

# Appendix 15B. Tables of operational military satellites

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**Table 15B.1.** US operational military satellites, as of 31 December 2002<sup>a</sup>

Common name	Official name	Intl name	NORAD design.	Launched (date)	Launcher	Launch site	Perigee (km)	Apogee (km)	Incl. (deg.)	Period (min.)	Comments
<i>Navigation satellites in medium earth orbit</i>											
GPS 2-02	SVN 13/USA 38	1989-044A	20061	10 June 89	Delta 6925	CCAFS	19 594	20 787	53.4	718.0	
GPS 2-04 <sup>b</sup>	SVN 19/USA 47	1989-085A	20302	21 Oct 89	Delta 6925	CCAFS	21 204	21 238	53.4	760.2	(Retired, not in SEM Almanac)
GPS 2-05	SVN 17/USA 49	1989-097A	20361	11 Dec 89	Delta 6925	CCAFS	19 795	20 583	55.9	718.0	
GPS 2-08 <sup>b</sup>	SVN 21/USA 63	1990-068A	20724	2 Aug 90	Delta 6925	CCAFS	19 716	20 705	56.2	718.8	(Decommissioned Jan. 2003)
GPS 2-09	SVN 15/USA 64	1990-088A	20830	1 Oct 90	Delta 6925	CCAFS	19 978	20 404	55.8	718.0	
GPS 2A-01	SVN 23/USA 66	1990-103A	20959	26 Nov 90	Delta 6925	CCAFS	19 764	20 637	56.4	718.4	
GPS 2A-02	SVN 24/USA 71	1991-047A	21552	4 July 91	Delta 7925	CCAFS	19 927	20 450	56.0	717.9	
GPS 2A-03	SVN 25/USA 79	1992-009A	21890	23 Feb 92	Delta 7925	CCAFS	19 913	20 464	53.9	717.9	
GPS 2A-04 <sup>b</sup>	SVN 28/USA 80	1992-019A	21930	10 Apr 92	Delta 7925	CCAFS	20 088	20 284	54.5	717.8	(Decommissioned May 1997)
GPS 2A-05	SVN 26/USA 83	1992-039A	22014	7 July 92	Delta 7925	CCAFS	19 822	20 558	55.9	718.0	
GPS 2A-06	SVN 27/USA 84	1992-058A	22108	9 Sep 92	Delta 7925	CCAFS	19 742	20 638	54.1	718.0	
GPS 2A-07	SVN 32/USA 85	1992-079A	22231	22 Nov 92	Delta 7925	CCAFS	20 042	20 339	55.7	718.0	
GPS 2A-08	SVN 29/USA 87	1992-089A	22275	18 Dec 92	Delta 7925	CCAFS	19 971	20 407	55.7	718.0	
GPS 2A-09	SVN 22/USA 88	1993-007A	22446	3 Feb 93	Delta 7925	CCAFS	19 768	20 609	53.4	717.9	
GPS 2A-10	SVN 31/USA 90	1993-017A	22581	30 Mar 93	Delta 7925	CCAFS	19 894	20 485	53.9	718.0	
GPS 2A-11	SVN 37/USA 91	1993-032A	22657	13 May 93	Delta 7925	CCAFS	19 864	20 516	53.9	718.0	
GPS 2A-12	SVN 39/USA 92	1993-042A	22700	26 June 93	Delta 7925	CCAFS	19 824	20 555	54.3	718.0	
GPS 2A-13	SVN 35/USA 94	1993-054A	22779	30 Aug 93	Delta 7925	CCAFS	20 085	20 291	53.6	717.9	
GPS 2A-14	SVN 34/USA 96	1993-068A	22877	26 Oct 93	Delta 7925	CCAFS	20 023	20 353	55.4	717.9	
GPS 2A-15	SVN 36/USA 100	1994-016A	23027	10 Mar 94	Delta 7925	CCAFS	20 014	20 364	53.8	717.9	

\* The authors wish to acknowledge the international group of hobbyists who annually produce thousands of precise observations of over 100 US military satellites, from which they derive accurate orbital elements. This small, informal group is the sole public source of orbital data for more than 30 of the satellites listed in these tables.

