38	265.482	225.035	305.930	40	679
	20082.450613	42428.58684	0.0007674	9.5487	47.0871	191.1930	150.5014
D . 166	90079B	Eutelsat II F-1					
	30-DEC-04	-3.34	261.807	235.885	287.728	46	544
	20087.526586	42425.01370	0.0007685	5.1958	77.9045	55.2846	148.9433

D . 167	81057F	Mage 1 (Meteosat 2 AKM)					
	31-DEC-04	-3.24	254.029	-58.438	566.496	36	392
	20088.178935	42418.34518	0.0070913	14.1535	13.5622	359.1321	209.2287
D . 168	78071A	ESA GEOS 2					
	30-DEC-04	-3.22	253.023	227.573	278.473	41	549
	20087.090150	42417.91776	0.0005707	14.6559	4.0479	139.8210	232.7998
D . 169	82106D	IUS stage 2					
	29-DEC-04	-3.21	251.728	64.007	439.448	40	569
	20086.061042	42416.84898	0.0044979	13.1230	23.2211	218.4866	263.0966
D . 170	88051C	PAS 1					
	30-DEC-04	-3.17	248.991	231.010	266.972	41	666
	20087.229884	42414.18185	0.0006342	3.4954	84.2912	143.0758	262.2572
D . 171	77048A	GOES 2					
	27-DEC-04	-3.15	247.341	191.442	303.241	44	707
	20084.753600	42410.59980	0.0015485	14.3015	8.3478	201.0177	0.5262
D . 172	89052A	Gorizont 18					
	30-DEC-04	-3.14	246.565	107.844	385.285	51	662
	20087.129468	42411.78226	0.0035144	9.5866	44.6782	142.8592	259.4137
D . 173	85016F	Proton-K fourth stage (Block DM)					
	29-DEC-04	-3.13	245.249	137.693	352.805	45	631
	20086.347951	42408.38614	0.0028132	12.2201	25.9210	48.1216	162.7939
D . 174	83006A	Sakura 2A					
	30-DEC-04	-3.12	244.862	203.734	285.989	42	568
	20087.965336	42409.10086	0.0010699	11.6913	29.8201	119.0966	302.7097
D . 175	83094A	RCA Satcom IIR					
	29-DEC-04	-3.10	242.754	170.820	314.687	39	704
	20086.910637	42406.13893	0.0017022	7.7192	62.4026	209.1926	355.7297
D . 176	84031F	Proton-K fourth stage (Block DM)					
	28-DEC-04	-3.05	239.520	171.136	307.904	43	607
	20085.715162	42403.90538	0.0016905	12.6381	22.6695	51.5305	27.8773
D . 177	94038D	Proton-K fourth stage (Block DM-2)					
	30-DEC-04	-3.04	238.112	135.237	340.987	44	440
	20087.135556	42402.90656	0.0023186	5.8152	67.8053	296.5160	279.7436
D . 178	00031D	Proton-K fourth stage (Block DM-2)					
	29-DEC-04	-3.01	235.748	176.011	295.484	45	219
	20086.443692	42398.80216	0.0011262	3.8025	83.0419	257.9263	184.6518
D . 179	77041A	Intelsat IVA F-4					
	19-DEC-04	-2.99	234.561	179.524	289.598	45	617
	20076.418368	42397.71582	0.0014115	12.8003	21.6995	64.2408	142.8796
D . 180	85048B	Morelos 1					
	25-DEC-04	-2.90	227.179	211.513	242.845	44	632
	20082.946481	42390.21735	0.0001019	8.2265	58.2727	330.5006	342.6544
D . 181	94002D	Proton-K fourth stage (Block DM-2M)					
	21-DEC-04	-2.90	227.076	69.593	384.559	45	471
	20078.679398	42392.72159	0.0039476	7.9551	58.9300	293.8948	83.2447
D . 182	81119A	Intelsat V F-3					
	27-DEC-04	-2.89	226.520	127.874	325.166	44	666
	20084.686551	42391.82771	0.0023653	10.7194	36.4695	28.9238	52.9059
D . 183	78062D	Aerojet SVM-5 (GOES 3 AKM)					
	24-DEC-04	-2.86	224.397	-241.929	690.724	38	474
	20081.685995	42388.61568	0.0111473	15.1799	6.8800	231.9819	25.3644

D . 184	69069A	ATS 5					
	30-DEC-04	-2.81	220.600	199.054	242.146	40	514
	20087.117905	42384.37756	0.0006619	13.5758	340.9712	150.5809	199.7046
D . 185	75011A	SMS 2					
	26-DEC-04	-2.75	215.274	154.821	275.727	39	499
	20083.347674	42378.39812	0.0012862	14.8501	3.3734	54.5477	143.1693
D . 186	83077A	Arabsat 1D-R					
	30-DEC-04	-2.70	211.221	106.230	316.213	42	678
	20087.338461	42374.81765	0.0023811	8.3853	56.8341	319.9343	195.6760
D . 187	92021A	Telecom 2B					
	30-DEC-04	-2.67	209.497	194.513	224.481	42	591
	20087.246157	42374.90308	0.0003769	3.6803	83.2807	95.8114	255.4222
D . 188	89020A	JC-Sat 1					
	21-DEC-04	-2.66	208.452	188.472	228.433	45	636
	20078.805972	42373.63975	0.0001806	6.2259	72.8998	284.9069	51.8439
D . 189	85015B	Brazilsat 1					
	23-DEC-04	-2.61	204.234	193.358	215.109	43	725
	20080.685671	42369.98083	0.0004536	7.8253	60.8861	136.1158	81.3976
D . 190	90063B	DFS-Kopernikus 2					
	29-DEC-04	-2.61	204.203	186.440	221.966	46	609
	20086.517338	42366.99423	0.0003472	3.7033	83.6710	140.9825	158.8396
D . 191	81076A	Himawari-2					
	21-DEC-04	-2.59	203.307	156.683	249.931	42	542
	20078.399688	42366.37888	0.0013387	13.4825	16.6878	110.8863	142.6361
D . 192	86003B	Satcom Ku-1					
	22-DEC-04	-2.59	203.015	185.584	220.446	44	702
	20079.793426	42368.23438	0.0000726	6.6284	69.8181	81.1794	52.3425
D . 193	00019D	Proton-K fourth stage (Block DM-2M)					
	28-DEC-04	-2.58	201.986	148.777	255.195	45	227
	20085.965139	42364.90767	0.0014278	4.1678	82.8805	104.0068	357.5436
D . 194	85109B	Morelos 2					
	28-DEC-04	-2.55	200.006	181.082	218.930	49	757
	20085.680752	42365.50879	0.0004108	5.3743	76.2114	283.5458	93.4200
D . 195	82004A	RCA Satcom IV					
	30-DEC-04	-2.46	192.966	172.055	213.878	45	618
	20087.677338	42358.69831	0.0005121	9.4151	47.8765	31.6323	64.6263
D . 196	75117A	RCA Satcom I					
	26-DEC-04	-2.43	190.483	86.444	294.523	38	563
	20083.779039	42352.26076	0.0023822	13.4096	16.8499	77.6729	1.1268
D . 197	85109D	Satcom Ku-2					
	30-DEC-04	-2.40	188.132	152.178	224.087	44	743
	20087.040405	42351.66181	0.0006521	6.3532	71.4463	64.8835	318.0385
D . 198	71116A	Intelsat IV F-3					
	25-DEC-04	-2.35	183.725	130.578	236.871	45	595
	20082.368970	42346.70805	0.0010653	14.4794	8.1845	257.1484	141.0292
D . 199	97070D	Proton-K fourth stage (Block DM-2)					
	29-DEC-04	-2.31	180.537	116.266	244.808	44	325
	20086.312199	42345.18613	0.0014070	5.9219	73.6395	305.0361	222.8663
D . 200	86026B	Brazilsat 2					
	28-DEC-04	-2.28	178.166	168.096	188.236	47	750
	20085.971493	42340.98209	0.0003198	6.7113	68.3630	130.5012	340.7749

D . 201	88018A	Spacenet 3R					
	28-DEC-04	-2.20	172.248	155.362	189.135	43	660
	20085.643275	42336.97847	0.0001924	4.6396	79.8798	32.6436	110.6183
D . 202	85028B	Anik C1					
	29-DEC-04	-2.19	171.886	112.159	231.613	45	687
	20086.795729	42336.95950	0.0012909	6.4204	71.8339	288.6076	46.5746
D . 203	88109A	Skynet 4B					
	26-DEC-04	-2.12	165.524	149.373	181.674	46	642
	20083.804444	42329.69253	0.0005328	9.2051	50.5758	108.1028	25.3541
D . 204	76010A	Intelsat IVA F-2					
	30-DEC-04	-2.11	165.148	140.519	189.777	44	582
	20087.449190	42329.53004	0.0006378	13.4489	16.4756	94.2135	115.6510
D . 205	83105A	Intelsat V F-7					
	22-DEC-04	-2.08	162.698	132.405	192.992	43	652
	20079.455671	42325.27724	0.0004266	10.0380	42.0341	227.6340	146.5649
D . 206	92072A	Galaxy VII					
	29-DEC-04	-2.07	161.902	134.936	188.869	42	580
	20086.760822	42328.19337	0.0006936	3.7357	83.2692	154.5482	70.5580
D . 207	97078A	Galaxy VIII-i					
	29-DEC-04	-2.06	161.119	143.913	178.325	51	358
	20086.496782	42323.82885	0.0006664	2.0415	88.6851	176.9167	170.9258
D . 208	91074D	Proton-K fourth stage (Block DM-2)					
	27-DEC-04	-2.04	159.875	145.219	174.531	41	483
	20084.880984	42322.58771	0.0001858	8.3427	54.9799	356.1744	1.0762
D . 209	92066A	DFS-Kopernikus 3					
	29-DEC-04	-1.95	152.608	133.331	171.885	47	542
	20086.553750	42315.02341	0.0005204	2.7561	86.2820	184.0183	148.1452
D . 210	89041A	Superbird A					
	31-DEC-04	-1.89	148.268	126.684	169.852	42	562
	20088.100613	42314.29624	0.0006908	9.8617	43.6604	157.1693	267.6253
D . 211	84114A	Spacenet 2					
	25-DEC-04	-1.86	145.536	102.885	188.187	38	684
	20082.974641	42307.92672	0.0007216	6.3655	71.4256	209.0960	345.5086
D . 212	90091B	Galaxy VI					
	21-DEC-04	-1.84	143.874	121.839	165.908	43	644
	20078.832778	42309.98167	0.0003766	1.9724	89.2049	31.5866	58.0496
D . 213	85076B	Optus A1					
	21-DEC-04	-1.84	143.726	125.019	162.433	43	551
	20078.500336	42306.26157	0.0003092	8.8136	52.9395	149.2431	142.3545
D . 214	82014A	Westar IV					
	30-DEC-04	-1.81	141.408	122.488	160.329	40	628
	20087.170741	42307.35478	0.0002620	9.4439	47.3323	88.8074	246.9488
D . 215	84093D	Telstar 3C					
	30-DEC-04	-1.78	138.970	118.296	159.644	43	706
	20087.319537	42303.06092	0.0003442	7.6851	62.1295	304.5354	207.9213
D . 216	95067B	Insat-IIC					
	30-DEC-04	-1.77	138.242	125.485	150.999	47	409
	20087.512870	42300.19461	0.0002703	2.5147	90.8643	123.4047	166.5018
D . 217	74093A	Intelsat IV F-8					
	30-DEC-04	-1.75	136.966	113.148	160.784	41	586
	20087.061481	42302.97726	0.0002360	13.3463	17.0770	346.0168	256.1321

D . 218	88081B	SBS V					
	22-DEC-04	-1.73	135.553	113.957	157.148	46	694
	20079.687998	42301.22555	0.0006112	4.2736	81.3994	108.4437	101.9548
D . 219	86026A	Gstar 2					
	31-DEC-04	-1.73	134.967	115.261	154.673	42	690
	20088.092245	42299.59751	0.0003078	7.5990	62.9671	234.4211	289.8325
D . 220	73023A	Anik A2					
	22-DEC-04	-1.71	133.757	74.259	193.254	39	536
	20079.533623	42300.06180	0.0011367	14.0661	11.4074	215.4795	87.7951
D . 221	92059D	Proton-K fourth stage (Block DM-2)					
	31-DEC-04	-1.71	133.338	82.408	184.268	46	492
	20088.140359	42299.51838	0.0011881	7.9875	58.8722	119.5577	268.5320
D . 222	78116A	Anik B1					
	30-DEC-04	-1.65	128.684	105.711	151.657	44	613
	20087.190231	42293.65836	0.0005141	12.0737	26.0837	57.3286	218.7175
D . 223	80091A	SBS I					
	29-DEC-04	-1.62	126.837	99.217	154.457	45	662
	20086.936979	42290.53522	0.0005051	11.9223	28.7152	339.8549	312.6945
D . 224	76042A	Comstar 1A					
	30-DEC-04	-1.62	126.857	109.249	144.465	42	586
	20087.087269	42292.91912	0.0003952	13.3203	17.1590	144.8297	246.9380
D . 225	94067A	Ekspress 1					
	29-DEC-04	-1.61	125.911	104.747	147.076	48	524
	20086.120486	42290.27313	0.0004225	4.0040	82.1412	19.6280	300.5546
D . 226	72003A	Intelsat IV F-4					
	28-DEC-04	-1.59	124.703	104.959	144.446	41	603
	20085.653727	42289.65801	0.0001324	14.1648	10.4346	282.9199	37.6523
D . 227	84080A	Himawari-3					
	24-DEC-04	-1.59	123.969	92.487	155.452	40	552
	20081.759132	42287.99833	0.0005127	11.0539	33.2609	304.4793	26.2561
D . 228	84101A	Galaxy III					
	22-DEC-04	-1.56	122.300	90.821	153.779	40	720
	20079.767523	42288.47247	0.0006567	7.6949	62.0005	182.1026	53.8998
D . 229	76035A	NATO IIIA					
	27-DEC-04	-1.55	120.806	14.559	227.052	38	608
	20084.914387	42285.37485	0.0025030	13.2754	3.9591	117.2259	298.3368
D . 230	89062A	TV-Sat 2					
	31-DEC-04	-1.52	118.967	79.735	158.199	45	596
	20088.148854	42284.63710	0.0004896	5.5096	75.9210	354.0584	282.2861
D . 231	74075A	Westar II					
	28-DEC-04	-1.51	117.910	96.076	139.744	40	507
	20085.437523	42282.13806	0.0001927	13.7105	13.4493	49.6847	118.7511
D . 232	83030A	RCA Satcom IR					
	29-DEC-04	-1.49	116.088	72.787	159.388	42	628
	20086.297604	42280.88163	0.0007971	8.8461	52.5096	303.0891	207.1864
D . 233	99047A	Yamal-100 No. 1					
	20-DEC-04	-1.47	114.596	-282.912	512.104	42	244
	20077.563067	42276.47821	0.0091804	4.5869	79.9601	199.4701	147.1768
D . 234	84022F	Proton-K fourth stage (Block DM)					
	30-DEC-04	-1.46	113.759	12.539	214.979	46	598
	20087.213970	42277.86499	0.0020621	13.8045	23.1004	292.9096	206.8995

D . 235	87028D	Proton-K fourth stage (Block DM)					
	29-DEC-04	-1.45	113.515	-2.749	229.778	47	605
	20086.679468	42279.45029	0.0025923	11.7341	34.8580	261.5644	51.5153
D . 236	85048D	Telstar 3D					
	25-DEC-04	-1.43	111.634	98.425	124.843	43	709
	20082.751447	42278.16443	0.0002044	7.4627	63.6162	59.1816	58.3892
D . 237	95063A	Gals 2					
	26-DEC-04	-1.39	108.702	80.963	136.440	50	474
	20083.696655	42275.04923	0.0005157	3.8347	82.9860	110.0364	96.3453
D . 238	91064B	Proton-K fourth stage (Block DM-2)					
	30-DEC-04	-1.36	106.164	89.192	123.135	42	493
	20087.162685	42272.93616	0.0002870	8.5643	54.0532	191.7859	256.5205
D . 239	74022A	Westar I					
	25-DEC-04	-1.35	105.408	77.253	133.564	42	532
	20082.519086	42272.00005	0.0006281	13.8506	12.6299	184.9661	91.4025
D . 240	82110C	Anik C3					
	30-DEC-04	-1.32	103.266	85.812	120.720	42	708
	20087.244641	42268.43496	0.0001105	9.5126	46.4999	226.4185	219.4059
D . 241	78002A	Intelsat IVA F-3					
	30-DEC-04	-1.31	102.334	84.410	120.258	41	583
	20087.630810	42269.15480	0.0003517	12.4347	23.2809	82.8806	56.8650
D . 242	87029A	Agila 1					
	30-DEC-04	-1.30	101.719	80.113	123.326	42	692
	20087.660567	42268.71985	0.0003656	7.1037	66.3719	196.0465	89.1230
D . 243	75091A	Intelsat IVA F-1					
	29-DEC-04	-1.24	96.666	71.250	122.082	43	599
	20086.940579	42261.36427	0.0005719	13.2984	16.8818	55.0709	299.6476
D . 244	82110B	SBS III					
	24-DEC-04	-1.21	94.841	59.124	130.558	42	723
	20081.822303	42257.88571	0.0005769	9.4490	46.7955	243.6203	16.9712
D . 245	82009A	Ekran 8					
	30-DEC-04	-1.19	93.268	-25.135	211.670	46	631
	20087.871539	42255.86272	0.0028660	14.0004	12.1679	129.0451	319.1013
D . 246	85109C	Optus A2					
	29-DEC-04	-1.18	92.315	79.435	105.195	45	724
	20086.925602	42253.96962	0.0003472	8.5171	54.5431	113.8900	342.6431
D . 247	79072A	Westar III					
	19-DEC-04	-1.17	91.699	73.158	110.239	42	563
	20076.774444	42255.23674	0.0003957	11.3592	31.1158	126.5275	23.6320
D . 248	74101A	Symphonie A					
	30-DEC-04	-1.12	87.747	68.581	106.913	40	520
	20087.027257	42254.77001	0.0002447	14.7872	359.9105	151.9950	251.3364
D . 249	91003A	Italsat 1					
	30-DEC-04	-1.11	86.796	33.345	140.248	42	557
	20087.223171	42253.95835	0.0015164	6.4067	70.8512	198.6496	251.3499
D . 250	80081F	Proton-K fourth stage (Block DM)					
	30-DEC-04	-1.10	86.253	62.800	109.707	46	603
	20087.550556	42254.14125	0.0003392	14.3299	7.7810	191.1650	70.2974
D . 251	93048B	Insat-IIB					
	25-DEC-04	-1.09	84.907	8.945	160.869	42	503
	20082.726181	42252.91169	0.0016274	3.8091	83.1530	2.6367	86.7302

