

SYS-6581 Simulink and Testing

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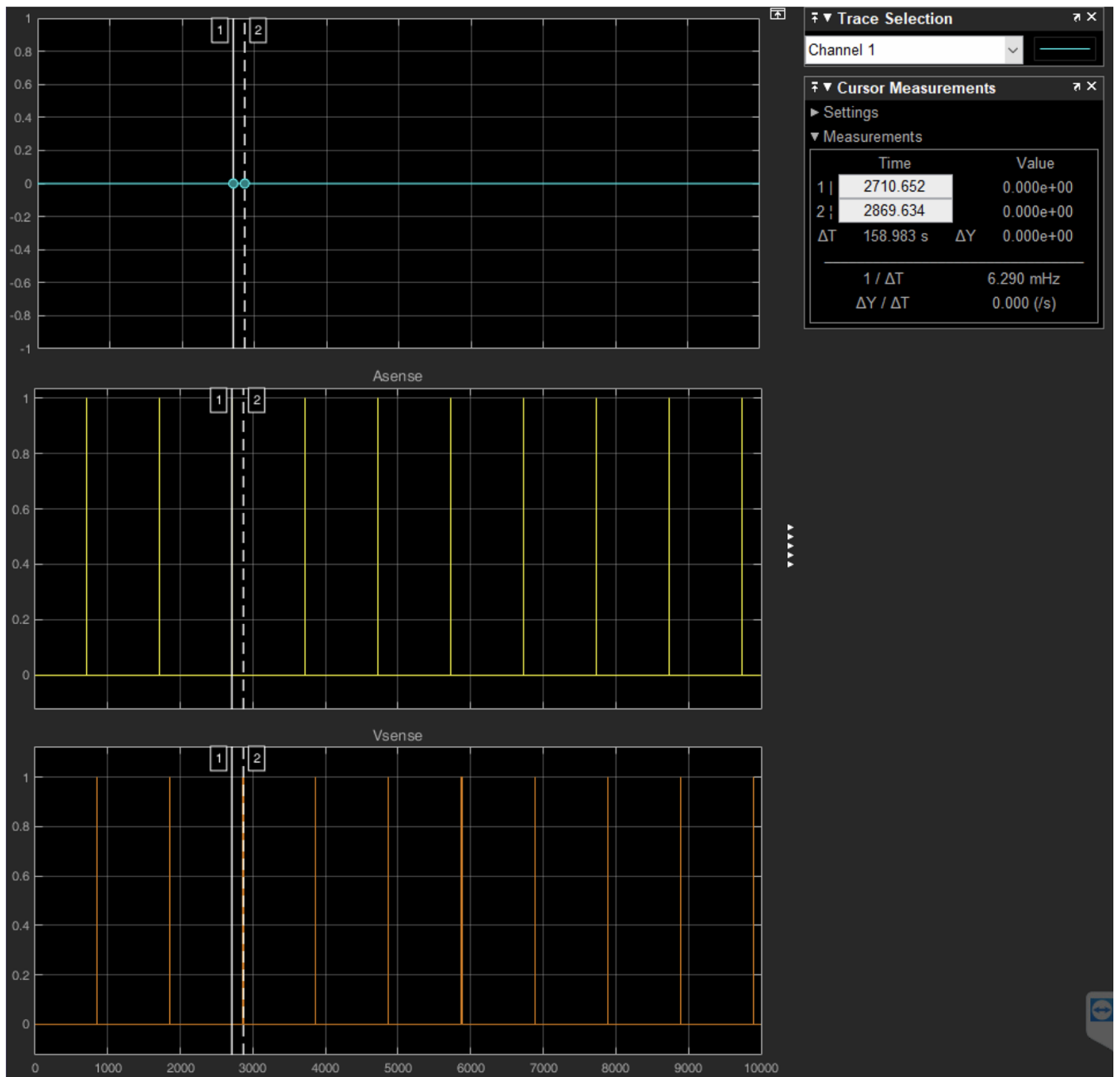
November 9, 2018

