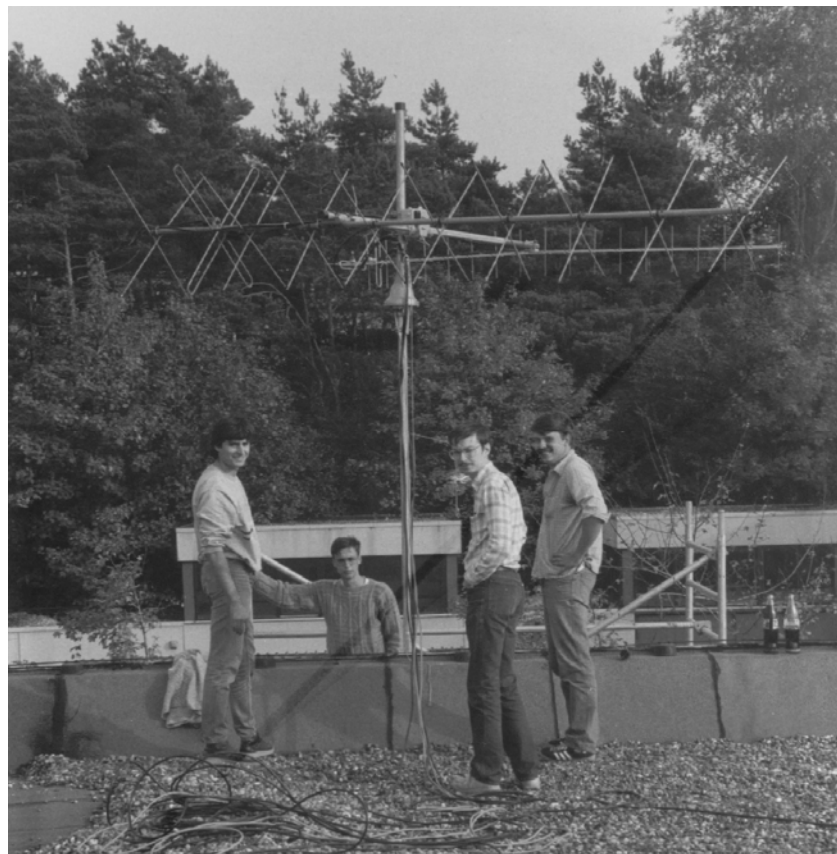


**Langenbrettach, December 31<sup>st</sup> 2007  
Matthias Bopp DD1US**

**This is a short introduction illustrating how I got hooked to satellite communication. It includes a little collection of bits and pieces about my early activities.**

**I guess it all started when my parents gave me 2 little CB walky talkies when I was around 10 years old. I learned about Ham Radio and at the age of 14 years I acquired my amateur radio license with the callsign DD1US. I was not allowed to operate my own station before I was 15 years old.**

**I finished school and in 1984 I started studying electronics engineering with a focus on communication technologies at the University of Kaiserslautern. I founded a satellite group at Ham Radio Group of the University of Kaiserslautern and became the Chairman. We built up a team of people interested in satellite communications centred but not limited to Ham Radio satellites. Here is a picture of the core team setting up antennas for 2m and 70cm. At the very left you can see me.**



**I subscribed to the NASA Prediction Bulletin mailing list and received every week a pile of paper with keplerian elements of various space objects. I tracked mostly weather and amateur satellites as well as MIR and Shuttle missions using hand calculations and charts. I received their radio transmissions and also made visual observations to estimate their orbits.**

U.S. DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration  
National Environmental Satellite Data and Information Service  
DCDB - E/SP21 WWB Room 806  
Washington, D.C. 20233



AIR MAIL

Matthias Bopp  
Kirchstrasse 8  
Langenbrettach  
Germany 7101

PREDICT DATA FOR JULY 1, 1991

	NOAA-09	NOAA-10	NOAA-11	NOAA-12
FREQ. MHZ	137.62	137.50	137.62	137.50
ORBIT #	33760	24852	14242	673
EQ. X TIME(Z)	2228.60	0052.20	0033.69	0014.59
LONG.ASC.NDEG	59.82	85.75	150.09	71.01
NODAL PERIOD	101.9657	101.1707	102.0280	101.3651
INC. BET ORB.	25.49	25.30	25.51	25.34

