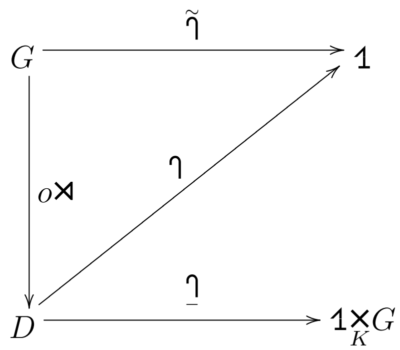
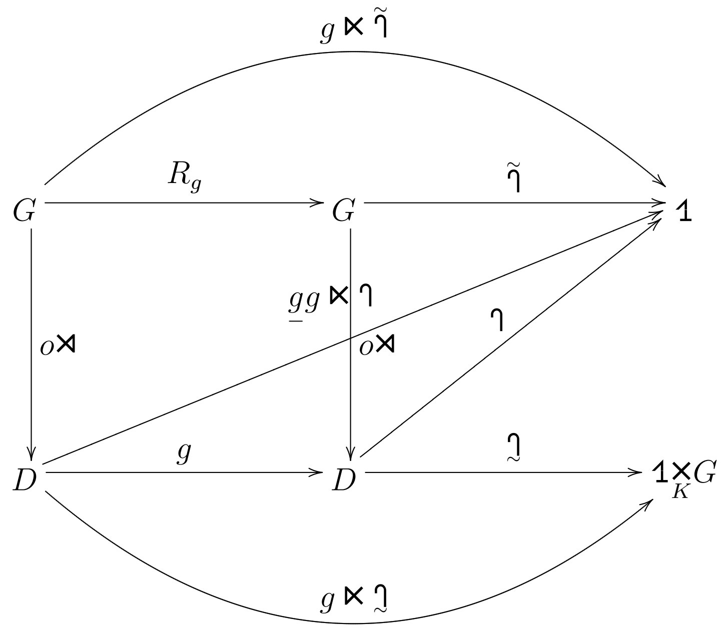
$$\text{cocycle } x{:}g \in D{\times}G \to K^{\mathbb{C}} \ni {}^{x}\underline{g}$$



$$1 \ni \begin{cases} {}^{\gamma_x}\tilde{\text{℩}} = {}^{x}_{1/2}B_x{}^{x}\text{℩} \\ {}^{g}\tilde{\text{℩}} = {}^{o}\underline{g}^{og}\text{℩} \end{cases} \implies {}^{kg}\tilde{\text{℩}} = {}^{o}\underline{kg}\,{}^{okg}\text{℩} = {}^{o}\underline{k}\,{}^{ok}\underline{g}\,{}^{og}\text{℩} = {}^{o}\underline{k}\,{}^{o}\underline{g}\,{}^{og}\text{℩} = {}^{o}\underline{k}\,{}^{g}\tilde{\text{℩}}$$

$$1{\times}(og) \ni \begin{cases} {}^{og}\underset{\sim}{\text{℩}} = {}^{g}\tilde{\text{℩}}{:}g = {}^{o}\underline{g}^{og}\text{℩}{:}g \\ {}^{x}\underset{\sim}{\text{℩}} = {}^{\gamma_x}\tilde{\text{℩}}{:}\gamma_x = {}^{x}_{1/2}B_x{}^{x}\text{℩}{:}\gamma_x \end{cases}$$



$${}^{y}\overbrace{g \ltimes \tilde{\daleth}} = {}^{y}\overbrace{R_g \tilde{\daleth}} = {}^{yg}\tilde{\daleth} \Longrightarrow {}^{ky}\overbrace{g \ltimes \tilde{\daleth}} = {}^{ky \cdot g}\tilde{\daleth} = {}^{k \cdot yg}\tilde{\daleth} = {}^{o}\underline{k}\,{}^{yg}\tilde{\daleth} = {}^{o}\underline{k}\,{}^{y}\overbrace{g \ltimes \tilde{\daleth}}$$

