High Temperature Monoclinic TlS Structure: AB_mC256_5_2a2b30c_32c-001

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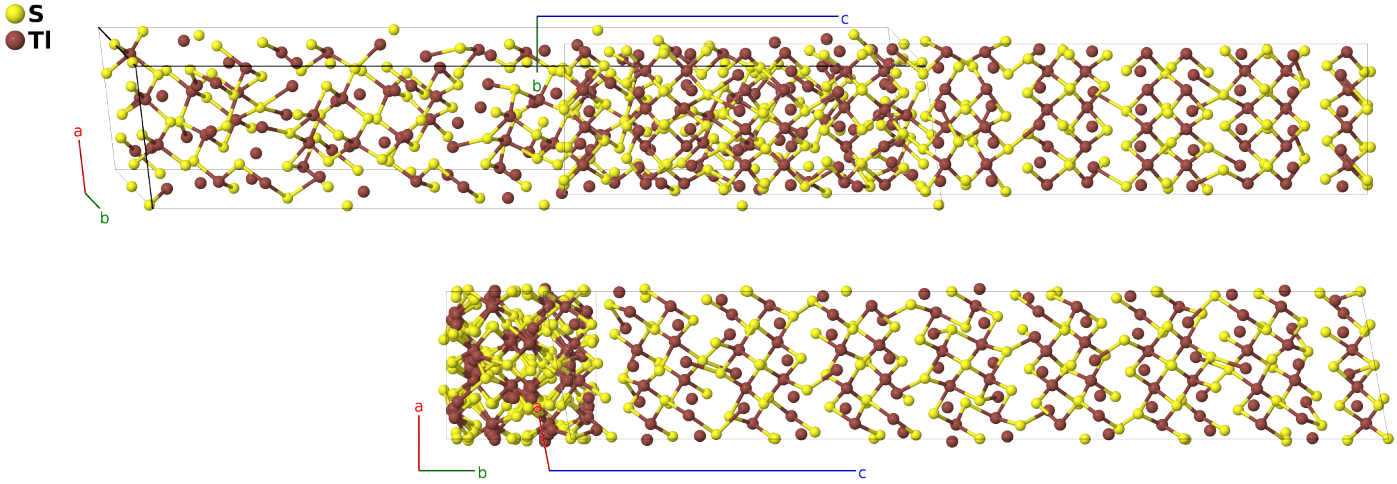


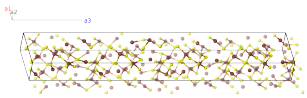
Prototype	STl
AFLOW prototype label	AB_mC256_5_2a2b30c_32c-001
ICSD	74446
Pearson symbol	mC256
Space group number	5
Space group symbol	$C2$
AFLOW prototype command	`aflow --proto=AB_mC256_5_2a2b30c_32c-001 --params=`$a, b/a, c/a, \beta, y_1, y_2, y_3, y_4, x_5, y_5, z_5, x_6, y_6, z_6, x_7, y_7, z_7, x_8, y_8, z_8, x_9, y_9, z_9, x_{10}, y_{10}, z_{10}, x_{11}, y_{11}, z_{11}, x_{12}, y_{12}, z_{12}, x_{13}, y_{13}, z_{13}, x_{14}, y_{14}, z_{14}, x_{15}, y_{15}, z_{15}, x_{16}, y_{16}, z_{16}, x_{17}, y_{17}, z_{17}, x_{18}, y_{18}, z_{18}, x_{19}, y_{19}, z_{19}, x_{20}, y_{20}, z_{20}, x_{21}, y_{21}, z_{21}, x_{22}, y_{22}, z_{22}, x_{23}, y_{23}, z_{23}, x_{24}, y_{24}, z_{24}, x_{25}, y_{25}, z_{25}, x_{26}, y_{26}, z_{26}, x_{27}, y_{27}, z_{27}, x_{28}, y_{28}, z_{28}, x_{29}, y_{29}, z_{29}, x_{30}, y_{30}, z_{30}, x_{31}, y_{31}, z_{31}, x_{32}, y_{32}, z_{32}, x_{33}, y_{33}, z_{33}, x_{34}, y_{34}, z_{34}, x_{35}, y_{35}, z_{35}, x_{36}, y_{36}, z_{36}, x_{37}, y_{37}, z_{37}, x_{38}, y_{38}, z_{38}, x_{39}, y_{39}, z_{39}, x_{40}, y_{40}, z_{40}, x_{41}, y_{41}, z_{41}, x_{42}, y_{42}, z_{42}, x_{43}, y_{43}, z_{43}, x_{44}, y_{44}, z_{44}, x_{45}, y_{45}, z_{45}, x_{46}, y_{46}, z_{46}, x_{47}, y_{47}, z_{47}, x_{48}, y_{48}, z_{48}, x_{49}, y_{49}, z_{49}, x_{50}, y_{50}, z_{50}, x_{51}, y_{51}, z_{51}, x_{52}, y_{52}, z_{52}, x_{53}, y_{53}, z_{53}, x_{54}, y_{54}, z_{54}, x_{55}, y_{55}, z_{55}, x_{56}, y_{56}, z_{56}, x_{57}, y_{57}, z_{57}, x_{58}, y_{58}, z_{58}, x_{59}, y_{59}, z_{59}, x_{60}, y_{60}, z_{60}, x_{61}, y_{61}, z_{61}, x_{62}, y_{62}, z_{62}, x_{63}, y_{63}, z_{63}, x_{64}, y_{64}, z_{64}, x_{65}, y_{65}, z_{65}, x_{66}, y_{66}, z_{66}$

- TlS occurs naturally in three forms (Villars, 2018):
  - The ground state is tetragonal in the TlSe ($B37$) structure which (Villars, 2018) calls “Tet-I” and (Kishida, 1994) calls “Type I.”
  - An intermediate tetragonal structure, which (Villars, 2018) calls “Tetragonal II,” and (Kashida, 1994) calls Type III.
  - A high temperature monoclinic structure, called “Mon” by (Villars, 2018) and “Type II” by (Kishida, 1994). (this structure)

- If we replaced the conventional cell primitive vector $\mathbf{a}_3$ used by (Nakamura, 1993) with $\mathbf{a}'_3 = \mathbf{a}_1 + \mathbf{a}_3$ both the conventional and primitive cells would be very close to tetragonal cells.

Base-centered Monoclinic primitive vectors

$$\mathbf{a_1} = \tfrac{1}{2}a\,\hat{\mathbf{x}} - \tfrac{1}{2}b\,\hat{\mathbf{y}}$$
$$\mathbf{a_2} = \tfrac{1}{2}a\,\hat{\mathbf{x}} + \tfrac{1}{2}b\,\hat{\mathbf{y}}$$
$$\mathbf{a_3} = c\cos\beta\,\hat{\mathbf{x}} + c\sin\beta\,\hat{\mathbf{z}}$$