NOTICE NOTICE NOTICE NOTICE NOTICE NOTICE NOTICE

ATTACHED:

NASA PREDICTION BULLETIN

NASA 10004

NASA GODDARD SPACE FLIGHT CENTER, CODE 513.2, GREENBELT, MD. 20771  
ISSUE DATE: January 3, 1984

BLTN 857 ELEM 857 OBJ 01028 1965 032 A 1 IN 3 PARTS PART I  
1 01028U 60532 A 81249.24100270 -0.00000031 0 8577  
2 01028 41.1912 87.2961 0244602 334.5611 24.3295 15.36231356909569

THIS PREDICTION SHOULD NOT BE USED FOR PRECISE SCIENTIFIC ANALYSIS.

PART II S-N EQUATOR CROSSINGS.

REV TIME Z LONG W REV TIME Z LONG W REV TIME Z LONG W

20 DEC 83  
91023 605.29 112.88 91024 749.93 140.18 91025 937.58 167.49  
91026 1125.23 194.79 91027 1315.88 225.09 91028 1500.52 249.40  
91029 1648.17 276.70 91030 1835.82 304.00 91031 2023.47 331.31  
91032 2211.11 358.61 91033 2358.76 25.92

21 DEC 83  
91034 144.41 55.22 91035 334.05 80.52 91036 521.70 107.83  
91037 709.35 125.13 91038 897.00 142.44 91039 1044.64 169.74  
91040 1235.29 217.04 91041 1419.94 244.35 91042 1607.59 271.65  
91043 1795.23 298.94 91044 1942.88 326.26 91045 2130.53 353.56  
91046 2318.18 20.87

22 DEC 83  
91047 105.82 48.17 91048 253.47 75.48 91049 441.12 102.78  
91050 628.76 130.08 91051 816.41 157.39 91052 1004.06 184.69  
91053 1191.71 212.00 91054 1339.15 239.30 91055 1527.00 266.60  
91056 1714.65 293.91 91057 1902.20 321.21 91058 2049.94 348.92  
91059 2237.59 15.82

23 DEC 83  
91060 25.24 43.12 91061 210.88 70.43 91062 400.53 97.73  
91063 548.18 125.04 91064 735.83 152.34 91065 923.47 179.64  
91066 1111.12 206.95 91067 1258.77 234.25 91068 1446.41 261.95  
91069 1634.06 288.86 91070 1821.71 316.16 91071 2009.56 343.47  
91072 2157.00 10.77 91073 2344.65 38.07

24 DEC 83  
91074 132.30 65.38 91075 319.94 92.68 91076 507.59 119.99  
91077 695.24 147.29 91078 842.88 174.59 91079 1020.55 201.90  
91080 1219.15 229.20 91081 1405.53 256.51 91082 1553.47 283.81  
91083 1741.12 311.11 91084 1928.77 338.42 91085 2116.41 3.72  
91086 2304.06 33.02

