Find an expression for $\left(\frac{\partial s}{\partial P}\right)_T$ for a gas whose equation of state is $P(v-b) = RT$.

According to the Maxwell relations is $\left(\frac{\partial s}{\partial P}\right)_T = -\left(\frac{\partial v}{\partial T}\right)_P$ and with the equation of state $P(v-b) = RT \rightarrow v = \frac{RT}{P} + b$ it follows that $\left(\frac{\partial s}{\partial P}\right)_T = -\left(\frac{\partial v}{\partial T}\right)_P = -\frac{R}{P} = -\frac{(v-b)}{T}$.