D . 252	75077A	Symphonie B					
	29-DEC-04	-1.09	84.929	60.872	108.986	38	543
	20086.839236	42248.03042	0.0004460	14.6910	357.7482	194.9855	317.0215
D . 253	88071A	Gorizont 16					
	29-DEC-04	-1.07	83.842	23.085	144.599	43	630
	20086.937500	42245.99115	0.0012982	10.0967	39.9307	232.7615	323.6180
D . 254	76073A	Comstar 2					
	30-DEC-04	-1.06	82.934	66.556	99.313	44	692
	20087.833461	42244.32335	0.0000760	13.1815	17.3304	95.4492	337.7293
D . 255	84049A	Chinasat 5 (Spacenet 1)					
	29-DEC-04	-1.04	80.794	58.795	102.794	43	720
	20086.926597	42241.94658	0.0004539	7.0445	66.6867	56.8752	354.3794
D . 256	93073E	Mage 1 (Meteosat 6 AKM)					
	25-DEC-04	-1.03	80.731	-212.247	373.708	37	311
	20082.553414	42243.27166	0.0064173	7.2488	64.6998	247.2938	130.2584
D . 257	97041D	Proton-K fourth stage (Block DM-2)					
	29-DEC-04	-0.97	75.641	-1412.390	1563.671	44	343
	20086.167731	42241.89589	0.0334263	4.8144	78.1180	79.8047	283.2982
D . 258	77014A	Kiku-2					
	30-DEC-04	-0.95	74.162	56.318	92.005	33	480
	20087.868611	42237.48319	0.0002929	14.5997	3.4177	188.1853	311.1123
D . 259	90016D	Proton-K fourth stage (Block DM)					
	27-DEC-04	-0.88	69.006	-99.855	237.867	43	534
	20084.860613	42230.13669	0.0043290	9.2553	47.1645	30.6823	0.9011
D . 260	90112D	Proton-K fourth stage (Block DM-2)					
	31-DEC-04	-0.88	68.994	-42.074	180.061	46	549
	20088.096690	42236.07579	0.0025908	8.7860	50.9451	330.9435	276.1333
D . 261	81057B	APPLE					
	27-DEC-04	-0.85	66.566	-31.497	164.629	42	555
	20084.760347	42227.60237	0.0023527	13.9122	12.3376	16.5952	2.1424
D . 262	77092J	Ekran 2 fragmentation debris					
	28-DEC-04	-0.83	64.656	-13.214	142.525	37	51
	20085.849826	42227.87982	0.0011954	14.7754	358.7860	27.8406	315.2815
D . 263	03053E	Proton-K fourth stage (Block DM-2M)					
	29-DEC-04	-0.83	64.727	-811.752	941.206	49	53
	20086.665486	42229.47170	0.0207363	1.0704	94.8040	80.5226	117.8473
D . 264	77018A	Palapa 2					
	25-DEC-04	-0.83	64.971	41.691	88.251	41	539
	20082.757639	42226.98784	0.0002792	12.6473	21.6527	286.3861	14.2817
D . 265	87084D	Proton-K fourth stage (Block DM)					
	26-DEC-04	-0.81	63.679	-56.698	184.056	45	618
	20083.762234	42227.46562	0.0030797	10.5128	36.1728	36.9958	26.3813
D . 266	83028F	Proton-K fourth stage (Block DM)					
	29-DEC-04	-0.81	63.401	-41.334	168.137	45	605
	20086.269132	42224.37156	0.0024934	13.0828	18.9901	15.3099	184.1573
D . 267	98025D	Proton-K fourth stage (Block DM-2)					
	31-DEC-04	-0.81	63.315	-71.838	198.468	44	317
	20088.135579	42229.23081	0.0029252	3.3137	78.8314	276.5968	289.5245
D . 268	75038A	Anik A3					
	28-DEC-04	-0.80	62.915	42.371	83.459	43	560
	20085.368646	42222.79170	0.0002158	13.3992	16.1228	166.3368	146.2715

D . 269	92088D	Proton-K fourth stage (Block DM-2)					
	25-DEC-04	-0.75	58.559	16.041	101.077	46	498
	20082.742072	42227.83451	0.0012673	6.7518	62.4945	304.9876	60.5040
D . 270	94060D	Proton-K fourth stage (Block DM-2)					
	27-DEC-04	-0.71	55.474	22.329	88.619	41	413
	20084.014792	42216.63286	0.0006567	6.5682	67.8009	294.9335	326.4195
D . 271	94087D	Proton-K fourth stage (Block DM-2)					
	29-DEC-04	-0.70	54.672	9.417	99.927	45	425
	20086.714572	42224.99922	0.0014234	6.3996	69.1331	293.0077	73.1373
D . 272	76066A	Palapa 1					
	26-DEC-04	-0.65	50.837	29.542	72.131	46	500
	20083.472014	42216.97537	0.0003393	13.1509	17.4337	38.1623	112.2470
D . 273	85055A	Intelsat VA F-11					
	28-DEC-04	-0.63	49.558	6.352	92.764	46	679
	20085.811748	42212.30575	0.0011929	8.7135	53.3280	233.2840	23.3471
D . 274	88034D	Proton-K fourth stage (Block DM)					
	29-DEC-04	-0.60	47.029	-58.082	152.141	43	607
	20086.974572	42211.17284	0.0023875	10.4145	38.2016	341.9408	308.5388
D . 275	75097F	Proton-K fourth stage (Block DM)					
	29-DEC-04	-0.58	45.757	-52.058	143.572	41	578
	20086.665926	42206.48629	0.0018710	14.4167	350.7699	355.0863	12.5901
D . 276	72041A	Intelsat IV F-5					
	30-DEC-04	-0.58	45.520	25.843	65.197	43	580
	20087.674502	42208.89096	0.0003299	14.4348	5.7968	71.1947	23.6068
D . 277	81114A	RCA Satcom IIIR					
	29-DEC-04	-0.56	43.906	25.454	62.359	41	563
	20086.971042	42206.41097	0.0003885	9.7942	44.0463	121.1720	315.7641
D . 278	04010F	Proton-K fourth stage (Block DM-2)					
	29-DEC-04	-0.56	42.016	-97.267	181.299	27	27
	20086.899699	42209.69315	0.0028920	0.9285	223.0906	31.4939	297.1080
D . 279	82082A	Anik D1					
	28-DEC-04	-0.56	43.554	17.286	69.823	47	618
	20085.458229	42202.44639	0.0006771	9.6150	45.1188	128.2630	142.9466
D . 280	93003D	IUS stage 2					
	27-DEC-04	-0.55	43.087	-251.499	337.672	40	475
	20084.963438	42204.43179	0.0064621	7.1439	46.1083	278.8151	321.7153
D . 281	94069D	Proton-K fourth stage (Block DM-2)					
	29-DEC-04	-0.55	43.236	-52.301	138.772	46	418
	20086.304456	42210.34809	0.0021933	6.8357	69.0340	293.4427	221.0036
D . 282	91010F	Proton-K fourth stage (Block DM-2)					
	26-DEC-04	-0.52	41.087	-25.064	107.238	43	544
	20083.986389	42201.85216	0.0017726	7.8970	54.9889	18.2877	324.0593
D . 283	83065A	Galaxy I					
	23-DEC-04	-0.52	40.497	24.825	56.169	32	680
	20080.897940	42199.69514	0.0003060	8.1924	57.5896	131.6868	1.4923
D . 284	04043D	Proton-K fourth stage (Block DM-2M)					
	22-DEC-04	-0.50	47.553	14.489	80.616	8	8
	20079.583472	42211.12899	0.0008912	0.2037	64.5305	310.2465	58.5116
D . 285	91015E	Mage 1 (Meteosat 5 AKM)					
	16-JUL-04	-0.50	38.784	-628.148	705.715	15	297
	19920.163889	42209.43540	0.0167769	8.1785	48.2451	19.9942	55.8959

D . 286	99047E	Proton-K fourth stage (Block DM-2M)					
	29-DEC-04	-0.49	38.390	-425.378	502.157	46	242
	20086.335660	42206.16479	0.0108266	4.5847	79.9910	198.8455	220.3842
D . 287	81096A	SBS II					
	30-DEC-04	-0.48	38.252	13.364	63.140	46	708
	20087.087650	42208.99130	0.0003997	11.2481	31.6067	6.8962	261.2218
D . 288	93072A	Gorizont 29					
	29-DEC-04	-0.47	37.467	-5.008	79.943	50	571
	20086.399213	42195.43022	0.0011092	7.0790	63.9174	154.7280	181.9873
D . 289	85107A	Raduga 17					
	25-DEC-04	-0.41	32.386	-16.130	80.903	41	622
	20082.653785	42205.52603	0.0013030	11.5907	27.8500	26.8185	58.0552
D . 290	95045D	Proton-K fourth stage (Block DM-2)					
	30-DEC-04	-0.40	31.864	-59.108	122.836	49	398
	20087.505069	42187.38026	0.0019363	5.9505	72.0753	195.4616	150.7946
D . 291	79035E	Proton-K fourth stage (Block DM)					
	29-DEC-04	-0.38	29.728	-100.104	159.560	48	586
	20086.330174	42186.42165	0.0028285	14.6220	3.2730	37.1129	146.5180
D . 292	00032C	Feng Yun 2 AKM					
	29-DEC-04	-0.37	31.292	-75.475	138.060	40	169
	20086.444826	42190.42122	0.0025394	2.9705	91.5506	175.8531	192.7623
D . 293	83059C	Palapa Pacific System					
	26-DEC-04	-0.33	26.257	4.340	48.174	42	638
	20083.495208	42189.85437	0.0001441	10.0817	40.7430	234.2947	127.1142
D . 294	00036D	Proton-K fourth stage (Block DM-2)					
	29-DEC-04	-0.31	24.665	-62.247	111.577	42	205
	20086.126319	42193.12856	0.0018817	2.4870	85.6284	214.8917	301.5758
D . 295	92082A	Gorizont 27					
	30-DEC-04	-0.30	21.745	-24.973	68.464	50	614
	20087.243773	42197.29402	0.0012118	7.7163	59.9782	176.7340	285.1143
D . 296	83098A	Galaxy II					
	29-DEC-04	-0.27	22.095	-4.781	48.971	45	715
	20086.098947	42196.41349	0.0003714	8.1206	58.1168	243.1331	284.5144
D . 297	92041A	Insat-IIA					
	28-DEC-04	-0.24	20.143	-4.048	44.334	49	564
	20085.473576	42170.45166	0.0005851	6.2426	71.8721	45.2294	164.0091
D . 298	81102F	Proton-K fourth stage (Block DM)					
	30-DEC-04	-0.24	19.897	-31.822	71.616	37	601
	20087.548009	42200.76125	0.0011935	13.9628	10.6091	12.7644	74.0657
D . 299	67001A	Intelsat II F-2					
	29-DEC-04	-0.21	15.680	-54.082	85.443	43	351
	20086.227627	42173.61523	0.0018778	11.9053	328.7964	185.3414	148.8665
D . 300	00029B	Proton-K fourth stage (Briz M)					
	29-DEC-04	0.24	-20.880	-1075.492	1033.732	43	210
	20086.498924	42156.16469	0.0253933	2.3993	77.5887	128.1641	161.0760
D . 301	66110A	ATS 1					
	30-DEC-04	0.26	-17.836	-52.760	17.088	37	524
	20087.222454	42151.87883	0.0007817	10.8967	321.3440	149.6897	142.3959
D . 302	92057A	Satcom C-4					
	31-DEC-04	0.29	-35.156	-44.234	-26.078	51	532
	20088.480509	42128.65753	0.0002068	0.6359	93.2590	186.0441	266.9158

D . 303	82103E	Proton-K fourth stage (Block DM)					
	29-DEC-04	0.30	-24.746	-79.842	30.350	41	594
	20086.290764	42149.69962	0.0011300	13.2855	14.9440	342.6333	172.1812
D . 304	81027A	Raduga 8					
	20-DEC-04	0.37	-29.855	-389.996	330.286	40	603
	20077.420266	42136.39823	0.0087787	14.3046	8.8341	53.7077	129.0019
D . 305	85048C	Arabsat 1B					
	28-DEC-04	0.50	-39.158	-97.405	19.089	43	632
	20085.506771	42127.06283	0.0022245	9.3411	47.3717	177.7378	127.6338
D . 306	85015A	Arabsat 1A					
	27-DEC-04	0.53	-41.504	-69.026	-13.983	47	536
	20084.818947	42125.89591	0.0006935	9.7681	43.2253	156.6527	11.7922
D . 307	69013B	Titan IIC stage 3 (Transtage)					
	29-DEC-04	0.54	-41.929	-119.076	35.218	46	404
	20086.541400	42119.49835	0.0020151	11.8647	331.0113	139.8271	37.9832
D . 308	89020E	Mage 1 (Meteosat 4 AKM)					
	30-DEC-04	0.60	-47.194	-610.962	516.574	26	282
	20087.304282	42120.04607	0.0135424	9.5125	38.5609	43.4336	191.0291
D . 309	88091D	IUS stage 2					
	29-DEC-04	0.71	-55.716	-142.305	30.872	38	613
	20086.451076	42113.27426	0.0017794	9.9041	45.3175	87.9618	144.8968
D . 310	03015A	Cosmos-2397					
	31-DEC-04	0.72	-54.839	-235.037	125.359	51	88
	20088.000856	42103.12654	0.0045568	0.7850	287.0658	321.2920	83.8888
D . 311	79087C	Proton-K fourth stage (Block DM)					
	27-DEC-04	0.73	-56.540	-225.914	112.833	45	579
	20084.835949	42110.55820	0.0037096	14.4528	4.3884	133.0958	327.1361
D . 312	93069D	Proton-K fourth stage (Block DM-2)					
	22-DEC-04	0.76	-59.441	-86.748	-32.133	47	455
	20079.945660	42108.87943	0.0004813	7.0795	63.8785	183.8304	351.4625
D . 313	75123F	Proton-K fourth stage (Block DM)					
	27-DEC-04	0.80	-62.042	-127.869	3.784	43	610
	20084.601377	42100.82655	0.0012170	14.3083	352.1149	359.1075	39.2226
D . 314	95035D	IUS stage 2					
	24-DEC-04	0.80	-62.443	-106.025	-18.860	47	389
	20081.675775	42097.62943	0.0010351	9.1253	70.5239	310.7791	93.5057
D . 315	90054D	Proton-K fourth stage (Block DM)					
	30-DEC-04	0.84	-65.246	-132.548	2.056	44	561
	20087.183391	42095.41730	0.0014077	9.0689	49.0170	245.7203	243.8855
D . 316	88071D	Proton-K fourth stage (Block DM)					
	29-DEC-04	0.99	-77.138	-156.997	2.720	46	632
	20086.037303	42085.59004	0.0020294	9.9780	39.6990	25.4284	288.5483
D . 317	87096D	Proton-K fourth stage (Block DM)					
	27-DEC-04	1.07	-83.128	-175.510	9.254	49	640
	20084.945729	42083.07707	0.0023813	10.3967	36.6054	33.6324	319.5464
D . 318	77048G	Aerojet SVM-5 (GOES 2 AKM)					
	30-DEC-04	1.09	-84.693	-993.012	823.626	21	315
	20087.251690	42083.74859	0.0222031	14.4639	358.9840	241.7504	167.1209
D . 319	89081D	Proton-K fourth stage (Block DM)					
	26-DEC-04	1.21	-94.334	-214.770	26.102	46	563
	20083.764190	42069.54189	0.0025193	9.3716	44.5821	268.7729	33.5626

D . 320	89021D	IUS stage 2					
	27-DEC-04	1.21	-94.427	-199.633	10.779	44	588
	20084.735972	42070.60483	0.0024349	10.9206	24.6199	352.7096	23.1016
D . 321	85102D	Proton-K fourth stage (Block DM-2)					
	28-DEC-04	1.27	-98.992	-189.894	-8.089	45	589
	20085.655938	42062.90907	0.0019144	11.4539	27.9429	305.3636	54.1945
D . 322	97049E	Mage 1 (Meteosat 7 AKM)					
	27-DEC-04	1.34	-103.949	-407.072	199.175	15	235
	20084.016250	42062.25036	0.0073316	4.3264	79.0394	117.1944	337.8044
D . 323	89041B	DFS-Kopernikus 1					
	24-DEC-04	1.40	-108.709	-160.487	-56.931	49	558
	20081.952454	42057.77773	0.0012706	7.1194	65.3501	95.2451	348.6578
D . 324	74039C	Titan IHC stage 3 (Transtage)					
	29-DEC-04	1.41	-109.678	-215.113	-4.243	46	590
	20086.985891	42052.42741	0.0026764	14.5274	352.4662	130.8795	259.0439
D . 325	88034A	Cosmos 1940					
	30-DEC-04	1.42	-110.210	-200.366	-20.054	42	551
	20087.176400	42052.69642	0.0022172	10.3330	37.7167	78.3645	235.5315
D . 326	04015D	Proton-K fourth stage (Block DM-2M)					
	30-DEC-04	1.58	-122.875	-192.339	-53.412	32	32
	20087.380012	42042.05080	0.0016651	0.6396	96.5918	111.4751	123.9564
D . 327	00013D	Proton-K fourth stage (Block DM-2M)					
	30-DEC-04	1.76	-136.270	-171.311	-101.228	48	223
	20087.106586	42028.07668	0.0006834	4.0421	83.7597	196.9478	306.2192
D . 328	74017A	Cosmos 637					
	30-DEC-04	1.82	-141.280	-307.319	24.759	43	603
	20087.412928	42021.48020	0.0038814	13.5416	345.8421	202.8015	97.8644
D . 329	96044A	Italsat 2					
	29-DEC-04	1.84	-142.743	-246.082	-39.403	47	368
	20086.340764	42020.44733	0.0023077	2.4641	86.2489	290.1778	224.6867
D . 330	94082D	Proton-K fourth stage (Block DM-2)					
	30-DEC-04	1.89	-146.396	-265.441	-27.350	43	433
	20087.389144	42018.55713	0.0026011	5.6660	77.5246	273.1715	197.8456
D . 331	87109D	Proton-K fourth stage (Block DM)					
	30-DEC-04	2.02	-156.955	-431.190	117.280	45	614
	20087.529850	42006.84440	0.0067894	10.2458	37.7128	62.2689	108.3789
D . 332	90094D	Proton-K fourth stage (Block DM-2)					
	29-DEC-04	2.12	-164.194	-314.367	-14.022	47	581
	20086.113866	41998.76916	0.0032580	8.8351	50.1418	299.8662	270.9014
D . 333	91046D	Proton-K fourth stage (Block DM-2)					
	29-DEC-04	2.37	-183.525	-250.965	-116.085	45	548
	20086.101887	41979.86648	0.0019089	8.3900	53.5556	41.9560	279.0958
D . 334	94080A	Zongxing 6 (A)					
	31-DEC-04	2.50	-193.196	-575.202	188.809	42	458
	20088.147188	41969.79338	0.0096625	7.3813	62.8099	166.2441	270.1257
D . 335	82009F	Proton-K fourth stage (Block DM)					
	30-DEC-04	2.55	-197.551	-359.395	-35.707	44	596
	20087.050556	41965.66333	0.0035806	13.7094	11.1417	344.1024	254.0334
D . 336	74017F	Proton-K fourth stage (Block DM)					
	29-DEC-04	2.62	-202.912	-395.705	-10.118	44	600
	20086.465880	41959.55849	0.0045555	13.4358	345.5057	213.3313	79.2809

D . 337	81061F	Proton-K fourth stage (Block DM)					
	29-DEC-04	2.64	-204.754	-222.064	-187.443	45	630
	20086.253542	41961.04489	0.0002539	13.8550	8.8927	173.3591	179.6080
D . 338	68081G	LES 6 operational debris					
	30-DEC-04	2.73	-211.630	-696.411	273.151	40	308
	20087.381944	41951.53114	0.0114817	11.3522	338.8814	209.5924	101.6394
D . 339	83100F	Proton-K fourth stage (Block DM)					
	28-DEC-04	2.80	-216.914	-302.001	-131.827	48	617
	20085.970914	41946.88172	0.0017766	12.9303	15.9986	302.9281	288.5622
D . 340	97065C	IABS					
	30-DEC-04	2.84	-219.727	-276.797	-162.656	45	322
	20087.609398	41944.43561	0.0020512	5.8653	73.1687	325.4412	114.1542
D . 341	92017D	Proton-K fourth stage (Block DM-2)					
	21-DEC-04	2.94	-227.246	-323.190	-131.302	45	515
	20078.650463	41935.95281	0.0022964	7.9760	56.7079	209.7153	91.7511
D . 342	83016F	Proton-K fourth stage (Block DM)					
	22-DEC-04	2.97	-229.555	-289.172	-169.939	44	586
	20079.786528	41935.75314	0.0016446	13.3918	12.4632	103.4841	357.8209
D . 343	88036E	Proton-K fourth stage (Block DM)					
	29-DEC-04	3.04	-235.279	-330.520	-140.038	45	608
	20086.073137	41928.26429	0.0021039	10.6744	33.5868	334.9031	269.3082
D . 344	92074D	Proton-K fourth stage (Block DM-2)					
	21-DEC-04	3.13	-242.357	-332.793	-151.920	41	479
	20078.949317	41922.87741	0.0019364	7.5446	59.4886	289.8598	346.5654
D . 345	85024D	Proton-K fourth stage (Block DM)					
	21-DEC-04	3.44	-265.448	-325.258	-205.638	44	616
	20078.568981	41897.87544	0.0015673	12.2988	21.4769	33.8780	86.2644
D . 346	95011D	Star 27 (Himawari-5 AKM)					
	28-DEC-04	3.53	-272.423	-1191.283	646.437	23	267
	20085.505220	41892.76615	0.0226495	6.4339	66.0902	157.2199	147.7832
D . 347	82093F	Proton-K fourth stage (Block DM)					
	22-DEC-04	3.53	-272.890	-298.899	-246.880	44	616
	20079.598576	41890.25263	0.0008264	13.2930	12.1495	95.1889	65.2678
D . 348	84090F	Proton-K fourth stage (Block DM)					
	25-DEC-04	3.57	-275.582	-347.890	-203.274	47	622
	20082.811470	41889.55736	0.0014694	12.4974	19.2802	313.4724	352.3793
D . 349	77092G	Proton-K fourth stage (Block DM)					
	25-DEC-04	3.64	-280.826	-327.358	-234.293	48	640
	20082.686655	41884.27691	0.0007408	14.3269	357.1032	321.5295	15.3326
D . 350	79015D	Proton-K fourth stage (Block DM)					
	26-DEC-04	3.84	-296.176	-334.865	-257.488	46	593
	20083.588993	41867.23890	0.0011615	14.2348	1.2302	101.9514	53.9211
D . 351	80104E	Proton-K fourth stage (Block DM)					
	27-DEC-04	3.85	-296.915	-431.678	-162.152	45	623
	20084.696319	41867.83464	0.0029096	13.9024	6.9158	340.2677	19.6357
D . 352	76023K	LES 8, LES 9 operational debris					
	29-DEC-04	3.85	-297.559	-313.399	-281.719	44	591
	20086.638935	41866.57708	0.0003388	14.1651	3.3597	158.9546	34.9622
D . 353	89053A	Olympus 1					
	28-DEC-04	3.95	-304.564	-370.862	-238.265	43	663
	20085.346470	41860.20318	0.0015370	9.0269	49.2649	127.7457	187.4996