25 DEC 83  
91087 51.71 60.13 91088 219.15 87.62 91089 427.00 114.94  
91090 614.65 142.24 91091 808.29 169.54

PART III. REDUCTION TO OTHER LATITUDES AND HEIGHTS FOR REV 91094

LAT MINUTES	N	PLUS	CORR	MT KILOM	LAT MINUTES	S	PLUS	CORR	MT KILOM
SN 0	0.	0.	944.0	NS 0	33.38	192.94	1300.41		
SN 5	2.15	354.84	939.6	NS 5	35.75	188.44	1305.61		
SN 10	4.15	349.54	938.5	NS 10	38.14	183.19	1307.81		
SN 15	6.55	343.94	940.8	NS 25	60.60	177.65	1306.81		
SN 20	8.85	337.83	946.8	NS 30	63.12	171.60	1308.21		
SN 25	11.10	330.89	957.0	NS 35	65.82	164.72	1295.41		
SN 30	13.98	322.63	972.4	NS 40	68.75	156.47	1279.51		
SN 35	17.17	311.72	995.6	NS 45	72.18	145.66	1257.61		
SN 40	21.92	295.67	1037.9	NS 50	77.21	127.54	1216.11		
N PT	25.88	276.58	1077.8	S PT	81.33	110.64	1175.61		
NS 40	29.90	259.82	1120.11	SN 40	85.41	93.91	1131.81		
NS 45	34.91	241.48	1170.92	SN 45	90.26	79.54	1079.42		
NS 50	38.16	230.64	1203.42	SN 50	93.51	64.68	1044.22		
NS 55	41.04	222.39	1224.81	SN 55	94.28	56.29	1017.12		
NS 60	42.49	215.90	1249.71	SN 60	94.72	49.46	993.51		
NS 65	46.00	209.44	1267.31	SN 65	95.17	42.25	977.61		
NS 70	48.43	202.59	1281.12	SN 70	95.21	37.76	962.2		
NS 75	51.91	193.64	1292.21	SN 75	95.45	32.46	952.1		
NS 80	52.18	191.54	1302.42	SN 80	95.62	27.20	944.2		

NOTICE NOTICE NOTICE NOTICE NOTICE NOTICE NOTICE

January 3, 1984

REVISED JANUARY 3, 1984

ATTACHED:

FORMAT EXPLANATION OF THE TWO-LINE ORBITAL ELEMENTS

1. MAP OVERLAY

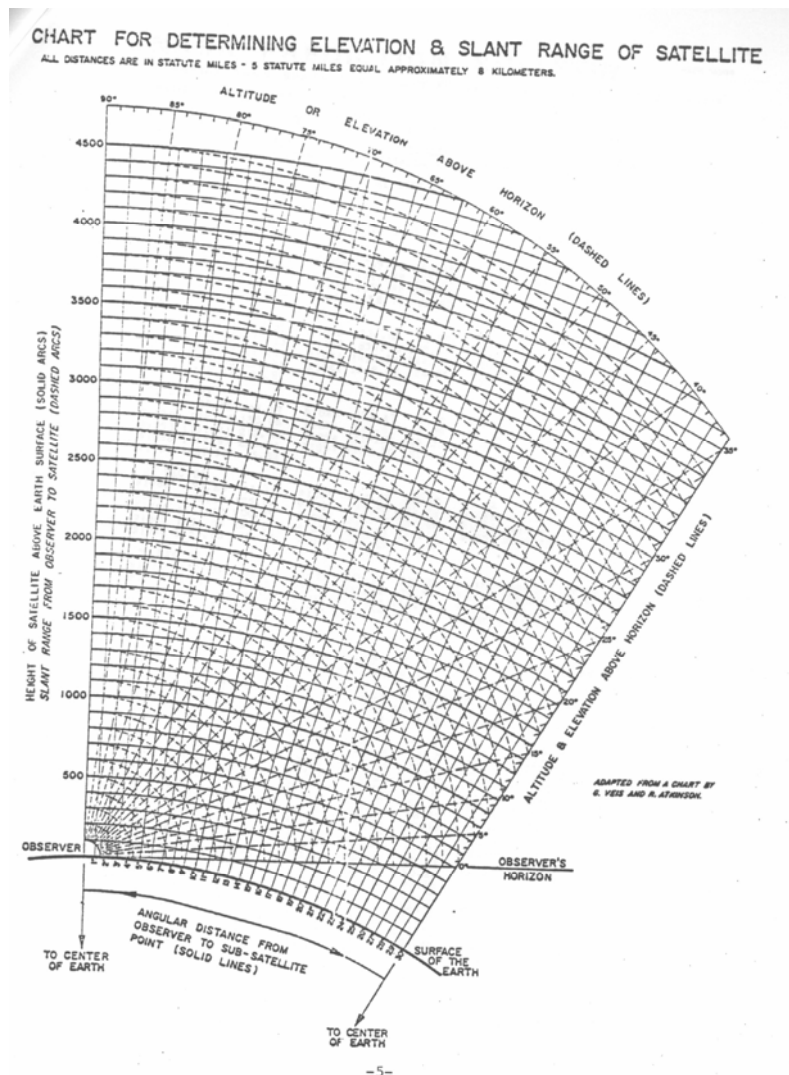
Attached is the format explanation of the classical orbital elements presented in a two-line format (see sample).

