$Bi_4Fe_5O_{13}F$ Structure: A4B4C5D14_tP108_135_i_i_dfh_egh2i-001

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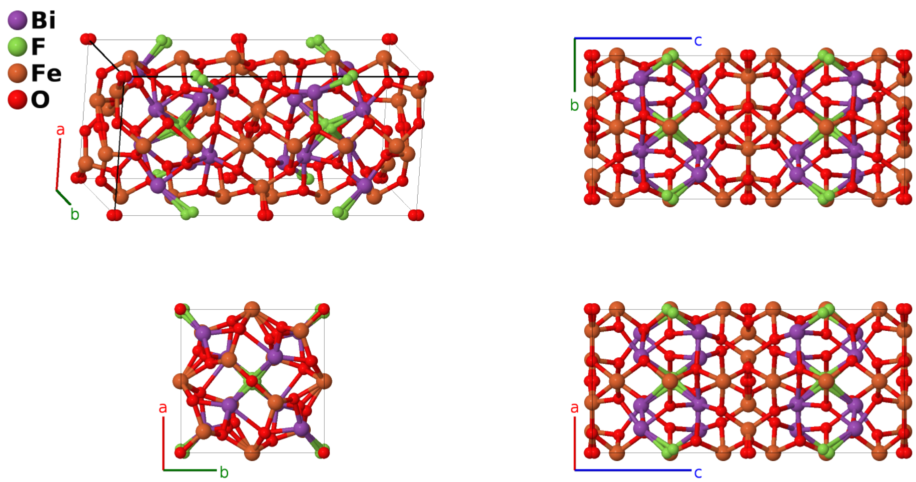
https://aflow.org/p/55HD

https://aflow.org/p/A4B4C5D14_tP108_135_i_i_dfh_egh2i-001

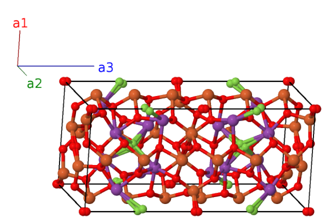


Prototype	$Bi_4FFe_5O_{13}$
AFLOW prototype label	A4B4C5D14_tP108_135_i_i_dfh_egh2i-001
ICSD	236370
Pearson symbol	tP108
Space group number	135
Space group symbol	$P4_2/mbc$
AFLOW prototype command	`aflow --proto=A4B4C5D14_tP108_135_i_i_dfh_egh2i-001` `--params=`$a, c/a, z_2, z_3, x_4, x_5, y_5, x_6, y_6, x_7, y_7, z_7, x_8, y_8, z_8, x_9, y_9, z_9, x_{10}, y_{10}, z_{10}$

- The O-I (8e) and F-I (16i) sites are only 1/4 occupied.

Simple Tetragonal primitive vectors

$$\mathbf{a_1} = a\,\hat{\mathbf{x}}$$
$$\mathbf{a_2} = a\,\hat{\mathbf{y}}$$
$$\mathbf{a_3} = c\,\hat{\mathbf{z}}$$



Basis vectors

		Lattice coordinates		Cartesian coordinates	Wyckoff position	Atom type
$\mathbf{B_{1}}$	=	$\frac{1}{2}\,\mathbf{a}_{2}+\frac{1}{4}\,\mathbf{a}_{3}$	=	$\frac{1}{2}a\,\mathbf{\hat{y}}+\frac{1}{4}c\,\mathbf{\hat{z}}$	(4d)	Fe I
$\mathbf{B_{2}}$	=	$\frac{1}{2}\,\mathbf{a}_{1}+\frac{3}{4}\,\mathbf{a}_{3}$	=	$\frac{1}{2}a\,\mathbf{\hat{x}}+\frac{3}{4}c\,\mathbf{\hat{z}}$	(4d)	Fe I
$\mathbf{B_{3}}$	=	$\frac{1}{2}\,\mathbf{a}_{2}+\frac{3}{4}\,\mathbf{a}_{3}$	=	$\frac{1}{2}a\,\mathbf{\hat{y}}+\frac{3}{4}c\,\mathbf{\hat{z}}$	(4d)	Fe I
$\mathbf{B_{4}}$	=	$\frac{1}{2}\,\mathbf{a}_{1}+\frac{1}{4}\,\mathbf{a}_{3}$	=	$\frac{1}{2}a\,\mathbf{\hat{x}}+\frac{1}{4}c\,\mathbf{\hat{z}}$	(4d)	Fe I
$\mathbf{B_{5}}$	=	$z_{2}\,\mathbf{a}_{3}$	=	$cz_{2}\,\mathbf{\hat{z}}$	(8e)	O I
$\mathbf{B_{6}}$	=	$\left(z_{2}+\frac{1}{2}\right)\,\mathbf{a}_{3}$	=	$c\left(z_{2}+\frac{1}{2}\right)\,\mathbf{\hat{z}}$	(8e)	O I
$\mathbf{B_{7}}$	=	$\frac{1}{2}\,\mathbf{a}_{1}+\frac{1}{2}\,\mathbf{a}_{2}-z_{2}\,\mathbf{a}_{3}$	=	$\frac{1}{2}a\,\mathbf{\hat{x}}+\frac{1}{2}a\,\mathbf{\hat{y}}-cz_{2}\,\mathbf{\hat{z}}$	(8e)	O I
