We prove that for any $n \geq 1$ there exist $n \times n$ matrices $A$ and $B$ such that for any vector $x \in \mathbb{R}^n$ with a nonzero first component, the orbit of $x$ under the action of the semigroup generated by $A$ and $B$ is dense in $\mathbb{R}^n$. As a corollary, we prove that for a large set of diagonal matrices $A$ and $B$ and any vector $V$ with nonzero entries, the orbit of any vector under the semigroup generated by the affine maps $x \rightarrow Ax + V$ and $x \rightarrow Bx$ is dense in $\mathbb{R}^n$. (Received July 30, 2009)