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For a countable group G , the space of left-invariant orders $LO(G)$ consists of all total orders on the domain of G such that for any elements x, y, z of G , if $x < y$ then $zx < zy$. Similarly, we define right-invariant orders and bi-orders on G . Left-orderable groups are torsion-free. While every abelian torsion-free group is orderable, not every countable group is left-orderable, and not every left-orderable group is bi-orderable. We investigate topological and computability-theoretic properties of spaces $LO(G)$. A countable group is computable if its domain and its group-theoretic operation are both computable. In particular, we study Turing degrees of left-invariant orders of computable torsion-free groups. (Received September 28, 2005)