$$\mathfrak{k} \in \underline{G} \Longrightarrow \underset{\sim}{\mathfrak{k}}_g = \mathfrak{k}\, \underline{R}_g \in \underline{G}_g$$

$$G \leftarrow K \times G$$

$$\mathfrak{b}\, \underline{R}_g{}^{g}\mathfrak{q} \in \underline{G}_g \xrightarrow{{}^{g}\mathfrak{q}} \underline{K} \ni \overset{+}{\mathfrak{b}}$$

$$\mathfrak{b}\, \underline{R}_g{}^{g}\mathfrak{q} = \mathfrak{b}_g{}^{g}\mathfrak{q} = \overset{+}{\mathfrak{b}} \text{ left K-inv}$$

$$\text{LHS} = \mathfrak{b}\, \underline{R}_g{}^{g}\mathfrak{q} \underset{\text{KN}}{=} \overbrace{\mathfrak{b}\, \underline{R}_g{}^{g}\overset{+}{\underline{R}^{-1}}} = \text{RHS}$$

$${}^{g}\overbrace{\overset{+}{\mathfrak{k}} \ltimes \mathfrak{q}} = \overset{+}{\mathfrak{k}}{}^{e}\underline{R_g \ltimes \mathfrak{q}}$$

$$\text{LHS} = {}^{0}\partial_t{}^{t_{\mathfrak{e}}\overset{+}{\mathfrak{k}}g}\mathfrak{q} = {}^{0}\partial_t{}^{t_{\mathfrak{e}}\overset{+}{\mathfrak{k}}}\overbrace{R_g \ltimes \mathfrak{q}} = \text{RHS}$$