Basis vectors

		Lattice coordinates		Cartesian coordinates	Wyckoff position	Atom type
$\mathbf{B_1}$	=	$-y_1\,\mathbf{a}_1 + y_1\,\mathbf{a}_2$	=	$by_1\,\hat{\mathbf{y}}$	(2a)	S I
$\mathbf{B_2}$	=	$-y_2\,\mathbf{a}_1 + y_2\,\mathbf{a}_2$	=	$by_2\,\hat{\mathbf{y}}$	(2a)	S II
$\mathbf{B_3}$	=	$-y_3\,\mathbf{a}_1 + y_3\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	=	$\frac{1}{2}c\cos\beta\,\hat{\mathbf{x}} + by_3\,\hat{\mathbf{y}} + \frac{1}{2}c\sin\beta\,\hat{\mathbf{z}}$	(2b)	S III
$\mathbf{B_4}$	=	$-y_4\,\mathbf{a}_1 + y_4\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	=	$\frac{1}{2}c\cos\beta\,\hat{\mathbf{x}} + by_4\,\hat{\mathbf{y}} + \frac{1}{2}c\sin\beta\,\hat{\mathbf{z}}$	(2b)	S IV
$\mathbf{B_5}$	=	$(x_5 - y_5)\,\mathbf{a}_1 + (x_5 + y_5)\,\mathbf{a}_2 + z_5\,\mathbf{a}_3$	=	$(ax_5 + cz_5\cos\beta)\,\hat{\mathbf{x}} + by_5\,\hat{\mathbf{y}} + cz_5\sin\beta\,\hat{\mathbf{z}}$	(4c)	S V
$\mathbf{B_6}$	=	$-(x_5 + y_5)\,\mathbf{a}_1 - (x_5 - y_5)\,\mathbf{a}_2 - z_5\,\mathbf{a}_3$	=	$-(ax_5 + cz_5\cos\beta)\,\hat{\mathbf{x}} + by_5\,\hat{\mathbf{y}} - cz_5\sin\beta\,\hat{\mathbf{z}}$	(4c)	S V
$\mathbf{B_7}$	=	$(x_6 - y_6)\,\mathbf{a}_1 + (x_6 + y_6)\,\mathbf{a}_2 + z_6\,\mathbf{a}_3$	=	$(ax_6 + cz_6\cos\beta)\,\hat{\mathbf{x}} + by_6\,\hat{\mathbf{y}} + cz_6\sin\beta\,\hat{\mathbf{z}}$	(4c)	S VI
$\mathbf{B_8}$	=	$-(x_6 + y_6)\,\mathbf{a}_1 - (x_6 - y_6)\,\mathbf{a}_2 - z_6\,\mathbf{a}_3$	=	$-(ax_6 + cz_6\cos\beta)\,\hat{\mathbf{x}} + by_6\,\hat{\mathbf{y}} - cz_6\sin\beta\,\hat{\mathbf{z}}$	(4c)	S VI
$\mathbf{B_9}$	=	$(x_7 - y_7)\,\mathbf{a}_1 + (x_7 + y_7)\,\mathbf{a}_2 + z_7\,\mathbf{a}_3$	=	$(ax_7 + cz_7\cos\beta)\,\hat{\mathbf{x}} + by_7\,\hat{\mathbf{y}} + cz_7\sin\beta\,\hat{\mathbf{z}}$	(4c)	S VII
$\mathbf{B_{10}}$	=	$-(x_7 + y_7)\,\mathbf{a}_1 - (x_7 - y_7)\,\mathbf{a}_2 - z_7\,\mathbf{a}_3$	=	$-(ax_7 + cz_7\cos\beta)\,\hat{\mathbf{x}} + by_7\,\hat{\mathbf{y}} - cz_7\sin\beta\,\hat{\mathbf{z}}$	(4c)	S VII
$\mathbf{B_{11}}$	=	$(x_8 - y_8)\,\mathbf{a}_1 + (x_8 + y_8)\,\mathbf{a}_2 + z_8\,\mathbf{a}_3$	=	$(ax_8 + cz_8\cos\beta)\,\hat{\mathbf{x}} + by_8\,\hat{\mathbf{y}} + cz_8\sin\beta\,\hat{\mathbf{z}}$	(4c)	S VIII
$\mathbf{B_{12}}$	=	$-(x_8 + y_8)\,\mathbf{a}_1 - (x_8 - y_8)\,\mathbf{a}_2 - z_8\,\mathbf{a}_3$	=	$-(ax_8 + cz_8\cos\beta)\,\hat{\mathbf{x}} + by_8\,\hat{\mathbf{y}} - cz_8\sin\beta\,\hat{\mathbf{z}}$	(4c)	S VIII
$\mathbf{B_{13}}$	=	$(x_9 - y_9)\,\mathbf{a}_1 + (x_9 + y_9)\,\mathbf{a}_2 + z_9\,\mathbf{a}_3$	=	$(ax_9 + cz_9\cos\beta)\,\hat{\mathbf{x}} + by_9\,\hat{\mathbf{y}} + cz_9\sin\beta\,\hat{\mathbf{z}}$	(4c)	S IX
$\mathbf{B_{14}}$	=	$-(x_9 + y_9)\,\mathbf{a}_1 - (x_9 - y_9)\,\mathbf{a}_2 - z_9\,\mathbf{a}_3$	=	$-(ax_9 + cz_9\cos\beta)\,\hat{\mathbf{x}} + by_9\,\hat{\mathbf{y}} - cz_9\sin\beta\,\hat{\mathbf{z}}$	(4c)	S IX
$\mathbf{B_{15}}$	=	$(x_{10} - y_{10})\,\mathbf{a}_1 + (x_{10} + y_{10})\,\mathbf{a}_2 + z_{10}\,\mathbf{a}_3$	=	$(ax_{10} + cz_{10}\cos\beta)\,\hat{\mathbf{x}} + by_{10}\,\hat{\mathbf{y}} + cz_{10}\sin\beta\,\hat{\mathbf{z}}$	(4c)	S X
$\mathbf{B_{16}}$	=	$-(x_{10} + y_{10})\,\mathbf{a}_1 - (x_{10} - y_{10})\,\mathbf{a}_2 - z_{10}\,\mathbf{a}_3$	=	$-(ax_{10} + cz_{10}\cos\beta)\,\hat{\mathbf{x}} + by_{10}\,\hat{\mathbf{y}} - cz_{10}\sin\beta\,\hat{\mathbf{z}}$	(4c)	S X
$\mathbf{B_{17}}$	=	$(x_{11} - y_{11})\,\mathbf{a}_1 + (x_{11} + y_{11})\,\mathbf{a}_2 + z_{11}\,\mathbf{a}_3$	=	$(ax_{11} + cz_{11}\cos\beta)\,\hat{\mathbf{x}} + by_{11}\,\hat{\mathbf{y}} + cz_{11}\sin\beta\,\hat{\mathbf{z}}$	(4c)	S XI
$\mathbf{B_{18}}$	=	$-(x_{11} + y_{11})\,\mathbf{a}_1 - (x_{11} - y_{11})\,\mathbf{a}_2 - z_{11}\,\mathbf{a}_3$	=	$-(ax_{11} + cz_{11}\cos\beta)\,\hat{\mathbf{x}} + by_{11}\,\hat{\mathbf{y}} - cz_{11}\sin\beta\,\hat{\mathbf{z}}$	(4c)	S XI
$\mathbf{B_{19}}$	=	$(x_{12} - y_{12})\,\mathbf{a}_1 + (x_{12} + y_{12})\,\mathbf{a}_2 + z_{12}\,\mathbf{a}_3$	=	$(ax_{12} + cz_{12}\cos\beta)\,\hat{\mathbf{x}} + by_{12}\,\hat{\mathbf{y}} + cz_{12}\sin\beta\,\hat{\mathbf{z}}$	(4c)	S XII
$\mathbf{B_{20}}$	=	$-(x_{12} + y_{12})\,\mathbf{a}_1 - (x_{12} - y_{12})\,\mathbf{a}_2 - z_{12}\,\mathbf{a}_3$	=	$-(ax_{12} + cz_{12}\cos\beta)\,\hat{\mathbf{x}} + by_{12}\,\hat{\mathbf{y}} - cz_{12}\sin\beta\,\hat{\mathbf{z}}$	(4c)	S XII