D . 354	86038D	Proton-K fourth stage (Block DM)					
	26-DEC-04	3.96	-305.534	-393.918	-217.150	45	556
	20083.730255	41858.97235	0.0018610	11.6881	25.2414	328.7225	26.6885
D . 355	87073D	Proton-K fourth stage (Block DM)					
	31-DEC-04	4.00	-308.449	-387.186	-229.713	42	624
	20088.178056	41855.34398	0.0014600	10.9510	30.5778	303.3407	226.4317
D . 356	84028F	Proton-K fourth stage (Block DM)					
	29-DEC-04	4.15	-320.392	-403.076	-237.708	41	617
	20086.775208	41844.63191	0.0019313	12.9032	15.3480	197.5452	357.6699
D . 357	76107F	Proton-K fourth stage (Block DM)					
	30-DEC-04	4.27	-329.406	-377.202	-281.611	44	620
	20087.110984	41835.01137	0.0008714	14.2194	353.7401	334.9566	214.8849
D . 358	88108D	Proton-K fourth stage (Block DM)					
	29-DEC-04	4.47	-344.876	-406.688	-283.064	47	632
	20086.614387	41818.76706	0.0015016	9.8544	41.3174	354.2772	81.7322
D . 359	68081E	Titan IIC stage 3 (Transtage)					
	29-DEC-04	4.48	-345.566	-746.113	54.981	42	593
	20086.583854	41818.63716	0.0093982	11.3024	338.2342	204.3251	29.3336
D . 360	68081A	OV2 5					
	28-DEC-04	4.62	-356.303	-703.401	-9.205	28	407
	20085.579850	41807.98835	0.0081844	11.2678	338.1303	210.6108	31.5703
D . 361	80060F	Proton-K fourth stage (Block DM)					
	29-DEC-04	4.80	-369.577	-444.207	-294.947	41	586
	20086.247650	41795.53816	0.0019937	13.9763	5.2524	73.0511	178.3077
D . 362	75100F	Aerojet SVM-5 (GOES 1 AKM)					
	29-DEC-04	5.97	-458.825	-1629.566	711.915	34	428
	20086.442859	41705.19511	0.0280914	14.1271	351.9958	211.4102	92.6623
D . 363	74039A	ATS 6					
	30-DEC-04	6.15	-472.161	-598.829	-345.494	45	644
	20087.415174	41691.84773	0.0030790	13.9943	350.3681	99.0986	102.1000
D . 364	70055A	Intelsat III F-8					
	29-DEC-04	7.16	-548.530	-1938.636	841.575	44	592
	20086.851331	41615.15745	0.0324922	10.4557	319.5123	78.6064	278.1194
D . 365	97029C	Feng Yun-2 AKM					
	16-DEC-04	9.38	-714.681	-1687.579	258.217	35	232
	20073.129630	41449.72665	0.0232232	5.0507	80.6523	203.3474	307.5659
D . 366	87040D	Proton-K fourth stage (Block DM)					
	28-DEC-04	9.88	-752.293	-816.399	-688.187	44	608
	20085.649745	41411.56137	0.0017023	11.6134	22.6551	97.6846	51.5152
D . 367	85007D	Proton-K fourth stage (Block DM)					
	29-DEC-04	9.91	-754.141	-820.786	-687.496	46	639
	20086.935914	41410.43292	0.0018391	11.2807	23.2960	80.1339	307.8880
D . 368	89052D	Proton-K fourth stage (Block DM)					
	29-DEC-04	10.04	-764.248	-893.191	-635.304	41	600
	20086.729178	41399.89448	0.0033616	9.0865	42.6862	52.2366	42.0297
D . 369	93072D	Proton-K fourth stage (Block DM-2)					
	29-DEC-04	10.41	-791.766	-867.256	-716.276	43	458
	20086.191690	41372.15799	0.0017457	6.7818	63.2462	307.4506	256.0120
D . 370	84063F	Proton-K fourth stage (Block DM)					
	30-DEC-04	10.86	-825.262	-894.961	-755.562	45	627
	20087.189514	41339.06913	0.0018307	11.6684	19.9312	44.0473	212.9217

D . 371	87100D	Proton-K fourth stage (Block DM)					
	25-DEC-04	11.26	-854.835	-919.613	-790.058	43	624
	20082.699838	41309.45111	0.0017366	10.2821	36.0729	45.4401	49.7116
D . 372	91014D	Proton-K fourth stage (Block DM-2)					
	23-DEC-04	11.38	-863.382	-970.776	-755.988	47	584
	20080.030880	41301.15071	0.0023222	8.7631	52.2363	277.3402	308.8644
D . 373	01015A	GSAT-1					
	30-DEC-04	12.78	-966.905	-1934.719	0.909	51	192
	20087.316516	41197.99618	0.0227306	2.2385	86.9018	59.4676	156.9611
D . 374	94030D	Proton-K fourth stage (Block DM-2)					
	30-DEC-04	12.84	-971.350	-1150.460	-792.241	41	452
	20087.255440	41192.66836	0.0044455	6.5460	64.7429	325.8116	233.3947
D . 375	97027B	Insat-IID					
	30-DEC-04	16.26	-1220.695	-2595.591	154.202	49	349
	20087.246273	40943.26910	0.0318138	5.8197	71.5796	249.6629	240.3328
D . 376	68050J	Titan IIC stage 3 (Transtage)					
	25-DEC-04	19.17	-1429.382	-2116.237	-742.527	43	579
	20082.752488	40735.09353	0.0175075	7.8570	308.4628	315.9066	301.7008
D . 377	66053J	Titan IIC stage 3 (Transtage)					
	28-DEC-04	23.21	-1715.547	-2364.194	-1066.900	43	597
	20085.776400	40448.57358	0.0164372	7.0171	302.6889	118.4013	287.4530
D . 378	68050H	OPS 9348 (IDSCS 27)					
	13-DEC-04	23.35	-1725.744	-2055.700	-1395.788	10	53
	20070.927824	40436.63803	0.0073276	8.1678	312.9882	78.5239	256.9341
D . 379	68050G	OPS 9347 (IDSCS 26)					
	14-NOV-04	24.32	-1793.193	-2108.370	-1478.015	10	58
	20041.187222	40370.84704	0.0175436	7.8983	312.7893	324.4262	191.4998
D . 380	67003H	IDCSP 15					
	09-OCT-04	25.04	-1843.843	-2142.636	-1545.050	16	116
	20005.342650	40318.41281	0.0069690	7.2019	306.1461	337.2328	165.5999
D . 381	66053F	IDCSP 5					
	09-JUL-04	25.62	-1884.242	-2111.959	-1656.524	10	57
	19913.423519	40279.44755	0.0060227	7.0371	304.0417	131.9102	224.2694
D . 382	68050E	OPS 9345 (IDSCS 24)					
	29-DEC-04	25.91	-1904.239	-2107.678	-1700.801	11	54
	20086.922442	40258.14872	0.0034375	7.8108	311.7249	85.5523	241.4704
D . 383	67003G	IDCSP 14					
	22-DEC-04	26.02	-1912.012	-2186.436	-1637.589	13	57
	20079.049699	40250.17787	0.0057157	6.9247	304.4777	352.3304	195.6698
D . 384	66053D	IDCSP 3					
	23-DEC-04	26.91	-1973.021	-2148.534	-1797.507	12	59
	20080.057685	40189.39434	0.0035959	6.4437	300.6734	155.6186	188.2654
D . 385	68050C	OPS 9343 (IDSCS 22)					
	25-DEC-04	26.92	-1974.321	-2059.703	-1888.938	35	83
	20082.952188	40188.59048	0.0017730	7.6767	310.9590	95.3886	233.7018
D . 386	68050B	OPS 9342 (IDSCS 21)					
	29-OCT-04	27.14	-1989.492	-2102.326	-1876.659	10	58
	20025.015174	40169.35041	0.0033403	7.8050	311.6853	112.5404	269.6913
D . 387	66053C	IDCSP 2					
	29-DEC-04	27.25	-1997.108	-2170.229	-1823.986	13	64
	20086.983623	40165.56346	0.0032522	6.3717	300.3338	164.2420	207.7586

D . 388	68050A	OPS 9341 (IDSCS 20)					
	29-DEC-04	27.29	-1999.464	-2058.734	-1940.194	33	195
	20086.761921	40164.68929	0.0012862	7.6347	311.0027	96.0158	298.4541
D . 389	66053B	IDCSP 1					
	14-DEC-04	27.49	-2013.205	-2133.417	-1892.992	30	235
	20071.918160	40150.84897	0.0030792	6.3768	300.3639	169.9463	246.1146
D . 390	66053A	GGTS 1					
	29-DEC-04	27.76	-2032.120	-2146.686	-1917.554	19	66
	20086.937650	40131.95778	0.0027949	6.3151	300.3575	180.2029	224.2842
D . 391	67003A	IDCSP 8					
	16-DEC-04	28.94	-2112.710	-2364.591	-1860.829	11	61
	20073.834120	40050.14667	0.0033705	6.5380	302.8157	64.4317	277.1884
D . 392	67066G	Titan IHC stage 3 (Transtage)					
	27-DEC-04	31.08	-2258.741	-2572.681	-1944.802	46	623
	20084.894653	39905.40551	0.0082271	11.1539	339.3744	132.6648	281.3499
D . 393	67066F	DODGE 1					
	24-DEC-04	32.02	-2322.442	-2530.215	-2114.668	47	598
	20081.014282	39841.59875	0.0053121	11.1340	338.9338	151.5515	241.2287
D . 394	67066E	LES 5					
	30-DEC-04	32.92	-2383.461	-2597.540	-2169.381	44	622
	20087.015590	39780.63187	0.0054996	11.0506	338.3896	170.6224	234.1504
D . 395	67066D	IDCSP 19					
	29-DEC-04	33.66	-2433.081	-2659.711	-2206.451	35	265
	20086.017697	39731.07517	0.0056449	10.9993	338.0337	181.5855	233.8961
D . 396	67066C	IDCSP 18					
	17-DEC-04	34.24	-2472.016	-2711.162	-2232.870	23	243
	20074.062477	39692.09209	0.0060345	10.9991	337.9679	191.3102	229.3362
D . 397	67066B	IDCSP 17					
	29-DEC-04	34.60	-2499.000	-2748.000	-2249.000	14	76
	20086.621620	39665.49871	0.0062847	10.9222	337.5413	197.4595	15.2013
D . 398	67066A	IDCSP 16					
	29-DEC-04	34.85	-2512.797	-2772.272	-2253.323	36	289
	20086.641458	39651.48160	0.0065025	10.9401	337.5448	199.6045	8.0097

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}	$\Delta\lambda$	λ_{min}	λ_{max}	N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ

For explanation, see definition at the beginning of Chapter 3 on page 28.

L1 . 1	95054A	Luch 1-1					
	29-DEC-04	740	5.0	72.5	77.5	46	457
	20086.749306	42163.35572	0.0006004	4.8684	85.1462	281.8974	76.5694
L1 . 2	77080A	SIRIO 1					
	28-DEC-04	740	6.0	72.0	78.0	30	414
	20085.558819	42163.97522	0.0003465	13.6748	13.5855	321.6219	75.0521
L1 . 3	93039A	Galaxy IV					
	30-DEC-04	741	6.1	72.0	78.1	45	548
	20087.720845	42162.76595	0.0010469	5.5679	75.3083	93.8519	76.2795
L1 . 4	90061A	Cosmos 2085					
	30-DEC-04	742	10.3	69.9	80.2	42	588
	20087.637720	42164.50280	0.0001027	9.0369	49.1056	197.8748	80.1196
L1 . 5	88066A	Cosmos 1961					
	30-DEC-04	742	10.4	69.9	80.3	46	698
	20087.633403	42161.78380	0.0002848	10.0601	39.8455	187.7273	72.4337
L1 . 6	94087A	Raduga 32					
	25-DEC-04	742	10.4	69.9	80.3	44	504
	20082.731215	42162.64346	0.0006952	6.3915	69.0474	67.8443	71.1224
L1 . 7	81018A	Comstar 4					
	23-DEC-04	742	10.8	69.7	80.5	49	659
	20080.977060	42166.05367	0.0002844	12.5002	22.0843	170.7131	80.3862
L1 . 8	84022A	Cosmos 1540					
	29-DEC-04	742	10.8	69.7	80.5	43	496
	20086.592963	42166.91692	0.0008841	13.7260	22.8532	67.2011	71.1350
L1 . 9	91010A	Cosmos 2133					
	22-DEC-04	742	11.2	69.5	80.7	45	657
	20079.701713	42162.04026	0.0001118	7.8523	55.7247	283.5833	71.3846
L1 . 10	98025A	Cosmos 2350					
	29-DEC-04	743	12.3	68.9	81.2	44	322
	20086.743229	42168.20191	0.0005469	3.3195	78.8050	309.1862	72.3483
L1 . 11	84031A	Cosmos 1546					
	30-DEC-04	743	12.6	68.8	81.3	38	510
	20087.561215	42162.72390	0.0022508	12.4639	21.9845	164.2346	80.7039
L1 . 12	90051A	Insat-ID					
	27-DEC-04	744	14.6	67.7	82.4	49	627
	20084.678715	42162.52573	0.0013369	5.8493	74.4351	353.4177	69.4308
L1 . 13	82044A	Cosmos 1366					
	25-DEC-04	744	14.7	67.7	82.4	43	514
	20082.596921	42164.27966	0.0003318	14.3170	17.1745	225.5445	67.8239

L1 . 14	94069A	Elektro 1					
	28-DEC-04	744	14.9	67.6	82.5	42	483
	20085.730382	42166.34721	0.0005779	6.8633	68.8780	39.7052	68.3439
L1 . 15	83028A	Raduga 12					
	25-DEC-04	747	19.9	65.1	85.0	44	585
	20082.555509	42166.60599	0.0001863	13.0614	18.9353	124.0073	84.5667
L1 . 16	81102A	Raduga 10					
	29-DEC-04	748	20.9	64.6	85.5	41	491
	20086.568796	42169.32465	0.0005828	13.9912	10.7974	58.6883	67.7655
L1 . 17	79035A	Raduga 5					
	26-DEC-04	748	21.2	64.4	85.6	39	573
	20083.565613	42163.93682	0.0003222	14.6359	3.4447	131.2172	64.4749
L1 . 18	75123A	Raduga 1					
	29-DEC-04	748	21.6	64.2	85.8	41	524
	20086.471736	42161.13971	0.0006958	14.4520	352.6755	66.7297	84.7285
L1 . 19	84016A	Raduga 14					
	22-DEC-04	750	23.2	63.4	86.6	40	482
	20079.629155	42165.12880	0.0001809	12.5175	21.4281	35.5454	63.4210
L1 . 20	76092A	Raduga 2					
	27-DEC-04	750	23.4	63.3	86.7	40	571
	20084.507755	42172.04711	0.0027010	14.6491	355.3230	168.0681	76.2805
L1 . 21	88014A	STTW-2					
	22-DEC-04	753	26.7	61.7	88.3	38	649
	20079.725521	42162.35559	0.0004472	8.5253	54.2581	338.3331	61.3503
L1 . 22	79062A	Gorizont 2					
	26-DEC-04	757	30.6	59.7	90.3	42	600
	20083.508843	42170.60478	0.0004528	14.5149	5.6111	135.2560	87.1441
L1 . 23	83118F	Proton-K fourth stage (Block DM)					
	21-DEC-04	761	33.8	58.0	91.8	43	542
	20078.576146	42173.78941	0.0046361	12.4782	21.3729	129.8904	83.8686
L1 . 24	88063A	Insat-IC					
	28-DEC-04	766	38.2	55.8	94.0	44	512
	20085.599965	42174.94702	0.0003461	10.3860	38.5761	313.1931	85.1718
L1 . 25	85102A	Cosmos 1700					
	30-DEC-04	768	39.1	55.3	94.5	46	593
	20087.601377	42152.05951	0.0004974	11.5594	28.2455	45.0049	72.4527
L1 . 26	97070A	Kupon 1					
	28-DEC-04	769	39.6	55.1	94.7	45	327
	20085.734005	42151.98920	0.0004455	5.6767	74.7376	358.4500	72.7883
L1 . 27	90054A	Gorizont 20					
	29-DEC-04	775	44.0	52.8	96.8	44	700
	20086.641007	42150.86370	0.0007785	9.1212	49.0458	32.9367	79.8818
L1 . 28	87096A	Cosmos 1897					
	30-DEC-04	776	44.2	52.7	96.9	43	568
	20087.568657	42155.95399	0.0003277	10.4742	36.7521	284.4747	92.6811
L1 . 29	84041A	Gorizont 9					
	29-DEC-04	776	44.4	52.6	97.0	41	502
	20086.521632	42161.14784	0.0006726	12.3408	22.5125	78.6056	96.5552
L1 . 30	79087A	Ekran 4					
	30-DEC-04	776	44.6	52.5	97.1	37	517
	20087.468565	42167.34898	0.0008105	14.5561	4.9203	328.0112	96.9286

L1 . 31	76107A	Ekran 1					
	29-DEC-04	778	45.4	52.1	97.5	39	586
	20086.503576	42178.79600	0.0062473	14.6600	355.7198	318.4106	75.6931
L1 . 32	76092F	Proton-K fourth stage (Block DM)					
	26-DEC-04	778	45.5	52.1	97.6	40	553
	20083.531586	42177.96890	0.0013094	14.6076	355.3754	334.1710	68.5908
L1 . 33	90112A	Raduga 26					
	29-DEC-04	778	45.6	52.0	97.6	43	649
	20086.719016	42168.12593	0.0004330	8.7758	50.7849	255.2757	53.3717
L1 . 34	90011A	DFH-2A					
	26-DEC-04	780	46.6	51.5	98.1	43	677
	20083.641852	42166.30235	0.0003156	7.3726	64.3443	324.6964	97.6692
L1 . 35	80104A	Ekran 6					
	26-DEC-04	781	47.3	51.1	98.5	43	595
	20083.604954	42157.11093	0.0006355	14.2573	8.3495	199.1092	55.1211
L1 . 36	03060D	Proton-K fourth stage (Block DM-2M)					
	22-DEC-04	784	48.6	50.5	99.1	44	44
	20079.594595	42156.63122	0.0017477	0.9368	92.6049	7.6646	54.6652
L1 . 37	92074A	Ekran 20					
	28-DEC-04	785	49.2	50.2	99.4	42	604
	20085.684479	42149.02742	0.0005162	7.6636	59.6621	32.7697	75.7310
L1 . 38	84016F	Proton-K fourth stage (Block DM)					
	29-DEC-04	785	49.2	50.2	99.4	42	580
	20086.546655	42150.82224	0.0037416	12.5064	21.4815	21.0271	86.5406
L1 . 39	77092A	Ekran 2					
	30-DEC-04	785	49.3	50.1	99.4	37	570
	20087.498194	42179.61725	0.0033678	14.7151	358.6073	151.7337	80.2068
L1 . 40	79015A	Ekran 3					
	30-DEC-04	786	49.9	49.8	99.7	44	595
	20087.458785	42159.19666	0.0038667	14.6200	2.7240	145.6516	98.6178
L1 . 41	81061A	Ekran 7					
	28-DEC-04	788	50.9	49.3	100.2	39	602
	20085.570498	42179.61304	0.0005290	14.1089	9.8413	149.2662	67.1495
L1 . 42	94008A	Raduga 1-3					
	30-DEC-04	790	51.7	48.9	100.6	46	545
	20087.627442	42164.77080	0.0000774	6.9724	65.8288	35.0472	100.4948
L1 . 43	90116A	Raduga 1-2					
	27-DEC-04	790	51.9	48.8	100.7	46	682
	20084.729097	42172.21455	0.0002736	8.7763	51.0916	293.4299	52.0037
L1 . 44	83100A	Ekran 11					
	29-DEC-04	795	54.3	47.6	101.8	44	503
	20086.571991	42181.44002	0.0004123	13.1582	16.8675	115.2119	72.6696
L1 . 45	86010A	STTW-1					
	30-DEC-04	800	56.7	46.3	103.0	40	553
	20087.687928	42161.93235	0.0004828	10.9731	33.7717	72.0621	46.7529
L1 . 46	96058A	Ekspress 2					
	29-DEC-04	802	57.6	45.9	103.4	40	415
	20086.705521	42182.07674	0.0006587	5.7380	74.6556	133.1163	82.0853
L1 . 47	01045D	Proton-K fourth stage (Block DM-2)					
	25-DEC-04	803	58.0	45.7	103.6	48	151
	20082.857500	42152.73659	0.0027682	1.4567	98.1503	164.0824	53.7965