GPS 2A-16	SVN 33/USA 117	1996-019A	23833	28 Mar 96	Delta 7925	CCAFS	20 086	20 294	53.4	718.0	
GPS 2A-17	SVN 40/USA 126	1996-041A	23953	16 July 96	Delta 7925	CCAFS	20 054	20 324	56.2	718.0	
GPS 2A-18	SVN 30/USA 128	1996-056A	24320	12 Sep 96	Delta 7925	CCAFS	20 016	20 363	54.0	718.0	
GPS 2A-19	SVN 38/USA 134	1997-067A	25030	6 Nov 97	Delta 7925	CCAFS	19 965	20 413	55.1	718.0	
GPS IIR-02	SVN 43/USA 132	1997-035A	24876	23 July 97	Delta 7925	CCAFS	20 145	20 235	55.9	718.0	
GPS IIR-03	SVN 46/USA 145	1999-055A	25933	7 Oct 99	Delta 7925	CCAFS	20 150	20 229	52.4	718.0	
GPS IIR-04	SVN 51/USA 150	2000-025A	26360	11 May 00	Delta 7925	CCAFS	20 146	20 234	55.3	718.0	
GPS IIR-05	SVN 44/USA 151	2000-040A	26407	16 July 00	Delta 7925	CCAFS	20 002	20 377	55.0	718.0	
GPS IIR-06	SVN 41/USA 154	2000-071A	26605	10 Nov 00	Delta 7925	CCAFS	20 144	20 234	55.6	718.0	
GPS IIR-07	SVN 54/USA 156	2001-004A	26690	30 Jan 01	Delta 7925	CCAFS	20 098	20 282	55.2	718.0	Replacing USA 066
<i>Communications satellites in elliptical orbit</i>											
SDS II-1 <sup>c</sup>	USA 40	1989-061B	20167	8 Aug 89	STS	KSC	500	39 850	63.4	717.7	Prob. replaced by USA 137
SDS II-2 <sup>c</sup>	USA 89	1992-086B	22518	2 Dec 92	STS 53	KSC	500	39 850	63.4	717.7	Prob. replaced by USA 162
SDS II-3	USA 125	1996-038A	23945	3 July 96	Titan IVA	CCAFS	500	39 850	63.4	717.7	
SDS III-1	USA 137	1998-005A	25148	29 Jan 98	Atlas IIA	CCAFS	500	39 850	63.4	717.7	+ COBRA BRASS (Capricorn)
SDS III-2	USA 162	2001-046A	26948	10 Oct 01	Atlas 2AS	CCAFS	500	39 850	63.4	717.7	+ COBRA BRASS (Aquila)
SLDCOM 1	USA 59	1990-050A	20641	8 June 90	Titan IV	VAFB	1 200	11 600	63.4	240.0	
SLDCOM 2	USA 72	1991-076A	21775	8 Nov 91	Titan IV	VAFB	1 200	11 600	63.4	240.0	
SLDCOM 3	USA 119	1996-029A	23893	12 May 96	Titan IV	VAFB	1 200	11 600	63.4	240.0	
<i>Communications satellites in geostationary orbit</i>											
LES 9 <sup>c</sup>	..	1976-023B	8747	15 Mar 76	Titan 3C	CCAFS	35 685	35 888	11.1	1436.0	105°W, Lincoln Exp. Satellite
FLTSAT 4 <sup>c</sup>	..	1980-087A	12046	31 Oct 80	Atlas	CCAFS	35 681	35 894	12.3	1436.0	172°E, Pacific, spare
FLTSAT 7 <sup>c</sup>	USA 20	1986-096A	17181	5 Dec 86	Atlas	CCAFS	35 766	35 809	4.9	1436.1	100°W, CONUS, spare
FLTSAT 8 <sup>c</sup>	USA 46	1989-077A	20253	25 Sep 89	Atlas G	CCAFS	35 770	35 792	2.6	1435.9	23°W, Atlantic, spare
UFO 02 <sup>c</sup>	USA 95	1993-056A	22787	3 Sep 93	Atlas I	CCAFS	35 166	36 409	2.8	1436.0	74°E, Indian Ocean, spare
UFO 03	USA 104	1994-035A	23132	24 June 94	Atlas I	CCAFS	35 775	35 799	2.8	1436.1	80°W
UFO 04 EHF	USA 108	1995-003A	23467	29 Jan 95	Atlas II	CCAFS	35 762	35 774	3.3	1435.2	2°E
UFO 05 EHF	USA 111	1995-027A	23589	31 May 95	Atlas II	CCAFS	35 767	35 808	3.4	1436.0	76°E
UFO 06 EHF	USA 114	1995-057A	23696	22 Oct 95	Atlas II	CCAFS	35 775	35 799	3.5	1436.0	104°W
UFO 07 EHF	USA 127	1996-042A	23967	25 July 96	Atlas II	CCAFS	35 770	35 805	3.7	1436.1	108°W
UFO 08 GBS	USA 138	1998-016A	25258	16 Mar 98	Atlas II	CCAFS	35 770	35 792	5.2	1435.9	44°W
UFO 09 GBS	USA 140	1998-058A	25501	20 Oct 98	Atlas II	CCAFS	35 770	35 805	5.6	1436.0	132°W
UFO 10 GBS	USA 146	1999-063A	25967	24 Nov 99	Atlas II	CCAFS	35 779	35 807	3.9	1436.0	79°E