5 Heart Modeling

5.1 Heart Modeling

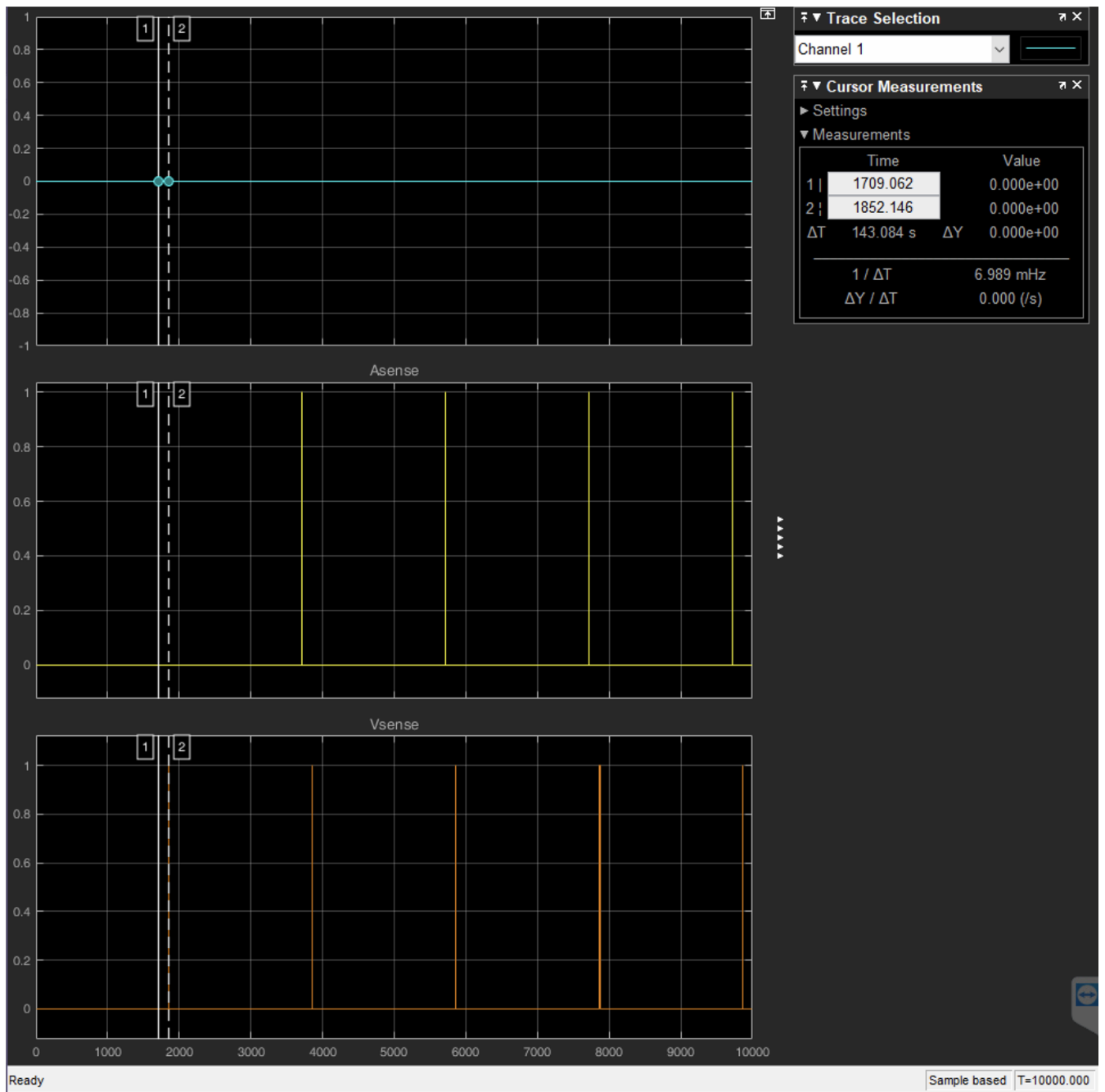
5.1.1 Normal Sinus Rhythm

- (a) NPN, total of 10 beats in 10 seconds.