$\mathbf{B_{8}}$	=	$\frac{1}{2}\,\mathbf{a}_{1}+\frac{1}{2}\,\mathbf{a}_{2}-\left(z_{2}-\frac{1}{2}\right)\,\mathbf{a}_{3}$	=	$\frac{1}{2}a\,\mathbf{\hat{x}}+\frac{1}{2}a\,\mathbf{\hat{y}}-c\left(z_{2}-\frac{1}{2}\right)\,\mathbf{\hat{z}}$	(8e)	O I
$\mathbf{B_{9}}$	=	$-z_{2}\,\mathbf{a}_{3}$	=	$-cz_{2}\,\mathbf{\hat{z}}$	(8e)	O I
$\mathbf{B_{10}}$	=	$-\left(z_{2}-\frac{1}{2}\right)\,\mathbf{a}_{3}$	=	$-c\left(z_{2}-\frac{1}{2}\right)\,\mathbf{\hat{z}}$	(8e)	O I
$\mathbf{B_{11}}$	=	$\frac{1}{2}\,\mathbf{a}_{1}+\frac{1}{2}\,\mathbf{a}_{2}+z_{2}\,\mathbf{a}_{3}$	=	$\frac{1}{2}a\,\mathbf{\hat{x}}+\frac{1}{2}a\,\mathbf{\hat{y}}+cz_{2}\,\mathbf{\hat{z}}$	(8e)	O I
$\mathbf{B_{12}}$	=	$\frac{1}{2}\,\mathbf{a}_{1}+\frac{1}{2}\,\mathbf{a}_{2}+\left(z_{2}+\frac{1}{2}\right)\,\mathbf{a}_{3}$	=	$\frac{1}{2}a\,\mathbf{\hat{x}}+\frac{1}{2}a\,\mathbf{\hat{y}}+c\left(z_{2}+\frac{1}{2}\right)\,\mathbf{\hat{z}}$	(8e)	O I
$\mathbf{B_{13}}$	=	$\frac{1}{2}\,\mathbf{a}_{2}+z_{3}\,\mathbf{a}_{3}$	=	$\frac{1}{2}a\,\mathbf{\hat{y}}+cz_{3}\,\mathbf{\hat{z}}$	(8f)	Fe II
$\mathbf{B_{14}}$	=	$\frac{1}{2}\,\mathbf{a}_{1}+\left(z_{3}+\frac{1}{2}\right)\,\mathbf{a}_{3}$	=	$\frac{1}{2}a\,\mathbf{\hat{x}}+c\left(z_{3}+\frac{1}{2}\right)\,\mathbf{\hat{z}}$	(8f)	Fe II
$\mathbf{B_{15}}$	=	$\frac{1}{2}\,\mathbf{a}_{1}-z_{3}\,\mathbf{a}_{3}$	=	$\frac{1}{2}a\,\mathbf{\hat{x}}-cz_{3}\,\mathbf{\hat{z}}$	(8f)	Fe II
$\mathbf{B_{16}}$	=	$\frac{1}{2}\,\mathbf{a}_{2}-\left(z_{3}-\frac{1}{2}\right)\,\mathbf{a}_{3}$	=	$\frac{1}{2}a\,\mathbf{\hat{y}}-c\left(z_{3}-\frac{1}{2}\right)\,\mathbf{\hat{z}}$	(8f)	Fe II
$\mathbf{B_{17}}$	=	$\frac{1}{2}\,\mathbf{a}_{2}-z_{3}\,\mathbf{a}_{3}$	=	$\frac{1}{2}a\,\mathbf{\hat{y}}-cz_{3}\,\mathbf{\hat{z}}$	(8f)	Fe II
$\mathbf{B_{18}}$	=	$\frac{1}{2}\,\mathbf{a}_{1}-\left(z_{3}-\frac{1}{2}\right)\,\mathbf{a}_{3}$	=	$\frac{1}{2}a\,\mathbf{\hat{x}}-c\left(z_{3}-\frac{1}{2}\right)\,\mathbf{\hat{z}}$	(8f)	Fe II