Common name	Official name	Intl name	NORAD design.	Launched (date)	Launcher	Launch site	Perigee (km)	Apogee (km)	Incl. (deg.)	Period (min.)	Comments
DSCS III B-5 <sup>c</sup>	USA 12/F3	1985-092A	16115	3 Oct 85	STS 51	KSC	35 786	35 786	0.0	1436.1	150°W, W. Pacific Residual #1
DSCS III A-2 <sup>c</sup>	USA 44/F4	1989-069B	20203	4 Sep 89	Titan 34D	CCAFS	35 786	35 786	0.0	1436.1	130°W, E. Pacific Residual
DSCS III B-14 <sup>c</sup>	USA 78/F5	1992-006A	21873	11 Feb 92	Atlas II	CCAFS	35 786	35 786	0.0	1436.1	45°W, W. Atlantic Residual
DSCS III B-12	USA 82/F6	1992-037A	22009	2 July 92	Atlas II	CCAFS	35 786	35 786	0.0	1436.1	60°E, Indian Ocean
DSCS III B-9 <sup>c</sup>	USA 93/F7	1993-046A	22719	19 July 93	Atlas II	CCAFS	35 786	35 786	0.0	1436.1	180°E, W. Pacific Residual #2
DSCS III B-10 <sup>c</sup>	USA 97/F8	1993-074A	22915	28 Nov 93	Atlas II	CCAFS	35 786	35 786	0.0	1436.1	57°E, Indian Ocean Residual
DSCS III B-7	USA 113/F9	1995-038A	23628	31 July 95	Atlas IIA	CCAFS	35 786	35 786	0.0	1436.1	52°W, W. Atlantic
DSCS III B-13	USA 135/F10	1997-065A	25019	24 Oct. 97	Atlas IIA	CCAFS	35 786	35 786	0.0	1436.1	135°W, W. Pacific
DSCS III B-8	USA 148/F11	2000-001A	26052	21 Jan 00	Atlas IIA	CCAFS	35 786	35 786	0.0	1436.1	175°E, W. Pacific
DSCS III B-11	USA 153/F12	2000-065A	26575	20 Oct 00	Atlas IIA	CCAFS	35 786	35 786	0.0	1436.1	12°W, E. Atlantic
Milstar-I 1	USA 99/DFS-1	1994-009A	22988	7 Feb 94	Titan IVA	CCAFS	35 786	35 786	0.0	1436.1	177.5°E, Pacific
Milstar-I 2	USA 115/DFS-2	1995-060A	23712	6 Nov 96	Titan IVA	CCAFS	35 766	35 810	0.4	1436.1	103°W, Americas
Milstar-II 1	USA 157	2001-009A	26715	27 Feb 01	Titan IVB	CCAFS	35 786	35 786	0.0	1436.1	90° W, Americas
Milstar-5	USA 164	2002-001A	27168	16 Jan 02	Titan IVB	CCAFS	35 787	35 802	3.6	1436.1	3.2° E, Europe
GeoLITE	USA 158	2001-020A	26770	18 May 01	Atlas IIA	CCAFS	35 786	35 786	0.0	1436.1	
<i>Weather satellites</i>											
GFO		1998-007A	25157	10 Feb 98	Taurus	VAFB	790	793	108.1	100.6	GeoSat follow-on
DMSP 5D-2 F12	USA 106	1994-057A	23233	29 Aug 94	Atlas E	VAFB	841	857	98.5	101.8	
DMSP 5D-2 F13	USA 109	1995-015A	23533	24 Mar 95	Atlas E	VAFB	844	852	98.8	101.8	
DMSP 5D-2 F14 <sup>c</sup>	USA 131	1997-012A	24753	4 Apr 97	Titan 2	VAFB	840	855	98.7	101.8	Back-up
DMSP 5D-3 F15	USA 147	1999-067A	25991	12 Dec 99	Titan 2	VAFB	837	851	98.7	101.7	
Oscar 29 <sup>c</sup>	NNSS 30290	1987-080B	18361	16 Sep 87	Scout G	VAFB	1 017	1 181	90.3	107.2	Stored
Oscar 27	NNSS 30270	1987-080A	18362	16 Sep 87	Scout G	VAFB	1 017	1 184	90.3	107.2	Operational
Oscar 23	NNSS 30230	1988-033A	19070	26 Apr 88	Scout G	VAFB	1 018	1 307	90.3	108.5	Operational
Oscar 32	NNSS 30320	1988-033B	19071	26 Apr 88	Scout G	VAFB	1 018	1 305	90.3	108.5	Operational
Oscar 25 <sup>c</sup>	NNSS 30250	1988-074A	19419	25 Aug 88	Scout G	VAFB	1 034	1 181	89.8	107.3	Stored
Oscar 31 <sup>c</sup>	NNSS 30310	1988-074B	19420	25 Aug 88	Scout G	VAFB	1 035	1 179	89.8	107.3	Stored
<i>Early-warning satellites in geostationary orbit</i>											
DSP F14 DSP 14 <sup>b</sup>	USA 39	1989-046A	20066	14 June 89	Titan IVA	CCAFS	35 467	36 107	7.1	1436.1	
DSP F15 DSP 15 <sup>b</sup>	USA 65	1990-095A	20929	13 Nov 90	Titan IVA	CCAFS	35 758	35 817	6.8	1436.1	38°W, repl. by USA 149?