2. FORMAT EXPLANATION OF THE NASA PREDICTION BULLETIN

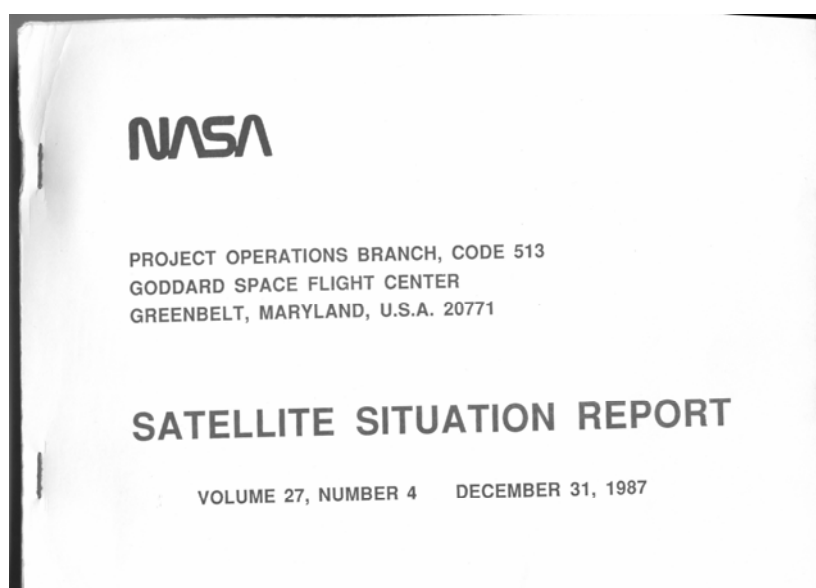
Plus (+) signs will not be printed. All values are assumed positive unless preceded by a minus (-) sign.

3. FORMAT EXPLANATION OF THE TWO-LINE ORBITAL ELEMENTS

Questions or comments concerning the Two-Line orbital elements may be directed to the Control Center Support Section, Code 513.2, Project Operations Branch, NASA Goddard Space Flight Center, Greenbelt, Md. 20771.



It also included the satellite situation report which was updated regularly.



I also tracked the space shuttle using the “SPARK, the “shuttle prediction and recognition kit” kindly provided by NASA. The kit was mailed by NASA to interested people and included a large map with the ground tracks over time, a transparency overlay to predict visibility times and conditions and some instructions on how to use it.