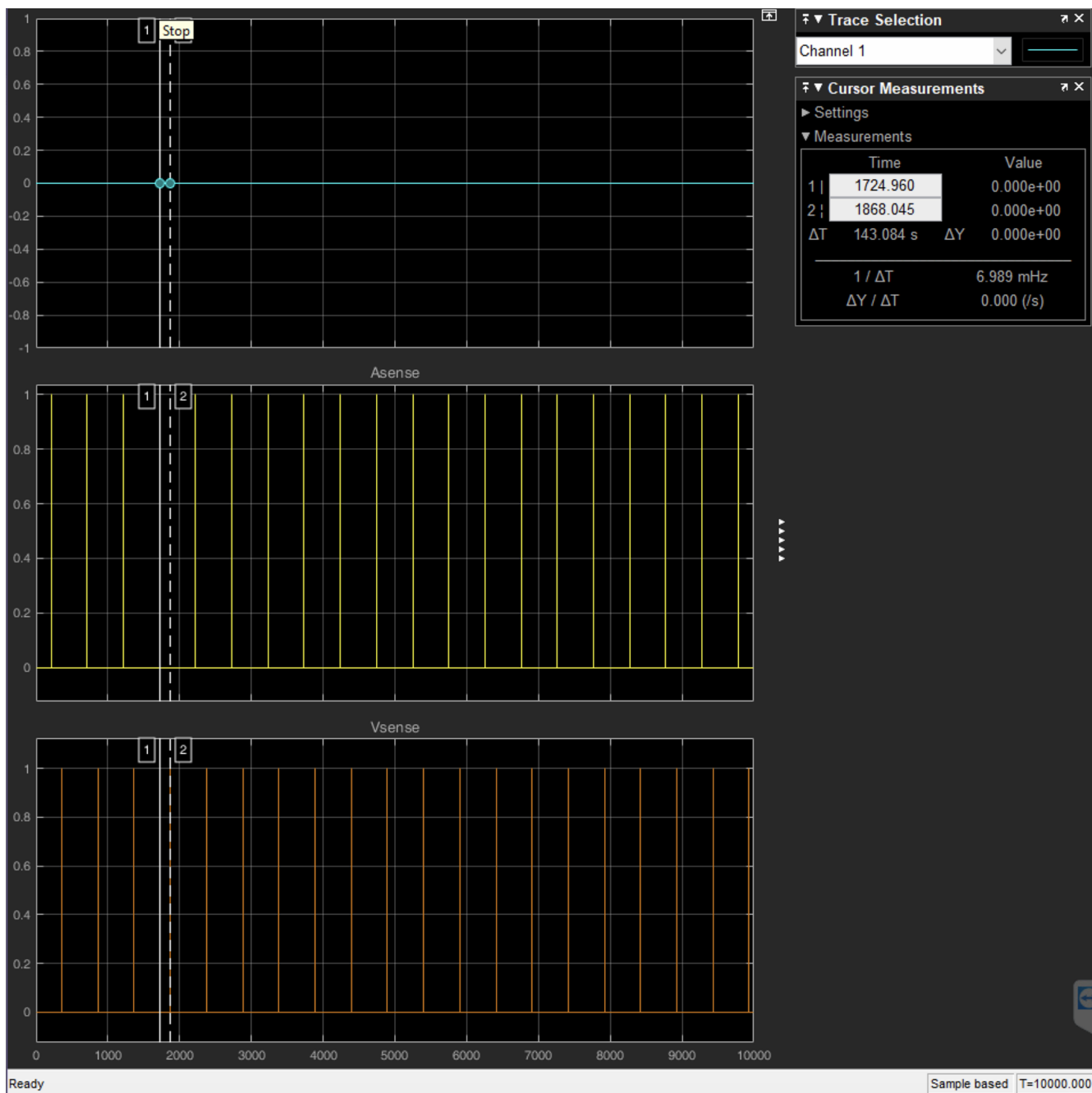
5.1.2 Sinus Bradycardia

(a) 30 bpm, total of 5 beats in 10 seconds.