DSP F16	USA 75	1991-080B	21805	24 Nov 91	STS 44	KSC	35 862	35 870	4.5	1440.1	165°W
DSP F17DSP17	USA 107	1994-084A	23435	22 Dec 94	Titan IVA	CCAFS	35 786	35 786	0.0	1436.1	146.5°W
DSP F18 DSP20	USA 130	1997-008A	24737	23 Feb 97	Titan IVB	CCAFS	35 786	35 786	0.0	1436.1	103°E
DSP F19DSP 18	USA 142	1999-017A	25669	9 Apr 99	Titan IVB	CCAFS	35 786	35 786	0.0	1436.1	
DSP F20	USA 149	2000-024A	26356	18 May 00	Titan IVB	CCAFS	35 773	35 807	0.7	1436.2	11.9°E
<i>Electronic intelligence satellites</i>											
Orion/Magnum 3	USA 67	1990-097B	20963	15 Nov 90	STS 38	KSC	35 786	35 786	3.0	1436.1	
Orion/Mentor 4	USA 110	1995-022A	23567	14 May 95	Titan IVA	CCAFS	35 786	35 786	3.0	1436.1	Poss. replacement for USA 8
Orion/Mentor 5	USA 139	1998-029A	25336	9 May 98	Titan IVA	CCAFS	35 786	35 786	3.0	1436.1	Poss. replacement for USA 48
Mercury 1	USA 105	1994-054A	23223	27 Aug 94	Titan IVA	CCAFS	35 786	35 786	3.0	1436.1	
Mercury 2	USA 118	1996-026A	23855	24 Apr 96	Titan IVA	CCAFS	35 786	35 786	3.0	1436.1	
Trumpet 1	USA 103	1994-026A	23097	3 May 94	Titan IVA	CCAFS	1 026	39 334	63.7	717.6	+ HERITAGE
Trumpet 2	USA 112	1995-034A	23609	10 July 95	Titan IVA	CCAFS	500	39 850	63.4	717.7	+ HERITAGE
Trumpet 3	USA 136	1997-068A	25034	8 Nov 97	Titan IVA	CCAFS	1 634	38 734	63.1	717.8	+ EHF Polar Adjunct
<i>Electronic ocean surveillance satellites</i>											
NOSS 1-7 SSU 1	USA 16	1986-014D	16623	9 Feb 86	Atlas H	VAFB	759	1 468	63.4	107.4	Manoeuvred in 2002
NOSS 1-7 SSU 2	USA 17	1986-014E	16624	9 Feb 86	Atlas H	VAFB	758	1 469	63.4	107.4	Manoeuvred in 2002
NOSS 1-7 SSU 3	USA 18	1986-014H	16631	9 Feb 86	Atlas H	VAFB	766	1 461	63.4	107.4	Manoeuvred in 2002
NOSS 2-1 SSU 1	USA 60	1990-050E	20642	8 June 90	Titan IV	VAFB	870	1 357	63.4	107.4	
NOSS 2-1 SSU 2	USA 61	1990-050C	20691	8 June 90	Titan IV	VAFB	868	1 359	63.4	107.4	
NOSS 2-1 SSU 3	USA 62	1990-050D	20692	8 June 90	Titan IV	VAFB	869	1 358	63.4	107.4	
NOSS 2-2 SSU 1	USA 74	1991-076C	21799	8 Nov 91	Titan IV	VAFB	900	1 327	63.4	107.4	
NOSS 2-2 SSU 2	USA 76	1991-076D	21808	8 Nov 91	Titan IV	VAFB	901	1 326	63.4	107.4	
NOSS 2-2 SSU 3	USA 77	1991-076E	21809	8 Nov 91	Titan IV	VAFB	903	1 324	63.4	107.4	
NOSS 2-3 SSU 1	USA 119	1996-029D	23862	12 May 96	Titan IV	VAFB	1 012	1 215	63.4	107.4	
NOSS 2-3 SSU 2	USA 120	1996-029C	23908	12 May 96	Titan IV	VAFB	1 009	1 218	63.4	107.4	
NOSS 2-3 SSU 3	USA 121	1996-029E	23936	12 May 96	Titan IV	VAFB	1 010	1 218	63.4	107.4	
NOSS 3-1 SSU 1	USA 160	2001-040A	26905	8 Sep 01	Atlas 2AS	VAFB	1 042	1 185	63.4	107.4	
NOSS 3-1 SSU 2	..	2001-040C	26907	8 Sep 01	Atlas 2AS	VAFB	1 042	1 185	63.4	107.4	
<i>Imagery intelligence satellites</i>											
Improved Crystal 2	USA 116	1995-066A	23728	5 Dec 95	Titan IV	VAFB	411	838	97.9	97.1	
Improved Crystal 3	USA 129	1996-072A	24680	20 Dec 96	Titan IV	VAFB	277	970	97.9	97.1	

Common name	Official name	Intl name	NORAD design.	Launched (date)	Launcher	Launch site	Perigee (km)	Apogee (km)	Incl. (deg.)	Period (min.)	Comments
Improved Crystal 4	USA 161	2001-044A	26934	5 Oct 01	Titan IV	VAFB	411	842	97.9	97.2	Replaced USA 116
Misty 1	USA 53	1990-019B	20516	28 Feb 90	STS 36	KSC	732	739	66.2	99.4	Oct. 1997 orbit. De orbited? <sup>d</sup>
Misty 2?	USA 144	1999-028A	25744	22 May 99	Titan IV	VAFB	2 694	3140	63.4	148.5	Probably not payload's orbit <sup>e</sup>
Lacrosse/Onyx 2	USA 69	1991-017A	21147	8 Mar 91	Titan IV	VAFB	649	656	68.0	97.7	
Lacrosse/Onyx 3	USA 133	1997-064A	25017	24 Oct 97	Titan IV	VAFB	663	670	57.0	97.9	
Lacrosse/Onyx 4	USA 152	2000-047A	26473	17 Aug 00	Titan IV	VAFB	685	689	68.0	98.4	
<i>Minor military/technology development satellites</i>											
Stacksat-TEX	P87-2/USA 57	1990-031B	20561	4 Nov 90	Atlas E	VAFB	616	747	89.8	98.3	Transceiver experiment
RADCAL	P92-1	1993-041A	22698	25 June 93	Scout	VAFB	755	887	89.6	101.2	Radar calibration
REX II	P89-1A	1996-014A	23814	9 Mar 96	Pegasus XL	VAFB	800	835	90.1	101.2	Radiation Experiment II
MSX	MSX	1996-024A	23851	24 Apr 96	Delta 2	VAFB	902	910	99.2	103.0	<sup>f</sup>
FORTE	P92-A	1997-047A	24920	28 Aug 97	Pegasus XL	VAFB	800	830	70.0	101.1	<sup>g</sup>
ARGOS	P91-1	1999-008A	25634	24 Feb 99	Delta 2	VAFB	827	840	98.9	101.5	<sup>h</sup>
MTI	P97-3	2000-014A	26102	12 Mar 00	Taurus	VAFB	538	569	97.4	95.6	Multi-spectral thermal imager
TSX-5	P95-2	2000-030A	26374	7 June 00	Pegasus	VAFB	404	1 633	68.9	105.5	<sup>i</sup>
MightySat II.1	P99-1	2000-042A	26414	19 July 00	Minotaur	CCAFS	492	517	97.8	94.6	

*Note:* In the column *Launched (date)*, '00' = 2000, '01' = 2001, '02' = 2002.

<sup>a</sup> Figures in italics = orbital elements are estimated.

<sup>b</sup> Inactive/retired spacecraft.

