Abstract. In this paper we compute the 3-primary $v_1$-periodic homotopy groups of the exceptional Lie group $E_7$. This represents the next stage in the author’s goal of calculating the $v_1$-periodic homotopy groups of all compact simple Lie groups (at least when localized at an odd prime). Most of the work goes into calculating the unstable Novikov spectral sequence of $\Omega E_7/Sp(2)$. Showing that this spectral sequence converges to the $v_1$-periodic homotopy groups in this case utilizes recent results of Bousfield and Bendersky-Thompson.