$\mathbf{B_{19}}$	=	$\frac{1}{2}\,\mathbf{a}_{1}+z_{3}\,\mathbf{a}_{3}$	=	$\frac{1}{2}a\,\mathbf{\hat{x}}+cz_{3}\,\mathbf{\hat{z}}$	(8f)	Fe II
$\mathbf{B_{20}}$	=	$\frac{1}{2}\,\mathbf{a}_{2}+\left(z_{3}+\frac{1}{2}\right)\,\mathbf{a}_{3}$	=	$\frac{1}{2}a\,\mathbf{\hat{y}}+c\left(z_{3}+\frac{1}{2}\right)\,\mathbf{\hat{z}}$	(8f)	Fe II
$\mathbf{B_{21}}$	=	$x_{4}\,\mathbf{a}_{1}+\left(x_{4}+\frac{1}{2}\right)\,\mathbf{a}_{2}+\frac{1}{4}\,\mathbf{a}_{3}$	=	$ax_{4}\,\mathbf{\hat{x}}+a\left(x_{4}+\frac{1}{2}\right)\,\mathbf{\hat{y}}+\frac{1}{4}c\,\mathbf{\hat{z}}$	(8g)	O II
$\mathbf{B_{22}}$	=	$-x_{4}\,\mathbf{a}_{1}-\left(x_{4}-\frac{1}{2}\right)\,\mathbf{a}_{2}+\frac{1}{4}\,\mathbf{a}_{3}$	=	$-ax_{4}\,\mathbf{\hat{x}}-a\left(x_{4}-\frac{1}{2}\right)\,\mathbf{\hat{y}}+\frac{1}{4}c\,\mathbf{\hat{z}}$	(8g)	O II
$\mathbf{B_{23}}$	=	$-\left(x_{4}-\frac{1}{2}\right)\,\mathbf{a}_{1}+x_{4}\,\mathbf{a}_{2}+\frac{3}{4}\,\mathbf{a}_{3}$	=	$-a\left(x_{4}-\frac{1}{2}\right)\,\mathbf{\hat{x}}+ax_{4}\,\mathbf{\hat{y}}+\frac{3}{4}c\,\mathbf{\hat{z}}$	(8g)	O II
$\mathbf{B_{24}}$	=	$\left(x_{4}+\frac{1}{2}\right)\,\mathbf{a}_{1}-x_{4}\,\mathbf{a}_{2}+\frac{3}{4}\,\mathbf{a}_{3}$	=	$a\left(x_{4}+\frac{1}{2}\right)\,\mathbf{\hat{x}}-ax_{4}\,\mathbf{\hat{y}}+\frac{3}{4}c\,\mathbf{\hat{z}}$	(8g)	O II
$\mathbf{B_{25}}$	=	$-x_{4}\,\mathbf{a}_{1}-\left(x_{4}-\frac{1}{2}\right)\,\mathbf{a}_{2}+\frac{3}{4}\,\mathbf{a}_{3}$	=	$-ax_{4}\,\mathbf{\hat{x}}-a\left(x_{4}-\frac{1}{2}\right)\,\mathbf{\hat{y}}+\frac{3}{4}c\,\mathbf{\hat{z}}$	(8g)	O II
$\mathbf{B_{26}}$	=	$x_{4}\,\mathbf{a}_{1}+\left(x_{4}+\frac{1}{2}\right)\,\mathbf{a}_{2}+\frac{3}{4}\,\mathbf{a}_{3}$	=	$ax_{4}\,\mathbf{\hat{x}}+a\left(x_{4}+\frac{1}{2}\right)\,\mathbf{\hat{y}}+\frac{3}{4}c\,\mathbf{\hat{z}}$	(8g)	O II
$\mathbf{B_{27}}$	=	$\left(x_{4}+\frac{1}{2}\right)\,\mathbf{a}_{1}-x_{4}\,\mathbf{a}_{2}+\frac{1}{4}\,\mathbf{a}_{3}$	=	$a\left(x_{4}+\frac{1}{2}\right)\,\mathbf{\hat{x}}-ax_{4}\,\mathbf{\hat{y}}+\frac{1}{4}c\,\mathbf{\hat{z}}$	(8g)	O II