<sup>c</sup> Back-up/spare spacecraft.

<sup>d</sup> Low-observable, i.e. stealth satellite

<sup>e</sup> Misty 2 in a similar orbit to Misty 1. Object in the tabulated orbit has characteristics of debris; perhaps a decoy.

<sup>f</sup> Midcourse space experiment. *Space Based Visible* camera now a USSSTRATCOM satellite tracking sensor.

<sup>g</sup> Fast on-orbit recording transient events.

<sup>h</sup> Advanced research and global observation satellite.

<sup>i</sup> Tri-service experiments mission.

**Table 15B.2.** Russian operational military satellites, as of 31 December 2002

Common name	Official name	Intl name	NORAD design.	Launched (date)	Launcher	Launch site	Perigee (km)	Apogee (km)	Incl. (deg.)	Period (min.)	Comments
<i>Navigation satellites in low earth orbit</i>											
Parus 76 <sup>a</sup>	Cosmos 2195	1992-36A	22006	1 July 92	Cosmos-3M	Plesetsk	959	1 016	82.9	104.8	Plane 1, off status unclear
Parus 77 <sup>a</sup>	Cosmos 2218	1992-73A	22207	29 Oct 92	Cosmos-3M	Plesetsk	969	1 020	82.9	104.9	Replaced by Cosmos 2366
Parus 78 <sup>a</sup>	Cosmos 2233	1993-08A	22487	9 Feb 93	Cosmos-3M	Plesetsk	957	1 011	82.9	104.7	Plane 5, active 1999
Parus 79 <sup>a</sup>	Cosmos 2239	1993-20A	22590	1 Apr 93	Cosmos-3M	Plesetsk	967	1 004	82.9	104.7	Plane 4, off active 1999
Parus 80 <sup>a</sup>	Cosmos 2266	1993-70A	22888	2 Nov 93	Cosmos-3M	Plesetsk	952	1 023	82.9	104.8	(Plane 1)
Parus 81 <sup>a</sup>	Cosmos 2279	1994-24A	23092	26 Apr 94	Cosmos-3M	Plesetsk	957	1 012	82.9	104.7	Replaced by Cosmos 378
Parus 84 <sup>a</sup>	Cosmos 2327	1996-04A	23773	16 Jan 96	Cosmos-3M	Plesetsk	953	1 026	83.0	104.8	Replaced by Cosmos 2334
Parus 85 <sup>a</sup>	Cosmos 2334	1996-52A	24304	5 Sep 96	Cosmos-3M	Plesetsk	970	1 015	82.9	104.9	Plane 2, standby active 1999
Parus 86	Cosmos 2336	1996-71A	24677	20 Dec 96	Cosmos-3M	Plesetsk	983	1 015	82.9	105.0	Plane 4
Parus 87	Cosmos 2341	1997-17A	24772	17 Apr 97	Cosmos-3M	Plesetsk	982	1 017	82.9	105.0	Plane 2
Parus 88	Cosmos 2346	1997-52A	24953	24 Sep 97	Cosmos-3M	Plesetsk	942	999	82.9	104.4	Plane 1
Parus 89	Cosmos 2361	1998-76A	25590	24 Dec 98	Cosmos-3M	Plesetsk	971	1 018	82.9	104.9	Plane 5
Parus 90	Cosmos 2366	1999-45A	25892	26 Aug 99	Cosmos-3M	Plesetsk	964	1 013	82.9	104.8	Plane 3, replaced Cosmos 2218
Parus 91	Cosmos 2378	2001-23A	26818	29 May 01	Cosmos-3M	Plesetsk	966	1 016	82.9	104.8	Plane 6, replaced Cosmos 2279
Parus 92	Cosmos 2389	2002-26A	27436	28 May 02	Cosmos-3M	Plesetsk	952	1 022	82.9	104.8	Plane 4, replaced Cosmos 2336
<i>Navigation satellites in medium earth orbit</i>											
GLONASS 72 766 <sup>a</sup>	Cosmos 2308	1995-09B	23512	7 Mar 95	Proton-K	Baikonur	19 118	19 155	63.7	675.7	Withdrawn 31 Oct. 2001
GLONASS 75 781 <sup>a</sup>	Cosmos 2317	1995-37B	23621	24 July 95	Proton-K	Baikonur	19 083	19 191	65.0	675.7	Withdrawn 31 Oct. 2001
GLONASS 76 785 <sup>a</sup>	Cosmos 2318	1995-37B	23622	24 July 95	Proton-K	Baikonur	19 058	19 215	65.0	675.7	Withdrawn 6 Apr. 2001
GLONASS 78 778 <sup>a</sup>	Cosmos 2324	1995-68B	23735	13 Dec 95	Proton-K	Baikonur	19 127	19 146	65.0	675.7	Withdrawn 30 Dec. 2001
GLONASS 80 786	Cosmos 2362	1998-77A	25593	30 Dec 98	Proton-K	Baikonur	19 105	19 169	65.2	675.7	Replaced Cosmos 2235
GLONASS 81 784	Cosmos 2363	1998-77B	25594	30 Dec 98	Proton-K	Baikonur	19 110	19 164	65.2	675.7	
GLONASS 82 779	Cosmos 2364	1998-77C	25595	30 Dec 98	Proton-K	Baikonur	19 132	19 141	65.2	675.7	Withdrawn 8 July 2002
GLONASS 83 783	Cosmos 2374	2000-63A	26564	13 Oct 00	Proton-K	Baikonur	19 125	19 148	64.6	675.7	
GLONASS 84 787	Cosmos 2375	2000-63B	26565	13 Oct 00	Proton-K	Baikonur	19 133	19 141	64.6	675.7	
GLONASS 85 788	Cosmos 2376	2000-63C	26566	13 Oct 00	Proton-K	Baikonur	19 035	19 238	64.6	675.7	
GLONASS 86 790	Cosmos 2380	2001-53C	26987	1 Dec 01	Proton-K	Baikonur	19 122	19 151	64.8	675.7	