$$\mathbf{B_{21}} = (x_{13}-y_{13})\,\mathbf{a}_1 + (x_{13}+y_{13})\,\mathbf{a}_2 + z_{13}\,\mathbf{a}_3 = (ax_{13}+cz_{13}\cos\beta)\,\hat{\mathbf{x}} + by_{13}\,\hat{\mathbf{y}} + cz_{13}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{S XIII}$$

$$\mathbf{B_{22}} = -(x_{13}+y_{13})\,\mathbf{a}_1 - (x_{13}-y_{13})\,\mathbf{a}_2 - z_{13}\,\mathbf{a}_3 = -(ax_{13}+cz_{13}\cos\beta)\,\hat{\mathbf{x}} + by_{13}\,\hat{\mathbf{y}} - cz_{13}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{S XIII}$$

$$\mathbf{B_{23}} = (x_{14}-y_{14})\,\mathbf{a}_1 + (x_{14}+y_{14})\,\mathbf{a}_2 + z_{14}\,\mathbf{a}_3 = (ax_{14}+cz_{14}\cos\beta)\,\hat{\mathbf{x}} + by_{14}\,\hat{\mathbf{y}} + cz_{14}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{S XIV}$$

$$\mathbf{B_{24}} = -(x_{14}+y_{14})\,\mathbf{a}_1 - (x_{14}-y_{14})\,\mathbf{a}_2 - z_{14}\,\mathbf{a}_3 = -(ax_{14}+cz_{14}\cos\beta)\,\hat{\mathbf{x}} + by_{14}\,\hat{\mathbf{y}} - cz_{14}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{S XIV}$$

$$\mathbf{B_{25}} = (x_{15}-y_{15})\,\mathbf{a}_1 + (x_{15}+y_{15})\,\mathbf{a}_2 + z_{15}\,\mathbf{a}_3 = (ax_{15}+cz_{15}\cos\beta)\,\hat{\mathbf{x}} + by_{15}\,\hat{\mathbf{y}} + cz_{15}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{S XV}$$

$$\mathbf{B_{26}} = -(x_{15}+y_{15})\,\mathbf{a}_1 - (x_{15}-y_{15})\,\mathbf{a}_2 - z_{15}\,\mathbf{a}_3 = -(ax_{15}+cz_{15}\cos\beta)\,\hat{\mathbf{x}} + by_{15}\,\hat{\mathbf{y}} - cz_{15}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{S XV}$$

$$\mathbf{B_{27}} = (x_{16}-y_{16})\,\mathbf{a}_1 + (x_{16}+y_{16})\,\mathbf{a}_2 + z_{16}\,\mathbf{a}_3 = (ax_{16}+cz_{16}\cos\beta)\,\hat{\mathbf{x}} + by_{16}\,\hat{\mathbf{y}} + cz_{16}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{S XVI}$$

$$\mathbf{B_{28}} = -(x_{16}+y_{16})\,\mathbf{a}_1 - (x_{16}-y_{16})\,\mathbf{a}_2 - z_{16}\,\mathbf{a}_3 = -(ax_{16}+cz_{16}\cos\beta)\,\hat{\mathbf{x}} + by_{16}\,\hat{\mathbf{y}} - cz_{16}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{S XVI}$$

$$\mathbf{B_{29}} = (x_{17}-y_{17})\,\mathbf{a}_1 + (x_{17}+y_{17})\,\mathbf{a}_2 + z_{17}\,\mathbf{a}_3 = (ax_{17}+cz_{17}\cos\beta)\,\hat{\mathbf{x}} + by_{17}\,\hat{\mathbf{y}} + cz_{17}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{S XVII}$$

$$\mathbf{B_{30}} = -(x_{17}+y_{17})\,\mathbf{a}_1 - (x_{17}-y_{17})\,\mathbf{a}_2 - z_{17}\,\mathbf{a}_3 = -(ax_{17}+cz_{17}\cos\beta)\,\hat{\mathbf{x}} + by_{17}\,\hat{\mathbf{y}} - cz_{17}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{S XVII}$$

$$\mathbf{B_{31}} = (x_{18}-y_{18})\,\mathbf{a}_1 + (x_{18}+y_{18})\,\mathbf{a}_2 + z_{18}\,\mathbf{a}_3 = (ax_{18}+cz_{18}\cos\beta)\,\hat{\mathbf{x}} + by_{18}\,\hat{\mathbf{y}} + cz_{18}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{S XVIII}$$

$$\mathbf{B_{32}} = -(x_{18}+y_{18})\,\mathbf{a}_1 - (x_{18}-y_{18})\,\mathbf{a}_2 - z_{18}\,\mathbf{a}_3 = -(ax_{18}+cz_{18}\cos\beta)\,\hat{\mathbf{x}} + by_{18}\,\hat{\mathbf{y}} - cz_{18}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{S XVIII}$$

$$\mathbf{B_{33}} = (x_{19}-y_{19})\,\mathbf{a}_1 + (x_{19}+y_{19})\,\mathbf{a}_2 + z_{19}\,\mathbf{a}_3 = (ax_{19}+cz_{19}\cos\beta)\,\hat{\mathbf{x}} + by_{19}\,\hat{\mathbf{y}} + cz_{19}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{S XIX}$$

$$\mathbf{B_{34}} = -(x_{19}+y_{19})\,\mathbf{a}_1 - (x_{19}-y_{19})\,\mathbf{a}_2 - z_{19}\,\mathbf{a}_3 = -(ax_{19}+cz_{19}\cos\beta)\,\hat{\mathbf{x}} + by_{19}\,\hat{\mathbf{y}} - cz_{19}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{S XIX}$$

$$\mathbf{B_{35}} = (x_{20}-y_{20})\,\mathbf{a}_1 + (x_{20}+y_{20})\,\mathbf{a}_2 + z_{20}\,\mathbf{a}_3 = (ax_{20}+cz_{20}\cos\beta)\,\hat{\mathbf{x}} + by_{20}\,\hat{\mathbf{y}} + cz_{20}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{S XX}$$

$$\mathbf{B_{36}} = -(x_{20}+y_{20})\,\mathbf{a}_1 - (x_{20}-y_{20})\,\mathbf{a}_2 - z_{20}\,\mathbf{a}_3 = -(ax_{20}+cz_{20}\cos\beta)\,\hat{\mathbf{x}} + by_{20}\,\hat{\mathbf{y}} - cz_{20}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{S XX}$$

$$\mathbf{B_{37}} = (x_{21}-y_{21})\,\mathbf{a}_1 + (x_{21}+y_{21})\,\mathbf{a}_2 + z_{21}\,\mathbf{a}_3 = (ax_{21}+cz_{21}\cos\beta)\,\hat{\mathbf{x}} + by_{21}\,\hat{\mathbf{y}} + cz_{21}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{S XXI}$$

$$\mathbf{B_{38}} = -(x_{21}+y_{21})\,\mathbf{a}_1 - (x_{21}-y_{21})\,\mathbf{a}_2 - z_{21}\,\mathbf{a}_3 = -(ax_{21}+cz_{21}\cos\beta)\,\hat{\mathbf{x}} + by_{21}\,\hat{\mathbf{y}} - cz_{21}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{S XXI}$$

$$\mathbf{B_{39}} = (x_{22}-y_{22})\,\mathbf{a}_1 + (x_{22}+y_{22})\,\mathbf{a}_2 + z_{22}\,\mathbf{a}_3 = (ax_{22}+cz_{22}\cos\beta)\,\hat{\mathbf{x}} + by_{22}\,\hat{\mathbf{y}} + cz_{22}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{S XXII}$$

