Patriot Missile Failure

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Problems created by round off error

- 28 Americans were killed on February 25, 1991 by an Iraqi Scud missile in Dhahran, Saudi Arabia.
- The patriot defense system failed to track and intercept the Scud. Why?

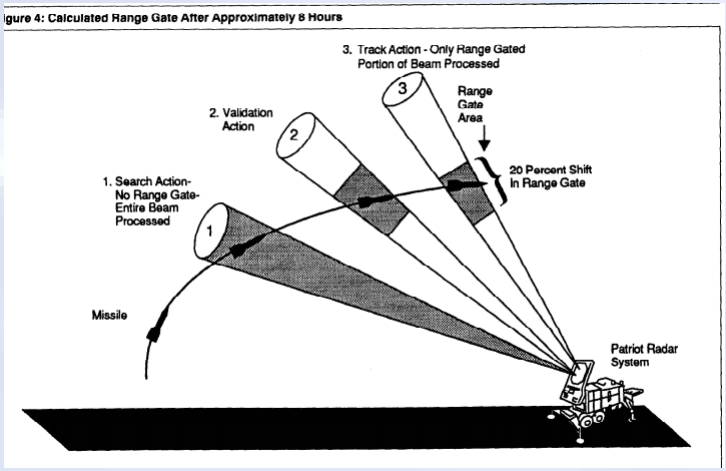
Source: https://upload.wikimedia.org/wikipedia/commons/thumb/f/f8/Patriot_missile_launch_b.jpg/300px-Patriot_missile_launch_b.jpg

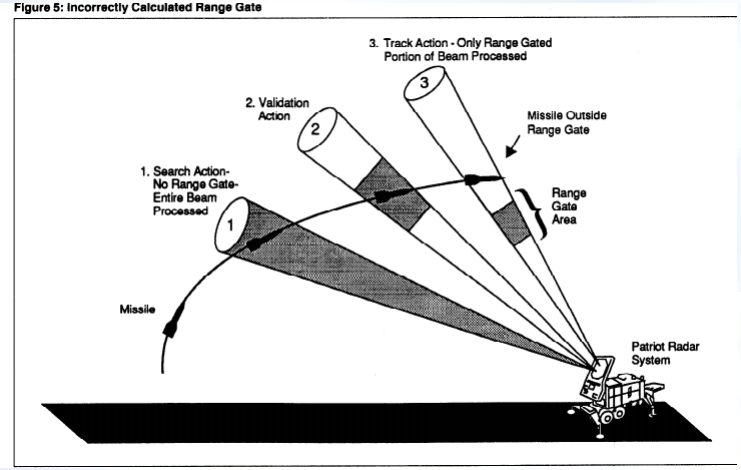
Problem with Patriot missile

- Clock cycle of $1/10$ seconds was represented in 24-bit fixed point register created an error of 9.5×10^{-8} seconds.
- The battery was on for 100 consecutive hours, thus causing an inaccuracy of

$$9.5 \times 10^{-8} \times 10 \times 60 \times 60 \times 100$$
$$= 0.342 \text{ seconds}$$

Calculated and Actual Range Data





- The shift calculated in the ranging system of the missile was 687 m.
- The target was considered to be out of range at a distance greater than 137 m.

Source: https://www.gao.gov/assets/220/215614.pdf

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