$\mathbf{B_{28}}$	=	$-\left(x_{4}-\frac{1}{2}\right)\,\mathbf{a}_{1}+x_{4}\,\mathbf{a}_{2}+\frac{1}{4}\,\mathbf{a}_{3}$	=	$-a\left(x_{4}-\frac{1}{2}\right)\,\mathbf{\hat{x}}+ax_{4}\,\mathbf{\hat{y}}+\frac{1}{4}c\,\mathbf{\hat{z}}$	(8g)	O II
$\mathbf{B_{29}}$	=	$x_{5}\,\mathbf{a}_{1}+y_{5}\,\mathbf{a}_{2}$	=	$ax_{5}\,\mathbf{\hat{x}}+ay_{5}\,\mathbf{\hat{y}}$	(8h)	Fe III
$\mathbf{B_{30}}$	=	$-x_{5}\,\mathbf{a}_{1}-y_{5}\,\mathbf{a}_{2}$	=	$-ax_{5}\,\mathbf{\hat{x}}-ay_{5}\,\mathbf{\hat{y}}$	(8h)	Fe III
$\mathbf{B_{31}}$	=	$-y_{5}\,\mathbf{a}_{1}+x_{5}\,\mathbf{a}_{2}+\frac{1}{2}\,\mathbf{a}_{3}$	=	$-ay_{5}\,\mathbf{\hat{x}}+ax_{5}\,\mathbf{\hat{y}}+\frac{1}{2}c\,\mathbf{\hat{z}}$	(8h)	Fe III
$\mathbf{B_{32}}$	=	$y_{5}\,\mathbf{a}_{1}-x_{5}\,\mathbf{a}_{2}+\frac{1}{2}\,\mathbf{a}_{3}$	=	$ay_{5}\,\mathbf{\hat{x}}-ax_{5}\,\mathbf{\hat{y}}+\frac{1}{2}c\,\mathbf{\hat{z}}$	(8h)	Fe III
$\mathbf{B_{33}}$	=	$-\left(x_{5}-\frac{1}{2}\right)\,\mathbf{a}_{1}+\left(y_{5}+\frac{1}{2}\right)\,\mathbf{a}_{2}$	=	$-a\left(x_{5}-\frac{1}{2}\right)\,\mathbf{\hat{x}}+a\left(y_{5}+\frac{1}{2}\right)\,\mathbf{\hat{y}}$	(8h)	Fe III
$\mathbf{B_{34}}$	=	$\left(x_{5}+\frac{1}{2}\right)\,\mathbf{a}_{1}-\left(y_{5}-\frac{1}{2}\right)\,\mathbf{a}_{2}$	=	$a\left(x_{5}+\frac{1}{2}\right)\,\mathbf{\hat{x}}-a\left(y_{5}-\frac{1}{2}\right)\,\mathbf{\hat{y}}$	(8h)	Fe III
$\mathbf{B_{35}}$	=	$\left(y_{5}+\frac{1}{2}\right)\,\mathbf{a}_{1}+\left(x_{5}+\frac{1}{2}\right)\,\mathbf{a}_{2}+\frac{1}{2}\,\mathbf{a}_{3}$	=	$a\left(y_{5}+\frac{1}{2}\right)\,\mathbf{\hat{x}}+a\left(x_{5}+\frac{1}{2}\right)\,\mathbf{\hat{y}}+\frac{1}{2}c\,\mathbf{\hat{z}}$	(8h)	Fe III
$\mathbf{B_{36}}$	=	$-\left(y_{5}-\frac{1}{2}\right)\,\mathbf{a}_{1}-\left(x_{5}-\frac{1}{2}\right)\,\mathbf{a}_{2}+\frac{1}{2}\,\mathbf{a}_{3}$	=	$-a\left(y_{5}-\frac{1}{2}\right)\,\mathbf{\hat{x}}-a\left(x_{5}-\frac{1}{2}\right)\,\mathbf{\hat{y}}+\frac{1}{2}c\,\mathbf{\hat{z}}$	(8h)	Fe III