L1 . 48	82093A	Ekran 9					
	24-DEC-04	809	60.3	44.5	104.8	35	509
	20081.647222	42157.58309	0.0026204	13.5515	13.2565	151.6668	46.8983
L1 . 49	89098A	Raduga 24					
	24-DEC-04	809	60.6	44.3	104.9	41	599
	20081.742153	42171.19875	0.0002839	9.5195	47.1640	69.8281	46.3643
L1 . 50	94012A	Raduga 31					
	29-DEC-04	811	61.4	43.9	105.3	46	480
	20086.676065	42146.51393	0.0004444	6.9467	65.6426	238.8924	83.6764
L1 . 51	80016A	Raduga 6					
	25-DEC-04	821	65.0	42.1	107.0	40	513
	20082.458762	42158.49915	0.0005281	14.4339	5.6996	100.6400	106.3142
L1 . 52	74060A	Molniya 1-S					
	27-DEC-04	826	66.9	41.0	108.0	45	589
	20084.581192	42161.90880	0.0009059	14.0786	346.8067	55.5759	41.2885
L1 . 53	78039A	Yuri					
	24-DEC-04	828	67.6	40.7	108.3	38	542
	20081.452396	42166.63851	0.0017636	14.5753	4.4183	105.1622	108.4496
L1 . 54	86044A	Gorizont 12					
	22-DEC-04	834	69.9	39.5	109.4	42	557
	20079.686632	42149.15766	0.0004410	11.2348	30.5340	99.1021	51.8015
L1 . 55	79105A	Gorizont 3					
	24-DEC-04	835	69.9	39.5	109.4	40	534
	20081.458935	42170.21779	0.0013548	14.4063	6.7654	60.0361	108.3397
L1 . 56	88111A	STTW-3					
	29-DEC-04	845	73.4	37.7	111.0	38	733
	20086.709630	42186.80116	0.0007832	7.5156	63.1513	323.3149	69.0834
L1 . 57	78073A	Raduga 4					
	27-DEC-04	846	73.6	37.6	111.2	46	578
	20084.425903	42164.26536	0.0012277	14.6958	1.1503	164.1242	111.6466
L1 . 58	75097A	Cosmos 775					
	27-DEC-04	863	78.6	34.9	113.5	41	598
	20084.594595	42175.24267	0.0009694	14.4070	350.7759	314.2153	40.2670
L1 . 59	89081A	Gorizont 19					
	28-DEC-04	865	79.1	34.7	113.8	41	692
	20085.680637	42186.54207	0.0004255	9.4470	44.6937	83.1521	62.2214
L1 . 60	77071A	Raduga 3					
	29-DEC-04	866	79.5	34.5	114.0	40	583
	20086.513808	42140.89124	0.0010869	14.7272	358.0902	76.1807	74.9691
L1 . 61	81069A	Raduga 9					
	29-DEC-04	866	79.5	34.4	114.0	38	516
	20086.605162	42184.05274	0.0001862	14.0673	10.2399	98.6390	54.0446
L1 . 62	96058D	Proton-K fourth stage (Block DM-2M)					
	27-DEC-04	872	81.1	33.6	114.7	45	334
	20084.789954	42147.11546	0.0008433	6.3892	69.9666	267.3896	48.7406
L1 . 63	94002A	Gals 1					
	28-DEC-04	872	81.3	33.6	114.8	45	555
	20085.685556	42142.42314	0.0009610	5.8187	73.9295	47.1638	89.5740
L1 . 64	84078F	Proton-K fourth stage (Block DM)					
	30-DEC-04	890	85.7	31.2	116.9	37	515
	20087.558449	42188.69040	0.0022629	12.1631	23.9259	10.7575	83.6565

L1 . 65	01037D	Proton-K fourth stage (Block DM-2)					
	24-DEC-04	895	87.0	30.5	117.5	48	158
	20081.648808	42157.98997	0.0021804	0.6633	74.9515	235.8255	32.7415
L1 . 66	91087A	Raduga 28					
	27-DEC-04	900	88.1	30.0	118.0	46	645
	20084.567674	42172.87028	0.0004389	8.2520	55.8706	314.0647	115.0239
L1 . 67	89030A	Raduga 23					
	27-DEC-04	912	90.9	28.5	119.3	43	690
	20084.732535	42147.44927	0.0019116	9.6656	42.6833	357.6187	42.4045
L1 . 68	82031A	Insat-IA					
	30-DEC-04	922	93.1	27.3	120.4	35	179
	20087.682998	42161.92870	0.0018574	13.6988	13.2625	210.0999	27.8397
L1 . 69	74060F	Proton-K fourth stage (Block DM)					
	27-DEC-04	932	95.2	26.2	121.4	42	482
	20084.580938	42146.71024	0.0017756	14.0883	346.7126	356.1021	41.1751
L1 . 70	90061D	Proton-K fourth stage (Block DM-2)					
	28-DEC-04	941	96.9	25.2	122.2	46	569
	20085.612442	42139.14646	0.0033782	9.0105	49.1598	2.9554	91.2625
L1 . 71	97021A	Zhongxing 6 (B)					
	30-DEC-04	978	103.6	21.6	125.2	49	399
	20087.524514	42193.78033	0.0003090	0.8953	91.6177	318.5372	71.9424
L1 . 72	86090D	Proton-K fourth stage (Block DM)					
	26-DEC-04	1007	108.4	19.0	127.4	38	602
	20083.733380	42181.51663	0.0007807	11.0117	32.4762	339.9206	32.8708
L1 . 73	91014A	Raduga 27					
	28-DEC-04	1025	111.0	17.6	128.6	39	667
	20085.757488	42187.71628	0.0000300	9.1453	53.5535	10.5375	43.2755
L1 . 74	84063A	Raduga 15					
	29-DEC-04	1032	112.0	17.0	129.0	46	510
	20086.555637	42134.93320	0.0004173	12.3798	22.5733	22.9286	84.2746
L1 . 75	77092H	Ekran 2 fragmentation debris					
	29-DEC-04	1051	114.6	15.6	130.2	37	266
	20086.593310	42189.40685	0.0011578	14.6807	358.3674	90.9052	46.5685
L1 . 76	03015F	Proton-K fourth stage (Block DM-2)					
	30-DEC-04	1074	117.5	13.9	131.4	45	75
	20087.503530	42133.66361	0.0011955	0.8147	285.8811	351.8021	79.3196
L1 . 77	83089B	Insat-IB					
	28-DEC-04	1080	118.2	13.5	131.8	40	587
	20085.472917	42170.53551	0.0006729	10.4468	37.8151	43.4663	130.3198
L1 . 78	95054D	Proton-K fourth stage (Block DM-2)					
	28-DEC-04	1108	121.5	11.7	133.2	40	324
	20085.777234	42196.09696	0.0019823	4.8523	85.3495	231.9759	67.5349
L1 . 79	77108A	Meteosat 1					
	27-DEC-04	1127	123.6	10.5	134.0	40	600
	20084.527303	42132.89608	0.0012469	14.6041	2.7407	252.1856	76.4406
L1 . 80	88095A	Raduga 22					
	25-DEC-04	1129	123.8	10.4	134.1	45	720
	20082.819653	42159.54137	0.0003444	9.9398	40.8890	0.2802	11.1263
L1 . 81	84035A	STW F-2					
	29-DEC-04	1141	125.1	9.6	134.7	41	512
	20086.731759	42181.32609	0.0008570	11.6059	27.1812	9.9909	25.2702

L1 . 82	95063D	Proton-K fourth stage (Block DM-2M)					
	29-DEC-04	1171	127.9	7.9	135.8	36	337
	20086.542280	42173.12972	0.0043250	6.9257	66.1008	337.2806	132.2746
L1 . 83	90102A	Gorizont 22					
	28-DEC-04	1325	139.3	0.8	140.1	36	697
	20085.624699	42197.08674	0.0002103	8.8278	50.3028	86.0738	87.9996
L1 . 84	74094A	Skynet 2B					
	21-DEC-04	1368	141.6	359.3	140.9	22	459
	20078.487986	42196.62920	0.0002580	14.0226	357.2784	323.2861	91.1149
L1 . 85	78035A	Intelsat IVA F-6					
	25-DEC-04	1447	145.0	356.8	141.9	44	559
	20082.766863	42151.92561	0.0007024	12.3854	22.8666	102.1616	12.2705
L1 . 86	93062D	Proton-K fourth stage (Block DM-2)					
	28-DEC-04	1557	148.5	354.2	142.7	45	377
	20085.614780	42136.13432	0.0010026	7.1372	63.8696	233.4278	104.9539
L1 . 87	67026A	Intelsat II F-3					
	30-DEC-04	1616	149.8	353.2	143.0	35	259
	20087.275266	42181.73972	0.0028700	11.0704	326.0716	183.4674	127.9440
L1 . 88	85035B	Telecom 1B					
	26-DEC-04	1667	150.7	352.4	143.1	43	616
	20083.830718	42168.93264	0.0001186	11.2478	31.2150	193.1344	356.5052
L1 . 89	82044F	Proton-K fourth stage (Block DM)					
	23-DEC-04	1688	151.1	352.1	143.2	37	530
	20080.757523	42177.83507	0.0015777	14.2936	17.0336	347.4321	11.6652
L1 . 90	92088A	Cosmos 2224					
	25-DEC-04	1741	151.8	351.5	143.3	44	618
	20082.931921	42164.71557	0.0004044	6.7612	62.2969	41.7932	351.9295

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}	$\Delta\lambda$	λ_{min}	λ_{max}	N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ

For explanation, see definition at the beginning of Chapter 3 on page 28.

L2 . 1	93058B	ACTS					
	30-DEC-04	900	0.5	254.5	255.0	50	567
	20087.228738	42164.60905	0.0001429	5.4481	76.2550	5.4431	254.7532
L2 . 2	88081A	Gstar 3					
	30-DEC-04	900	0.6	254.6	255.2	45	645
	20087.113218	42164.56027	0.0002577	12.0637	34.5324	328.3865	254.8954
L2 . 3	76023B	LES 9 (RTGPP)					
	30-DEC-04	900	0.6	254.6	255.2	51	744
	20087.371782	42164.61718	0.0025803	10.5424	196.9499	255.6497	252.5905
L2 . 4	82105A	Aurora I					
	30-DEC-04	902	0.8	254.5	255.3	51	743
	20087.140660	42164.84958	0.0004079	9.6622	44.4832	197.1023	254.9218
L2 . 5	71009A	NATO IIB					
	29-DEC-04	902	0.9	254.2	255.1	49	558
	20086.979850	42164.76183	0.0002224	13.9845	345.8824	45.8047	254.4301
L2 . 6	69101A	Skynet 1A					
	29-DEC-04	910	4.2	252.6	256.8	45	474
	20086.971285	42164.53812	0.0025707	13.0092	340.7026	115.7860	252.5934
L2 . 7	93073A	Solidaridad 1					
	30-DEC-04	911	8.2	250.7	258.9	48	552
	20087.247361	42166.87346	0.0003123	3.8122	83.2165	43.5136	254.8928
L2 . 8	78062A	GOES 3					
	30-DEC-04	911	8.4	250.6	258.9	49	749
	20087.060602	42165.60679	0.0001902	13.7039	12.2140	55.4038	251.6105
L2 . 9	70021A	NATO I					
	29-DEC-04	912	10.9	249.3	260.2	46	479
	20086.969016	42166.95673	0.0004164	13.0325	344.2517	114.4197	256.7729
L2 . 10	71095A	OPS 9431 (DSCS II F-1)					
	30-DEC-04	913	13.1	248.2	261.3	51	682
	20087.002315	42164.23172	0.0005481	14.1337	347.7249	116.0572	248.1980
L2 . 11	93077A	Telstar 4A					
	30-DEC-04	914	16.6	246.5	263.1	51	572
	20087.201817	42168.52100	0.0005438	6.4685	70.3961	298.5838	258.6085
L2 . 12	76023A	LES 8 (RTGPP)					
	30-DEC-04	914	17.3	246.1	263.5	50	734
	20087.468657	42163.38627	0.0011379	10.5766	196.7987	249.4872	255.3060
L2 . 13	95049A	Telstar 402R					
	29-DEC-04	925	32.5	238.7	271.2	51	463
	20086.309201	42164.54485	0.0003250	1.1775	89.3540	112.9470	239.0617

L2 . 14	85076C	ASC 1					
	30-DEC-04	940	45.6	232.3	277.9	51	689
	20087.246100	42164.03886	0.0004187	7.9081	60.0661	196.4761	232.3962
L2 . 15	75100A	GOES 1					
	30-DEC-04	943	48.4	231.0	279.4	48	710
	20087.002951	42176.54598	0.0002165	14.6829	0.4121	144.1912	260.6123
L2 . 16	83041A	GOES 6					
	29-DEC-04	963	60.2	225.3	285.5	47	743
	20086.130081	42179.44104	0.0003352	11.2484	31.3272	51.9235	246.6324
L2 . 17	81049A	GOES 5					
	30-DEC-04	995	75.4	218.1	293.5	51	682
	20087.192164	42166.65169	0.0004938	11.9546	26.1676	109.5916	218.1074
L2 . 18	76004A	Hermes					
	30-DEC-04	1006	79.6	216.1	295.7	49	677
	20087.104803	42155.10923	0.0015125	14.7100	357.3396	67.3370	220.9182
L2 . 19	68081D	LES 6					
	29-DEC-04	1039	90.4	211.0	301.4	47	611
	20086.849549	42175.19919	0.0009361	11.8070	339.6539	208.4369	295.1864
L2 . 20	87100A	Raduga 21					
	30-DEC-04	1099	105.9	203.8	309.8	48	750
	20087.133993	42139.51819	0.0002819	10.8188	38.0099	33.9427	250.9021
L2 . 21	65028A	Intelsat I F-1					
	29-DEC-04	1133	113.1	200.6	313.6	24	104
	20086.940775	42188.14803	0.0004048	9.7318	310.3038	125.7535	233.0606
L2 . 22	97086A	HGS-1					
	29-DEC-04	1278	134.7	191.1	325.8	48	327
	20086.586586	42149.77384	0.0050440	3.2495	259.7659	33.0184	310.9884
L2 . 23	84078A	Gorizont 10					
	29-DEC-04	1307	137.9	189.8	327.7	50	629
	20086.266898	42161.80005	0.0003176	12.1654	23.7066	126.1330	189.6253
L2 . 24	67094A	Intelsat II F-4					
	29-DEC-04	1323	139.5	189.1	328.6	46	433
	20086.771146	42147.69263	0.0018505	11.4888	325.1922	144.2294	309.1756
L2 . 25	90016A	Raduga 25					
	30-DEC-04	1323	139.6	189.1	328.6	51	706
	20087.296134	42179.97752	0.0004859	9.2375	46.9003	23.0421	201.2528
L2 . 26	82103A	Gorizont 6					
	29-DEC-04	1339	141.0	188.5	329.5	49	596
	20086.999965	42136.30476	0.0004428	13.3190	14.9162	84.0005	276.2354
L2 . 27	85070A	Raduga 16					
	28-DEC-04	1348	141.9	188.1	330.0	48	584
	20085.971319	42143.02871	0.0002031	11.7626	26.8349	91.6110	299.4487
L2 . 28	80081A	Raduga 7					
	30-DEC-04	1466	150.9	184.8	335.7	48	572
	20087.228634	42158.94556	0.0003376	14.2353	7.3082	111.0801	186.0754
L2 . 29	92059A	Cosmos 2209					
	27-DEC-04	1488	152.2	184.3	336.6	45	596
	20084.960174	42166.80981	0.0001913	7.9373	58.6187	42.0698	336.1289
L2 . 30	94038A	Cosmos 2282					
	30-DEC-04	1488	152.2	184.3	336.6	48	534
	20087.170231	42195.49397	0.0007280	5.7735	67.5448	264.7321	267.1207

L2 . 31	85016A	Cosmos 1629					
	30-DEC-04	1502	153.0	184.1	337.1	50	588
	20087.267164	42174.70298	0.0004658	12.0509	25.0579	47.9247	189.9105
L2 . 32	87091A	Cosmos 1894					
	31-DEC-04	1504	153.1	184.0	337.2	47	698
	20088.009942	42190.07841	0.0003398	10.5888	35.4594	145.0025	292.1606
L2 . 33	80004A	OPS 6393 (FLTSATCOM F3)					
	30-DEC-04	1543	155.2	183.4	338.6	43	670
	20087.957442	42191.81358	0.0026145	12.4898	10.5554	53.4886	286.4332
L2 . 34	89101A	Cosmos 2054					
	30-DEC-04	1713	161.2	181.8	343.0	48	696
	20087.110648	42133.50999	0.0002118	9.3033	46.2856	282.5726	267.5434
L2 . 35	94082A	Luch 1					
	30-DEC-04	1936	164.9	181.2	346.1	48	507
	20087.208252	42196.59774	0.0004793	5.7196	77.3077	330.5814	263.1781
L2 . 36	94060A	Cosmos 2291					
	28-DEC-04	2111	166.2	181.1	347.2	47	526
	20085.964421	42161.76053	0.0005266	6.5822	67.5460	353.7065	342.4789

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}	$\Delta\lambda$	λ_{min}	λ_{max}	N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ

For explanation, see definition at the beginning of Chapter 3 on page 28.

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 4.

