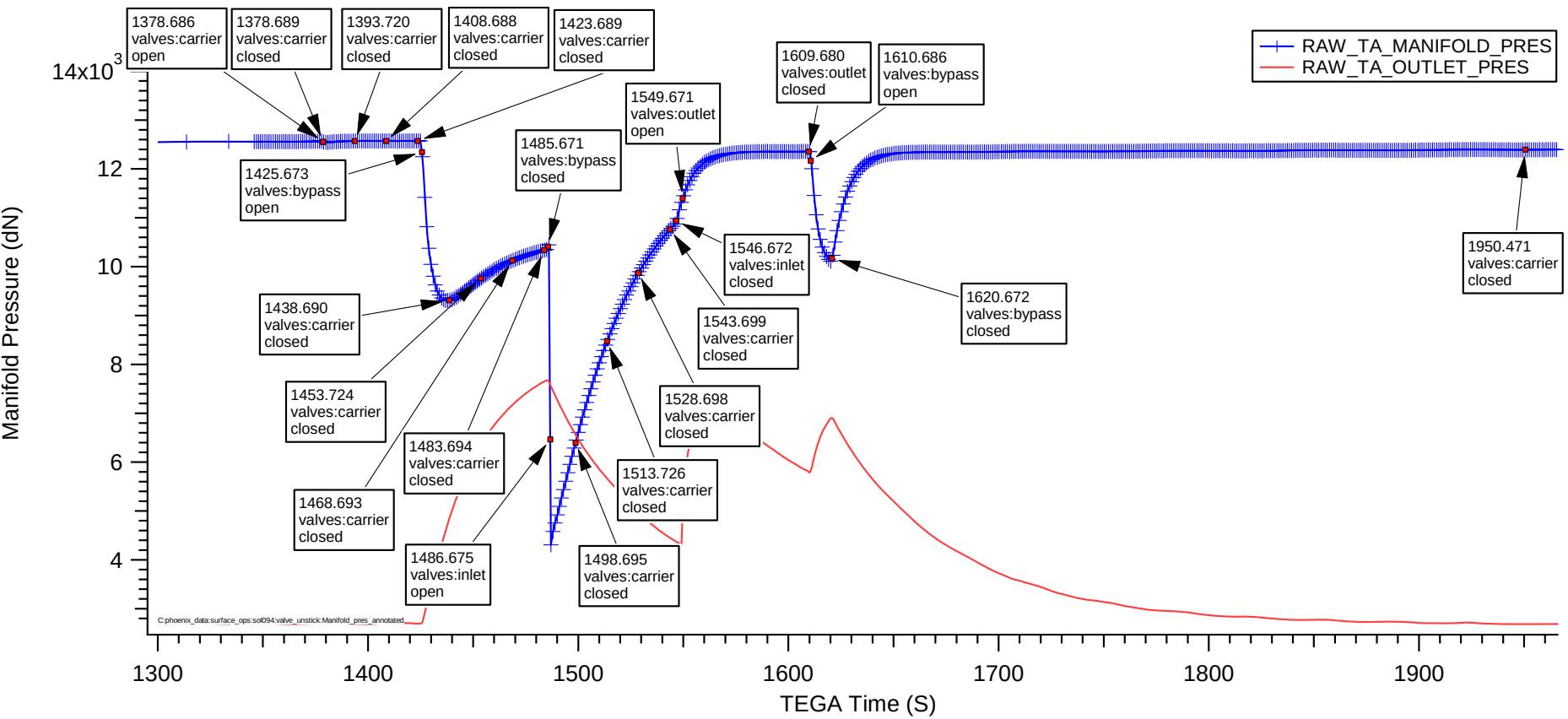
TEGA Carrier Valve Unstick Attempt #2, Sol 94

Background

- Sol 92: Carrier regulation valve became very leaky during mid-temp ramp. High manifold pressure prevents any more firings of the valve
- Sol 93: Shortened mid-temp procedure used as diagnostic. Leak is worse than we thought, unable to vent manifold down to a reasonable pressure. Pressure regulation code does not fire the valve due to high manifold pressure.
- Sol 94: Run modified door open procedure to force valve to fire using sequence 90a. Removed actual door opening from procedure.

Modified Door Open



- This block consisted of a string of alternating carrier open and carrier close commands
- Carrier Open at 1378.686 says that the valve itself was indicating it was closed at that time
- After that, we see no carrier open commands, just carrier closed. This indicates that the valve is indicating open after that command.
- The conclusion is that we were able to move the valve armature. This is a good sign that
    a) The valve is not broken since we were able to move it
    b) We are not too far away from putting enough energy into the valve

Aker Operation

- Aker valves have 3 states:
  1. Open
  2. Closed
  3. Stuck somewhere in between
- A normal current pulse will almost always move the valve between states 1 and 2
- Too little energy in the pulse can move the valve to state 3
- It takes a larger than normal current pulse to move the valve out of state 3

Next Attempt

- For sol 95 we will run a new product that will attempt to unstick the armature by rocking it with all the energy we can muster.
- Normal valve commands will not try to put the valve into the state that the valve is reporting as its current state
  - We can poke values into the AKER_CTL register in the FPGA to bypass this limitation
- The Aker controller runs from a regulated +30V supply, but there are a couple of things we can do to increase the energy.
  - We can control the length of time we allow the capacitor bank to discharge into the valve: We normally allow between 1 and 2mS, we will increase that to 10mS to allow the capacitor to fully discharge into the valve
  - We will do this while the valve and the electronics are cold. This will decrease the series resistance of the capacitors, the FET switches, and the valve windings, thus increasing the current.