$$\mathbf{B_{40}} = -(x_{22}+y_{22})\,\mathbf{a}_1 - (x_{22}-y_{22})\,\mathbf{a}_2 - z_{22}\,\mathbf{a}_3 = -(ax_{22}+cz_{22}\cos\beta)\,\hat{\mathbf{x}} + by_{22}\,\hat{\mathbf{y}} - cz_{22}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{S XXII}$$

$$\mathbf{B_{41}} = (x_{23}-y_{23})\,\mathbf{a}_1 + (x_{23}+y_{23})\,\mathbf{a}_2 + z_{23}\,\mathbf{a}_3 = (ax_{23}+cz_{23}\cos\beta)\,\hat{\mathbf{x}} + by_{23}\,\hat{\mathbf{y}} + cz_{23}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{S XXIII}$$

$$\mathbf{B_{42}} = -(x_{23}+y_{23})\,\mathbf{a}_1 - (x_{23}-y_{23})\,\mathbf{a}_2 - z_{23}\,\mathbf{a}_3 = -(ax_{23}+cz_{23}\cos\beta)\,\hat{\mathbf{x}} + by_{23}\,\hat{\mathbf{y}} - cz_{23}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{S XXIII}$$

$$\mathbf{B_{43}} = (x_{24}-y_{24})\,\mathbf{a}_1 + (x_{24}+y_{24})\,\mathbf{a}_2 + z_{24}\,\mathbf{a}_3 = (ax_{24}+cz_{24}\cos\beta)\,\hat{\mathbf{x}} + by_{24}\,\hat{\mathbf{y}} + cz_{24}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{S XXIV}$$

$$\mathbf{B_{44}} = -(x_{24}+y_{24})\,\mathbf{a}_1 - (x_{24}-y_{24})\,\mathbf{a}_2 - z_{24}\,\mathbf{a}_3 = -(ax_{24}+cz_{24}\cos\beta)\,\hat{\mathbf{x}} + by_{24}\,\hat{\mathbf{y}} - cz_{24}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{S XXIV}$$

$$\mathbf{B_{45}} = (x_{25}-y_{25})\,\mathbf{a}_1 + (x_{25}+y_{25})\,\mathbf{a}_2 + z_{25}\,\mathbf{a}_3 = (ax_{25}+cz_{25}\cos\beta)\,\hat{\mathbf{x}} + by_{25}\,\hat{\mathbf{y}} + cz_{25}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{S XXV}$$

$$\mathbf{B_{46}} = -(x_{25}+y_{25})\,\mathbf{a}_1 - (x_{25}-y_{25})\,\mathbf{a}_2 - z_{25}\,\mathbf{a}_3 = -(ax_{25}+cz_{25}\cos\beta)\,\hat{\mathbf{x}} + by_{25}\,\hat{\mathbf{y}} - cz_{25}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{S XXV}$$

$$\mathbf{B_{47}} = (x_{26}-y_{26})\,\mathbf{a}_1 + (x_{26}+y_{26})\,\mathbf{a}_2 + z_{26}\,\mathbf{a}_3 = (ax_{26}+cz_{26}\cos\beta)\,\hat{\mathbf{x}} + by_{26}\,\hat{\mathbf{y}} + cz_{26}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{S XXVI}$$

$$\mathbf{B_{48}} = -(x_{26}+y_{26})\,\mathbf{a}_1 - (x_{26}-y_{26})\,\mathbf{a}_2 - z_{26}\,\mathbf{a}_3 = -(ax_{26}+cz_{26}\cos\beta)\,\hat{\mathbf{x}} + by_{26}\,\hat{\mathbf{y}} - cz_{26}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{S XXVI}$$

$$\mathbf{B_{49}} = (x_{27}-y_{27})\,\mathbf{a}_1 + (x_{27}+y_{27})\,\mathbf{a}_2 + z_{27}\,\mathbf{a}_3 = (ax_{27}+cz_{27}\cos\beta)\,\hat{\mathbf{x}} + by_{27}\,\hat{\mathbf{y}} + cz_{27}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{S XXVII}$$

$$\mathbf{B_{50}} = -(x_{27}+y_{27})\,\mathbf{a}_1 - (x_{27}-y_{27})\,\mathbf{a}_2 - z_{27}\,\mathbf{a}_3 = -(ax_{27}+cz_{27}\cos\beta)\,\hat{\mathbf{x}} + by_{27}\,\hat{\mathbf{y}} - cz_{27}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{S XXVII}$$

$$\mathbf{B_{51}} = (x_{28}-y_{28})\,\mathbf{a}_1 + (x_{28}+y_{28})\,\mathbf{a}_2 + z_{28}\,\mathbf{a}_3 = (ax_{28}+cz_{28}\cos\beta)\,\hat{\mathbf{x}} + by_{28}\,\hat{\mathbf{y}} + cz_{28}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{S XXVIII}$$

$$\mathbf{B_{52}} = -(x_{28}+y_{28})\,\mathbf{a}_1 - (x_{28}-y_{28})\,\mathbf{a}_2 - z_{28}\,\mathbf{a}_3 = -(ax_{28}+cz_{28}\cos\beta)\,\hat{\mathbf{x}} + by_{28}\,\hat{\mathbf{y}} - cz_{28}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{S XXVIII}$$

$$\mathbf{B_{53}} = (x_{29}-y_{29})\,\mathbf{a}_1 + (x_{29}+y_{29})\,\mathbf{a}_2 + z_{29}\,\mathbf{a}_3 = (ax_{29}+cz_{29}\cos\beta)\,\hat{\mathbf{x}} + by_{29}\,\hat{\mathbf{y}} + cz_{29}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{S XXIX}$$

$$\mathbf{B_{54}} = -(x_{29}+y_{29})\,\mathbf{a}_1 - (x_{29}-y_{29})\,\mathbf{a}_2 - z_{29}\,\mathbf{a}_3 = -(ax_{29}+cz_{29}\cos\beta)\,\hat{\mathbf{x}} + by_{29}\,\hat{\mathbf{y}} - cz_{29}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{S XXIX}$$

$$\mathbf{B_{55}} = (x_{30}-y_{30})\,\mathbf{a}_1 + (x_{30}+y_{30})\,\mathbf{a}_2 + z_{30}\,\mathbf{a}_3 = (ax_{30}+cz_{30}\cos\beta)\,\hat{\mathbf{x}} + by_{30}\,\hat{\mathbf{y}} + cz_{30}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{S XXX}$$

$$\mathbf{B_{56}} = -(x_{30}+y_{30})\,\mathbf{a}_1 - (x_{30}-y_{30})\,\mathbf{a}_2 - z_{30}\,\mathbf{a}_3 = -(ax_{30}+cz_{30}\cos\beta)\,\hat{\mathbf{x}} + by_{30}\,\hat{\mathbf{y}} - cz_{30}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{S XXX}$$

$$\mathbf{B_{57}} = (x_{31}-y_{31})\,\mathbf{a}_1 + (x_{31}+y_{31})\,\mathbf{a}_2 + z_{31}\,\mathbf{a}_3 = (ax_{31}+cz_{31}\cos\beta)\,\hat{\mathbf{x}} + by_{31}\,\hat{\mathbf{y}} + cz_{31}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{S XXXI}$$