L3 . 1	71095B	OPS 9432 (DSCS II F-2)					
	30-DEC-04	2937	335.4	174.4	149.7	49	578
	20087.181343	42175.73694	0.0002317	14.0469	347.9329	193.2743	183.7166
L3 . 2	91054D	IUS stage 2					
	30-DEC-04	2938	333.9	175.1	149.0	40	465
	20087.668542	42199.82324	0.0033649	10.1505	53.7249	132.9438	73.8937
L3 . 3	91064A	Cosmos 2155					
	27-DEC-04	2943	332.7	175.7	148.4	50	651
	20084.823600	42144.87190	0.0000876	8.5148	53.7845	151.9059	20.6081
L3 . 4	90094A	Gorizont 21					
	29-DEC-04	3021	328.1	178.1	146.2	48	708
	20086.301979	42144.25309	0.0005995	8.9243	50.2530	58.8245	203.4925
L3 . 5	87091D	Proton-K fourth stage (Block DM)					
	29-DEC-04	3145	347.8	168.0	155.9	47	617
	20086.418275	42173.60485	0.0023111	10.5783	35.5765	51.5200	147.0200
L3 . 6	97041A	Cosmos 2345					
	30-DEC-04	3314	324.0	180.2	144.2	47	355
	20087.271806	42197.00528	0.0156530	4.8198	77.8407	80.4500	242.5209
L3 . 7	95045A	Cosmos 2319					
	31-DEC-04	3512	323.2	180.6	143.8	48	479
	20088.121632	42137.13989	0.0006079	5.9642	71.9189	19.2864	288.1692
L3 . 8	94067D	Proton-K fourth stage (Block DM-2M)					
	29-DEC-04	3728	322.7	180.9	143.6	41	428
	20086.637870	42196.86513	0.0005374	7.5490	61.9079	280.3087	93.7206
L3 . 9	91079A	Cosmos 2172					
	29-DEC-04	3771	322.7	180.9	143.6	44	614
	20086.830729	42181.35555	0.0003739	8.3247	55.1363	179.2397	17.4328
L3 . 10	85007A	Gorizont 11					
	29-DEC-04	3801	322.6	180.9	143.6	40	611
	20086.439560	42181.13443	0.0001674	11.8870	25.3691	11.0590	128.9513
L3 . 11	87084A	Cosmos 1888					
	30-DEC-04	3836	322.6	180.9	143.5	43	729
	20087.829699	42170.13141	0.0003311	10.4962	35.8481	52.1095	357.6190

L3 . 12	86027A	Cosmos 1738					
	28-DEC-04	3904	322.5	181.0	143.5	43	656
	20085.814144	42171.56585	0.0012301	11.8320	30.9794	274.4658	0.1588
L3 . 13	94030A	Gorizont 30					
	25-DEC-04	3929	322.5	181.0	143.5	49	550
	20082.955706	42165.97826	0.0002956	6.8644	65.7045	63.8847	346.7402

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

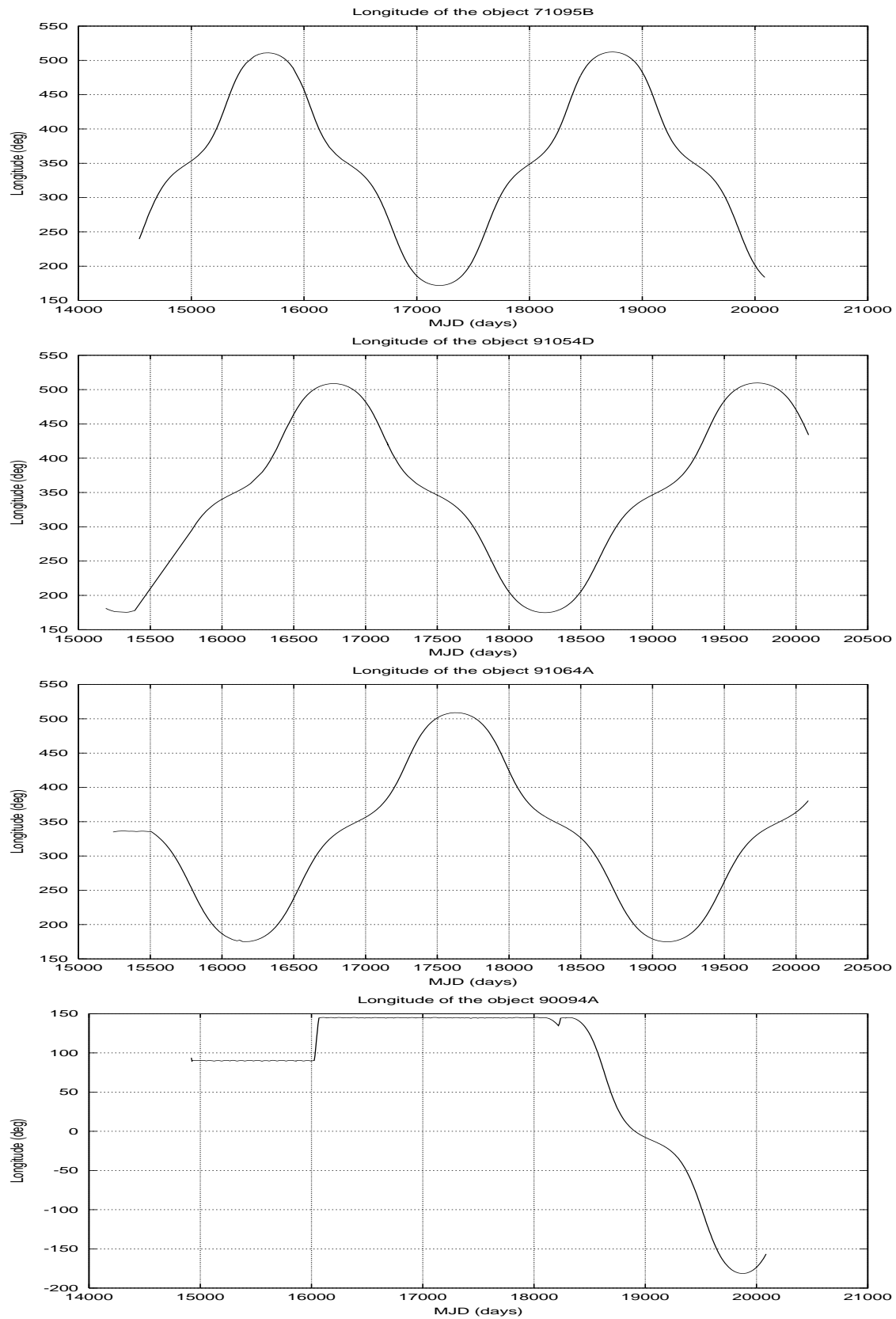


Figure 2: Longitude history of the objects librating around the two stable points

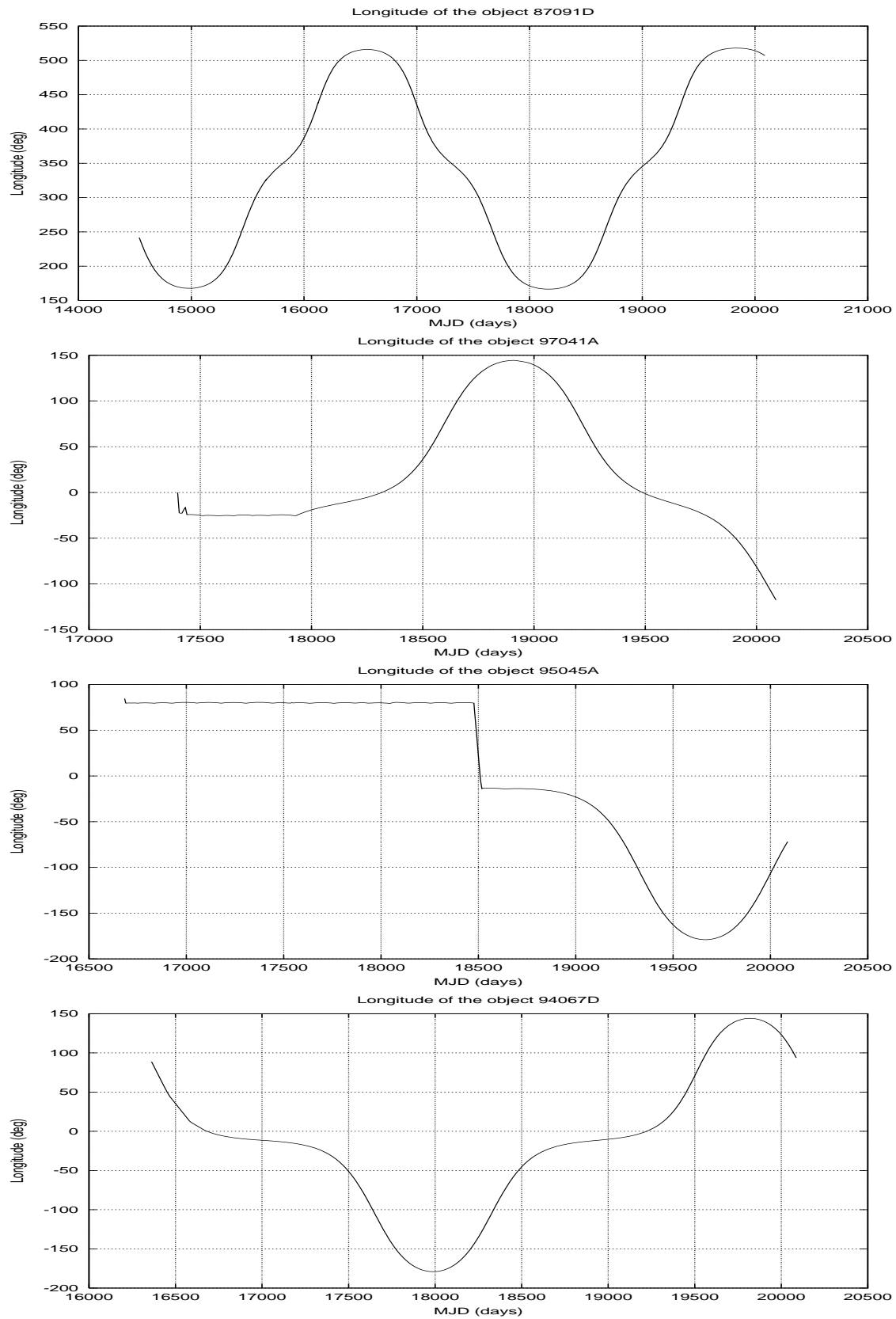


Figure 3: Longitude history of the objects librating around the two stable points

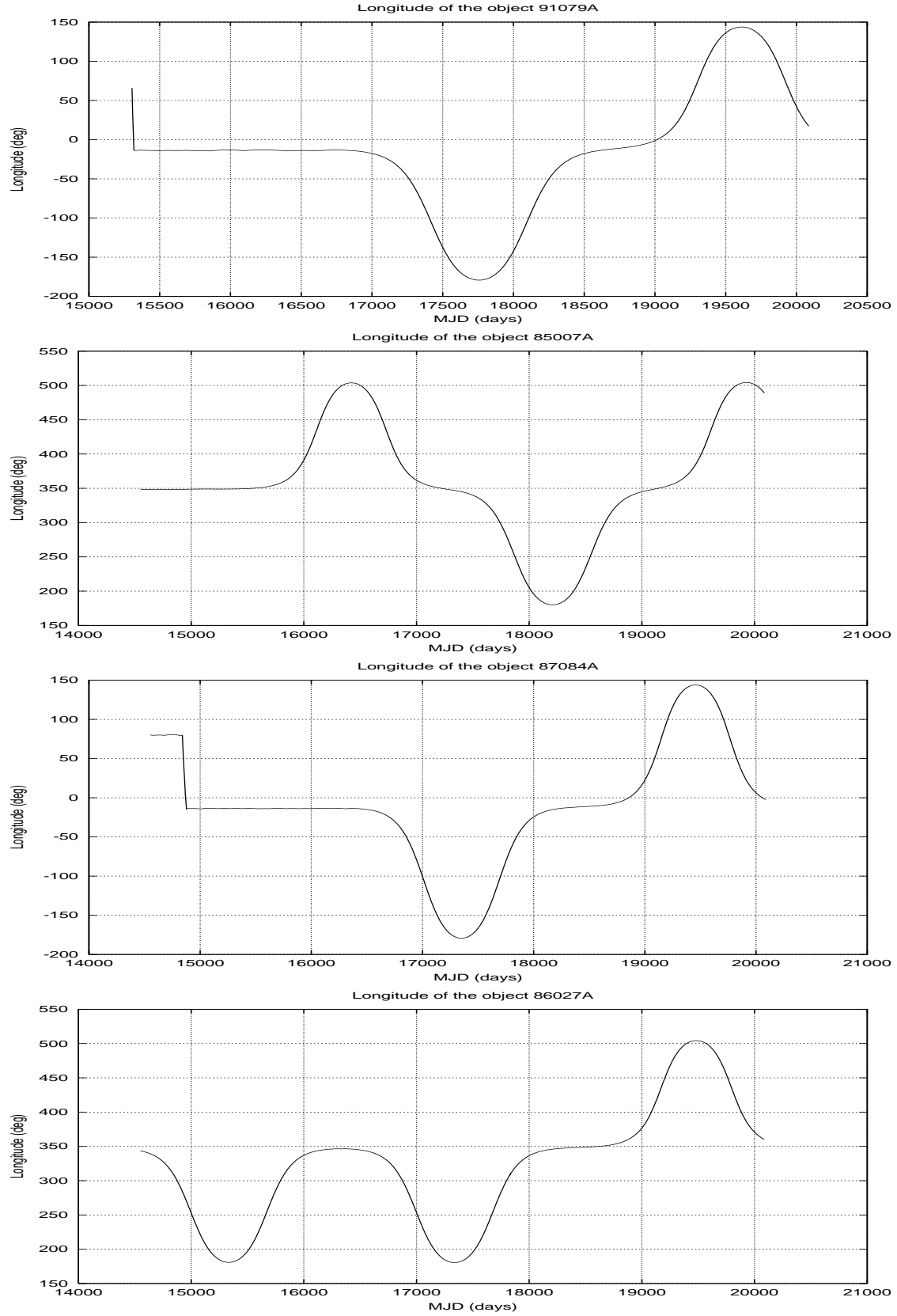
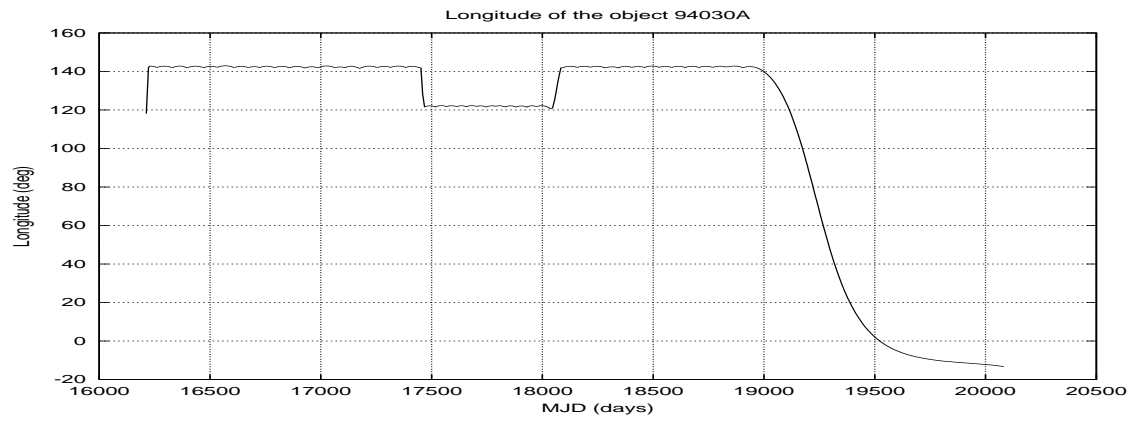


Figure 4: Longitude history of the objects librating around the two stable points



4 Table 2: objects without TLEs during the last 6 months

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 or C2 (if there are any objects in these categories), then according to the ascending order of longitude of station keeping.
2. Status C, then according to the COSPAR identifier.
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).
7. Status U, then according to the COSPAR identifier.
8. Status UU, then according to the COSPAR identifier.

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

In this list there are objects which were under control up to the time where TLE were available. In this case, the following data are given:

C1.nn	COSPAR	NAME					
	Date	$\bar{\lambda}$				N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ

For explanation, see definition at the beginning of Chapter 3 on page 28.

C1 . 1	97076A	Astra 1G					
	02-JUL-04	19.20				21	256
	19906.000000	42166.42992	0.0002995	0.0122	319.8851	65.1991	19.1689

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

In this list there are objects which were under control up to the time where TLE were available. In this case, the following data are given:

C2.nn	COSPAR	NAME					
	Date	$\bar{\lambda}$				N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ

For explanation, see definition at the beginning of Chapter 3 on page 28.

C2 . 1	99063A	USA 146 (UFO F10)					
	19-OCT-03	71.87				0	182
	19649.969549	42163.74424	0.0003846	3.3159	309.1036	271.1711	71.3278
C2 . 2	95027A	USA 111 (UFO F5)					
	24-FEB-99	72.13				0	124
	17951.774387	42163.34563	0.0011775	3.6059	326.3895	280.0712	72.7074
C2 . 3	98016A	USA 138 (UFO F8)					
	01-MAR-99	171.55				0	40
	17956.700880	42163.38936	0.0005074	5.5083	312.9171	351.9521	171.5237
C2 . 4	95003A	USA 108 (UFO F4)					
	24-FEB-99	182.73				0	194
	17951.651389	42161.93403	0.0003335	3.5127	327.2481	333.4570	182.7743
C2 . 5	95057A	USA 114 (UFO F6)					
	04-MAR-99	255.05				0	175
	17959.250127	42165.25495	0.0003717	3.6823	325.0378	348.3518	255.0249
C2 . 6	86096A	USA 20 (FLTSATCOM F7)					
	05-MAR-99	260.23				0	422
	17960.081042	42163.28536	0.0005828	4.6556	59.7015	294.4197	259.9672
C2 . 7	89077A	USA 46 (FLTSATCOM F8)					
	03-MAR-99	337.09				0	424
	17958.213368	42163.03140	0.0005678	2.4559	31.5708	261.0402	337.4950
C2 . 8	98058A	USA 140 (UFO F9)					
	04-MAR-99	337.31				0	20
	17959.060903	42166.28749	0.0005660	5.8535	319.5705	85.0476	337.0673
C2 . 9	94035A	USA 104 (UFO F3)					
	04-MAR-99	345.43				0	205
	17959.989699	42166.46244	0.0004433	2.9671	323.1210	12.4458	344.4986

4.3 Satellites under control

In this list there are objects for which no TLEs are available, but which are controlled according to information provided by KIAM. Longitude data is based on calculations from LANL data, ITU data analysis and orbital information provided by satellite observers. The following data are given:

C.nn	COSPAR	NAME	DATE	LONGITUDE
C . 1	81107A	OPS 4029 (VORTEX 3)		
C . 2	85010B	USA 8 (MAGNUM 1)		
C . 3	85092B	USA 11 (DSCS III B-04)		
C . 4	85092C	USA 12 (DSCS III B-05)		
C . 5	89035A	USA 37 (VORTEX 6)		
C . 6	89046A	USA 39 (DSP F14)	09-OCT-04	216.0
C . 7	89069B	USA 44 (DSCS III A-02)		
C . 8	89090B	USA 48 (MAGNUM 2)		
C . 9	90095A	USA 65 (DSP F15)	12-SEP-04	322.0
C . 10	90097B	USA 67 (SDS 2)		
C . 11	91080B	USA 75 (DSP F16)	30-NOV-00	195.0
C . 12	92006A	USA 78 (DSCS III B-14)		
C . 13	92037A	USA 82 (DSCS III B-12)		
C . 14	93046A	USA 93 (DSCS III B-09)		
C . 15	93056A	USA 95 (UFO F2)	10-OCT-04	27.0
C . 16	93074A	USA 97 (DSCS III B-10)		
C . 17	94009A	USA 99 (Milstar DFS-1)	17-DEC-04	293.0
C . 18	94054A	USA 105 (MERCURY 1)		
C . 19	94084A	USA 107 (DSP F17)		145.0
C . 20	95022A	USA 110 (Advanced ORION 1)		
C . 21	95038A	USA 113 (DSCS III B-07)		
C . 22	95060A	USA 115 (Milstar DFS-2)		
C . 23	96026A	USA 118 (MERCURY 2)	24-SEP-03	354.0
C . 24	96042A	USA 127 (UFO F7)	08-DEC-04	261.0
C . 25	97008A	USA 130 (DSP F18)		103.0
C . 26	97065A	USA 134 (DSCS III B-13)		
C . 27	98029A	USA 139 (Advanced ORION 2)	28-DEC-04	44.0
C . 28	00001A	USA 148 (DSCS III B-08)		
C . 29	00024A	USA 149 (DSP F20)	06-DEC-03	8.0
C . 30	00065A	USA 153 (DSCS III B-11)		
C . 31	00080A	USA 155 (SDS 3)		
C . 32	01009A	USA 157 (Milstar-2 F2)		
C . 33	01020A	USA 158 (GeoLITE)		
C . 34	01033A	USA 159 (DSP F21)		70.0

C . 35	01046A	USA 162 (SDS 3 F3)		
C . 36	02001A	USA 164 (Milstar-2 F3)	02-AUG-03	4.0
C . 37	03008A	USA 167 (DSCS III A-3)		
C . 38	03012A	USA 169 (Milstar-2 F4)	03-DEC-04	270.0
C . 39	03040A	USA 170 (DSCS III B-6)		
C . 40	03041A	USA 171 (Advanced ORION 3)		
C . 41	03057A	USA 174 (UFO F11)		
C . 42	04004A	USA 176 (DSP F22)		

4.4 Objects in a drift orbit

In this list there are objects which were in a drift orbit according to their last available TLEs or information provided by KIAM. 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	Ω	ω	λ

For explanation, see definition at the beginning of Chapter 3 on page 28.