$${}^{y}\overline{\underline{g}g \ltimes \daleth} = {}^{o}\underline{y}\,{}^{oy}\overbrace{\underline{g}g \ltimes \daleth} = {}^{o}\underline{y}\,{}^{oy}\underline{g}\,{}^{oy \cdot g}\daleth = {}^{o}\underline{yg}\,{}^{oyg}\daleth = {}^{yg}\tilde{\daleth} = {}^{y}\overbrace{R_g \tilde{\daleth}}$$

$$x{:}\flat \in D \rtimes \underline{G} \xrightarrow{\rtimes} \underline{D} \ni \flat_x$$

$$\flat_{og} = \flat_g\, o^{g}\underline{\rtimes}$$

$${}^{x}\overbrace{\dot{x}\nabla\daleth} = \dot{x}\,{}^{x}\underline{\daleth} - \underline{\bar{\flat} \rtimes g}_{x}\, \underline{\varrho}\,{}^{x}\daleth$$

$${}^{y}\overbrace{R_g \ltimes \tilde{\daleth}} = {}^{yg}\tilde{\daleth} = {}^{o}\underline{yg}\,{}^{oyg}\daleth = {}^{o}\underline{yg}\,{}^{y}\overbrace{R_g \ltimes \underbrace{o\rtimes} \ltimes \daleth}$$

$$\bar{\flat}\,{}^{e}\underline{R_g \ltimes \underbrace{o\rtimes} \ltimes \daleth} = \flat_{-}\,\underline{R}_g\,{}^{g}\underline{o\rtimes}\,{}^{og}\underline{\daleth} = \flat\,\underline{R}_g\,{}^{g}\underline{o\rtimes}\,{}^{og}\underline{\daleth} = \dot{x}\,{}^{x}\underline{\daleth}$$

$${}^{o}\underset{\sim}{g}\,{}^{x}\overbrace{\dot{x}\nabla\daleth} = {}^{g}\overline{\dot{x}\nabla\underset{\sim}{\daleth}} = {}^{g}\overline{\underbrace{\flat_g\,{}^{g}o\rtimes}\nabla\underset{\sim}{\daleth}} = \bar{\flat}\,{}^{e}\underline{R_g \ltimes \tilde{\daleth}} = \bar{\flat}\,{}^{e}{}^{o}\underline{yg}\,{}^{y}\overbrace{R_g \ltimes \underbrace{o\rtimes} \ltimes \daleth}_{y}$$

$$= \bar{\flat}\,{}^{e}{}^{o}\underbrace{yg}_{y}\,{}^{e}\overbrace{R_g \ltimes \underbrace{o\rtimes} \ltimes \daleth} + {}^{o}\underset{\sim}{g}\,\bar{\flat}\,{}^{e}\underline{R_g \ltimes \underbrace{o\rtimes} \ltimes \daleth} = \overbrace{\bar{\flat}\,{}^{e}{}^{o}\underline{yg}_{y}}^{\not\ \underline{\varrho}}\,{}^{x}\daleth + {}^{o}\underset{\sim}{g}\,\overbrace{\dot{x}\,{}^{x}\underline{\daleth}}$$

$${}^{o}\underline{yg} = {}^{o}\underline{gg^{-1}yg} = {}^{o}\underline{g}\,{}^{x}\underline{g^{-1}yg} = {}^{o}\underline{g}\,{}^{x}\underline{y \rtimes g}$$

$$\bar{\flat}\,{}^{e}{}^{o}\underline{yg}_{y} = {}^{o}\underline{g}\,\bar{\flat}\,{}^{ex}\underline{\rtimes g} = {}^{o}\underline{g}\,{}^{x}\underline{\bar{\flat}\,{}^{e}\rtimes g} = {}^{o}\underline{g}\,{}^{x}\underline{\bar{\flat} \rtimes g}$$

$$\underbrace{\flat \rtimes g}_{wg} = \flat_w\,{}^{w}\underline{g} \Longrightarrow \overline{\bar{\flat} \rtimes g}_{x}\,{}^{o}\underline{g} = \overline{\underbrace{\flat \rtimes g}_{wg_o}}^{w} = \underline{\flat_w\,{}^{w}\underline{g}}_{o}$$

$$M = B \Longrightarrow {}^{x}\overbrace{\dot{x}\nabla\daleth} = \dot{x}\,{}^{x}\underline{\daleth} - \dot{x} \bullet \overset{*}{x} \ltimes {}^{x}\daleth$$

