**Exercise:** Here is a complicated system, where all of NMR-active nuclei in the ring are coupled to each other. Analyze the multiplets and identify all of the $^1H-^1H$ and $^1H-^{31}P$ $J$ couplings in the spectrum.

[C$_{11}$H$_{15}$OP]

300 MHz $^1H$ NMR spectrum in CDCl$_3$
Source: Olafs Daugulis/Vedejs (Reich digitized hard copy)
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The H-H couplings can be matched up pairwaise, the remaining coupling to each proton have to be to the $^{31}$P. If the downfield proton of each CH$_2$ group was assigned to the one cis to the P=O group, then the conformation must be A to fit the couplings, other wise B

The smallest $^3$J$_{HH}$ should be between pseudoequatorial trans protons H$^2$ and H$^3$

The largest $^3$J$_{HP}$ (50 Hz) should be to the anti proton

Boxed ones are unmatched, thus $J_{HP}$