Common name	Official name	Intl name	NORAD design.	Launched (date)	Launcher	Launch site	Perigee (km)	Apogee (km)	Incl. (deg.)	Period (min.)	Comments
GLONASS 87 789	Cosmos 2381	2001-53B	26988	1 Dec 01	Proton-K	Baikour	19 075	19 198	64.9	675.7	
GLONASS 88 711	Cosmos 2382	2001-53A	26989	1 Dec 01	Proton-K	Baikour	19 120	19 153	64.8	675.7	unhealthy since launch
GLONASS 89 791	Cosmos 2394	2002-60A	27617	25 Dec 02	Proton-K	Baikour	19 133	19 137	64.8	675.7	
GLONASS 90 792	Cosmos 2395	2002-60B	27618	25 Dec 02	Proton-K	Baikour	19 131	19 138	64.8	675.6	
GLONASS 91 793	Cosmos 2396	2002-60C	26619	25 Dec 02	Proton-K	Baikour	19 127	19 146	64.8	675.7	
<i>Communications satellites in low earth orbit</i>											
Strela-3	Cosmos 2337	1997-06D	24728	14 Feb 97	Tsyklon 3	Plesetsk	1 407	1 417	82.6	113.9	
Strela-3	Cosmos 2338	1997-06E	24729	14 Feb 97	Tsyklon 3	Plesetsk	1 415	1 417	82.6	114.0	
Strela-3	Cosmos 2339	1997-06F	24730	14 Feb 97	Tsyklon 3	Plesetsk	1 416	1 419	82.6	114.1	
Strela-3	Cosmos 2352	1998-36A	25363	16 June 98	Tsyklon 3	Plesetsk	1 317	1 876	82.6	118.0	
Strela-3	Cosmos 2353	1998-36B	25364	16 June 98	Tsyklon 3	Plesetsk	1 307	1 872	82.6	117.9	
Strela-3	Cosmos 2354	1998-36C	25365	16 June 98	Tsyklon 3	Plesetsk	1 314	1 874	82.6	118.0	
Strela-3	Cosmos 2355	1998-36D	25366	16 June 98	Tsyklon 3	Plesetsk	1 309	1 870	82.6	117.9	
Strela-3	Cosmos 2356	1998-36E	25367	16 June 98	Tsyklon 3	Plesetsk	1 304	1 869	82.6	117.8	
Strela-3	Cosmos 2357	1998-36F	25368	16 June 98	Tsyklon 3	Plesetsk	1 300	1 865	82.6	117.7	
Strela-3	Cosmos 2384	2001-58D	27058	27 Dec 01	Tsyklon 3	Plesetsk	1 417	1 422	82.5	114.1	
Strela-3	Cosmos 2385	2001-58E	27059	27 Dec 01	Tsyklon 3	Plesetsk	1 420	1 423	82.5	114.2	
Strela-3	Cosmos 2386	2001-58F	27060	27 Dec 01	Tsyklon 3	Plesetsk	1 410	1 421	82.5	114.0	
Strela-3	Cosmos 2390	2002-36A	27464	8 July 02	Tsyklon 3	Plesetsk	1 473	1 511	82.5	115.7	
Strela-3	Cosmos 2391	2002-36B	27465	8 July 02	Tsyklon 3	Plesetsk	1 471	1 511	82.5	115.7	
<i>Communications satellites in elliptical orbit</i>											
Molniya-M 3-44	..	1993-25A	22633	21 Apr 93	Molniya-M	Plesetsk	389	39 975	64.3	717.7	
Molniya-M 3-45	..	1993-49A	22729	4 Aug 93	Molniya-M	Plesetsk	2 630	37 751	64.5	718.1	
Molniya-M 3-46	..	1994-51A	23211	23 Aug 94	Molniya-M	Plesetsk	1 242	39 106	64.8	717.4	
Molniya-M 3-47	..	1995-42A	23642	9 Aug 95	Molniya-M	Plesetsk	1 375	38 985	64.1	717.6	
Molniya-M 3-48	..	1996-60A	24640	24 Oct 96	Molniya-M	Plesetsk	1 965	38 401	64.9	717.8	
Molniya-M 3-49	..	1998-40A	25379	1 July 98	Molniya-M	Plesetsk	492	39 862	64.1	717.5	
Molniya-M 3-50	..	1999-36A	25847	8 July 99	Molniya-M	Plesetsk	2 024	38 353	63.5	718.0	
Molniya-M 3-51	..	2001-30A	26867	20 July 01	Molniya-M	Plesetsk	1 026	39 343	63.0	717.8	K-1 improved