$$\underline{\flat_w\,{}^{w}\underline{g}}_{0} = \underline{\underbrace{a - w\overset{*}{a}w}\,{}^{w}\overset{-1}{B}_{-x}\,{}^{x}\overset{1/2}{B}_{x}}_{0} = \underline{\underbrace{a - w\overset{*}{a}w}\,{}^{w}\overset{-1}{B}_{-x}}_{0}\,{}^{x}\overset{1/2}{B}_{x}$$

$$\underline{\bar{\flat} \rtimes g}_{x} = {}^{0}\underline{\underbrace{a - w\overset{*}{a}w}\,{}^{w}\overset{-1}{B}_{-x}} = {}^{0}\underbrace{a - w\overset{*}{a}w}_{=0}\,{}^{0}\overset{-1}{B}_{-x} + \underbrace{a - 0\overset{*}{a}0}\,{}^{0}\underline{{}^{w}\overset{-1}{B}_{-x}}$$

$$= -a\,{}^{0}\overset{-1}{B}_{-x}\,{}^{0}\underline{{}^{w}B_{-x}}\,{}^{0}\overset{-1}{B}_{-x} = -a\,{}^{0}\underline{{}^{w}B_{-x}} = -a\,{}^{0}\underline{\not\ + 2w \bullet \overset{*}{x} + Q_w Q_x} = -2a \bullet \overset{*}{x}$$

$$M = D \Longrightarrow {}^{x}\overbrace{\dot{x} \nabla \daleth} = \dot{x}\, {}^{x}\underline{\daleth} - \alpha P_a^{1/2} \bullet \underset{-1}{\overset{*}{a}}\, \underline{\varrho}\, {}^{x}\daleth$$

$$\overset{*}{a} = a : \overset{*}{b} = -b \Longrightarrow \gamma_{a+b} = P_a^{1/2}\, \mathfrak{t}_b$$

$$\overset{*}{\alpha} = \alpha : \overset{*}{\beta} = -\beta \Longrightarrow \flat_w^{\alpha+\beta} = \alpha \overset{*}{e} w + \beta$$

$$\underbrace{\flat \rtimes g}_{wg} = \flat_w\, {}^{w}\underline{g} = \underbrace{\alpha\overset{*}{e}w+\beta} P_a^{1/2} = \underbrace{\alpha\overset{*}{e}w} P_a^{1/2} + \beta P_a^{1/2} = \underbrace{\alpha P_a^{1/2}}\, \underset{-1}{\overset{*}{a}}\, \underbrace{w P_a^{1/2}} + \beta P_a^{1/2} = \underbrace{\alpha P_a^{1/2}}\, \underset{-1}{\overset{*}{a}}\, \underbrace{wg-b} + \beta P_a^{1/2}$$

$$\Longrightarrow \underbrace{\flat \rtimes g}_{w} = \underbrace{\alpha P_a^{1/2}}\, \underset{-1}{\overset{*}{a}}\, \underbrace{w-b} + \beta P_a^{1/2}$$

$$\Longrightarrow \underline{\flat \rtimes g}_{w} = \alpha P_a^{1/2} \bullet \underset{-1}{\overset{*}{a}}$$

$$\mathfrak{b} = \overset{+}{\mathfrak{b}} \times \overset{-}{\mathfrak{b}}$$

$$\flat : \natural\ (\nabla \P) = -\frac{1}{2} \flat \overset{+}{\times} \natural$$

$$\underbrace{a - x\overset{*}{a}x} \times \underbrace{b - x\overset{*}{b}x} = a \bullet \overset{*}{b} - b \bullet \overset{*}{a} \in \overset{+}{\mathfrak{b}}$$

$$G \xrightarrow{o\rtimes} D = K \neg G$$

$${}^{G}\underset{\infty}{\triangle}\rceil \xleftarrow{\ltimes} G \ltimes {}^{G}\underset{\infty}{\triangle}\rceil$$

$${}^{g}\overbrace{y \ltimes \P} = {}^{yg}\P$$

$${}^{g}\overbrace{\flat \ltimes \P} = {}^{0}\partial_t\, {}^{t\mathfrak{e}^{\flat} g}\P$$

