

CAMSAT News Release

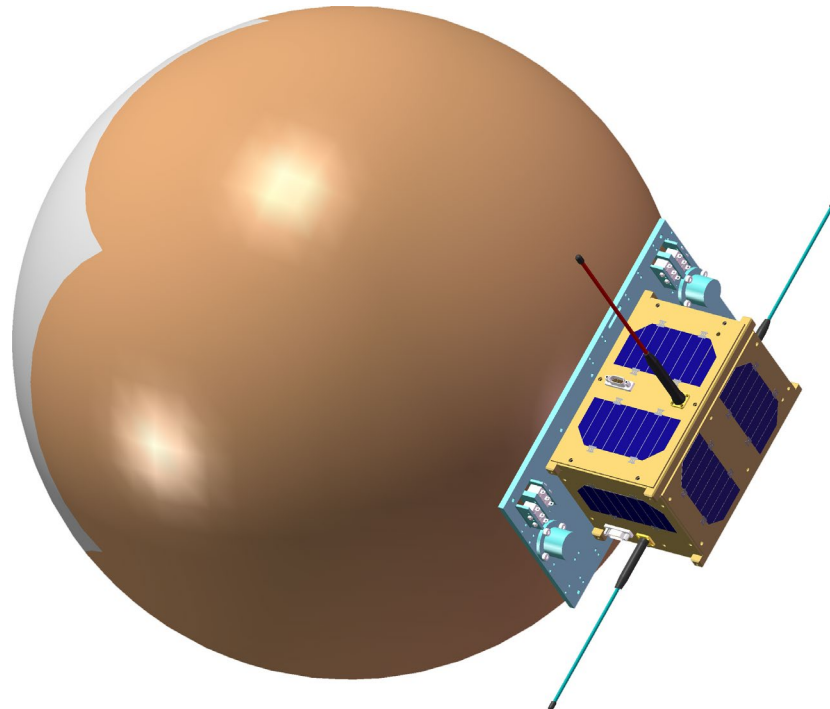
20190601

CAS-7B (BP-1B) amateur radio satellite is now ready for launch

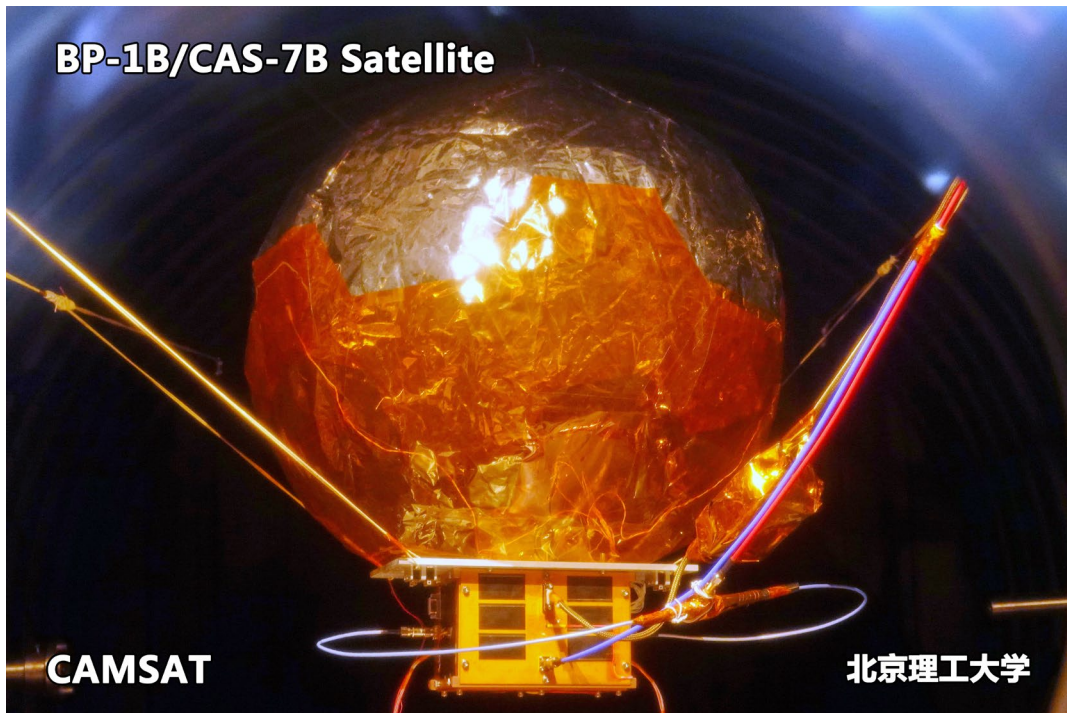
CAS-7B (BP-1B) satellite is an amateur radio satellite combined with educational. Chinese Amateur Satellite Group (CAMSAT) is working the project with Beijing Institute of Technology (BIT), one of the most famous aerospace universities in China. The university provides support in launch of the satellite, there are many teachers and students from this university are participating in the development and testing of the satellite. With the help of CAMSAT, the university has established an amateur radio club (call sign: BI1LG), many students are the members, they are learning amateur radio satellite communication and experience endless fun.

