BACAR-14 (2026) Payload Report-Back

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Summary

BACAR-14 lifted off at 07:59:10 on Saturday 17 October 2026 carrying 17 payloads.

My payload combined a 6 m WSPR beacon with a camera and environmental telemetry system.

My WSPR payload transmitted on 6 m (50.293 MHz) from a 3 m half-wave vertical dipole. Seven transmissions were logged before the last packet at 08:38:00, and at 13.72 km altitude it was heard by six stations at distances of 5 to 170 km.

The camera and weather telemetry payload captured 243 wide-angle HD photos and a full set of environmental and motion data, reaching a barometric altitude of 15,338 m before power failed at 08:39:10. The launch was violent, with peaks of 11.1 g and about ±500 °/s of rotation.

The GK9501/E108 GPS on the Pi-Zero stopped updating shortly after lift-off, well below the 18 km CoCom limit. This suggests the receiver uses OR logic and was tripped by the speed of the initial launch jolt.

The ATGM336H GPS on the Pi-Pico is not subject to this restriction, but power failed before its behaviour above 18 km could be tested.

Detail

Launch

On Saturday 17 October 2026 at 07:59:10, the BACAR-14 latex balloon, filled with enough hydrogen to lift 17 payloads, rose from the ground into the sky.

My payload was second from last in the flight train. All payloads were attached to the train and switched on by 07:00 so that every function, including the monitoring equipment, could be tested before launch.

The WSPR Payload

It transmitted WSPR on 6 m (50.293 MHz) using a 3 m half-wave vertical dipole. One leg was fixed to one of the four upper strings supporting the payload, and the other to a lower string.

By take-off, the WSPR payload had made four transmissions (four packets each), all received by my local WSPR receiving station at the launch site. In flight, only a further three transmissions were received. At an altitude of 13.72 km, the transmission was also received by the following stations on 6 m:

Station	Grid	Distance	SNR (dB)
ZR1WT	KG43pf	5 km	−4 to −7
ZS6EMS	KG43ev	115 km	−3 to −4

ZS6GL	KG33xv	150 km	+11
ZS6ANT	KG33wu	155 km	−2 to −4
ZS6BOS	KG33uu	170 km	−1
ZS6GC	KG43ol	25 km	+11

The last entry in the WSPR payload log was recorded at 08:38:00 on 17 October 2026, when the final WSPR packet was transmitted.

Here is the url to analyse the WSPR data:-

https://wsprtv.com/?cs=ZR6WT&ch=472&band=6m&start_date=2026-10-08&ct_dec=ct,s:2_121:-80:1,21:0:5,111:0:10,51:0:1~ct,s:3_501:-25:0.1,4:0:1,201:-500:5,4:0:1&ct_labels=Ambient,Humidity,Pressure,UV,GForce,GAxis,Rotation,AxialAxis&ct_units=C,PCent,MBars,Index,g,,Deg

Click on the bar-graph icon to reveal the telemetry detail, which includes:-
Lat, Long, Alt, VSpeed, Speed, Batt-Volts,
CPU-Temp, Ambient, Humidity, Pressure, UV,
Max GForce last 10mins, and axis (vertical, lateral, longitudinal)
Max Rotation Speed and axis (yaw, roll, pitch)

The Camera and Weather Telemetry Payload

The camera and weather telemetry payload captured 243 HD wide-angle photographs before power failed.

A link to the launch video, which includes a subset of these photos, will follow soon.

The last log entry, at 08:39:10, marks the final image saved to the SD card.

The significant telemetry from the flight is summarised below:

Telemetry item	Lowest recorded value	Time - barometric altitude	Highest recorded value	Time - barometric altitude
Temperature	8.7 °C	08:39:10 - 15,338 m	44.9 °C	07:59:40 - 1,893 m
Relative humidity	8.0%	08:20:30 - 8,663 m	25.5%	07:58:30 - 1,709 m
UV index	0.69	07:58:10 - 1,706 m	15.54	08:36:30 - 14,396 m
G-force (signed dominant-axis peak)	−1.043 g, vertical	08:29:20 - 11,996 m	+11.125 g, vertical	07:59:10 - 1,745 m
Axial rotation rate (signed peak)	−503.1 °/s, roll	07:59:10 - 1,745 m	+500.4 °/s, yaw	07:59:30 - 1,790 m
Atmospheric pressure	109 hPa	08:39:10 - 15,338 m	824 hPa	07:58:10 - 1,706 m
Barometric altitude	1,706 m	07:58:10	15,338 m	08:39:10

Note: At lift-off the payload recorded a peak vertical acceleration of 11.13 g and rotation rates of +500 °/s and −503.1 °/s. In short, the payload was yanked/thrown about considerably at launch.

Key Points Learnt from BACAR-14

GPS failure after lift-off

The GPS attached to the Pi-Zero failed to update its position and altitude immediately after lift-off. The GPS is a GK9501/E108 and according to its documentation, the maximum altitude in balloon mode is 18,000 m, although accuracy degrades above roughly 10,000 m.

CoCom limits

I also learnt that CoCom limits probably apply. These are artificial altitude and speed limits that civilian GPS/GNSS receiver chips enforce. CoCom stands for the Coordinating Committee for Multilateral Export Controls. The typical thresholds are:

- Altitude above approximately 18,000 m (about 60,000 ft), and/or
- Speed above approximately 515 m/s (about 1,000 knots, or 1,850 km/h).

Manufacturers implement these limits in one of two ways:

- **OR logic:** the receiver stops working if either limit is exceeded. This is common on cheaper modules, and is why many GPS units freeze on high-altitude balloons.
- **AND logic:** the receiver stops only if both limits are exceeded simultaneously. This is preferred for high-altitude ballooning, because balloons climb high but travel relatively slowly.

Although the original CoCom organisation no longer exists, the name has stuck, and the restrictions continue under later regimes, chiefly the Missile Technology Control Regime (MTCR).

Conclusions

The payload was nowhere near 18 km when the GPS stopped updating, so the receiver must be using OR logic. The initial yank at lift-off probably exceeded the speed limit.

The GPS on the Pi-Pico is an ATGM336H, was not affected by this restriction. However, because power failed before the payload reached 18 km, I still do not know whether it works above the CoCom limit.

Both systems stopped logging within approximately a minute of each other. This is consistent with a power failure, although the precise cause still needs to be confirmed. Power capacity and delivery will therefore be a priority for investigation before the next flight.