$$o^{g}\rtimes = og$$

$${}^{o}\underline{g} \in K^{\mathbb{C}}$$

$$\dot{x} \in \underline{D}_x$$

$$x = og$$

$$o \rtimes \left(\gamma_t g\right) = o\gamma_t g = \underbrace{og}\, \underbrace{g^{-1}\gamma_t g} = x\, \underbrace{g^{-1}\gamma_t g}$$

$$\Longrightarrow \underbrace{\flat \underline{R}_g}\, o^{g} \underline{\rtimes} = \underbrace{\flat \rtimes g}_{x} = \dot{x}$$

$$\flat\, {}^{e}\underline{R_g \tilde{\daleth}} = {}^{o}\underline{g}\; {}^{x}\underline{\flat \rtimes g}\, {}^{x}\daleth + {}^{o}\underline{g}\; {}^{x}\overbrace{\underbrace{\flat \rtimes g} \ltimes \daleth}$$

$$\text{LHS} = {}^{0}\partial_t\, {}^{t\mathfrak{e}^{\flat} g}\tilde{\daleth} = {}^0\partial_t\, {}^{o}\underline{{}^{t}\mathfrak{e}^{\flat} g}\, {}^{o t\mathfrak{e}^\flat g}\daleth = {}^0\partial_t\, {}^{o}\underline{g\, {}^{t}\mathfrak{e}^{\flat\rtimes g}}\, {}^{og\, t\mathfrak{e}^{\flat\rtimes g}}\daleth = {}^0\partial_t\, \overbrace{{}^{o}\underline{g}\; {}^{x}\underline{{}^{t}\mathfrak{e}^{\flat\rtimes g}}\, {}^{x\, t\mathfrak{e}^{\flat\rtimes g}}\daleth}$$

$$= {}^{o}\underline{g}\; \overbrace{{}^0\partial_t\, {}^{x}\underline{{}^{t}\mathfrak{e}^{\flat\rtimes g}}}\, {}^{x}\daleth + {}^{o}\underline{g}\; \overbrace{{}^0\partial_t\, {}^{x\, t\mathfrak{e}^{\flat\rtimes g}}\daleth} = {}^{o}\underline{g}\; {}^{x}\underline{{}^0\partial_t\, {}^{t}\mathfrak{e}^{\flat\rtimes g}}\, {}^{x}\daleth + {}^{o}\underline{g}\; \overbrace{{}^0\partial_t\, {}^{x\, t\mathfrak{e}^{\flat\rtimes g}}\daleth} = \text{RHS}$$

$${}^{x}\overbrace{\nabla_{\dot x}\daleth} = {}^{x}\underline{\overset{-}{\flat} \rtimes g}\, {}^{x}\daleth + {}^{x}\overbrace{\underbrace{\overset{-}{\flat} \rtimes g} \ltimes \daleth}$$

$${}^{o}\underline{g}\; {}^{og}\overbrace{\nabla_{\dot x}\daleth} = {}^{o}\underline{g}\; {}^{x}\overbrace{\nabla_{\dot x}\daleth} = {}^{g}\overline{\nabla_{\dot x}\daleth} = {}^{g}\overline{\nabla_{\flat_g o^g \underline{\rtimes}}\daleth} = \flat_g\, {}^{g}\underline{\tilde\daleth} - {}^0\partial_t\, {}^{\exp t \underbrace{\flat_g {}^{g}\daleth} \ltimes g}\tilde\daleth$$

$$= \flat\, \underline{R}_g\, {}^{g}\underline{\tilde\daleth} - {}^0\partial_t\, {}^{\exp t \overset{+}{\flat} \ltimes g}\tilde\daleth = \flat\, {}^{e}\underline{R_g\tilde\daleth} - \overset{+}{\flat}\, {}^{e}\underline{R_g\tilde\daleth} = \overset{-}{\flat}\, {}^{e}\underline{R_g\tilde\daleth} = {}^{g}\overbrace{\overset{-}{\flat}\ltimes\tilde\daleth} = \overset{-}{\flat}\, {}^{e}\underline{R_g \ltimes \tilde\daleth}$$