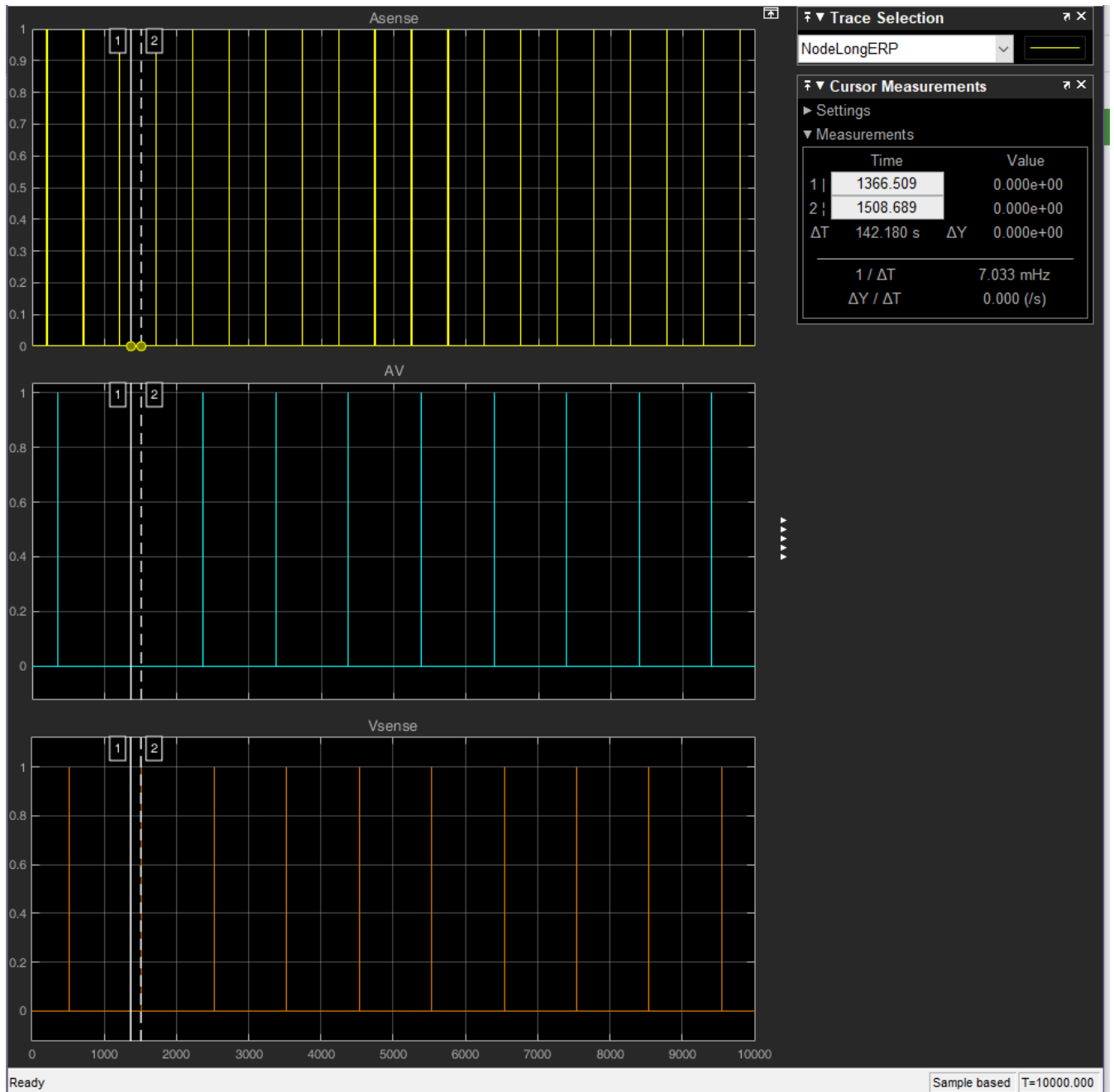
5.1.3 Sinus Tachycardia

(a) 60 bpm, total of 20 beats in 10 seconds.



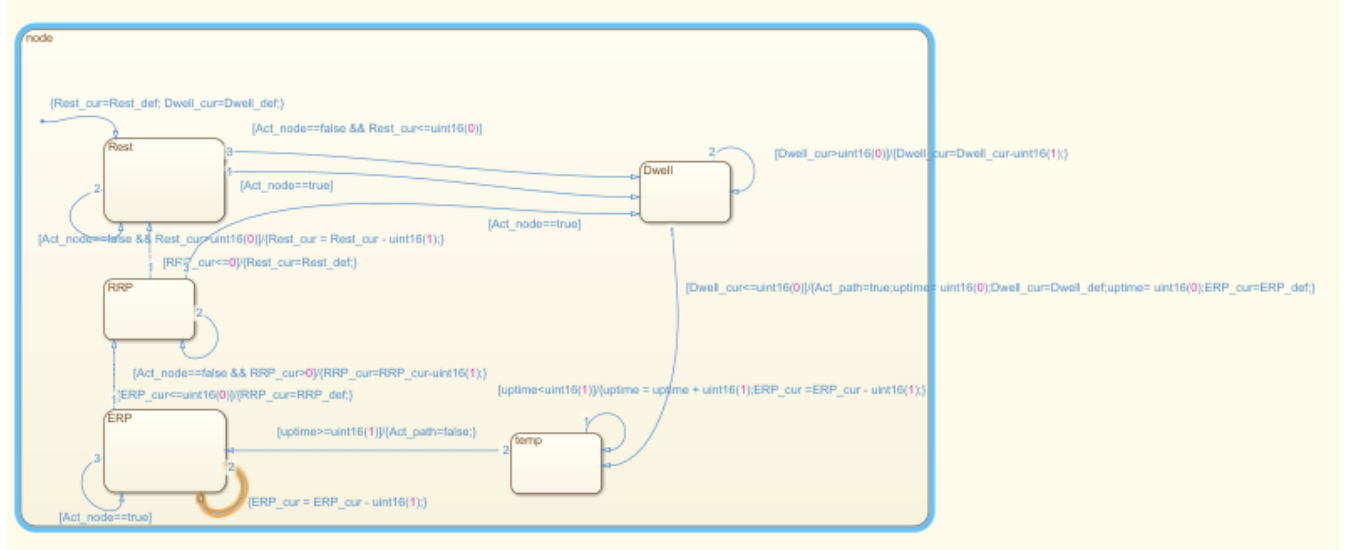
5.1.4 AV Block

(a) NPNPN.