$$\mathbf{B_{58}} = -(x_{31}+y_{31})\,\mathbf{a}_1 - (x_{31}-y_{31})\,\mathbf{a}_2 - z_{31}\,\mathbf{a}_3 = -(ax_{31}+cz_{31}\cos\beta)\,\hat{\mathbf{x}} + by_{31}\,\hat{\mathbf{y}} - cz_{31}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{S XXXI}$$

$$\mathbf{B_{59}} = (x_{32}-y_{32})\,\mathbf{a}_1 + (x_{32}+y_{32})\,\mathbf{a}_2 + z_{32}\,\mathbf{a}_3 = (ax_{32}+cz_{32}\cos\beta)\,\hat{\mathbf{x}} + by_{32}\,\hat{\mathbf{y}} + cz_{32}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{S XXXII}$$

$$\mathbf{B_{60}} = -(x_{32}+y_{32})\,\mathbf{a}_1 - (x_{32}-y_{32})\,\mathbf{a}_2 - z_{32}\,\mathbf{a}_3 = -(ax_{32}+cz_{32}\cos\beta)\,\hat{\mathbf{x}} + by_{32}\,\hat{\mathbf{y}} - cz_{32}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{S XXXII}$$

$$\mathbf{B_{61}} = (x_{33}-y_{33})\,\mathbf{a}_1 + (x_{33}+y_{33})\,\mathbf{a}_2 + z_{33}\,\mathbf{a}_3 = (ax_{33}+cz_{33}\cos\beta)\,\hat{\mathbf{x}} + by_{33}\,\hat{\mathbf{y}} + cz_{33}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{S XXXIII}$$

$$\mathbf{B_{62}} = -(x_{33}+y_{33})\,\mathbf{a}_1 - (x_{33}-y_{33})\,\mathbf{a}_2 - z_{33}\,\mathbf{a}_3 = -(ax_{33}+cz_{33}\cos\beta)\,\hat{\mathbf{x}} + by_{33}\,\hat{\mathbf{y}} - cz_{33}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{S XXXIII}$$

$$\mathbf{B_{63}} = (x_{34}-y_{34})\,\mathbf{a}_1 + (x_{34}+y_{34})\,\mathbf{a}_2 + z_{34}\,\mathbf{a}_3 = (ax_{34}+cz_{34}\cos\beta)\,\hat{\mathbf{x}} + by_{34}\,\hat{\mathbf{y}} + cz_{34}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{S XXXIV}$$

$$\mathbf{B_{64}} = -(x_{34}+y_{34})\,\mathbf{a}_1 - (x_{34}-y_{34})\,\mathbf{a}_2 - z_{34}\,\mathbf{a}_3 = -(ax_{34}+cz_{34}\cos\beta)\,\hat{\mathbf{x}} + by_{34}\,\hat{\mathbf{y}} - cz_{34}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{S XXXIV}$$

$$\mathbf{B_{65}} = (x_{35}-y_{35})\,\mathbf{a}_1 + (x_{35}+y_{35})\,\mathbf{a}_2 + z_{35}\,\mathbf{a}_3 = (ax_{35}+cz_{35}\cos\beta)\,\hat{\mathbf{x}} + by_{35}\,\hat{\mathbf{y}} + cz_{35}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{Tl I}$$

$$\mathbf{B_{66}} = -(x_{35}+y_{35})\,\mathbf{a}_1 - (x_{35}-y_{35})\,\mathbf{a}_2 - z_{35}\,\mathbf{a}_3 = -(ax_{35}+cz_{35}\cos\beta)\,\hat{\mathbf{x}} + by_{35}\,\hat{\mathbf{y}} - cz_{35}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{Tl I}$$

$$\mathbf{B_{67}} = (x_{36}-y_{36})\,\mathbf{a}_1 + (x_{36}+y_{36})\,\mathbf{a}_2 + z_{36}\,\mathbf{a}_3 = (ax_{36}+cz_{36}\cos\beta)\,\hat{\mathbf{x}} + by_{36}\,\hat{\mathbf{y}} + cz_{36}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{Tl II}$$

$$\mathbf{B_{68}} = -(x_{36}+y_{36})\,\mathbf{a}_1 - (x_{36}-y_{36})\,\mathbf{a}_2 - z_{36}\,\mathbf{a}_3 = -(ax_{36}+cz_{36}\cos\beta)\,\hat{\mathbf{x}} + by_{36}\,\hat{\mathbf{y}} - cz_{36}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{Tl II}$$