$\mathbf{B_{37}}$	=	$x_{6}\,\mathbf{a}_{1}+y_{6}\,\mathbf{a}_{2}$	=	$ax_{6}\,\mathbf{\hat{x}}+ay_{6}\,\mathbf{\hat{y}}$	(8h)	O III
$\mathbf{B_{38}}$	=	$-x_{6}\,\mathbf{a}_{1}-y_{6}\,\mathbf{a}_{2}$	=	$-ax_{6}\,\mathbf{\hat{x}}-ay_{6}\,\mathbf{\hat{y}}$	(8h)	O III
$\mathbf{B_{39}}$	=	$-y_{6}\,\mathbf{a}_{1}+x_{6}\,\mathbf{a}_{2}+\frac{1}{2}\,\mathbf{a}_{3}$	=	$-ay_{6}\,\mathbf{\hat{x}}+ax_{6}\,\mathbf{\hat{y}}+\frac{1}{2}c\,\mathbf{\hat{z}}$	(8h)	O III

$\mathbf{B_{40}}$	=	$y_6\,\mathbf{a}_1 - x_6\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	=	$ay_6\,\hat{\mathbf{x}} - ax_6\,\hat{\mathbf{y}} + \frac{1}{2}c\,\hat{\mathbf{z}}$	(8h)	O III
$\mathbf{B_{41}}$	=	$-\left(x_6 - \frac{1}{2}\right)\,\mathbf{a}_1 + \left(y_6 + \frac{1}{2}\right)\,\mathbf{a}_2$	=	$-a\left(x_6 - \frac{1}{2}\right)\,\hat{\mathbf{x}} + a\left(y_6 + \frac{1}{2}\right)\,\hat{\mathbf{y}}$	(8h)	O III
$\mathbf{B_{42}}$	=	$\left(x_6 + \frac{1}{2}\right)\,\mathbf{a}_1 - \left(y_6 - \frac{1}{2}\right)\,\mathbf{a}_2$	=	$a\left(x_6 + \frac{1}{2}\right)\,\hat{\mathbf{x}} - a\left(y_6 - \frac{1}{2}\right)\,\hat{\mathbf{y}}$	(8h)	O III
$\mathbf{B_{43}}$	=	$\left(y_6 + \frac{1}{2}\right)\,\mathbf{a}_1 + \left(x_6 + \frac{1}{2}\right)\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	=	$a\left(y_6 + \frac{1}{2}\right)\,\hat{\mathbf{x}} + a\left(x_6 + \frac{1}{2}\right)\,\hat{\mathbf{y}} + \frac{1}{2}c\,\hat{\mathbf{z}}$	(8h)	O III
$\mathbf{B_{44}}$	=	$-\left(y_6 - \frac{1}{2}\right)\,\mathbf{a}_1 - \left(x_6 - \frac{1}{2}\right)\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	=	$-a\left(y_6 - \frac{1}{2}\right)\,\hat{\mathbf{x}} - a\left(x_6 - \frac{1}{2}\right)\,\hat{\mathbf{y}} + \frac{1}{2}c\,\hat{\mathbf{z}}$	(8h)	O III
$\mathbf{B_{45}}$	=	$x_7\,\mathbf{a}_1 + y_7\,\mathbf{a}_2 + z_7\,\mathbf{a}_3$	=	$ax_7\,\hat{\mathbf{x}} + ay_7\,\hat{\mathbf{y}} + cz_7\,\hat{\mathbf{z}}$	(16i)	Bi I
$\mathbf{B_{46}}$	=	$-x_7\,\mathbf{a}_1 - y_7\,\mathbf{a}_2 + z_7\,\mathbf{a}_3$	=	$-ax_7\,\hat{\mathbf{x}} - ay_7\,\hat{\mathbf{y}} + cz_7\,\hat{\mathbf{z}}$	(16i)	Bi I