D . 1	84080E	Star 27 (Himawari-3 AKM)					
	14-MAR-04	-1.88	146.843	-442.012	735.699	1	206
	19796.000000	42311.08672	0.0137519	11.7783	27.8906	252.3641	118.1113
D . 2	64047A	Syncom 3					
	06-DEC-74	-0.26	14.584	-42.610	71.779	0	1
	9105.000162	42178.80189	0.0013560	8.5490	55.8370	186.3490	354.0779
D . 3	82106B	DSCS III A-01					
	05-MAR-99						464
	17960.409780	42164.73576	0.0003549	6.8774	52.8139	297.1903	229.9574
D . 4	80087A	OPS 6394 (FLTSATCOM F4)					
	03-MAR-99						472
	17958.623785	42163.92645	0.0006198	12.1356	33.1941	276.1645	171.8950
D . 5	78016A	OPS 6391 (FLTSATCOM F1)					
	27-FEB-99						437
	17954.837558	42164.45767	0.0004213	13.8965	28.2801	324.7110	71.8157
D . 6	69013A	TACSAT 1					
	09-JUN-95	0.24	-11.683	-38.028	14.663	0	1
	16595.000000	42152.53489	0.0006250	14.5242	5.4374	66.8749	177.0778
D . 7	68081H	LES 6 operational debris					
	01-MAY-04	5.18	-398.693	-710.060	-87.326	2	133
	19844.606933	41766.39460	0.0067623	11.5482	339.4455	263.8595	259.3838
D . 8	66053H	IDCSP 7					
	03-JUL-04	23.72	-1751.348	-2111.532	-1391.164	9	56
	19907.000000	40412.62895	0.0089818	7.1663	303.2935	119.4374	257.6954
D . 9	66053G	IDCSP 6					
	03-JUL-04	24.75	-1823.698	-2090.380	-1557.015	10	59
	19907.000000	40340.37400	0.0066428	7.1546	305.8702	125.8849	236.5985
D . 10	68050F	OPS 9346 (IDSCS 25)					
	03-JUL-04	25.23	-1856.926	-2039.897	-1673.954	9	77
	19907.000000	40307.70291	0.0046059	8.0510	313.5849	76.8775	247.1384
D . 11	66053E	IDCSP 4					
	03-JUL-04	26.29	-1930.796	-2116.169	-1745.423	9	56
	19907.000000	40233.35239	0.0046092	6.8755	303.3680	138.8806	50.2216
D . 12	68050D	OPS 9344 (IDSCS 23)					
	03-JUL-04	26.49	-1944.505	-2040.381	-1848.629	10	56
	19907.000000	40219.87187	0.0023596	7.8805	313.9364	78.8755	23.6303
D . 13	67003F	IDCSP 13					
	03-JUL-04	26.88	-1971.523	-2189.779	-1753.266	9	60
	19907.000000	40192.63131	0.0051808	7.0057	306.1297	359.6514	258.0882

D . 14	67003E	IDCSP 12					
	03-JUL-04	27.59	-2020.014	-2204.833	-1835.194	9	59
	19907.000000	40144.37562	0.0043747	7.0887	304.4421	12.5175	133.5153
D . 15	67003D	IDCSP 11					
	03-JUL-04	28.17	-2060.221	-2216.050	-1904.392	10	56
	19907.000000	40103.96299	0.0036552	7.0938	304.3856	28.3683	225.1079
D . 16	67003C	IDCSP 10					
	03-JUL-04	28.58	-2088.581	-2280.342	-1896.821	9	59
	19907.000000	40075.64687	0.0032737	6.8070	304.4556	41.8244	151.7425
D . 17	67003B	IDCSP 9					
	03-JUL-04	28.80	-2103.497	-2250.420	-1956.573	12	61
	19907.000000	40060.73313	0.0033579	6.9588	304.8901	51.7813	215.8854
D . 18	67003J	Titan IHC stage 3 (Transtage)					
	19-JUL-95	28.86	-2107.470	-2225.921	-1989.020	0	3
	16635.000000	40057.05212	0.0029345	11.3730	343.9923	194.5544	69.2907

4.5 Objects in a libration orbit around the Eastern stable point

In this list there are objects which were in a libration orbit around the Eastern stable point (longitude 75 E) according to their last available TLEs. The following data are given:

L1.nn	COSPAR	NAME					
	Date	P_{lib}	$\Delta\lambda$	λ_{min}	λ_{max}	N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ

For explanation, see definition at the beginning of Chapter 3 on page 28.

L1 . 1	69011A	Intelsat III F-3					
	24-MAY-79	745	17.1	66.5	83.6	0	1
	10735.000116	42162.82061	0.0004227	6.0892	56.2985	126.6913	66.7736
L1 . 2	80060A	Ekran 5					
	14-MAR-94	787	50.3	49.6	99.9	0	6
	16143.862176	42173.66880	0.0017224	11.3266	45.7592	51.2216	94.7890
L1 . 3	68081C	OV5 4					
	19-JUL-95	1688	151.1	352.1	143.2	0	2
	16635.000000	42172.17641	0.0006806	13.5815	11.0544	79.3747	139.5031

4.6 Objects in a libration orbit around the Western stable point

In this list there are objects which were in a libration orbit around the Western stable point (longitude 105 W) according to their last available TLEs. The following data are given:

L2.nn	COSPAR	NAME					
	Date	P_{lib}	$\Delta\lambda$	λ_{min}	λ_{max}	N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ

For explanation, see definition at the beginning of Chapter 3 on page 28.

L2 . 1	70032A	Intelsat III F-7					
	25-MAY-71	1635	158.9	182.3	341.2	0	1
	7814.000197	42161.42111	0.0001880	0.8486	92.4009	157.2095	357.2114

4.7 Objects in a libration orbit around both stable points

In this list there are objects which were in a libration orbit around both stable points according to their last available TLEs. The following data are given:

L3.nn	COSPAR	NAME					
	Date	P_{lib}	$\Delta\lambda$	λ_{min}	λ_{max}	N_{ly}	N_{tot}
	MJD	a	e	i	Ω	ω	λ

For explanation, see definition at the beginning of Chapter 3 on page 28.

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.

EMPTY

4.8 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	68063A	OPS 2222 (CANYON 1)	Payload
U . 2	68063B	Atlas SLV-3A Agena D stage 2	Rocket Body
U . 3	69036A	OPS 3148 (CANYON 2)	Payload
U . 4	69036B	Atlas SLV-3A Agena D stage 2	Rocket Body
U . 5	70046A	OPS 5346 (Rhyolite 1)	Payload
U . 6	70069A	OPS 7329 (CANYON 3)	Payload
U . 7	70069B	Atlas SLV-3A Agena D stage 2	Rocket Body
U . 8	71039A	OPS 3811 (DSP F2)	Payload
U . 9	71039B	Titan IIC stage 3 (Transtage)	Rocket Body
U . 10	72010A	OPS 1570 (DSP F3)	Payload
U . 11	72010B	Titan IIC stage 3 (Transtage)	Rocket Body
U . 12	72101A	OPS 9390 (CANYON 5)	Payload
U . 13	73013A	OPS 6063 (Rhyolite 2)	Payload
U . 14	73040A	OPS 6157 (DSP F4)	Payload
U . 15	73040B	Titan IIC stage 3 (Transtage)	Rocket Body
U . 16	75055A	OPS 4966 (CANYON 6)	Payload
U . 17	75055B	Atlas SLV-3A Agena D stage 2	Rocket Body
U . 18	75118A	OPS 3165 (DSP F5)	Payload
U . 19	75118C	Titan IIC stage 3 (Transtage)	Rocket Body
U . 20	75118D	OPS 3165 debris (Telescope aperture sun	Debris
U . 21	76059A	OPS 2112 (DSP F6)	Payload
U . 22	76059C	Titan IIC stage 3 (Transtage)	Rocket Body
U . 23	76059D	OPS 2112 debris (Telescope aperture sun	Debris
U . 24	77007A	OPS 3151 (DSP F7)	Payload
U . 25	77007C	Titan IIC stage 3 (Transtage)	Rocket Body
U . 26	77007D	OPS 3151 debris (Telescope aperture sun	Debris
U . 27	77038A	OPS 9751 (CANYON 7)	Payload
U . 28	77038C	Atlas SLV-3A Agena D stage 2	Rocket Body
U . 29	77114A	OPS 4258 (AQUACADE 3)	Payload
U . 30	78038A	OPS 8790 (AQUACADE 4)	Payload
U . 31	78058A	OPS 9454 (VORTEX 1) (CHALET 1)	Payload
U . 32	78058B	Titan IIC stage 3 (Transtage)	Rocket Body
U . 33	79053A	OPS 7484 (DSP F8)	Payload
U . 34	79053C	Titan IIC stage 3 (Transtage)	Rocket Body
U . 35	79053D	OPS 7484 debris (Telescope aperture sun	Debris
U . 36	79086A	OPS 1948 (VORTEX 2) (CHALET 2)	Payload
U . 37	79086C	Titan IIC stage 3 (Transtage)	Rocket Body
U . 38	81025A	OPS 7350 (DSP F9)	Payload

U . 39	81025C	Titan IIIC stage 3 (Transtage)	Rocket Body
U . 40	81107C	Titan IIIC stage 3 (Transtage)	Rocket Body
U . 41	82019A	OPS 8701 (DSP F10)	Payload
U . 42	82019B	Titan IIIC stage 3 (Transtage)	Rocket Body
U . 43	84009A	OPS 0441 (VORTEX 4)	Payload
U . 44	84009C	Titan 34D stage 3 (Transtage)	Rocket Body
U . 45	84037A	OPS 7641 (DSP F11)	Payload
U . 46	84037B	Titan 34D stage 3 (Transtage)	Rocket Body
U . 47	84129A	USA 7 (DSP F12)	Payload
U . 48	84129B	Titan 34D stage 3 (Transtage)	Rocket Body
U . 49	85010D	IUS stage 2	Rocket Body
U . 50	85092E	IUS stage 2	Rocket Body
U . 51	87022F	Star 27 (GOES 7 AKM)	Rocket Body
U . 52	87097A	USA 28 (DSP F13)	Payload
U . 53	87097B	Titan 34D stage 3 (Transtage)	Rocket Body
U . 54	89035C	Titan 34D stage 3 (Transtage)	Rocket Body
U . 55	89046D	IUS stage 2	Rocket Body
U . 56	89046E	USA 39 debris (Telescope aperture sunco	Debris
U . 57	89069A	USA 43 (DSCS II F-15)	Payload
U . 58	89069D	Titan 34D stage 3 (Transtage)	Rocket Body
U . 59	89090D	IUS stage 2	Rocket Body
U . 60	90095D	IUS stage 2	Rocket Body
U . 61	90097D	AKM ?	Rocket Body
U . 62	91080D	IUS stage 2	Rocket Body
U . 63	92006C	IABS	Rocket Body
U . 64	92037C	IABS	Rocket Body
U . 65	93046C	IABS	Rocket Body
U . 66	93074B	IABS	Rocket Body
U . 67	94009B	Titan IVA stage 3 (Centaur)	Rocket Body
U . 68	94054B	Titan IVA stage 3 (Centaur)	Rocket Body
U . 69	94084D	IUS stage 2	Rocket Body
U . 70	95022B	Titan IVA stage 3 (Centaur)	Rocket Body
U . 71	95038C	IABS	Rocket Body
U . 72	95060B	Titan IVA stage 3 (Centaur)	Rocket Body
U . 73	96026B	Titan IVA stage 3 (Centaur)	Rocket Body
U . 74	97008D	IUS stage 2	Rocket Body
U . 75	97008E	USA 130 debris (Telescope aperture sunc	Debris
U . 76	98029B	Titan IVB stage 3 (Centaur)	Rocket Body
U . 77	00001C	IABS	Rocket Body
U . 78	00024D	IUS stage 2	Rocket Body
U . 79	00065C	IABS	Rocket Body
U . 80	01009B	Titan IVB stage 3 (Centaur)	Rocket Body
U . 81	01033D	IUS stage 2	Rocket Body
U . 82	01033E	USA 159 debris (Telescope aperture sunc	Debris
U . 83	02001B	Titan IVB stage 3 (Centaur)	Rocket Body

U . 84	03008C	IABS	Rocket Body
U . 85	03012B	Titan IVB stage 3 (Centaur)	Rocket Body
U . 86	03040C	IABS	Rocket Body
U . 87	03041B	Titan IVB stage 3 (Centaur)	Rocket Body
U . 88	04004D	IUS stage 2	Rocket Body

4.9 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	90095	USA 65 debris (Telescope aperture suncover)	Debris
UU. 47	90100	Satcom C-1 debris (Array restraint cable)	Debris
UU. 48	90100	Gstar 4 debris (Array restraint cable)	Debris
UU. 49	91015	Meteosat 5 debris (MVIRI cover)	Debris
UU. 50	91015	Meteosat 5 debris (MVIRI cooler cover)	Debris
UU. 51	91028	Spacenet 4 debris (Array restraint cable)	Debris
UU. 52	91037	Aurora II debris (Array restraint cable)	Debris
UU. 53	91080	USA 75 debris (Telescope aperture suncover)	Debris
UU. 54	92057	Satcom C-4 debris (Array restraint cable)	Debris
UU. 55	92060	Satcom C-3 debris (Array restraint cable)	Debris
UU. 56	93073	Meteosat 6 debris (MVIRI cover)	Debris
UU. 57	93073	Meteosat 6 debris (MVIRI cooler cover)	Debris
UU. 58	94040	BS-3N debris (Array restraint cable)	Debris
UU. 59	94084	USA 107 debris (Telescope aperture suncover)	Debris
UU. 60	95011	Himawari-5 debris (VISSR cover)	Debris
UU. 61	96003	Koreasat 2 debris (Array restraint cable)	Debris
UU. 62	97049	Meteosat 7 debris (MVIRI cover)	Debris
UU. 63	97049	Meteosat 7 debris (MVIRI cooler cover)	Debris
UU. 64	00024	USA 149 debris (Telescope aperture suncover)	Debris
UU. 65	04004	USA 176 debris (Telescope aperture suncover)	Debris

4.10 Unidentified objects

In this list there are objects which were observed repeatedly by ground based telescopes but could not be correlated to any launch. Orbits were established by processing of optical measurements and propagation to the ascending node closest but earlier than Jan 1, 2005 00:00:00 UTC. 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. The listed orbits are a joint product of the Keldysh Institute of Applied Mathematics (KIAM, Moscow), Observatory Sciences Ltd. (United Kingdom), Astronomical Institute of the University of Bern, Crimean Astrophysical Observatory (Nauchny), Central (Pulkovo) Astronomical Observatory (St. Petersburg) and Space Informatics Analytical Systems JSC (Moscow). The following data are given:

UI.nn	YYYYMMDD	HHMMSS.SSS	Tnodal	Hmin	Hmax	Longit
	Inclin	RAAN	AoP	SemiAxis	Eccentr	M

where:

- UI.NN - number of object (UI means 'unidentified')
- YYYYMMDD HHMMSS.SSS - date and time of ascending node crossing, UTC
- Tnodal - nodal period, min
- Hmin - minimal height above Earth ellipsoid, km
- Hmax - maximal height above Earth ellipsoid, 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.

UI.01	20041231 00.4465	133129.126 015.8528	1437.1842 092.2578	35774.0 42165.934	35799.4 0.0002689	069.2865 264.3270
UI.02	20041231 01.1184	003648.136 088.3809	1429.7704 083.8604	35583.2 42035.275	35728.5 0.0017578	339.3121 276.1906
UI.03	20041231 01.2175	095931.332 046.7413	1434.0541 324.0795	35677.9 42117.129	35799.0 0.0014332	155.7997 034.8692
UI.04	20041231 01.2326	211850.987 068.8088	1436.2926 023.2463	35776.8 42163.164	35793.0 0.0001910	007.9715 336.2066
UI.05	20041231 01.3344	172936.473 069.5789	1444.4465 206.2985	34949.0 42327.168	36944.7 0.0235218	066.2667 151.9688
UI.06	20041231 01.5654	190630.103 090.2877	1424.0914 287.4473	35528.3 41927.562	35568.5 0.0004536	063.1110 072.4302
UI.07	20041231 01.9793	153649.443 324.9933	1436.0732 157.8435	35769.0 42166.523	35803.4 0.0003486	349.8518 201.5704
UI.08	20041231 02.1044	001939.057 077.1855	1436.2432 171.3004	35616.1 42165.017	35957.1 0.0040442	332.3446 188.5470
UI.09	20041231 03.0659	183849.303 336.7268	1438.4025 315.3230	29354.8 42211.043	42308.3 0.1535214	316.1157 032.9245
UI.10	20041231 03.3303	124459.983 330.0628	1445.3916 033.0068	30116.3 42348.557	41821.0 0.1382321	038.2129 334.6180
UI.11	20041231 03.6681	095808.293 082.6660	1423.2097 053.8336	35311.7 41912.472	35754.4 0.0053074	192.9416 306.5699

UI.12	20041231	012953.958	1386.1945	30352.1	39266.9	109.3382
	03.7035	231.2837	252.5278	41188.152	0.1082250	095.6693
UI.13	20041231	160527.533	1436.9502	35595.9	36014.8	327.1632
	03.9585	309.1041	072.5009	42184.988	0.0049877	287.8221
UI.14	20041231	172654.792	1431.4522	35648.0	35750.6	180.6676
	03.9602	182.4149	299.3480	42079.185	0.0012627	060.9177
UI.15	20041231	220857.467	1423.1694	35464.8	35602.8	008.7012
	04.1918	081.6265	184.2992	41912.138	0.0016422	175.6037
UI.16	20041231	110815.906	1431.6796	35549.0	35851.8	173.1758
	04.5791	080.4752	359.7773	42078.928	0.0036006	000.1394
UI.17	20041231	170000.580	1446.0774	35500.4	36463.2	053.1476
	05.3039	048.7516	160.8004	42360.089	0.0113749	199.4167
UI.18	20041231	135205.794	1436.1335	31958.9	39616.7	048.9464
	05.3103	357.5230	205.6615	42167.065	0.0907794	149.2020
UI.19	20041231	201715.121	1423.1378	35524.5	35541.6	029.7116
	05.6276	074.6450	301.4338	41911.727	0.0001852	058.4541
UI.20	20041231	151718.724	1448.2069	31470.3	40577.5	029.5805
	05.7357	359.4988	273.2032	42402.556	0.1074382	074.3210
UI.21	20041231	234048.185	1432.0203	35667.3	35750.5	028.4567
	06.1652	124.1986	119.5074	42088.211	0.0009908	240.7173
UI.22	20041231	201718.112	1421.8942	35495.0	35522.2	019.7881
	07.2050	064.7470	098.0594	41887.462	0.0003342	261.8712
UI.23	20041231	181046.562	1437.0640	30323.8	41288.0	334.8805
	07.4318	348.2142	309.9908	42185.242	0.1300262	039.1225
UI.24	20041231	044932.105	1444.5258	30578.3	41322.9	175.3987
	07.5975	347.8689	002.4437	42331.330	0.1269304	357.9711
UI.25	20041231	102516.444	1448.0483	31740.0	40299.7	099.5066
	07.8492	356.1413	320.3651	42399.613	0.1009951	032.5006
UI.26	20041231	164350.582	1436.0441	31255.4	40318.8	002.2481
	07.9497	353.7803	262.6547	42165.520	0.1075083	084.8289
UI.27	20041231	135532.288	1434.3911	35561.0	35947.0	066.0279
	08.1624	015.3637	003.5383	42132.667	0.0045939	356.3083
UI.28	20041231	222628.979	1410.1234	34922.2	35632.6	337.0074
	08.3077	054.3633	273.9226	41656.093	0.0085293	084.9819
UI.29	20041231	171324.834	1422.3061	35479.5	35555.6	041.0967
	08.8091	039.9937	054.9209	41895.569	0.0008953	305.0189
UI.30	20041231	155652.164	1463.5809	36216.3	36431.5	061.5353
	09.0576	041.2377	072.5292	42701.968	0.0025038	287.6065
UI.31	20041231	133023.402	1412.8972	34373.6	36290.1	026.4615
	10.5317	329.4266	168.2148	41712.361	0.0229264	192.2041
UI.32	20041231	024303.605	1423.3940	35523.7	35555.1	251.8836
	11.9093	032.5673	034.7716	41916.921	0.0003578	325.1360
UI.33	20041231	180247.947	1424.4949	35334.1	35786.0	019.7084
	12.0401	030.9568	328.7386	41938.885	0.0053945	030.8264
UI.34	20041231	193900.885	1456.5661	36179.1	36197.6	358.8400
	12.2131	034.2032	048.8575	42565.844	0.0001999	311.0484
UI.35	20041231	111003.449	1436.0840	35748.2	35826.7	064.9630
	12.4798	332.7338	020.7867	42167.192	0.0009716	339.1464
UI.36	20041231	153304.005	1435.8378	35769.9	35794.6	358.3423
	12.5792	332.0438	164.4854	42162.541	0.0002358	195.4168
UI.37	20041231	233126.980	1459.2074	36200.2	36279.6	293.1503
	12.7340	026.7836	064.5038	42617.364	0.0009090	295.4764