Because of the orbital apogee and the size and mass of the satellite, the orbital life of the satellite is expected to be only one week, up to a maximum of one month, which will also provide with an opportunity for hams to track and monitor satellite entering the atmosphere.

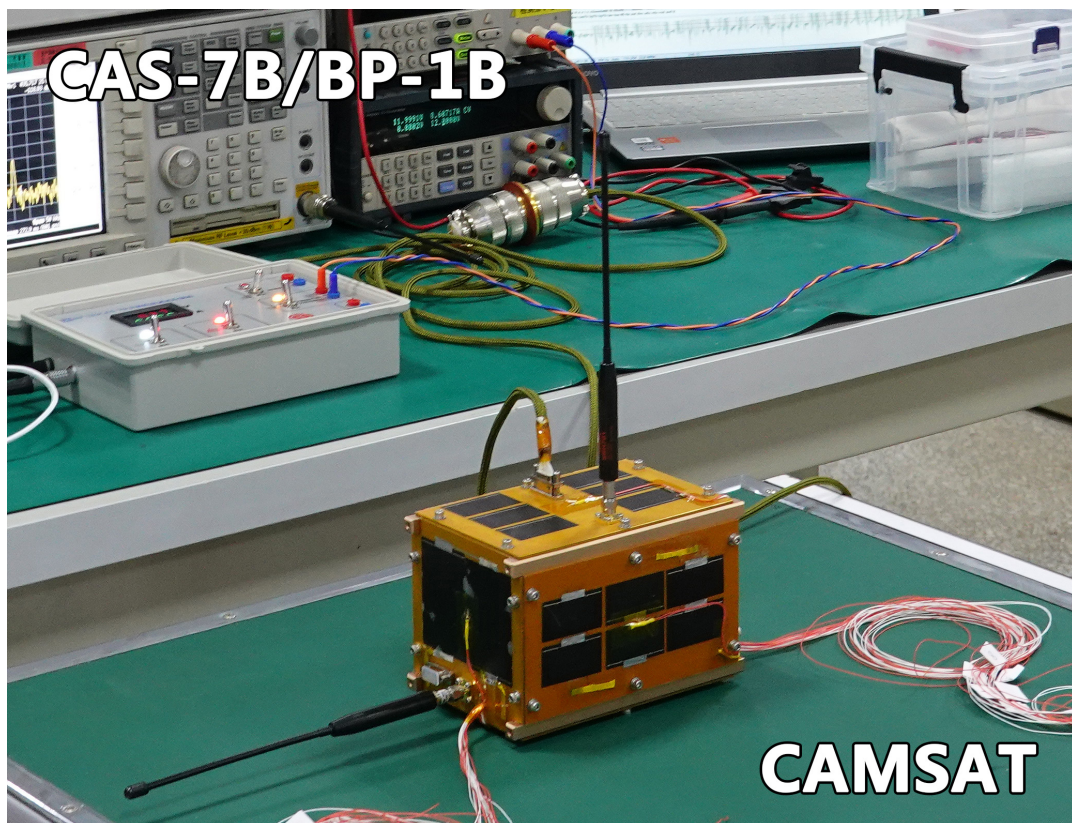
The CAS-7B (BP-1B) is scheduled to be launched at the end of June this year. The launch will use a new launch vehicle from a small commercial rocket company. This is the first launch of this launch vehicle, and there is a large possibility of failure, if the launch fails, we will have another launch later this year.



