In this work, an approach to jointly estimating the tone hole configuration (fingering) and reed model parameters of a saxophone is presented. The problem isn't one of merely estimating pitch as one applied fingering can be used to produce several different pitches by bugling or overblowing. Nor can a fingering be estimated solely by the spectral envelope of the produced sound (as it might for estimation of vocal tract shape in speech) since one fingering can produce markedly different spectral envelopes depending on the player's embouchure and control of the reed. The problem is therefore addressed by jointly estimating both the reed (source) parameters and the fingering (filter) of a saxophone model using convex optimization and 1) a bank of filter frequency responses derived from measurement of the saxophone configured with all possible fingerings and 2) sample recordings of notes produced using all possible fingerings, played with different overblowing, dynamics and timbre. The saxophone model couples one of several possible frequency response pairs (corresponding to the applied fingering), and a quasi–static reed model generating input pressure at the mouthpiece, with control parameters being blowing pressure and reed stiffness. Applied fingering and reed parameters are estimated for a given recording by formalizing a minimization problem, where the cost function is the error between the recording and the synthesized sound produced by the model having incremental parameter values for blowing pressure and reed stiffness. The minimization problem is nonlinear and not differentiable and is made solvable using convex optimization. The performance of the fingering identification is evaluated with better accuracy than previous reported value.