$\mathbf{B_{47}}$	=	$-y_7\,\mathbf{a}_1 + x_7\,\mathbf{a}_2 + \left(z_7 + \frac{1}{2}\right)\,\mathbf{a}_3$	=	$-ay_7\,\hat{\mathbf{x}} + ax_7\,\hat{\mathbf{y}} + c\left(z_7 + \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(16i)	Bi I
$\mathbf{B_{48}}$	=	$y_7\,\mathbf{a}_1 - x_7\,\mathbf{a}_2 + \left(z_7 + \frac{1}{2}\right)\,\mathbf{a}_3$	=	$ay_7\,\hat{\mathbf{x}} - ax_7\,\hat{\mathbf{y}} + c\left(z_7 + \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(16i)	Bi I
$\mathbf{B_{49}}$	=	$-\left(x_7 - \frac{1}{2}\right)\,\mathbf{a}_1 + \left(y_7 + \frac{1}{2}\right)\,\mathbf{a}_2 - z_7\,\mathbf{a}_3$	=	$-a\left(x_7 - \frac{1}{2}\right)\,\hat{\mathbf{x}} + a\left(y_7 + \frac{1}{2}\right)\,\hat{\mathbf{y}} - cz_7\,\hat{\mathbf{z}}$	(16i)	Bi I
$\mathbf{B_{50}}$	=	$\left(x_7 + \frac{1}{2}\right)\,\mathbf{a}_1 - \left(y_7 - \frac{1}{2}\right)\,\mathbf{a}_2 - z_7\,\mathbf{a}_3$	=	$a\left(x_7 + \frac{1}{2}\right)\,\hat{\mathbf{x}} - a\left(y_7 - \frac{1}{2}\right)\,\hat{\mathbf{y}} - cz_7\,\hat{\mathbf{z}}$	(16i)	Bi I
$\mathbf{B_{51}}$	=	$\left(y_7 + \frac{1}{2}\right)\,\mathbf{a}_1 + \left(x_7 + \frac{1}{2}\right)\,\mathbf{a}_2 - \left(z_7 - \frac{1}{2}\right)\,\mathbf{a}_3$	=	$a\left(y_7 + \frac{1}{2}\right)\,\hat{\mathbf{x}} + a\left(x_7 + \frac{1}{2}\right)\,\hat{\mathbf{y}} - c\left(z_7 - \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(16i)	Bi I
$\mathbf{B_{52}}$	=	$-\left(y_7 - \frac{1}{2}\right)\,\mathbf{a}_1 - \left(x_7 - \frac{1}{2}\right)\,\mathbf{a}_2 - \left(z_7 - \frac{1}{2}\right)\,\mathbf{a}_3$	=	$-a\left(y_7 - \frac{1}{2}\right)\,\hat{\mathbf{x}} - a\left(x_7 - \frac{1}{2}\right)\,\hat{\mathbf{y}} - c\left(z_7 - \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(16i)	Bi I
$\mathbf{B_{53}}$	=	$-x_7\,\mathbf{a}_1 - y_7\,\mathbf{a}_2 - z_7\,\mathbf{a}_3$	=	$-ax_7\,\hat{\mathbf{x}} - ay_7\,\hat{\mathbf{y}} - cz_7\,\hat{\mathbf{z}}$	(16i)	Bi I
