current, both based on current clamp data. $I_{\text{Na}}, I_{\text{K}}$ are the fast Na$^+$ and K$^+$ currents responsible for the generation of action potentials (taken from Ref. 17). Details of the kinetics of these currents, based on estimates from physiological data, are given in Ref. 10.

The synaptic current $I_{\text{GABA}}$ represents the intra-RE inhibitory current, mediated by $\gamma$-aminobutyric acid (GABA). The receptors on RE cells are of GABA$_A$ type with a very weak GABA component. Only the

\[ g_{\text{KL}} = \tilde{g}_{\text{KL}} m \]  \hspace{1cm} [4]

\[ \frac{dm}{dt} = \alpha [S] m - \beta (1 - m) \]  \hspace{1cm} [5]

where $\tilde{g}_{\text{KL}} (= 1 \text{nS})$ is the maximal leak conductance for K$^+$ and $[S]$ represents the concentration of second messenger. For RE neurons, the only experiments available for noradrenergic and serotonergic depolarization are from delivery of agonists in vitro;\textsuperscript{21} the response based on an initial stimulus, $G_{\text{max}}$, is
Control of reticular thalamic oscillations

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oscillations. This behavior was extremely robust to changes in parameters such as the reversal potential of GABAergic currents ($E_{Cl}$), the values of the synaptic conductances or the amount of leak $K^+$ current affected by NE/5HT synapses. Typically, $E_{Cl}$ and the resting membrane potential in the absence of NE/5HT around the neocortex.
FIG. 2. Dependence of RE oscillatory behavior on the membrane potential. Simulation of a network of 100 RE cells interconnected with their neighbors through GABAergic synapses. The top 10 traces represent the activity of 10 neurons in the network and the bottom trace is the average membrane potential. 20% of NE/5HT synapses were initially activated (as in Fig. 1b). In these conditions, the network showed self-sustained oscillations at a frequency of 10–16 Hz and the average membrane potential displayed waxing and waning fluctuations of amplitude. After 2 s (first arrow), all NE/5HT synaptic activity

100 mV