CAS-7B/BP-1B Satellite schematic diagram



CAS-7B/BP-1B was undergoing thermal vacuum test



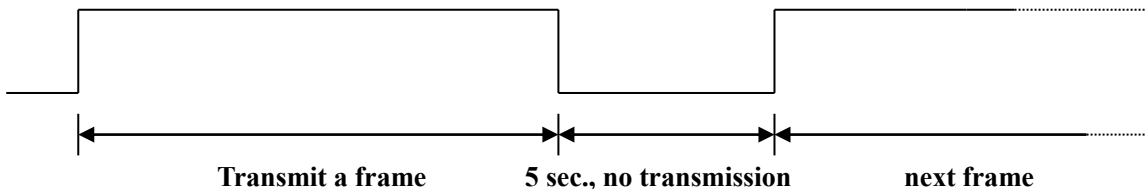
CAS-7B/BP-1B was undergoing test



- **Satellite Name:** CAS-7B/BP-1B
- Architecture: 1.5U Cube-satellite with flexible film ball
- Dimensions: 263Lx140Wx105H mm with 500 mm diameter flexible film ball
- Mass: 3kg
- Stabilization: Pneumatic resistance sail passive control
- Orbit:
 - Orbit type : LEO
 - Apogee : 300km Circular orbit
 - Inclination : 42.7°
 - Period : 90.6min
- Payload:
 - VHF Antenna: one $1/4\lambda$ monopole antenna with max.0dBi gain is located at +Y side
 - UHF Antenna: two $1/4\lambda$ monopole antennas with max.0dBi gain are located at -Z and +Z side
 - CW Telemetry Beacon: 435.715MHz 20dBm
 - V/U FM Transponder Downlink: 435.690MHz 20dBm, 16kHz bandwidth
 - V/U FM Transponder Uplink: 145.900MHz 16kHz bandwidth

● **CAS-7B (BP-1B) Satellites CW Telemetry Beacon Encoding Format**

1、 Telemetry beacon transmission timing:



2、 Telemetry modulation and encoding:

- (1) Modulation: CW;
- (2) Encoding: Morse Code;
- (3) Transmitting speed: 22wps;
- (4) Numeric telemetry data encoding:

Numeral	Encoding
0	T
1	A
2	U
3	V
4	4
5	E



6	6
7	B
8	D
9	N

3、Content of a telemetry frame

Transmission Sequence	Content of Transmission	Note	Encoding
1	CAS7B	Satellite Identifier	Standard Morse Code
2	BP1B	Start Identifier	Standard Morse Code
3	BP1B	Start Identifier	Standard Morse Code
4 - 35	CH1 – CH32	Telemetry Data Channel 1-32	Encoded Morse Code
36	CAMSAT	Stop Identifier	Standard Morse Code
37	CAMSAT	Stop Identifier	Standard Morse Code