$\mathbf{B_{54}}$	=	$x_7\,\mathbf{a}_1 + y_7\,\mathbf{a}_2 - z_7\,\mathbf{a}_3$	=	$ax_7\,\hat{\mathbf{x}} + ay_7\,\hat{\mathbf{y}} - cz_7\,\hat{\mathbf{z}}$	(16i)	Bi I
$\mathbf{B_{55}}$	=	$y_7\,\mathbf{a}_1 - x_7\,\mathbf{a}_2 - \left(z_7 - \frac{1}{2}\right)\,\mathbf{a}_3$	=	$ay_7\,\hat{\mathbf{x}} - ax_7\,\hat{\mathbf{y}} - c\left(z_7 - \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(16i)	Bi I
$\mathbf{B_{56}}$	=	$-y_7\,\mathbf{a}_1 + x_7\,\mathbf{a}_2 - \left(z_7 - \frac{1}{2}\right)\,\mathbf{a}_3$	=	$-ay_7\,\hat{\mathbf{x}} + ax_7\,\hat{\mathbf{y}} - c\left(z_7 - \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(16i)	Bi I
$\mathbf{B_{57}}$	=	$\left(x_7 + \frac{1}{2}\right)\,\mathbf{a}_1 - \left(y_7 - \frac{1}{2}\right)\,\mathbf{a}_2 + z_7\,\mathbf{a}_3$	=	$a\left(x_7 + \frac{1}{2}\right)\,\hat{\mathbf{x}} - a\left(y_7 - \frac{1}{2}\right)\,\hat{\mathbf{y}} + cz_7\,\hat{\mathbf{z}}$	(16i)	Bi I
$\mathbf{B_{58}}$	=	$-\left(x_7 - \frac{1}{2}\right)\,\mathbf{a}_1 + \left(y_7 + \frac{1}{2}\right)\,\mathbf{a}_2 + z_7\,\mathbf{a}_3$	=	$-a\left(x_7 - \frac{1}{2}\right)\,\hat{\mathbf{x}} + a\left(y_7 + \frac{1}{2}\right)\,\hat{\mathbf{y}} + cz_7\,\hat{\mathbf{z}}$	(16i)	Bi I
$\mathbf{B_{59}}$	=	$-\left(y_7 - \frac{1}{2}\right)\,\mathbf{a}_1 - \left(x_7 - \frac{1}{2}\right)\,\mathbf{a}_2 + \left(z_7 + \frac{1}{2}\right)\,\mathbf{a}_3$	=	$-a\left(y_7 - \frac{1}{2}\right)\,\hat{\mathbf{x}} - a\left(x_7 - \frac{1}{2}\right)\,\hat{\mathbf{y}} + c\left(z_7 + \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(16i)	Bi I
$\mathbf{B_{60}}$	=	$\left(y_7 + \frac{1}{2}\right)\,\mathbf{a}_1 + \left(x_7 + \frac{1}{2}\right)\,\mathbf{a}_2 + \left(z_7 + \frac{1}{2}\right)\,\mathbf{a}_3$	=	$a\left(y_7 + \frac{1}{2}\right)\,\hat{\mathbf{x}} + a\left(x_7 + \frac{1}{2}\right)\,\hat{\mathbf{y}} + c\left(z_7 + \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(16i)	Bi I
$\mathbf{B_{61}}$	=	$x_8\,\mathbf{a}_1 + y_8\,\mathbf{a}_2 + z_8\,\mathbf{a}_3$	=	$ax_8\,\hat{\mathbf{x}} + ay_8\,\hat{\mathbf{y}} + cz_8\,\hat{\mathbf{z}}$	(16i)	F I
