⌜ $d\tilde{P}(\eta, \Theta_t \cdots \Theta_t)$

$= \tilde{P}(d\eta, \Theta_t, \cdots \Theta_t) - \tilde{P}(\eta, d\Theta_t, \cdots \Theta_t) - \tilde{P}(\eta, \Theta_t, d\Theta_t, \cdots)$

$- \cdots = \tilde{P}(d\eta, \Theta_t, \cdots \Theta_t) - \tilde{P}(\eta, d\Theta_t, \cdots \Theta_t) \times (k-1).$

since $\deg \eta = 1$. ⌟

Note: For those accustomed to the general formalism of differential geometry, we can sketch the above calculation in more intrinsic terms as follows: First, the operator $D : A^q(E) \longrightarrow A^{q+1}(E)$ may be extended to an operator on all tensor bundles of E. Then since the connection matrix of D can be made to vanish at any point, we obtain the Bianchi identity

$$D\Theta = 0,$$

and applying P to the algebra $A^*(\mathrm{Hom}(E,E))$, where $A_i \in A^{d_i}(\mathrm{Hom}(E,E))$; thus $dP(\Theta) \equiv 0$.

⌜ $De_i = \theta_{ij} \otimes e_j \Rightarrow D^2 e_i = d\theta_{ij} \otimes e_j - \theta_{ij} \wedge De_j$

$= d\theta_{ij} \otimes e_j - \theta_{ij} \wedge \theta_{j\alpha} \otimes e_\alpha$

$= d\theta_{ij} \otimes e_j - \theta_{i\alpha} \wedge \theta_{\alpha j} \otimes e_j = (d\theta_{ij} - (\theta \wedge \theta)_{ij}) \otimes e_j$

$\Rightarrow \Theta = (d\theta_{ij} - (\theta \wedge \theta)_{ij})\, e_i^* \otimes e_j = (d\theta - \theta \wedge \theta)_{ij}\, e_i^* \otimes e_j$

$\Rightarrow D\Theta = d((d\theta - \theta \wedge \theta)_{ij}) \otimes e_i^* \otimes e_j$

$- (d\theta - \theta \wedge \theta)_{ij} \wedge D(e_i^* \otimes e_j)$

$= -d(\theta \wedge \theta)_{ij} \otimes e_i^* \otimes e_j - (d\theta - \theta \wedge \theta)_{ij} \wedge (\theta_{i\alpha}^* e_\alpha^* \otimes e_j$

$+ e_i^* \otimes \theta_{j\beta}^* e_\beta)$

But since $0 = d\langle e_\alpha^*, e_\beta \rangle = \langle De_\alpha^*, e_\beta \rangle + \langle e_\alpha^*, De_\beta \rangle =$

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