4、Content of telemetry data channel

Channel	Name of Parameter	Type	Data Range		Description and Equation
			N(min)	N(max)	
CH1	Telemetry frames transmitted counter	Data	000	999	the counter is incremented by one after a CW telemetry frame is sent. Restart from zero after the counter is full.
CH2	Executed remote command counter	Data	000	999	the counter is incremented by one after a remote command is executed. Restart from zero after the counter is full.
CH3	Current operating mode	Status	001	110	①
CH4	Sail ball inflatable control	Status	050	591	②
CH5	Payload Status	Status	000	111	③
CH6	Battery voltage	Data	000	999	$V=N/100$ (V)
CH7	Primary power supply voltage	Data	000	999	$V=N/10$ (V)
CH8	DC / DC converter output voltage	Data	000	999	$V=N/100$ (V)
CH9	OBC power supply voltage	Data	000	999	$V=N/100$ (V)
CH10	Solar cell array total current	Data	000	999	$I=N$ (mA)
CH11	+X Solar cell array current	Data	000	999	$I=N$ (mA)
CH12	-X Solar cell array current	Data	000	999	$I=N$ (mA)
CH13	+Y Solar cell array current	Data	000	999	$I=N$ (mA)
CH14	-Y Solar cell array current	Data	000	999	$I=N$ (mA)
CH15	+Z Solar cell array current	Data	000	999	$I=N$ (mA)
CH16	-Z Solar cell array current	Data	000	999	$I=N$ (mA)



CAS-7B(BP-1B) Satellite

CH17	Power supply total output current	Data	000	999	I=N (mA)
CH18	OBC current	Data	000	999	I=N (mA)
CH19	CW beacon current	Data	000	999	I=N (mA)
CH20	FM transponder current	Data	000	999	I=N (mA)
CH21	OBC temperature	Data	000	999	④
CH22	Battery 1 temperature	Data	000	999	④
CH23	Battery 2 temperature	Data	000	999	④
CH24	CW beacon temperature	Data	000	999	④
CH25	FM transponder temperature	Data	000	999	④
CH26	Sail ball surface temperature 1	Data	000	999	④
CH27	Sail ball surface temperature 2	Data	000	999	④
CH28	Sail ball surface temperature 3	Data	000	999	④
CH29	Satellite X-axis attitude angle	Data	000	999	⑤
CH30	Satellite Y-axis attitude angle	Data	000	999	⑤
CH31	Satellite Z-axis attitude angle	Data	000	999	⑤
CH32	Sail ball internal pressure	Data	000	999	PV= Nx3 (mV) ⑥

Note:

(1) CH3 Current operating mode:

- 001:Mode 1 (Sleeping)
- 010:Mode 2 (CW Beacon, transmit per 5 minutes)
- 011:Mode 3 (CW Beacon Continuously)
- 100:Mode 4 (CW Beacon + FM Transponder)
- 101:Mode 5 (CW Beacon + FM Transponder + Heater 1)
- 110:Mode 6 (CW Beacon + FM Transponder + Heater 1+Heater 2)

(2) CH4 Sail ball inflatable control: ABC

- A and B: Pressure sensor measurement delay, 05-59 seconds
- C: Sail ball inflatable primary switcher status, 0 = OFF, 1 = ON

(3) CH5 Payload Status: ABC

- A: CW Beacon, 0 = OFF, 1 = ON
- B: FM Transponder, 0 = OFF, 1 = ON
- C: Sail ball inflatable secondary switcher status, 0 = OFF, 1 = ON

(4) Temperature: ABC

- A: 0 - 2, Temperature = ABC °C
- A: ≥3, Temperature = -(A-3)BC °C

(5) Satellite attitude angle: ABC

Attitude angle	A	B	C
0° ~ 99°	0	0 - 9	0 - 9
100° ~ 180°	1	0 - 9	0 - 9

-0° ~ -99°	8	0 - 9	0 - 9
-100° ~ -180°	9	0 - 9	0 - 9

(6) Sail ball internal pressure:

	Sail ball internal pressure (Pa)	PV (mV)
1	101300	2388
2	2000	2366
3	1900	2365
4	1800	2366
5	1700	2332
6	1600	2272
7	1500	2222
8	1400	2159
9	1300	2076
10	1200	1948
11	1100	1863
12	1000	1761
13	900	1596
14	800	1398
15	700	1301
16	600	1153
17	500	982
18	400	779
19	300	571
20	200	367
21	100	212
22	80	155
23	60	121
24	40	84
25	20	47
26	5	12
27	1	3
28	1×10^{-2}	0
29	1×10^{-3}	0