$\mathbf{B_{69}}$	=	$(x_{37}-y_{37})\,\mathbf{a}_1+(x_{37}+y_{37})\,\mathbf{a}_2+z_{37}\,\mathbf{a}_3$	=	$(ax_{37}+cz_{37}\cos\beta)\,\hat{\mathbf{x}}+by_{37}\,\hat{\mathbf{y}}+cz_{37}\sin\beta\,\hat{\mathbf{z}}$	(4c)	Tl III
$\mathbf{B_{70}}$	=	$-(x_{37}+y_{37})\,\mathbf{a}_1-(x_{37}-y_{37})\,\mathbf{a}_2-z_{37}\,\mathbf{a}_3$	=	$-(ax_{37}+cz_{37}\cos\beta)\,\hat{\mathbf{x}}+by_{37}\,\hat{\mathbf{y}}-cz_{37}\sin\beta\,\hat{\mathbf{z}}$	(4c)	Tl III
$\mathbf{B_{71}}$	=	$(x_{38}-y_{38})\,\mathbf{a}_1+(x_{38}+y_{38})\,\mathbf{a}_2+z_{38}\,\mathbf{a}_3$	=	$(ax_{38}+cz_{38}\cos\beta)\,\hat{\mathbf{x}}+by_{38}\,\hat{\mathbf{y}}+cz_{38}\sin\beta\,\hat{\mathbf{z}}$	(4c)	Tl IV
$\mathbf{B_{72}}$	=	$-(x_{38}+y_{38})\,\mathbf{a}_1-(x_{38}-y_{38})\,\mathbf{a}_2-z_{38}\,\mathbf{a}_3$	=	$-(ax_{38}+cz_{38}\cos\beta)\,\hat{\mathbf{x}}+by_{38}\,\hat{\mathbf{y}}-cz_{38}\sin\beta\,\hat{\mathbf{z}}$	(4c)	Tl IV
$\mathbf{B_{73}}$	=	$(x_{39}-y_{39})\,\mathbf{a}_1+(x_{39}+y_{39})\,\mathbf{a}_2+z_{39}\,\mathbf{a}_3$	=	$(ax_{39}+cz_{39}\cos\beta)\,\hat{\mathbf{x}}+by_{39}\,\hat{\mathbf{y}}+cz_{39}\sin\beta\,\hat{\mathbf{z}}$	(4c)	Tl V
$\mathbf{B_{74}}$	=	$-(x_{39}+y_{39})\,\mathbf{a}_1-(x_{39}-y_{39})\,\mathbf{a}_2-z_{39}\,\mathbf{a}_3$	=	$-(ax_{39}+cz_{39}\cos\beta)\,\hat{\mathbf{x}}+by_{39}\,\hat{\mathbf{y}}-cz_{39}\sin\beta\,\hat{\mathbf{z}}$	(4c)	Tl V
$\mathbf{B_{75}}$	=	$(x_{40}-y_{40})\,\mathbf{a}_1+(x_{40}+y_{40})\,\mathbf{a}_2+z_{40}\,\mathbf{a}_3$	=	$(ax_{40}+cz_{40}\cos\beta)\,\hat{\mathbf{x}}+by_{40}\,\hat{\mathbf{y}}+cz_{40}\sin\beta\,\hat{\mathbf{z}}$	(4c)	Tl VI
$\mathbf{B_{76}}$	=	$-(x_{40}+y_{40})\,\mathbf{a}_1-(x_{40}-y_{40})\,\mathbf{a}_2-z_{40}\,\mathbf{a}_3$	=	$-(ax_{40}+cz_{40}\cos\beta)\,\hat{\mathbf{x}}+by_{40}\,\hat{\mathbf{y}}-cz_{40}\sin\beta\,\hat{\mathbf{z}}$	(4c)	Tl VI
$\mathbf{B_{77}}$	=	$(x_{41}-y_{41})\,\mathbf{a}_1+(x_{41}+y_{41})\,\mathbf{a}_2+z_{41}\,\mathbf{a}_3$	=	$(ax_{41}+cz_{41}\cos\beta)\,\hat{\mathbf{x}}+by_{41}\,\hat{\mathbf{y}}+cz_{41}\sin\beta\,\hat{\mathbf{z}}$	(4c)	Tl VII
$\mathbf{B_{78}}$	=	$-(x_{41}+y_{41})\,\mathbf{a}_1-(x_{41}-y_{41})\,\mathbf{a}_2-z_{41}\,\mathbf{a}_3$	=	$-(ax_{41}+cz_{41}\cos\beta)\,\hat{\mathbf{x}}+by_{41}\,\hat{\mathbf{y}}-cz_{41}\sin\beta\,\hat{\mathbf{z}}$	(4c)	Tl VII
$\mathbf{B_{79}}$	=	$(x_{42}-y_{42})\,\mathbf{a}_1+(x_{42}+y_{42})\,\mathbf{a}_2+z_{42}\,\mathbf{a}_3$	=	$(ax_{42}+cz_{42}\cos\beta)\,\hat{\mathbf{x}}+by_{42}\,\hat{\mathbf{y}}+cz_{42}\sin\beta\,\hat{\mathbf{z}}$	(4c)	Tl VIII
$\mathbf{B_{80}}$	=	$-(x_{42}+y_{42})\,\mathbf{a}_1-(x_{42}-y_{42})\,\mathbf{a}_2-z_{42}\,\mathbf{a}_3$	=	$-(ax_{42}+cz_{42}\cos\beta)\,\hat{\mathbf{x}}+by_{42}\,\hat{\mathbf{y}}-cz_{42}\sin\beta\,\hat{\mathbf{z}}$	(4c)	Tl VIII
$\mathbf{B_{81}}$	=	$(x_{43}-y_{43})\,\mathbf{a}_1+(x_{43}+y_{43})\,\mathbf{a}_2+z_{43}\,\mathbf{a}_3$	=	$(ax_{43}+cz_{43}\cos\beta)\,\hat{\mathbf{x}}+by_{43}\,\hat{\mathbf{y}}+cz_{43}\sin\beta\,\hat{\mathbf{z}}$	(4c)	Tl IX
$\mathbf{B_{82}}$	=	$-(x_{43}+y_{43})\,\mathbf{a}_1-(x_{43}-y_{43})\,\mathbf{a}_2-z_{43}\,\mathbf{a}_3$	=	$-(ax_{43}+cz_{43}\cos\beta)\,\hat{\mathbf{x}}+by_{43}\,\hat{\mathbf{y}}-cz_{43}\sin\beta\,\hat{\mathbf{z}}$	(4c)	Tl IX
$\mathbf{B_{83}}$	=	$(x_{44}-y_{44})\,\mathbf{a}_1+(x_{44}+y_{44})\,\mathbf{a}_2+z_{44}\,\mathbf{a}_3$	=	$(ax_{44}+cz_{44}\cos\beta)\,\hat{\mathbf{x}}+by_{44}\,\hat{\mathbf{y}}+cz_{44}\sin\beta\,\hat{\mathbf{z}}$	(4c)	Tl X
$\mathbf{B_{84}}$	=	$-(x_{44}+y_{44})\,\mathbf{a}_1-(x_{44}-y_{44})\,\mathbf{a}_2-z_{44}\,\mathbf{a}_3$	=	$-(ax_{44}+cz_{44}\cos\beta)\,\hat{\mathbf{x}}+by_{44}\,\hat{\mathbf{y}}-cz_{44}\sin\beta\,\hat{\mathbf{z}}$	(4c)	Tl X
$\mathbf{B_{85}}$	=	$(x_{45}-y_{45})\,\mathbf{a}_1+(x_{45}+y_{45})\,\mathbf{a}_2+z_{45}\,\mathbf{a}_3$	=	$(ax_{45}+cz_{45}\cos\beta)\,\hat{\mathbf{x}}+by_{45}\,\hat{\mathbf{y}}+cz_{45}\sin\beta\,\hat{\mathbf{z}}$	(4c)	Tl XI
$\mathbf{B_{86}}$	=	$-(x_{45}+y_{45})\,\mathbf{a}_1-(x_{45}-y_{45})\,\mathbf{a}_2-z_{45}\,\mathbf{a}_3$	=	$-(ax_{45}+cz_{45}\cos\beta)\,\hat{\mathbf{x}}+by_{45}\,\hat{\mathbf{y}}-cz_{45}\sin\beta\,\hat{\mathbf{z}}$	(4c)	Tl XI
$\mathbf{B_{87}}$	=	$(x_{46}-y_{46})\,\mathbf{a}_1+(x_{46}+y_{46})\,\mathbf{a}_2+z_{46}\,\mathbf{a}_3$	=	$(ax_{46}+cz_{46}\cos\beta)\,\hat{\mathbf{x}}+by_{46}\,\hat{\mathbf{y}}+cz_{46}\sin\beta\,\hat{\mathbf{z}}$	(4c)	Tl XII
$\mathbf{B_{88}}$	=	$-(x_{46}+y_{46})\,\mathbf{a}_1-(x_{46}-y_{46})\,\mathbf{a}_2-z_{46}\,\mathbf{a}_3$	=	$-(ax_{46}+cz_{46}\cos\beta)\,\hat{\mathbf{x}}+by_{46}\,\hat{\mathbf{y}}-cz_{46}\sin\beta\,\hat{\mathbf{z}}$	(4c)	Tl XII
$\mathbf{B_{89}}$	=	$(x_{47}-y_{47})\,\mathbf{a}_1+(x_{47}+y_{47})\,\mathbf{a}_2+z_{47}\,\mathbf{a}_3$	=	$(ax_{47}+cz_{47}\cos\beta)\,\hat{\mathbf{x}}+by_{47}\,\hat{\mathbf{y}}+cz_{47}\sin\beta\,\hat{\mathbf{z}}$	(4c)	Tl XIII
$\mathbf{B_{90}}$	=	$-(x_{47}+y_{47})\,\mathbf{a}_1-(x_{47}-y_{47})\,\mathbf{a}_2-z_{47}\,\mathbf{a}_3$	=	$-(ax_{47}+cz_{47}\cos\beta)\,\hat{\mathbf{x}}+by_{47}\,\hat{\mathbf{y}}-cz_{47}\sin\beta\,\hat{\mathbf{z}}$	(4c)	Tl XIII
$\mathbf{B_{91}}$	=	$(x_{48}-y_{48})\,\mathbf{a}_1+(x_{48}+y_{48})\,\mathbf{a}_2+z_{48}\,\mathbf{a}_3$	=	$(ax_{48}+cz_{48}\cos\beta)\,\hat{\mathbf{x}}+by_{48}\,\hat{\mathbf{y}}+cz_{48}\sin\beta\,\hat{\mathbf{z}}$	(4c)	Tl XIV
$\mathbf{B_{92}}$	=	$-(x_{48}+y_{48})\,\mathbf{a}_1-(x_{48}-y_{48})\,\mathbf{a}_2-z_{48}\,\mathbf{a}_3$	=	$-(ax_{48}+cz_{48}\cos\beta)\,\hat{\mathbf{x}}+by_{48}\,\hat{\mathbf{y}}-cz_{48}\sin\beta\,\hat{\mathbf{z}}$	(4c)	Tl XIV