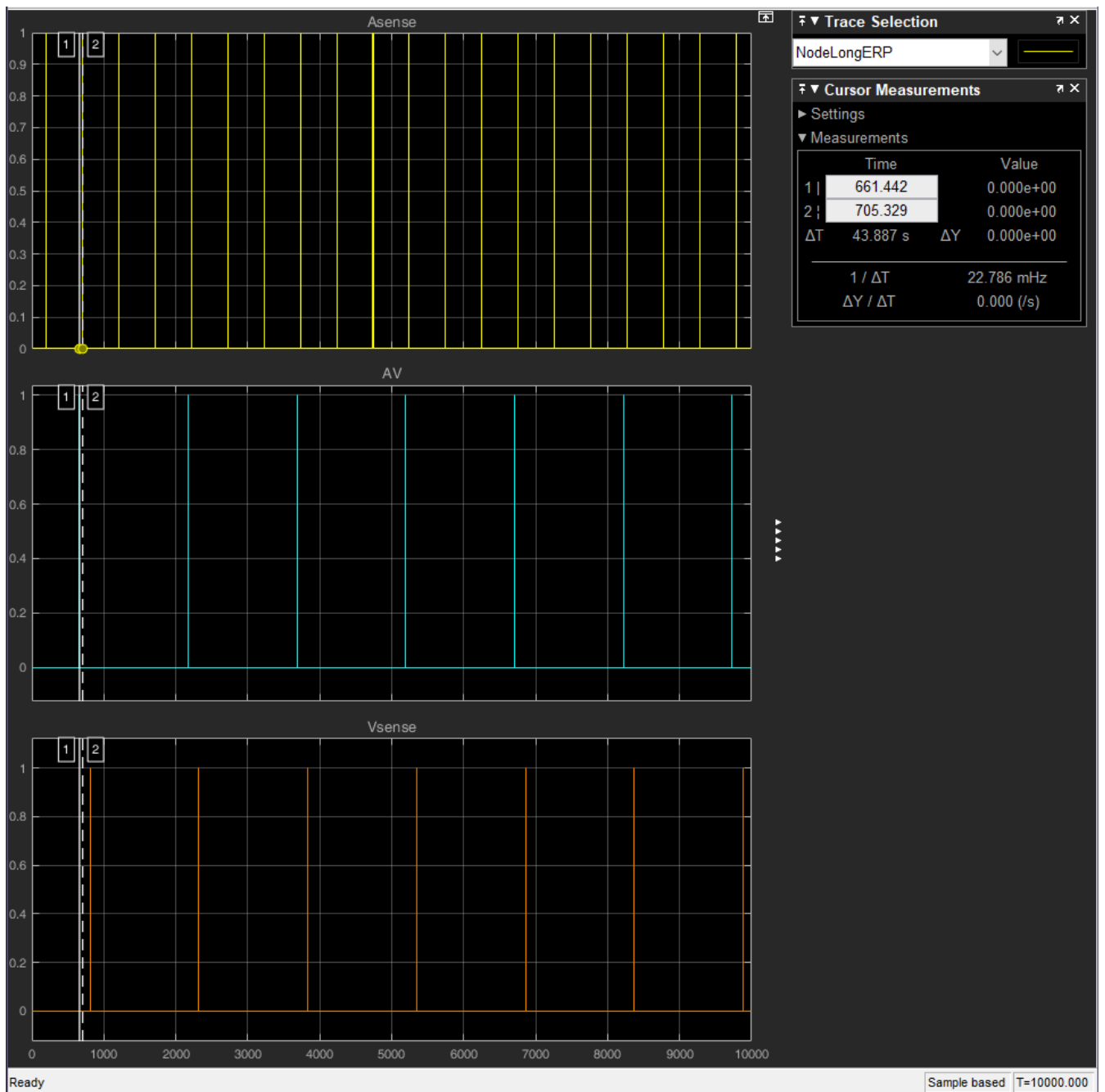


5.1.5 AV Delay

(a) Adding the dwell images

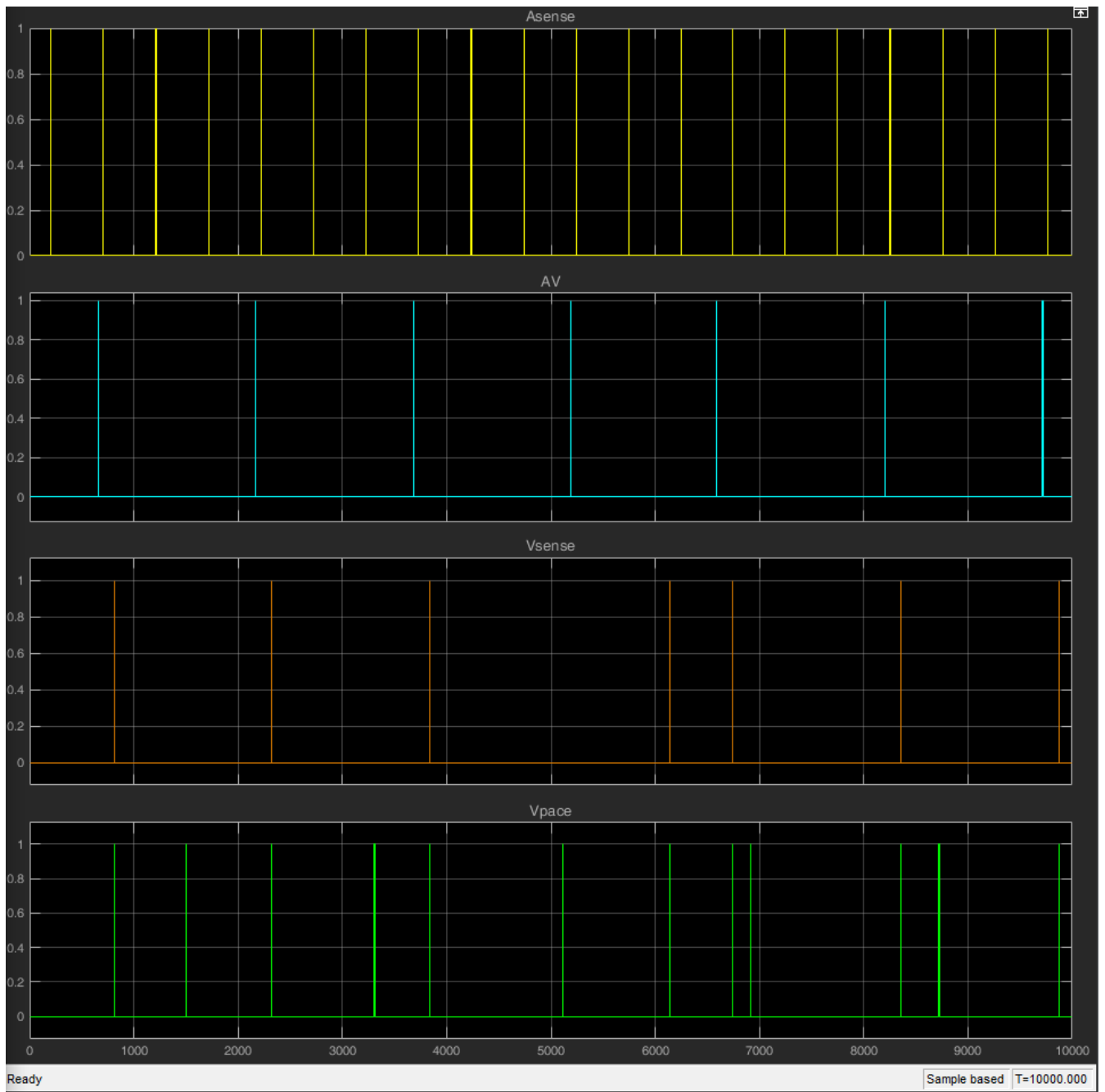


(b) Scope



5.1.6 Premature Ventricula Complex