UI.38	20041231	044823.033	1430.5177	35421.2	35936.6	166.8705
	12.8766	338.9645	305.0983	42058.057	0.0061779	054.2151
UI.39	20041231	053651.484	1422.1019	35468.7	35558.4	193.1213
	13.0821	017.3738	292.7048	41891.968	0.0010979	067.0626
UI.40	20041231	023108.962	1420.9419	35254.5	35727.5	235.7995
	13.1255	013.4988	103.5622	41869.191	0.0056184	256.9461
UI.41	20041231	125050.407	1437.1521	35639.1	35976.6	080.0155
	13.3436	013.0598	175.4467	42187.066	0.0040007	184.4728
UI.42	20041231	030541.489	1445.5438	35497.3	36448.5	193.5364
	13.4643	339.8830	291.3349	42350.538	0.0112589	067.3621
UI.43	20041231	111841.829	1436.0520	35693.7	35883.1	073.3395
	13.4969	343.2773	069.0748	42166.266	0.0022362	291.0564
UI.44	20041231	135222.211	1435.2229	35566.8	35976.9	064.8706
	13.6286	013.3371	258.4383	42149.347	0.0048908	100.8983
UI.45	20041231	234218.016	1457.0350	36110.4	36285.3	279.6768
	13.6819	016.0282	076.2975	42575.286	0.0020282	283.8161
UI.46	20041231	101850.211	1466.4872	36359.8	36403.0	125.5289
	13.6927	020.4624	084.0215	42758.850	0.0004745	275.9225
UI.47	20041231	202226.502	1428.3573	35515.1	35759.2	353.6003
	13.7933	039.8313	072.4456	42014.663	0.0028891	287.7773
UI.48	20041231	062635.542	1442.4427	35886.4	35936.1	146.7870
	14.1460	343.4938	160.6462	42291.258	0.0005381	199.2707
UI.49	20041231	090541.317	1446.3552	35862.2	36114.2	107.4104
	14.2760	343.9995	200.2322	42367.662	0.0029417	159.5475
UI.50	20041231	085221.339	1432.1879	35663.7	35757.4	117.4955
	14.3316	350.7456	352.3986	42090.374	0.0011530	007.4778
UI.51	20041231	085827.679	1447.9285	35750.1	36290.2	135.5634
	14.3349	010.3465	086.9802	42397.677	0.0063376	273.6361
UI.52	20041231	085220.659	1433.1165	35601.5	35856.5	117.4609
	14.3754	350.7078	150.2588	42108.575	0.0029808	209.8045
UI.53	20041231	171540.097	1458.2111	36177.1	36264.6	011.4987
	14.4430	010.9229	080.4984	42598.320	0.0009998	279.5067
UI.54	20041231	100957.276	1431.8637	35653.6	35757.8	099.8432
	14.4912	352.5457	038.1734	42083.989	0.0012459	321.8091
UI.55	20041231	160115.670	1414.8725	30933.2	39810.6	021.2289
	14.7722	001.9985	027.5044	41750.444	0.1063281	337.6584
UI.56	20041231	041003.597	1447.5142	35992.4	36032.0	191.5863
	14.8365	354.0668	043.8422	42390.063	0.0004649	316.0907
UI.57	20041231	150623.623	1476.4223	36245.5	36901.2	031.1820
	15.1344	358.1942	191.7660	42952.504	0.0076074	167.9505
UI.58	20041231	113844.899	1526.4921	37405.7	37675.4	098.6793
	16.2148	013.6304	231.2092	43917.374	0.0030955	128.4177
UI.59	20041231	012115.104	1407.3220	29914.4	40536.2	235.9784
	20.6498	356.1118	273.8460	41601.312	0.1277201	071.6109
UI.60	20041231	165433.541	1436.3328	30352.6	41232.8	010.6179
	21.3499	004.7151	183.3022	42171.940	0.1289713	175.6607

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	Ω	ω	λ
Ind. 1	91055A	Intelsat VI F-5					
	31-DEC-04					51	645
	20088.182500	42164.97909	0.0002370	0.2488	95.2545	281.5313	282.9900
Ind. 2	93069A	Gorizont 28					
	30-DEC-04					49	584
	20087.344086	42162.29981	0.0001010	7.1234	63.8667	280.5366	102.5234
Ind. 3	02011A	TDRS 9					
	30-DEC-04					51	144
	20087.515359	42107.08544	0.0004782	6.3969	275.6755	346.9620	258.0383
Ind. 4	04041A	AMC-15					
	31-DEC-04					12	12
	20088.386366	42071.69069	0.0002386	0.0463	224.8301	60.8190	242.0131
Ind. 5	04042C	Feng Yun 2C AKM					
	25-DEC-04					2	2
	20082.726528	41867.80379	0.0022168	0.6908	288.9120	286.1435	3.7429
Ind. 6	04043A	Ekspress AM-1					
	31-DEC-04					8	8
	20088.010683	42243.16858	0.0016909	0.0341	284.0440	351.1094	54.9210

The longitude history of the objects in this category is plotted in Figures 5 and 6.

Figure 5: Longitude history of the objects of indeterminate status

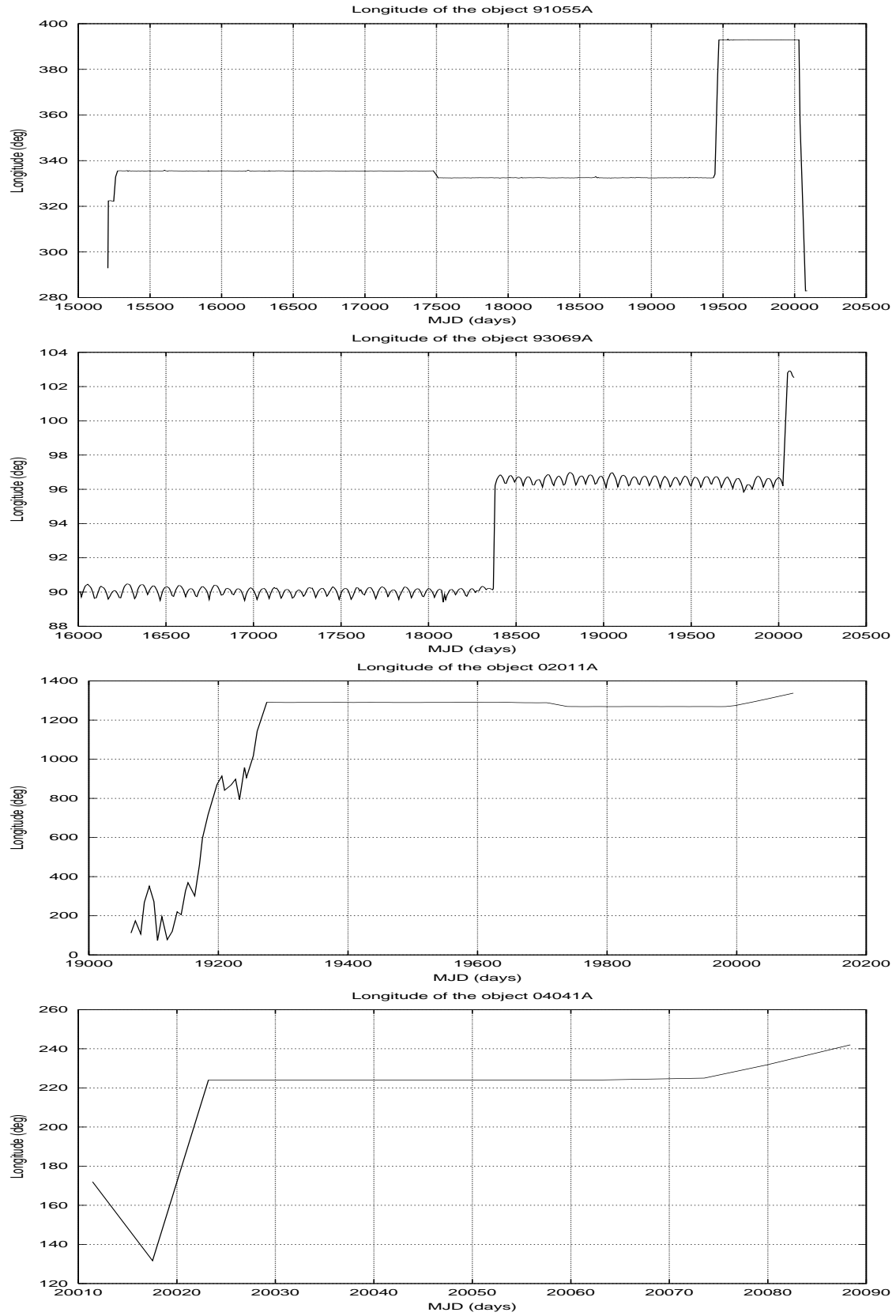
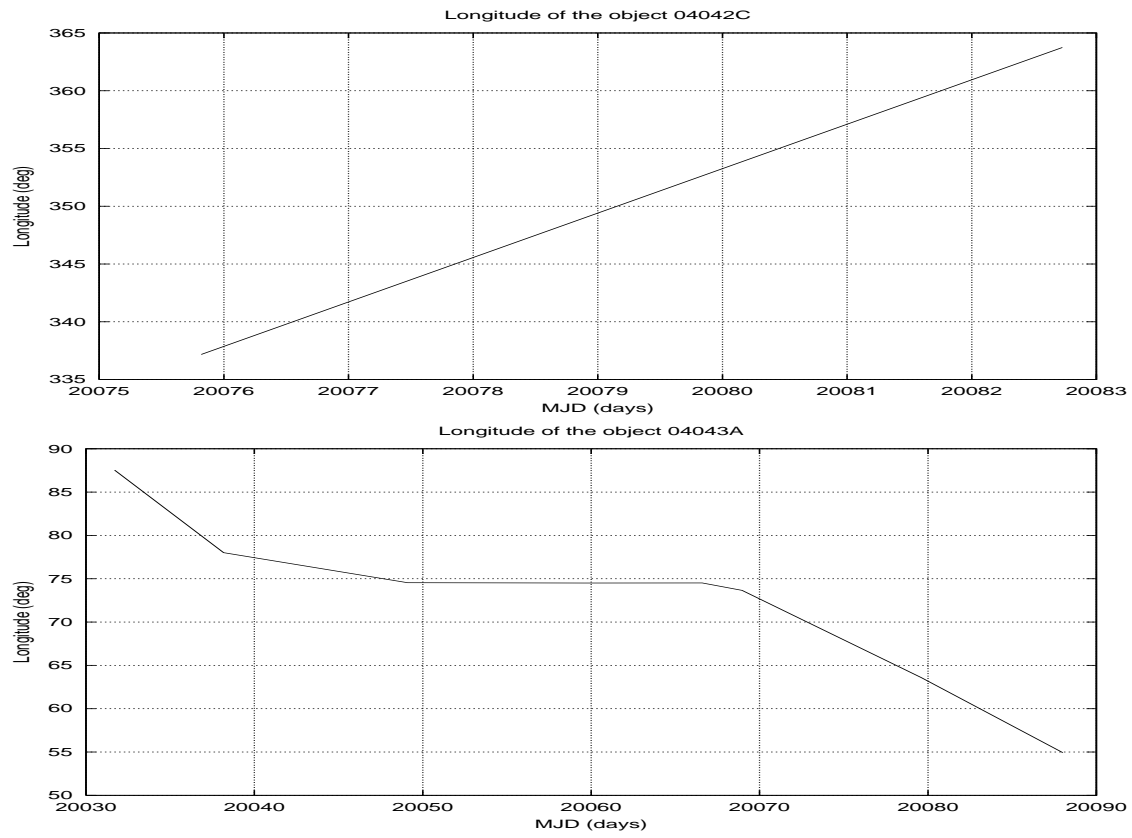


Figure 6: Longitude history of the objects of indeterminate status



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

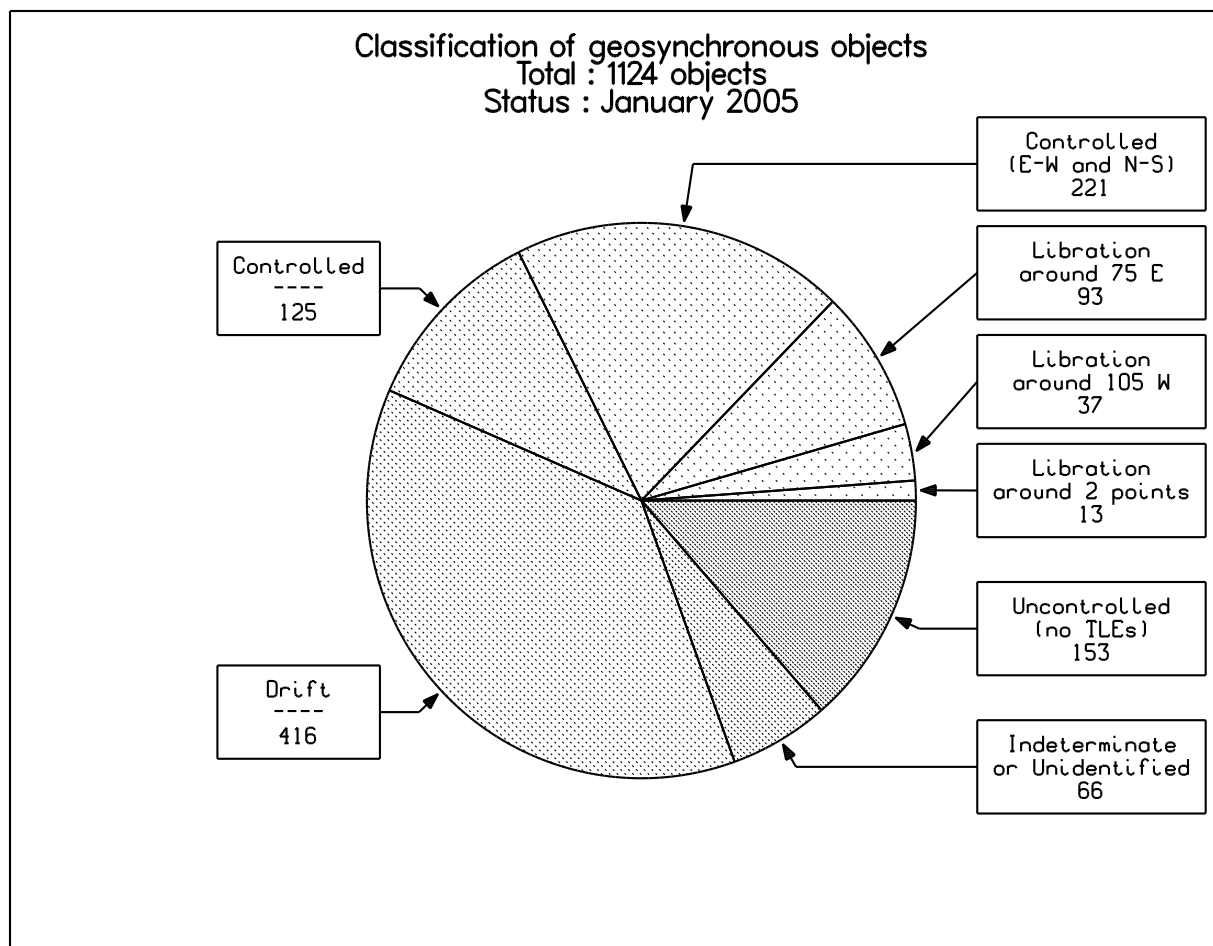


Figure 7: Number of objects in each category

Please note, that the 125 controlled objects consist of the 83 objects in class C2 (only East-West station keeping) and the 42 objects in Section 4.3 where no TLEs are available.

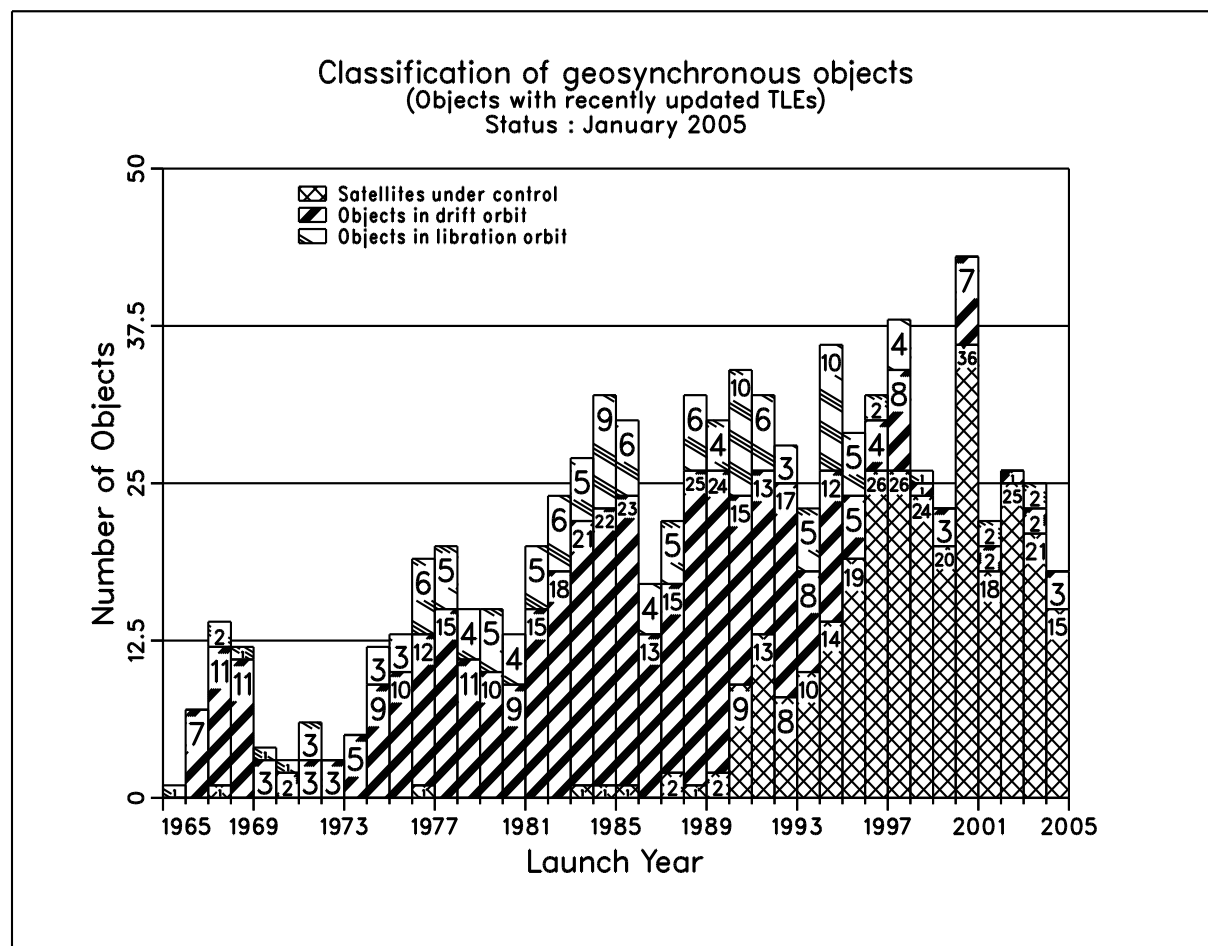


Figure 8: Number of objects in each category according to the launch year.

23 objects were launched into or near GEO in 2004, however, the orbital status could only be determined for 18 of them.