Molniya-M 3-52	..	2001-50A	26970	25 Oct 01	Molniya-M	Plesetsk	541	39 820	63.4	717.7	
<i>Communications satellites in geostationary orbit</i>											
Luch-5	Luch	1994-82A	23426	16 Dec 94	Proton	Baikonur	35 766	35 801	3.9	1435.9	20°W
Luch-6	Luch 1	1995-54A	23680	11 Oct 95	Proton	Baikonur	35 752	35 821	3.0	1436.0	77°E
Potok/Geizer 6	Cosmos 2085	1990-61A	20693	18 July 90	Proton	Baikonur	35 777	35 798	7.7	1436.1	80°E
Potok/Geizer 7	Cosmos 2172	1991-79A	21789	22 Nov 91	Proton	Baikonur	35 760	35 802	6.1	1435.7	98°E, drifting 0.40 deg/d E
Potok/Geizer 8	Cosmos 2291	1994-60A	23267	21 Sep 94	Proton	Baikonur	35 760	35 810	4.9	1435.9	178°W
Potok/Geizer 9	Cosmos 2319	1995-45A	23653	30 Aug 95	Proton	Baikonur	35 799	35 840	4.2	1437.7	117°W, drifting 0.41deg/d W
Potok/Geizer 11	Cosmos 2371	2000-36A	26394	4 July 00	Proton	Baikonur	35 770	35 802	0.2	1436.0	79°E
Raduga 29	..	1993-13A	22557	25 Mar 93	Proton	Baikonur	35 779	35 790	5.9	1435.9	12°E
Raduga 30	..	1993-62A	22836	30 Sep 93	Proton	Baikonur	35 783	35 790	5.5	1436.0	70°E
Raduga 1-3	..	1994-08A	22981	5 Feb 94	Proton	Baikonur	35 790	35 800	5.3	1436.5	98°E, drifting 0.10 deg/d W
Raduga 1-4	..	1999-10A	25642	28 Feb 99	Proton K	Baikonur	35 783	35 801	2.9	1436.0	35°E
Raduga 1-5	..	2000-49A	26477	28 Aug 00	Proton K	Baikonur	35 783	35 790	0.5	1436.0	49°E
Raduga 1-6	..	2001-45A	26936	6 Oct 01	Proton K	Baikonur	35 785	35 788	0.4	1436.0	85°E
<i>Early-warning satellites in elliptical orbit</i>											
Oko-77	Cosmos 2340	1997-15A	24761	9 Apr 97	Molniya-M	Plesetsk	3 291	37 039	65.8	717.0	Replaced Cosmos 2217
Oko-78	Cosmos 2342	1997-22A	24800	14 May 97	Molniya-M	Plesetsk	2 694	37 656	66.9	717.4	
Oko-79	Cosmos 2351	1998-27A	25327	8 May 98	Molniya-M	Plesetsk	3 016	37 331	64.0	717.4	
Oko-80	Cosmos 2368	1999-73A	26042	28 Dec 99	Molniya-M	Plesetsk	1 936	38 461	63.1	718.4	
Oko-81	Cosmos 2388	2002-17A	27409	1 Apr 02	Molniya-M	Plesetsk	549	39 804	63.6	717.5	
Oko-82	Cosmos 2393	2002-59A	27613	24 Dec 02	Molniya-M	Plesetsk	658	39 705	62.9	717.7	
<i>Early-warning satellites in geostationary orbit</i>											
Prognoz 12	Cosmos 2350	1998-25A	25315	28 Apr 98	Proton	Baikonur	35 769	35 813	1.5	1436.3	72°E, Asian coverage
Prognoz 13	Cosmos 2379	2001-37A	26892	25 Aug 01	Proton	Baikonur	35 786	35 793	1.2	1436.2	24°W, USA coverage
<i>Electronic intelligence satellites</i>											
Tselina-D <sup>a</sup>	Cosmos 2221	1992-80A	22236	24 Nov 92	Tsyklon 3	Plesetsk	615	643	82.5	97.2	
Tselina-D <sup>a</sup>	Cosmos 2228	1992-94A	22286	25 Dec 92	Tsyklon 3	Plesetsk	615	644	82.5	97.2	
Tselina-D <sup>a</sup>	Cosmos 2242	1993-24A	22626	16 Apr 93	Tsyklon 3	Plesetsk	616	643	82.5	97.2	
Tselina-2	Cosmos 2219	1992-76A	22219	17 Nov 92	Zenit-2	Baikonur	840	868	71.1	101.9	Status?
Tselina-2	Cosmos 2227	1992-93A	22284	25 Dec 92	Zenit-2	Baikonur	845	864	71.0	101.9	Status?
Tselina-2	Cosmos 2237	1993-16A	22565	26 Mar 93	Zenit-2	Baikonur	854	859	70.9	102.0	Status?



Common name	Official name	Intl name	NORAD design.	Launched (date)	Launcher	Launch site	Perigee (km)	Apogee (km)	Incl. (deg.)	Period (min.)	Comments
Tselina-2 <sup>a</sup>	Cosmos 2263	1993-59A	22802	16 Sep 93	Zenit-2	Baikonur	850	861	70.9	101.9	
Tselina-2	Cosmos 2278	1994-23A	23087	23 Apr 94	Zenit-2	Baikonur	848	859	71.1	101.9	Status?
Tselina-2	Cosmos 2297	1994-77A	23404	24 Nov 94	Zenit-2	Baikonur	841	867	71.0	101.9	
Tselina-2	Cosmos 2322	1995-58A	23704	31 Oct 95	Zenit-2	Baikonur	845	863	71.0	101.9	
Tselina-2	Cosmos 2333	1996-51A	24297	4 Sep 96	Zenit-2	Baikonur	850	860	70.9	101.9	New heavy ELINT class
Tselina-2	Cosmos 2360	1998-45A	25406	28 July 98	Zenit-2	Baikonur	852	860	70.9	101.9	
Tselina-2	Cosmos 2369	2000-06A	26069	3 Feb 00	Zenit-2	Baikonur	849	860	71.0	101.9	
<i>Electronic ocean surveillance satellites</i>											
US-PM 10	Cosmos 2367	1999-72A	26040	26 Dec 99	Tsyklon 2	Baikonur	399	470	65.0	93.2	Re-entered 20 July 2002
US-PM 11	Cosmos 2383	2001-57A	27053	20 Dec 01	Tsyklon 2	Baikonur	410	423	65.0	92.8	
<i>Imagery intelligence satellites</i>											
Yantar-4K1	Cosmos 2387	2002-08A	26775	25 Feb 02	Soyuz	Plesetsk	165	344	67.1	88.8	Re-entered 27 June 2002
Arkon 1	Cosmos 2344	1997-28A	24827	6 June 97	Proton	Baikonur	1 466	2 790	63.4	130.0	
Arkon 2	Cosmos 2392	2002-37A	27470	25 July 02	Proton	Baikonur	1 512	1 774	63.5	119.0	

Note: In the column *Launched (date)*, '00' = 2000, '01' = 2001, '02' = 2002

<sup>a</sup> Back-up/spare spacecraft.