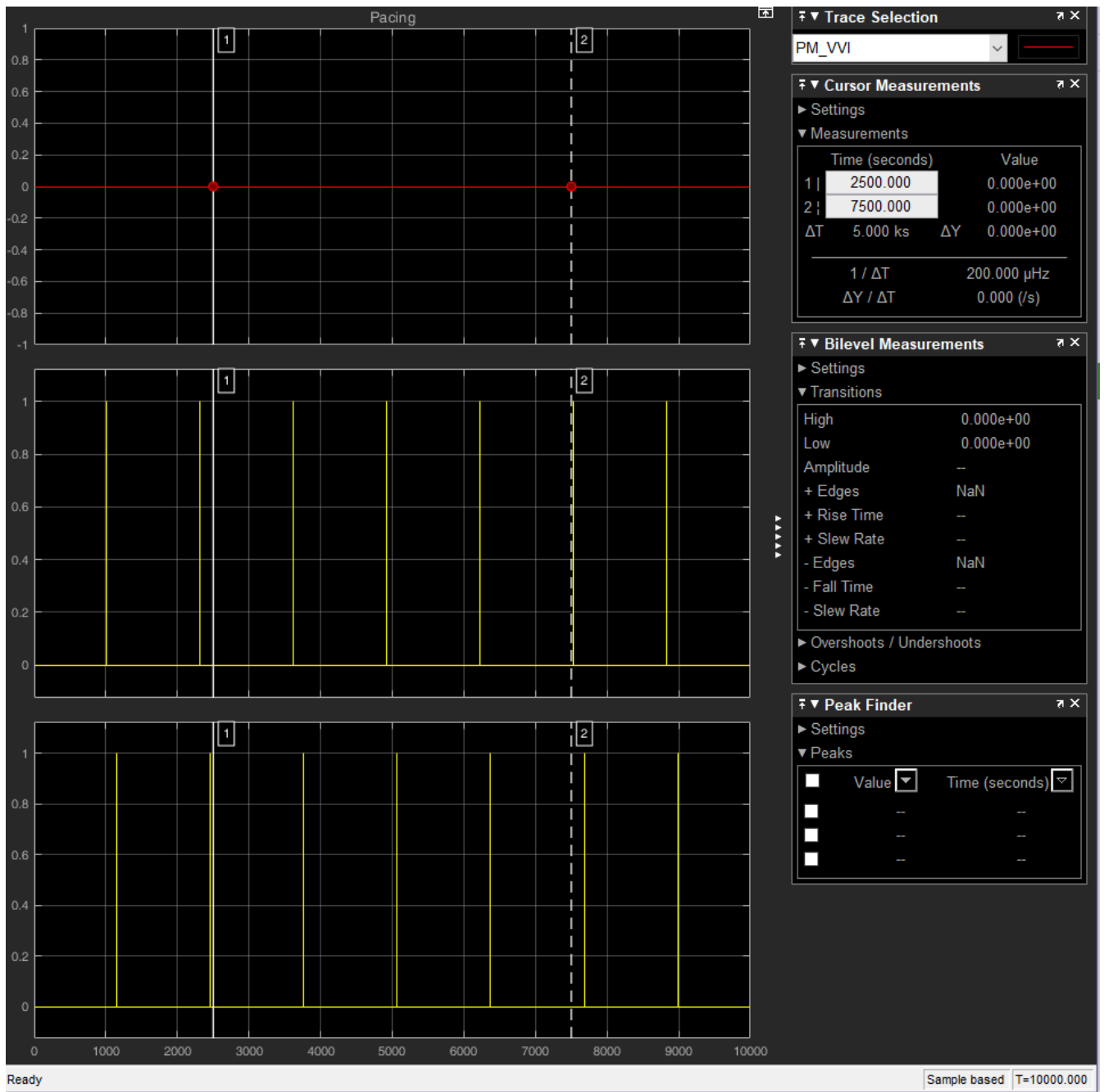
- (a) PVC, also known as Rhythm HiJack, is a ventricular event that is triggered spontaneously. (Lec-11,pg 26).



