1067-92-2335   **Srisairam Achuthan*** (sachut@lsuhsc.edu), 2020 Gravier Street, Suite D, New Orleans, LA 70112, and **Jianxia Cui** (cuijianxia@gmail.com), **Robert J. Butera** (rbutera@gatech.edu) and **Carmen C. Canavier** (ccanav@lsuhsc.edu), 2020 Gravier Street, Suite D, New Orleans, LA 70112. *The degree of phase locking observed in hybrid neural circuits can be explained using maps based on the phase resetting curve.*

For networks of intrinsic neural oscillators, phase locking can be predicted using a phase resetting curve (PRC) that measures the extent to which a perturbation at a given phase advances or delays the next spike. We use the PRC measured under the assumption of pulsatile coupling in an isolated model neuron and an open loop biological neuron to predict phase locking when these two repetitively spiking neurons are reciprocally coupled via the dynamic clamp experimental setup. The experimental results exhibit varying degrees of noisy phase locking and/or non-stationarity. A map constructed based on the PRCs of the two neurons can account for observed firing patterns in which no neuron fires more than twice consecutively. Slipping episodes in which one neuron fires an extra spike can be induced by noise or by a frequency mismatch. Adding noise to the map allows us to develop criteria to differentiate these cases. The continuity of the PRC constrains the fixed points of the map to an even number, and allows period drift in the biological neuron to induce bifurcations in the observed activity when fixed points annihilate one another. (Received September 22, 2010)