$$\mathbf{B_{93}} = (x_{49}-y_{49})\,\mathbf{a}_1 + (x_{49}+y_{49})\,\mathbf{a}_2 + z_{49}\,\mathbf{a}_3 = (ax_{49}+cz_{49}\cos\beta)\,\hat{\mathbf{x}} + by_{49}\,\hat{\mathbf{y}} + cz_{49}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{Tl XV}$$

$$\mathbf{B_{94}} = -(x_{49}+y_{49})\,\mathbf{a}_1 - (x_{49}-y_{49})\,\mathbf{a}_2 - z_{49}\,\mathbf{a}_3 = -(ax_{49}+cz_{49}\cos\beta)\,\hat{\mathbf{x}} + by_{49}\,\hat{\mathbf{y}} - cz_{49}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{Tl XV}$$

$$\mathbf{B_{95}} = (x_{50}-y_{50})\,\mathbf{a}_1 + (x_{50}+y_{50})\,\mathbf{a}_2 + z_{50}\,\mathbf{a}_3 = (ax_{50}+cz_{50}\cos\beta)\,\hat{\mathbf{x}} + by_{50}\,\hat{\mathbf{y}} + cz_{50}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{Tl XVI}$$

$$\mathbf{B_{96}} = -(x_{50}+y_{50})\,\mathbf{a}_1 - (x_{50}-y_{50})\,\mathbf{a}_2 - z_{50}\,\mathbf{a}_3 = -(ax_{50}+cz_{50}\cos\beta)\,\hat{\mathbf{x}} + by_{50}\,\hat{\mathbf{y}} - cz_{50}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{Tl XVI}$$

$$\mathbf{B_{97}} = (x_{51}-y_{51})\,\mathbf{a}_1 + (x_{51}+y_{51})\,\mathbf{a}_2 + z_{51}\,\mathbf{a}_3 = (ax_{51}+cz_{51}\cos\beta)\,\hat{\mathbf{x}} + by_{51}\,\hat{\mathbf{y}} + cz_{51}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{Tl XVII}$$

$$\mathbf{B_{98}} = -(x_{51}+y_{51})\,\mathbf{a}_1 - (x_{51}-y_{51})\,\mathbf{a}_2 - z_{51}\,\mathbf{a}_3 = -(ax_{51}+cz_{51}\cos\beta)\,\hat{\mathbf{x}} + by_{51}\,\hat{\mathbf{y}} - cz_{51}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{Tl XVII}$$

$$\mathbf{B_{99}} = (x_{52}-y_{52})\,\mathbf{a}_1 + (x_{52}+y_{52})\,\mathbf{a}_2 + z_{52}\,\mathbf{a}_3 = (ax_{52}+cz_{52}\cos\beta)\,\hat{\mathbf{x}} + by_{52}\,\hat{\mathbf{y}} + cz_{52}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{Tl XVIII}$$

$$\mathbf{B_{100}} = -(x_{52}+y_{52})\,\mathbf{a}_1 - (x_{52}-y_{52})\,\mathbf{a}_2 - z_{52}\,\mathbf{a}_3 = -(ax_{52}+cz_{52}\cos\beta)\,\hat{\mathbf{x}} + by_{52}\,\hat{\mathbf{y}} - cz_{52}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{Tl XVIII}$$

$$\mathbf{B_{101}} = (x_{53}-y_{53})\,\mathbf{a}_1 + (x_{53}+y_{53})\,\mathbf{a}_2 + z_{53}\,\mathbf{a}_3 = (ax_{53}+cz_{53}\cos\beta)\,\hat{\mathbf{x}} + by_{53}\,\hat{\mathbf{y}} + cz_{53}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{Tl XIX}$$

$$\mathbf{B_{102}} = -(x_{53}+y_{53})\,\mathbf{a}_1 - (x_{53}-y_{53})\,\mathbf{a}_2 - z_{53}\,\mathbf{a}_3 = -(ax_{53}+cz_{53}\cos\beta)\,\hat{\mathbf{x}} + by_{53}\,\hat{\mathbf{y}} - cz_{53}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{Tl XIX}$$

$$\mathbf{B_{103}} = (x_{54}-y_{54})\,\mathbf{a}_1 + (x_{54}+y_{54})\,\mathbf{a}_2 + z_{54}\,\mathbf{a}_3 = (ax_{54}+cz_{54}\cos\beta)\,\hat{\mathbf{x}} + by_{54}\,\hat{\mathbf{y}} + cz_{54}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{Tl XX}$$

$$\mathbf{B_{104}} = -(x_{54}+y_{54})\,\mathbf{a}_1 - (x_{54}-y_{54})\,\mathbf{a}_2 - z_{54}\,\mathbf{a}_3 = -(ax_{54}+cz_{54}\cos\beta)\,\hat{\mathbf{x}} + by_{54}\,\hat{\mathbf{y}} - cz_{54}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{Tl XX}$$

$$\mathbf{B_{105}} = (x_{55}-y_{55})\,\mathbf{a}_1 + (x_{55}+y_{55})\,\mathbf{a}_2 + z_{55}\,\mathbf{a}_3 = (ax_{55}+cz_{55}\cos\beta)\,\hat{\mathbf{x}} + by_{55}\,\hat{\mathbf{y}} + cz_{55}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{Tl XXI}$$

$$\mathbf{B_{106}} = -(x_{55}+y_{55})\,\mathbf{a}_1 - (x_{55}-y_{55})\,\mathbf{a}_2 - z_{55}\,\mathbf{a}_3 = -(ax_{55}+cz_{55}\cos\beta)\,\hat{\mathbf{x}} + by_{55}\,\hat{\mathbf{y}} - cz_{55}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{Tl XXI}$$

$$\mathbf{B_{107}} = (x_{56}-y_{56})\,\mathbf{a}_1 + (x_{56}+y_{56})\,\mathbf{a}_2 + z_{56}\,\mathbf{a}_3 = (ax_{56}+cz_{56}\cos\beta)\,\hat{\mathbf{x}} + by_{56}\,\hat{\mathbf{y}} + cz_{56}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{Tl XXII}$$

$$\mathbf{B_{108}} = -(x_{56}+y_{56})\,\mathbf{a}_1 - (x_{56}-y_{56})\,\mathbf{a}_2 - z_{56}\,\mathbf{a}_3 = -(ax_{56}+cz_{56}\cos\beta)\,\hat{\mathbf{x}} + by_{56}\,\hat{\mathbf{y}} - cz_{56}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{Tl XXII}$$

$$\mathbf{B_{109}} = (x_{57}-y_{57})\,\mathbf{a}_1 + (x_{57}+y_{57})\,\mathbf{a}_2 + z_{57}\,\mathbf{a}_3 = (ax_{57}+cz_{57}\cos\beta)\,\hat{\mathbf{x}} + by_{57}\,\hat{\mathbf{y}} + cz_{57}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{Tl XXIII}$$

$$\mathbf{B_{110}} = -(x_{57}+y_{57})\,\mathbf{a}_1 - (x_{57}-y_{57})\,\mathbf{a}_2 - z_{57}\,\mathbf{a}_3 = -(ax_{57}+cz_{57}\cos\beta)\,\hat{\mathbf{x}} + by_{57}\,\hat{\mathbf{y}} - cz_{57}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{Tl XXIII}$$

