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An antipodal set of a Riemannian symmetric space M , introduced by B. -Y. Chen and T. Nagano in 1980's, is a subset A of M on which $s_x(y) = y$ holds for any elements x, y in A , where s_x denotes the geodesic symmetry at x on M . We explicitly describe maximal antipodal sets of compact Riemannian symmetric spaces related to the compact connected simple Lie group of type G_2 by realizing it as the automorphism group of the octonions. Moreover, we observe a close relation between the algebraic structure of the octonions and the Fano plane by using these explicit descriptions. (Received September 13, 2019)