



GPS Clock Event on SVN 27

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April 24th 1998



Observed Anomaly: PRN 27

19:35:23 10 Mar 1998

- ✧ Loss of lock observed despite high elevation
- ✧ “Unusual” behavior seen on carrier phase
- ✧ All receivers observed similar behavior
- ✧ L1 code deviations identical to carrier
- ✧ Conclusion:
 - ✧ *Satellite Clock Anomaly*



Measured Errors on PRN 27

SPS Specifications:

| | SPS Specification [§] | Observed Error |
|-----------------|--------------------------------|----------------------|
| SA Range | NTE 150 m | < 5 m |
| SA Velocity | NTE 2 m/s | > 2.5 m/s |
| SA Acceleration | NTE 19 mm/s ² | > 2 m/s ² |

[§] from GPS SPS Signal Specification 2nd Edition



PRN 27 Status

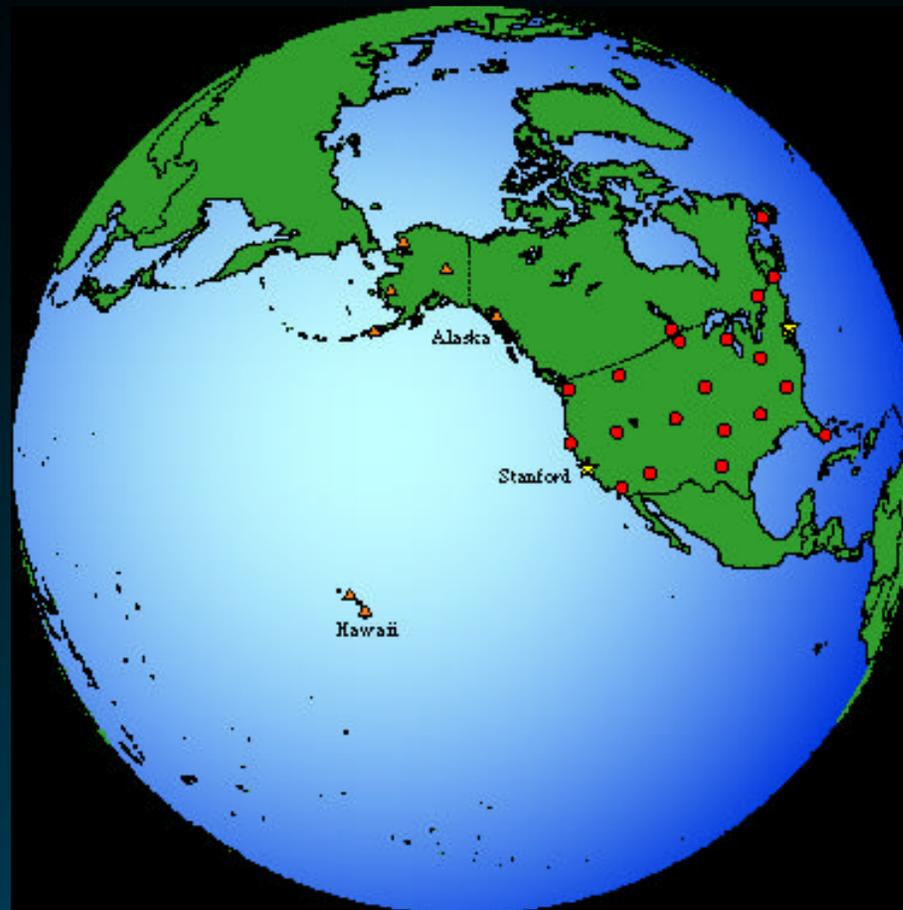
Satellite Information

- ✈ Block IIa: SVN 27
- ✈ Launched 9 Sep 1992--Operational 30 Sep 1992
- ✈ Slot: A3
- ✈ Clock: Cesium
- ✈ Set healthy in both ephemeris and almanac



GPS Reference Network

NSTB Receiver Locations:





Receiver Performance

| Receiver Type A | Receiver Type B | Receiver Type C |
|--------------------|------------------|------------------|
| Tracked 15 / 17 | Tracked 8 / 8 | Tracked 0 / 6 |



Unanswered Questions

Ongoing Investigation

- ✈ What causes this event? Operational or Random
- ✈ When and how often does this event occur?
- ✈ Which satellites can be affected?
- ✈ What is the impact on aviation? -- Mitigation
 - ✈ *Availability (LAAS and WAAS) -- External*
 - ✈ *Continuity (LAAS and WAAS) -- Algorithm*
 - ✈ *Integrity (LAAS) -- SQM*