$$\mathbf{B_{111}} = (x_{58}-y_{58})\,\mathbf{a}_1 + (x_{58}+y_{58})\,\mathbf{a}_2 + z_{58}\,\mathbf{a}_3 = (ax_{58}+cz_{58}\cos\beta)\,\hat{\mathbf{x}} + by_{58}\,\hat{\mathbf{y}} + cz_{58}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{Tl XXIV}$$

$$\mathbf{B_{112}} = -(x_{58}+y_{58})\,\mathbf{a}_1 - (x_{58}-y_{58})\,\mathbf{a}_2 - z_{58}\,\mathbf{a}_3 = -(ax_{58}+cz_{58}\cos\beta)\,\hat{\mathbf{x}} + by_{58}\,\hat{\mathbf{y}} - cz_{58}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{Tl XXIV}$$

$$\mathbf{B_{113}} = (x_{59}-y_{59})\,\mathbf{a}_1 + (x_{59}+y_{59})\,\mathbf{a}_2 + z_{59}\,\mathbf{a}_3 = (ax_{59}+cz_{59}\cos\beta)\,\hat{\mathbf{x}} + by_{59}\,\hat{\mathbf{y}} + cz_{59}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{Tl XXV}$$

$$\mathbf{B_{114}} = -(x_{59}+y_{59})\,\mathbf{a}_1 - (x_{59}-y_{59})\,\mathbf{a}_2 - z_{59}\,\mathbf{a}_3 = -(ax_{59}+cz_{59}\cos\beta)\,\hat{\mathbf{x}} + by_{59}\,\hat{\mathbf{y}} - cz_{59}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{Tl XXV}$$

$$\mathbf{B_{115}} = (x_{60}-y_{60})\,\mathbf{a}_1 + (x_{60}+y_{60})\,\mathbf{a}_2 + z_{60}\,\mathbf{a}_3 = (ax_{60}+cz_{60}\cos\beta)\,\hat{\mathbf{x}} + by_{60}\,\hat{\mathbf{y}} + cz_{60}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{Tl XXVI}$$

$$\mathbf{B_{116}} = -(x_{60}+y_{60})\,\mathbf{a}_1 - (x_{60}-y_{60})\,\mathbf{a}_2 - z_{60}\,\mathbf{a}_3 = -(ax_{60}+cz_{60}\cos\beta)\,\hat{\mathbf{x}} + by_{60}\,\hat{\mathbf{y}} - cz_{60}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{Tl XXVI}$$

$$\mathbf{B_{117}} = (x_{61} - y_{61})\,\mathbf{a}_1 + (x_{61} + y_{61})\,\mathbf{a}_2 + z_{61}\,\mathbf{a}_3 = (ax_{61} + cz_{61}\cos\beta)\,\hat{\mathbf{x}} + by_{61}\,\hat{\mathbf{y}} + cz_{61}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{Tl XXVII}$$

$$\mathbf{B_{118}} = -(x_{61} + y_{61})\,\mathbf{a}_1 - (x_{61} - y_{61})\,\mathbf{a}_2 - z_{61}\,\mathbf{a}_3 = -(ax_{61} + cz_{61}\cos\beta)\,\hat{\mathbf{x}} + by_{61}\,\hat{\mathbf{y}} - cz_{61}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{Tl XXVII}$$

$$\mathbf{B_{119}} = (x_{62} - y_{62})\,\mathbf{a}_1 + (x_{62} + y_{62})\,\mathbf{a}_2 + z_{62}\,\mathbf{a}_3 = (ax_{62} + cz_{62}\cos\beta)\,\hat{\mathbf{x}} + by_{62}\,\hat{\mathbf{y}} + cz_{62}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{Tl XXVIII}$$

$$\mathbf{B_{120}} = -(x_{62} + y_{62})\,\mathbf{a}_1 - (x_{62} - y_{62})\,\mathbf{a}_2 - z_{62}\,\mathbf{a}_3 = -(ax_{62} + cz_{62}\cos\beta)\,\hat{\mathbf{x}} + by_{62}\,\hat{\mathbf{y}} - cz_{62}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{Tl XXVIII}$$

$$\mathbf{B_{121}} = (x_{63} - y_{63})\,\mathbf{a}_1 + (x_{63} + y_{63})\,\mathbf{a}_2 + z_{63}\,\mathbf{a}_3 = (ax_{63} + cz_{63}\cos\beta)\,\hat{\mathbf{x}} + by_{63}\,\hat{\mathbf{y}} + cz_{63}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{Tl XXIX}$$

$$\mathbf{B_{122}} = -(x_{63} + y_{63})\,\mathbf{a}_1 - (x_{63} - y_{63})\,\mathbf{a}_2 - z_{63}\,\mathbf{a}_3 = -(ax_{63} + cz_{63}\cos\beta)\,\hat{\mathbf{x}} + by_{63}\,\hat{\mathbf{y}} - cz_{63}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{Tl XXIX}$$

$$\mathbf{B_{123}} = (x_{64} - y_{64})\,\mathbf{a}_1 + (x_{64} + y_{64})\,\mathbf{a}_2 + z_{64}\,\mathbf{a}_3 = (ax_{64} + cz_{64}\cos\beta)\,\hat{\mathbf{x}} + by_{64}\,\hat{\mathbf{y}} + cz_{64}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{Tl XXX}$$

$$\mathbf{B_{124}} = -(x_{64} + y_{64})\,\mathbf{a}_1 - (x_{64} - y_{64})\,\mathbf{a}_2 - z_{64}\,\mathbf{a}_3 = -(ax_{64} + cz_{64}\cos\beta)\,\hat{\mathbf{x}} + by_{64}\,\hat{\mathbf{y}} - cz_{64}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{Tl XXX}$$

$$\mathbf{B_{125}} = (x_{65} - y_{65})\,\mathbf{a}_1 + (x_{65} + y_{65})\,\mathbf{a}_2 + z_{65}\,\mathbf{a}_3 = (ax_{65} + cz_{65}\cos\beta)\,\hat{\mathbf{x}} + by_{65}\,\hat{\mathbf{y}} + cz_{65}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{Tl XXXI}$$

$$\mathbf{B_{126}} = -(x_{65} + y_{65})\,\mathbf{a}_1 - (x_{65} - y_{65})\,\mathbf{a}_2 - z_{65}\,\mathbf{a}_3 = -(ax_{65} + cz_{65}\cos\beta)\,\hat{\mathbf{x}} + by_{65}\,\hat{\mathbf{y}} - cz_{65}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{Tl XXXI}$$

$$\mathbf{B_{127}} = (x_{66} - y_{66})\,\mathbf{a}_1 + (x_{66} + y_{66})\,\mathbf{a}_2 + z_{66}\,\mathbf{a}_3 = (ax_{66} + cz_{66}\cos\beta)\,\hat{\mathbf{x}} + by_{66}\,\hat{\mathbf{y}} + cz_{66}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{Tl XXXII}$$

$$\mathbf{B_{128}} = -(x_{66} + y_{66})\,\mathbf{a}_1 - (x_{66} - y_{66})\,\mathbf{a}_2 - z_{66}\,\mathbf{a}_3 = -(ax_{66} + cz_{66}\cos\beta)\,\hat{\mathbf{x}} + by_{66}\,\hat{\mathbf{y}} - cz_{66}\sin\beta\,\hat{\mathbf{z}} \quad (4c) \quad \text{Tl XXXII}$$

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