**Table 15B.3.** Rest of the world, operational military satellites, as of 31 December 2002

Mission	Common name	Official name	Intl name	NORAD design.	Launched (date)	Launcher	Launch site	Perigee (km)	Apogee (km)	Period (min.)	Incl. (deg.)	Comments
<i>Australia</i>												
Comm.	Leasat 5	SYNCOM IV-05	1990-002B	20410	9 Jan 90	STS	KSC	35 782	35 795	4.6	1436.2	156°E
<i>China</i>												
Comm.	Zhongxing-22	ChinaSat-22	2000-003A	26058	25 Jan 00	LM-3A	Xichang	35 777	35 801	0.0	1436.2	98°E
Imagery	ZY 2-1	Zi Yuan 2	2000-050A	26481	1 Sep 00	CZ-4B	Taiyuan	494	497	97.3	94.4	
Imagery	ZY 2-2	Zi Yuan 2B	2002-049A	27550	27 Oct 02	CZ-4B	Taiyuan	486	505	97.4	94.4	
Nav	Beidou-01A	BNTS-1A	2000-069A	26599	30 Oct 00	LM-3A	Xichang	35 773	35 803	0.0	1436.1	140°E
Nav	Beidou-01B	BNTS-1B	2000-082A	26643	20 Dec 00	LM-3A	Xichang	35 766	35 809	0.0	1436.1	80°E
Sigint	Shenzou-4	Shenzou-4	2000-061C	27634	29 Dec 02	CZ-2F	Taiyuan	365	380	42.4	91.8	Module <sup>b</sup>
<i>Europe</i>												
Comm. <sup>a</sup>	NATO 3D	..	1984-115A	15391	14 Nov 84	Thor Delta	CCAFS	35 785	35 790	5.2	1436.1	19.2°W, spare
Comm.	NATO 4A	..	1991-001A	21047	8 Jan 91	Delta 7925	CCAFS	35 778	35 798	4.3	1436.1	17.8°W
Comm.	NATO 4B	..	1993-076A	22921	7 Dec 93	Delta 7925	CCAFS	35 775	35 802	2.5	1436.1	20.2°W, spare
Comm. <sup>a</sup>	Skynet 4A	..	1990-001A	20401	1 Jan 90	Titan 3	CCAFS	35 786	35 789	5.2	1436.1	34°W, spare
Comm. <sup>a</sup>	Skynet 4C	..	1990-079A	20776	30 Aug 90	Ariane-4	Kourou	35 777	35 797	4.7	1436.1	1°W, spare
Comm.	Skynet 4D	..	1998-002A	25134	9 Jan 98	Delta 7925	CCAFS	35 566	35 798	1.4	1430.7	moving <sup>c</sup>
Comm.	Skynet 4E	..	1990-09B	25639	26 Feb 99	Ariane-4	Kourou	35 760	35 807	1.8	1435.9	56°E
Comm.	Skynet 4F	..	2001-005B	26695	7 Feb 01	Ariane-4	Kourou	35 773	35 804	2.5	1436.1	5.9°E
Comm.	Sirca 1	..	2001-005A	26694	7 Feb 01	Ariane-4	Kourou	35 770	35 805	0.1	1436.1	16°E
Imagery	Helios 1A	..	1995-033A	23605	7 July 95	Ariane-4	Kourou	685	685	98.1	98.4	
Imagery	Helios 1B	..	1999-064A	25977	4 Dec 99	Ariane-4	Kourou	685	685	98.1	98.4	
<i>India</i>												
Imagery	TES	..	2001-049A	26957	22 Oct 01	PSLV	SHAR	550	587	97.7	95.9	
<i>Israel: commercial</i>												
Imagery	EROS-A1	..	2000-079A	26631	5 Dec 00	START-1	Plesetsk	465	488	97.3	94.0	
Imagery	Ofeq-5	..	2000-025A	27434	28 May 02	START-1	Palmachim	369	673	94.8	143.5	

Mission	Common name	Official name	Intl name	NORAD design.	Launched (date)	Launcher	Launch site	Perigee (km)	Apogee (km)	Period (min.)	Incl. (deg.)	Comments
<i>USA: commercial</i>												
Imagery	Ikonos 2	..	1999-051A	25919	24 Sep 99	Athena 2	VAFB	683	683	98.1	98.3	
Imagery	Quickbird 2	..	2001-047A	26953	18 Oct 01	Delta 2	VAFB	448	453	97.2	93.5	

*Note:* In the column *Launched (date)*, '00' = 2000, '01' = 2001 and '02' = 2002.

<sup>a</sup> Back-up/spare spacecraft

<sup>b</sup> Orbital module from un-manned test flight of Shenzou manned spacecraft. Performed orbit-maintenance manoeuvres in 2003.

<sup>c</sup> At 54.8°E on 31 Dec. 2002, drifting east 1.35 degrees per day. Arrived at 38.9°E early Feb.