This is a repeat of previous results of G. Birkhoff, a retired individual in mathematics.

1. The "laborious alternative" method is in fact the same method taught in any reputable university. The definitions (1.2), (1.7), and (1.8) are all the same. Definition 1 is ECE Theory. So what is Birkhoff trying to say?

2. The assertion by Birkhoff against his eqs. (2.1) to (2.2) is not made in ECE Theory. This is an example of disinformation. The correct method is already given in R. L. Evans, "Generalized Covariant Unified Field Theory" (Academic Press, 1965 and 2002) Vol. 1. pp. 261 ff.

Start with the Einstein equation:
\[ R_{\mu \nu} - \frac{1}{2} R g_{\mu \nu} = 8 \pi T_{\mu \nu} \]  

Introduce:
\[ R_{\mu \nu} = R_{\mu}^{\ \alpha} \nu_{\alpha} - 8 \pi T_{\mu \nu} \]  
\[ T_{\mu \nu} = T^{\ \alpha}_{\mu} \nu_{\alpha} - 8 \pi G_{\mu \nu} \]  
\[ g_{\mu \nu} = \eta_{\mu \nu} \]  

Eq. (4) is the standard decomposition of the metric into the product of two tetradas (e.g. Carroll).
This method is used in eqs. (3) and (4) to define $R^a$ and $T^a$, which are vector valued as forms. One of the Einstein field equations is:

$$G^a = -\frac{1}{4} R 
abla a - (5)$$

$$T^a = \frac{1}{4} T \nabla a - (6)$$

Eqs. (5) and (6) are derived from the definition of $R$ and $T$ originally used by Einstein:

$$R = g^a b R_{ab} , \quad T = g^a b T_{ab} - (7)$$

Use the Einstein convention:

$$\Gamma^a b = 4 - (8)$$

and the Greek convention:

$$\nabla a \nabla a = 1 - (9)$$

To obtain:

$$R = g^a b \nabla a = \nabla b \nabla a \nabla b R_{ab} = \nabla b \nabla a \nabla b R_{ab} - (10)$$

where we have used eq. (2).

Multiply both sides of eq. (10) by $\nabla a$ to obtain:

$$R^a = -\frac{1}{4} R \nabla a - (11)$$

This is because the R.H.S. of eq. (10) is:

$$\left( \nabla a \nabla b \nabla a \right) \left( \nabla b \nabla a \nabla b \right) \left( \nabla b \nabla a \nabla b \right) = 4 \nabla a \nabla b \nabla a \nabla b \nabla a \nabla b \nabla a \nabla b \nabla a \nabla b \nabla a \nabla b \nabla a \nabla b \nabla a \nabla b \nabla a \nabla b \nabla a \nabla b \nabla a \nabla b$$
Multiply both sides of eq. (13) by $a^a_e$ to obtain:

$$R^a = \frac{1}{4} R a^a_e - (13)$$

So:

$$R^a = R^\mu - \frac{1}{2} R a^a_e = -\frac{1}{4} R a^a_e - (14)$$

This is eq. (5). Q.E.D.

The contracted form of eq. (1) is:

$$R = \frac{k T}{a^a_e} - (15)$$

(Refer to, "The Meaning of Relativity"). Multiply both sides of eq. (15) by $v^a_e$:

$$R v^a_e = -\frac{k T}{a^a_e} v^a_e - (16)$$

Substituting eqs. (5) and (10) into eq. (16) gives:

$$G^a = \frac{k T}{a^a_e}$$

Write eq. (17) in the form:

$$\frac{1}{4} R a^a_e - \frac{1}{2} R v^a_e = \frac{1}{4} k T v^a_e - (18)$$

Multiply both sides of eq. (18) by $a^a_e$.
\[ \begin{align*}
\frac{1}{4} R a^a \cdot V \cdot \Lambda_{ab} &= \frac{1}{2} R a^a \cdot a^b \cdot \Lambda_{ab} \quad (1a) \\
&= \frac{1}{4} k T a^a \cdot V \cdot \Lambda_{ab} \\
&= k T a^a \cdot V \cdot \Lambda_{ab} \\
&= k T a^a \cdot V \cdot \Lambda_{ab} \\
\end{align*} \]

Using Eqs. (3) - (4), and (5) and (6), plus

\[ \text{eq. (1), Q.E.D.} \]

So, both have been directly derived.

To be seen verified out many times before.

Proof:

Starting from eq. (16) we may consider:

\[ R a^a \cdot v \cdot \Lambda_{ab} = - k T a^a \cdot v \cdot \Lambda_{ab} \quad (20) \]

\[ R a^a \cdot 
\]
\[ c(n) := \forall \mu \land \forall \nu - (24) \]

I assume that this is what Baker is trying to say. The definition of wedge product that I use is the same as that used by everyone else, e.g., Carroll, and is given in detail in Vol. 1, Chapter 17, Appendix C, equation (3.5):

\[
\left( (A \land B) \land \cdots \land \left( p_1 \land p_2 \right) \right) \land \left( p_{i+1} \right)
\]

Example 1: Given in Eq. (3.11) and (3.13).

a) There is no type mismatch in Eqs. (25) and (24).

b) There is no "illegal removal" of indices. This is misinformation by Baker, who tries to create confusion.

Further deliberate misinformation by Baker. There are errors in Eqs. (3.10)/(3.13) on p. 4, and it is incorrect. The correct equation...
b) is eq. (2.26) of volume 1:
\[ e_1 \times e_2 = e_3 \]  \hspace{1cm} (26)

at cyclism

John makes the star (denoting complex conjugate).
This shows that he does not know what he is doing.
He cannot even copy out my work correctly.

The 6th element is:
\[ ds^2 = g_{\mu\nu} dx^\mu dx^\nu \]  \hspace{1cm} (27)

This is a scalar, not a symmetric two-form.

c) John confuses a scalar with a symmetric two-form. This is deliberate misformation.

d) John incorrectly asserts that the Hodge dual of a two-form cannot be defined. This is, I assume, what he is trying to do at p. 5.
It is well known that the Hodge dual of a two-form is 4-D is another two-form (e.g. Carroll)
There is deliberate misinformation by B. H. C. in the book. He
misrepresents my definitions, and makes no comparative
reduction. My definition are as follows:

\[ v_{ij} = \begin{bmatrix} l_1 & l_2 & l_3 \\ l_4 & l_5 & l_6 \end{bmatrix} = \begin{bmatrix} l_1^2 & l_1l_2 & l_1l_3 \\ l_2l_1 & l_2^2 & l_2l_3 \\ l_3l_1 & l_3l_2 & l_3^2 \end{bmatrix} \] (27)

Q.E.D. 

The does not have anything to do with B. H. C.'s remark.

This does B. H. C. again spreading misinformation. To
make no remarks at the foot of the page is nonsense in
Cartan geometry. ECE is based on

a Cartan geometry.

Finally, observe misinformation on page 6 of B. H. C. makes no sense in light of the
self-consistent mathematics of the developments.