$$
\begin{aligned}
\chi^2 = & (\alpha_{12} - A_1 + A_2)^2 + (\alpha_{23} - A_2 + A_3)^2 + \ldots && (1)\\
& (\beta_{12} - B_1 + B_2)^2 + (\beta_{23} - B_2 + B_3)^2 + \ldots && (2)\\
& (T_1 - A_1 + B_1)^2 + (T_2 - A_2 + B_2)^2 + \ldots && (3)
\end{aligned}
$$

$$
\frac{1}{2}\frac{\partial \chi^2}{\partial A_2} = (\alpha_{12} - A_1 + A_2) - (\alpha_{23} - A_2 + A_3) - (T_2 - A_2 + B_2) = 0 \qquad (4)
$$

$$
\begin{pmatrix}
0 \\
\alpha_{23} - \alpha_{12} + T_2 \\
\alpha_{34} - \alpha_{23} + T_3 \\
\alpha_{45} - \alpha_{34} + T_4 \\
\alpha_{51} - \alpha_{45} + T_5 \\
\beta_{12} - \beta_{51} + T_1 \\
\beta_{23} - \beta_{12} + T_2 \\
\beta_{34} - \beta_{23} + T_3 \\
\beta_{45} - \beta_{34} + T_4 \\
\beta_{51} - \beta_{45} + T_5
\end{pmatrix}
=
\begin{pmatrix}
1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
-1 & 3 & -1 & & & & -1 & & & \\
 & -1 & 3 & -1 & & & & -1 & & \\
 & & -1 & 3 & -1 & & & & -1 & \\
-1 & & & -1 & 3 & & & & & -1 \\
-1 & & & & & 3 & -1 & & & -1 \\
 & -1 & & & & -1 & 3 & -1 & & \\
 & & -1 & & & & -1 & 3 & -1 & \\
 & & & -1 & & & & -1 & 3 & -1 \\
 & & & & -1 & -1 & & & -1 & 3
\end{pmatrix}
\begin{pmatrix}
A_1 \\ A_2 \\ A_3 \\ A_4 \\ A_5 \\ B_1 \\ B_2 \\ B_3 \\ B_4 \\ B_5
\end{pmatrix}
$$