5.2 Pacemaker Model Simulink

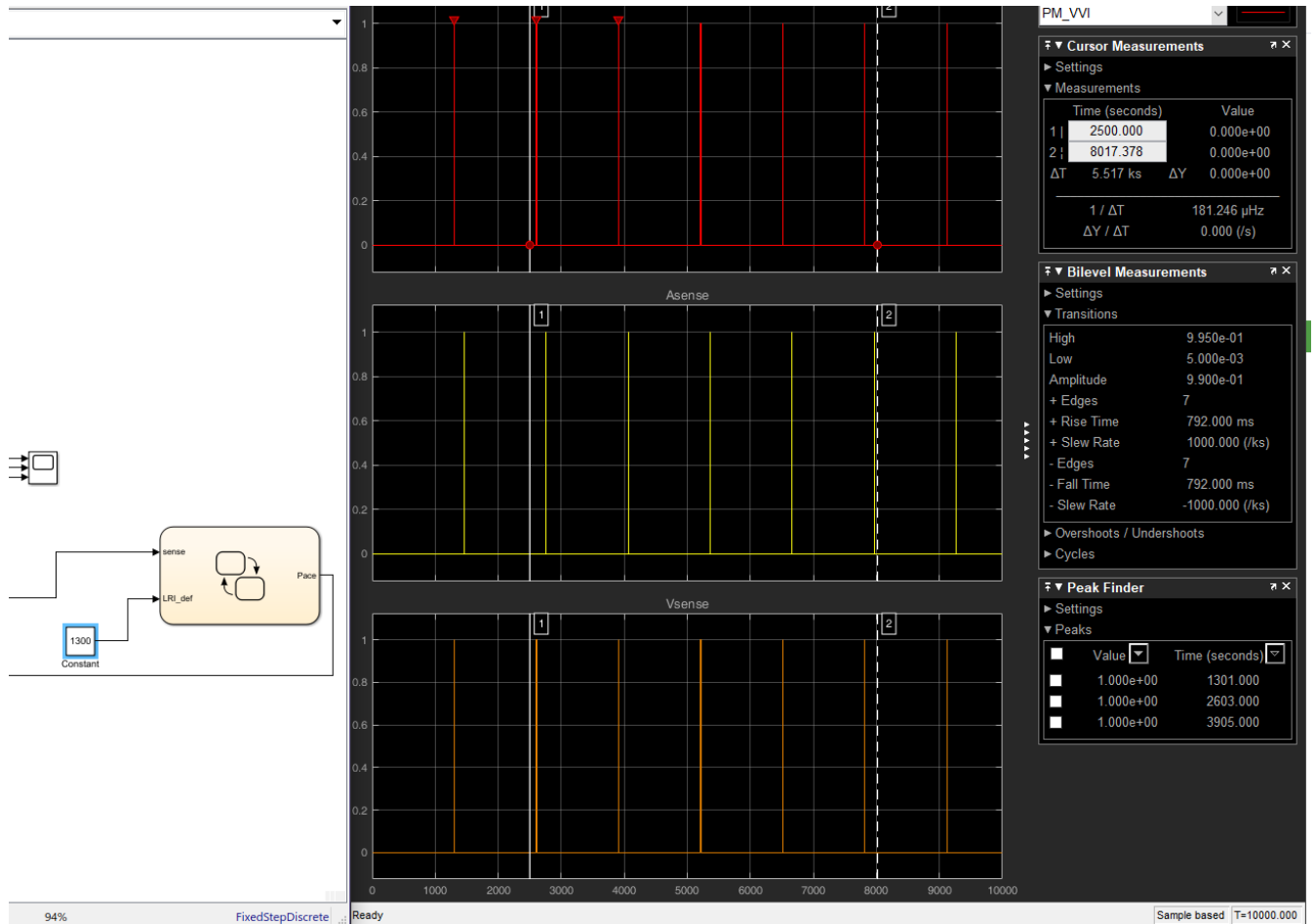
5.2.1 Observer VVI pacemaker

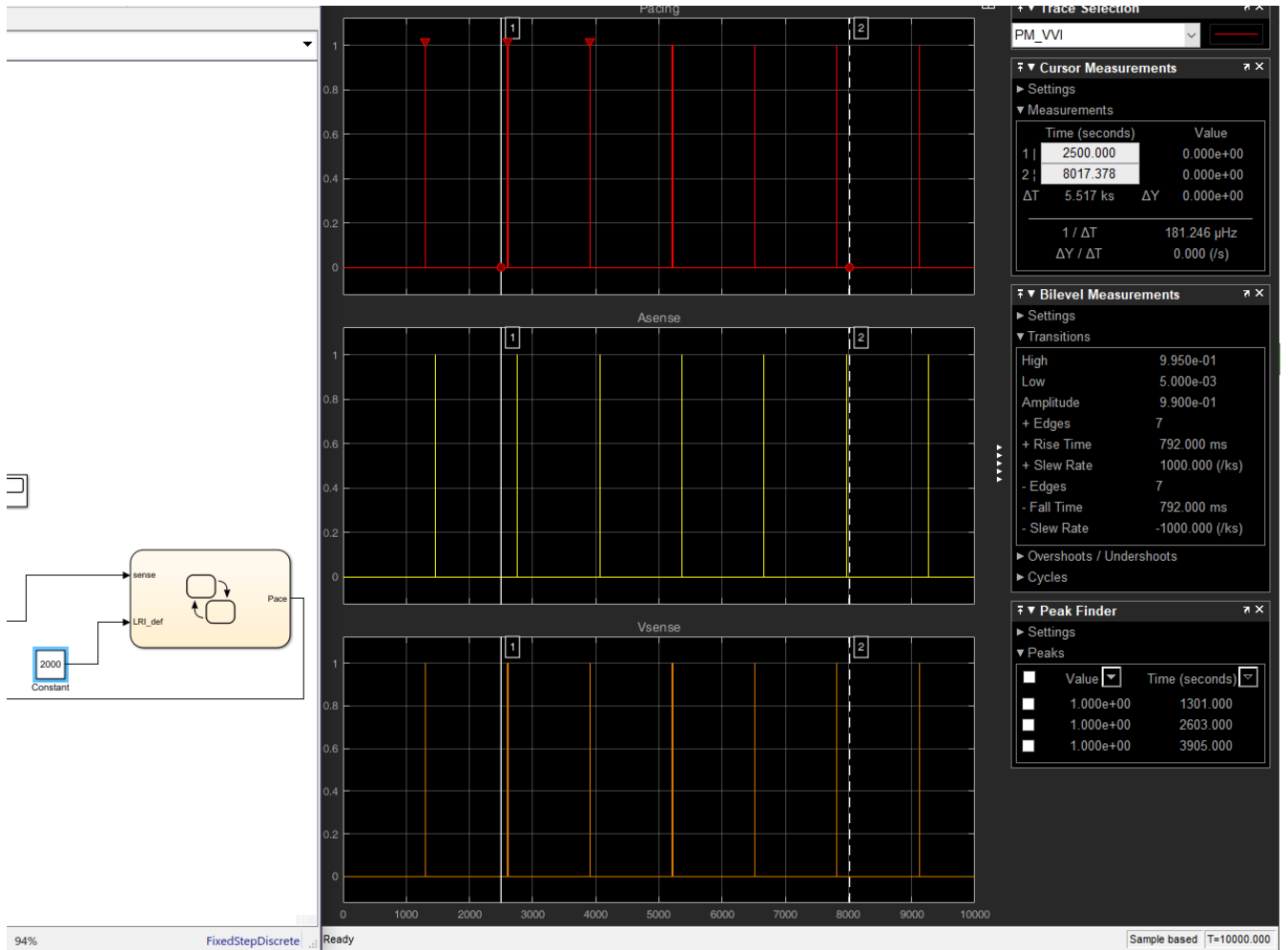
- (a) I do not see the PM pacing, probably because the Lower Rate Interval of
 $1300 = A_{rest} + A_{erp}$



5.2.2 Debugging the VVI

- (a) The PM fires and triggers the V node in place of the delayed A signal to trigger the V node on time. Likely any setting above the atrium 1800ms fire will not trigger the pacemaker correctly.





5.2.3 Maintaining the minimum heart rate

- (a) Definitions: where AEI = atrial escape interval, PVARP = postventricular atrial refractory period, AVI = Atrioventricular interval, TARP = Total Atrial Refractory Period, and LRI = Lower Rate Interval.

(b)

$$LRI = AEI + AVI = 1000 + 300 = 1300$$

(c)

$$AVI = TARP - PVARP = 650 - (300 + 150) = 200$$

