The Iwahori Hecke algebra was described, in terms of generators and relations, in a beautiful work of Iwahori and Matsumoto over 40 years ago. This algebra has a canonical basis consisting of characteristic functions of double cosets. This important feature is missing when one wants to extend the theory to non-linear groups. In this work we show how the Weil representation can be used to construct a basis of the algebra for the metaplectic group i.e. two fold central extension of the symplectic group. (Received July 29, 2011)