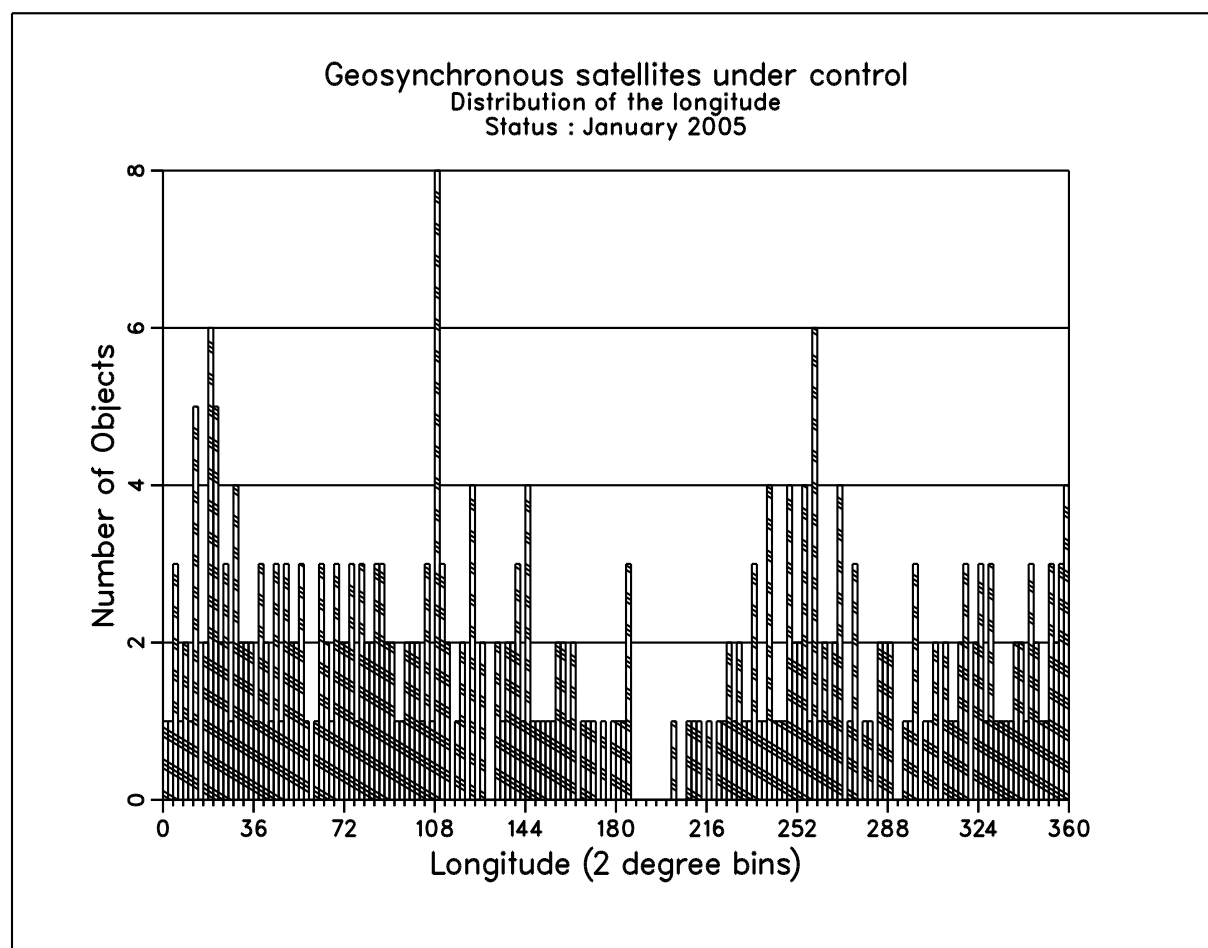


Figure 9: Distribution of the longitude of the 294 satellites under control (with updated TLEs).

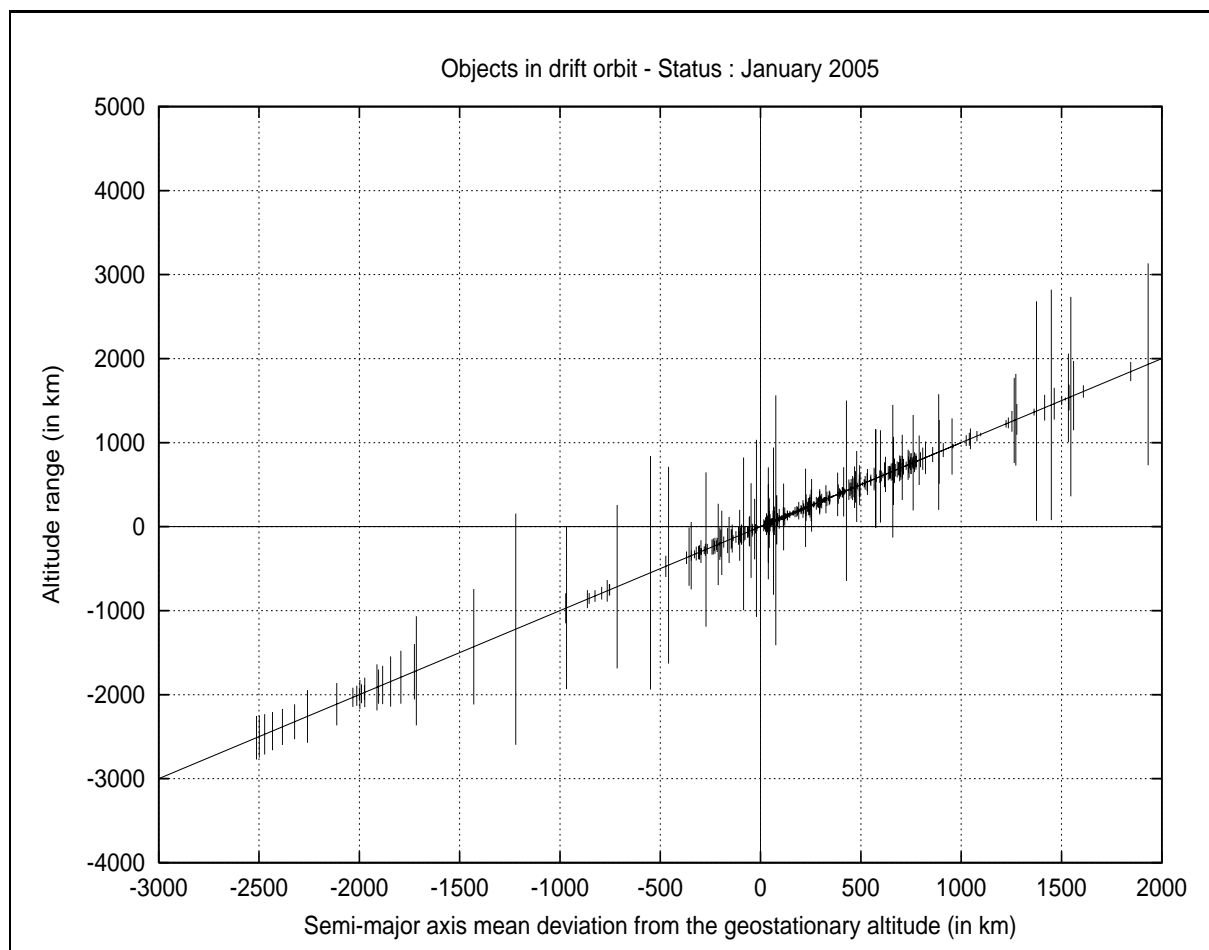


Figure 10: Distribution and altitude range of the objects in drift orbit.

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.

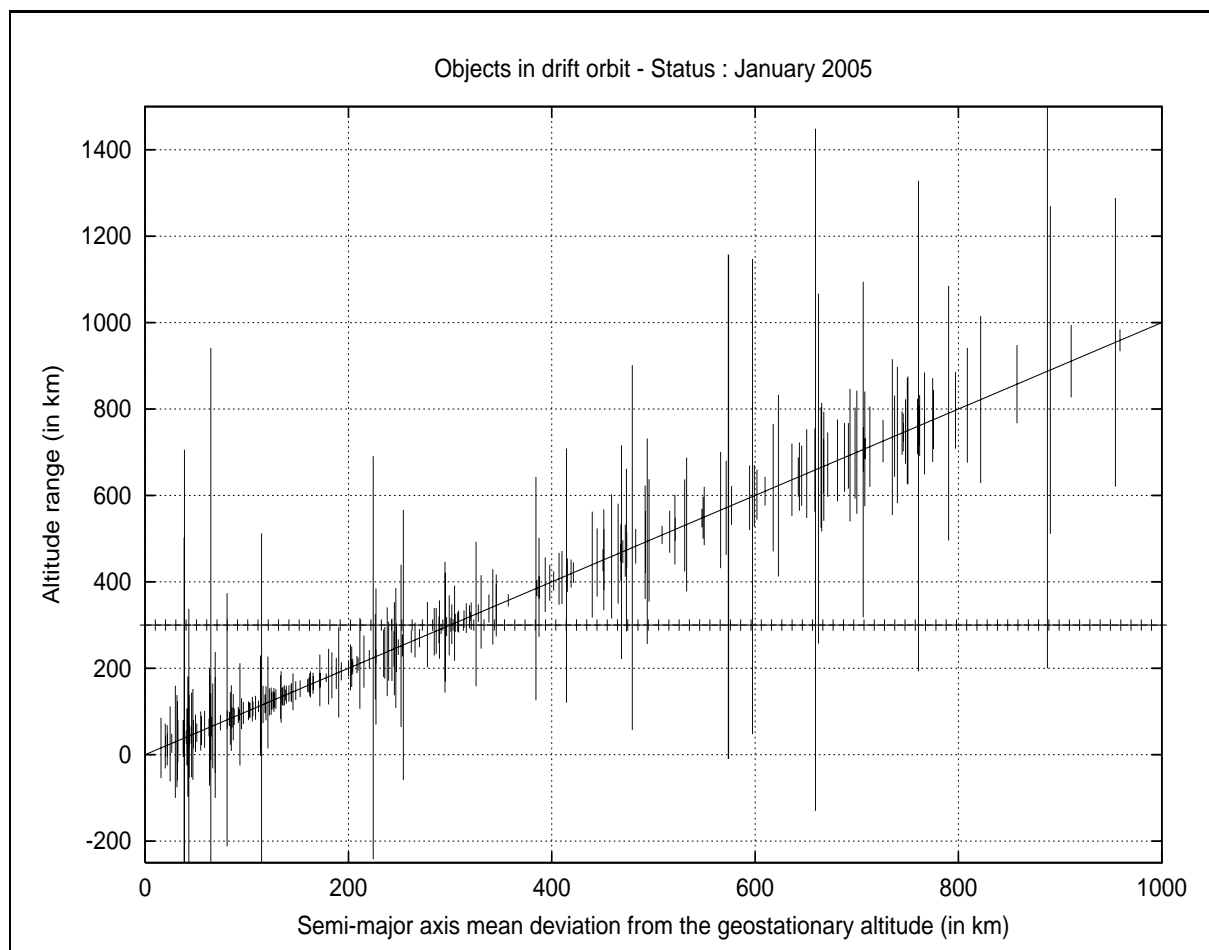


Figure 11: Zoom in the distribution and altitude range of the objects in drift orbit.

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.

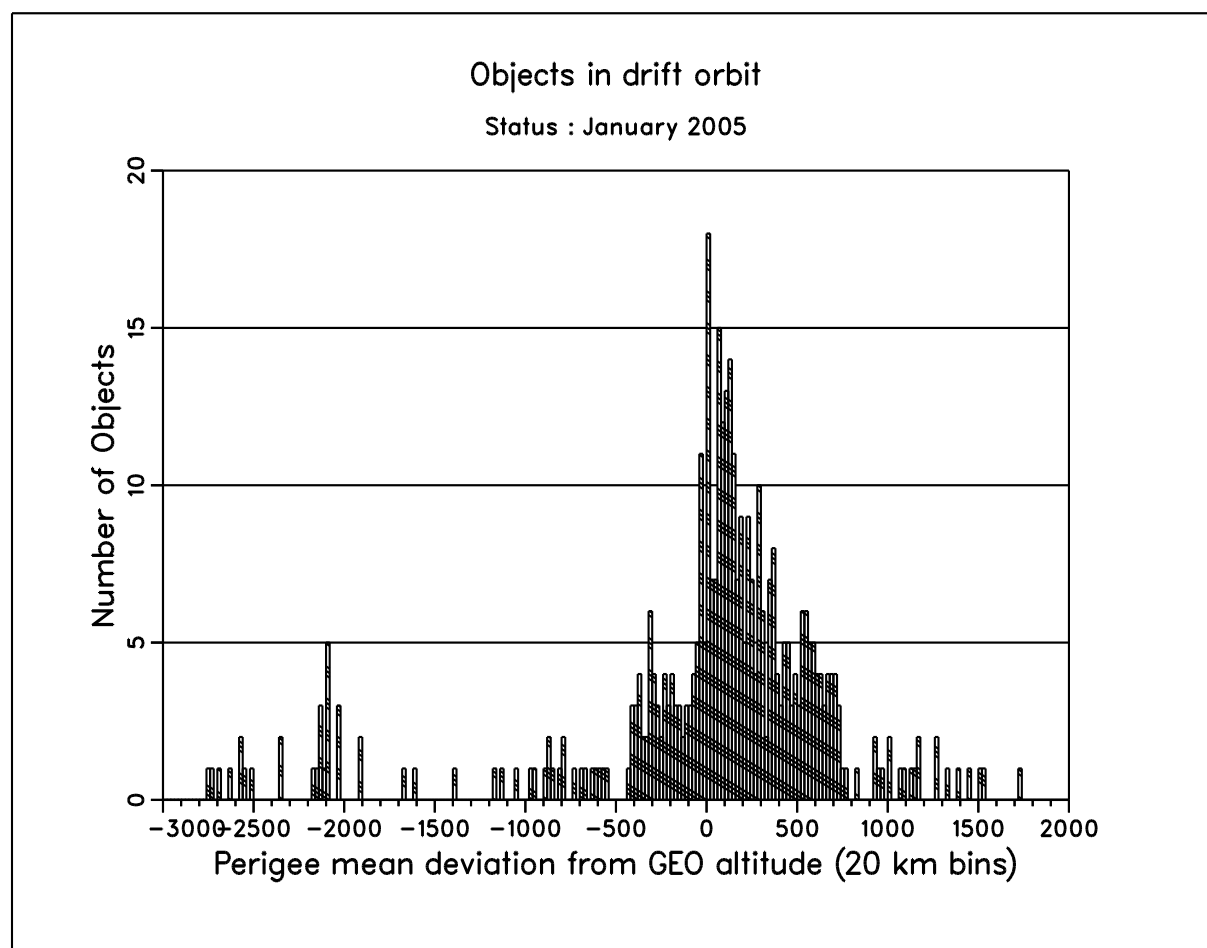


Figure 12: Distribution of the perigee mean deviation from the geostationary altitude.

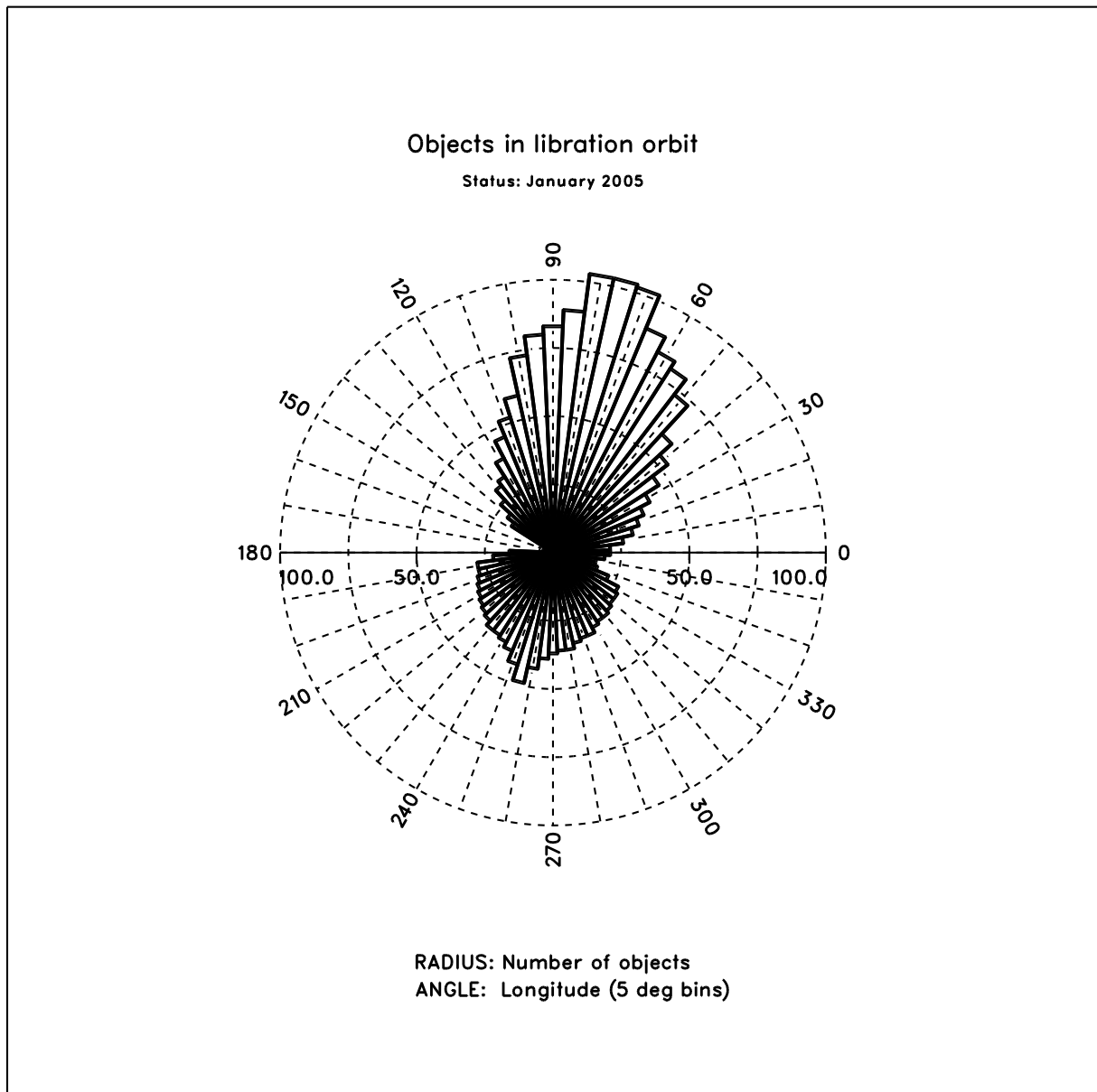


Figure 13: Distribution of the objects in libration orbit in 5-deg bins of geographic longitude (objects with updated TLEs only).

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 0.1
- mean motion between 0.9 and 1.1 revolution per sidereal day, corresponding approximately to a semi-major axis of 42164 ± 2800 km
- inclination lower than 20 degrees

869 objects met these criteria as of 31 December 2004. 255 more objects are also known to be in this orbital region although no orbital elements are available in DISCOS. Thus, the total number of objects in the geostationary region is 1124. They can be classified as follows:

- 346 are controlled (221 under longitude and inclination control),
- 416 are in a drift orbit,
- 143 are in a libration orbit,
- 88 are uncontrolled with no orbital elements available,
- 6 could not be classified (3 of them were recently launched and are en route to their longitude slot; the other 3 had a recent manoeuvre).
- 65 are uncatalogued objects but which can be associated to a launch
- 60 are unidentified objects

Compared with the last issue of January 2004 the following changes can be observed: There were 23 new objects (18 payloads and 5 rocket bodies) launched into or near GEO during the last year.

13 spacecraft reached end of life as far as it can be inferred from the orbital elements stored in DISCOS (or declared by spacecraft operators): five were reorbited more than 300 km above GEO: Astra 1A (88109B), GSTAR 4 (90100B, US), Insat II R (92010B, India, previously Arabsat 1C), GOES 8 (94022A, US) and PAS 6 (97040A, US). Five spacecraft were reorbited into a graveyard orbit below the altitude recommended by IADC:

- Morelos 2 (85109B, Mexico) 180 x 220 km above GEO,
- Brazilsat 2 (86026B, Brazil) 170 x 190 km above GEO,
- Telecom 2B (92021A, France) 195 x 225 km above GEO,
- Insat IIB (93048B, India) 9 x 160 km above GEO,
- Galaxy 8-i (97078A, US) 145 x 180 km above GEO,

Comstar 4 (81018A, Tonga) and Zhongxing 6 (97021A, China) seemed to have been abandoned around the Eastern stable point last year. ACTS (93058B, US) was moved to 105° W already in August 2000 after it was realised that the propellant reserves revealed a much lower amount than expected. However, it was only decommissioned on 28 April 2004 (source: Orbital Debris Quaterly News, July 2004).

In 2004 five rocket upper stages were added to the GEO debris environment:

- Three Russian Proton-K fourth stages: 04010F was left in an orbit -100 x 180 km passing through GEO, 04015D was left below GEO (-192 x -53 km) and 04043D was left very low above GEO (15 x 80 km).
- One Chinese apogee kick motor (04042C) was left in a -390 x -200 km orbit below GEO
- One US upper stage (04004D) was launched towards GEO, but no orbit data is available.

This analysis has shown that the IADC reorbiting recommendations were only partially followed by the spacecraft operators. A more rigorous control of the reorbiting practices in GEO is required to preserve this unique resource.

8 References

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

9 Acknowledgements

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