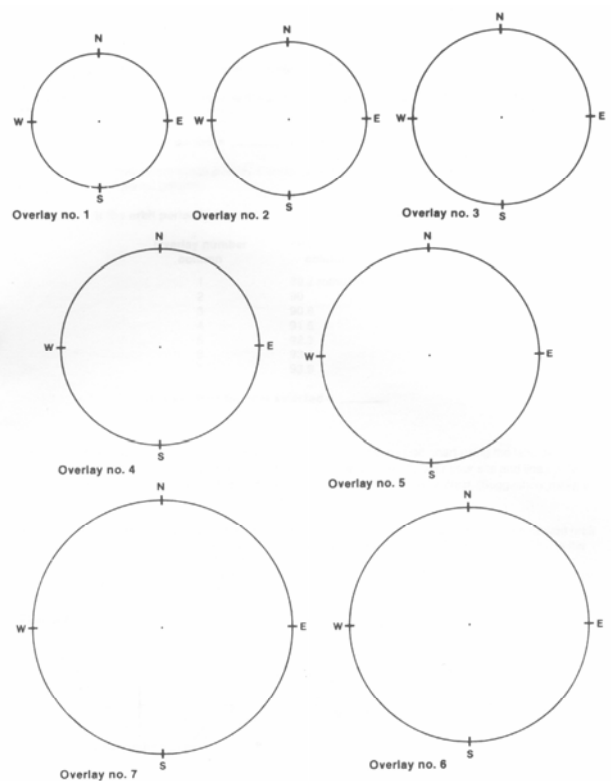
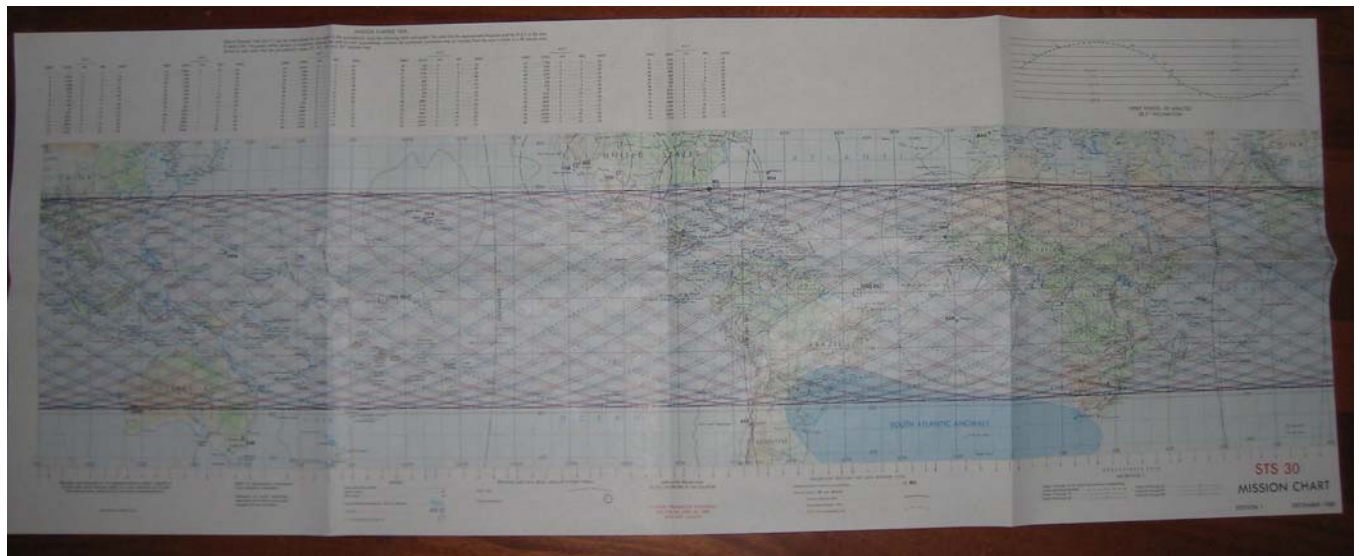
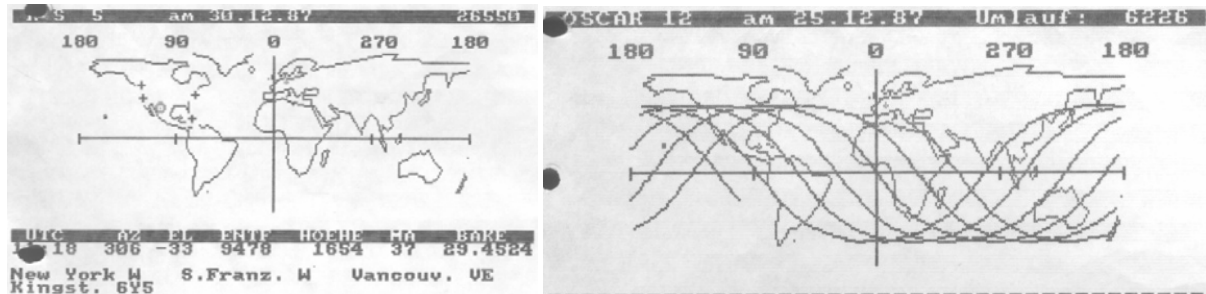


Figure I-6A.— Transparent overlays.

Later I wrote my first satellite tracking program on a Z80 and after punching in the elements I received predictions and even ground plots. It was not very fancy but a big help versus the previous hand calculations. Using this software I tracked many satellites as well as MIR and Shuttle missions, both by receiving their radio signals as well as observing them visually.



I finished University and started working but never forgot completely about satellite tracking and monitoring.

Best regards

Matthias DD1US

Email: [dd1us@amsat.org](mailto:dd1us@amsat.org)

Homepage: [www.dd1us.de](http://www.dd1us.de)