$\mathbf{B_{62}}$	=	$-x_8\,\mathbf{a}_1 - y_8\,\mathbf{a}_2 + z_8\,\mathbf{a}_3$	=	$-ax_8\,\hat{\mathbf{x}} - ay_8\,\hat{\mathbf{y}} + cz_8\,\hat{\mathbf{z}}$	(16i)	F I
$\mathbf{B_{63}}$	=	$-y_8\,\mathbf{a}_1 + x_8\,\mathbf{a}_2 + \left(z_8 + \frac{1}{2}\right)\,\mathbf{a}_3$	=	$-ay_8\,\hat{\mathbf{x}} + ax_8\,\hat{\mathbf{y}} + c\left(z_8 + \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(16i)	F I
$\mathbf{B_{64}}$	=	$y_8\,\mathbf{a}_1 - x_8\,\mathbf{a}_2 + \left(z_8 + \frac{1}{2}\right)\,\mathbf{a}_3$	=	$ay_8\,\hat{\mathbf{x}} - ax_8\,\hat{\mathbf{y}} + c\left(z_8 + \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(16i)	F I
$\mathbf{B_{65}}$	=	$-\left(x_8 - \frac{1}{2}\right)\,\mathbf{a}_1 + \left(y_8 + \frac{1}{2}\right)\,\mathbf{a}_2 - z_8\,\mathbf{a}_3$	=	$-a\left(x_8 - \frac{1}{2}\right)\,\hat{\mathbf{x}} + a\left(y_8 + \frac{1}{2}\right)\,\hat{\mathbf{y}} - cz_8\,\hat{\mathbf{z}}$	(16i)	F I
$\mathbf{B_{66}}$	=	$\left(x_8 + \frac{1}{2}\right)\,\mathbf{a}_1 - \left(y_8 - \frac{1}{2}\right)\,\mathbf{a}_2 - z_8\,\mathbf{a}_3$	=	$a\left(x_8 + \frac{1}{2}\right)\,\hat{\mathbf{x}} - a\left(y_8 - \frac{1}{2}\right)\,\hat{\mathbf{y}} - cz_8\,\hat{\mathbf{z}}$	(16i)	F I
$\mathbf{B_{67}}$	=	$\left(y_8 + \frac{1}{2}\right)\,\mathbf{a}_1 + \left(x_8 + \frac{1}{2}\right)\,\mathbf{a}_2 - \left(z_8 - \frac{1}{2}\right)\,\mathbf{a}_3$	=	$a\left(y_8 + \frac{1}{2}\right)\,\hat{\mathbf{x}} + a\left(x_8 + \frac{1}{2}\right)\,\hat{\mathbf{y}} - c\left(z_8 - \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(16i)	F I
$\mathbf{B_{68}}$	=	$-\left(y_8 - \frac{1}{2}\right)\,\mathbf{a}_1 - \left(x_8 - \frac{1}{2}\right)\,\mathbf{a}_2 - \left(z_8 - \frac{1}{2}\right)\,\mathbf{a}_3$	=	$-a\left(y_8 - \frac{1}{2}\right)\,\hat{\mathbf{x}} - a\left(x_8 - \frac{1}{2}\right)\,\hat{\mathbf{y}} - c\left(z_8 - \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(16i)	F I
$\mathbf{B_{69}}$	=	$-x_8\,\mathbf{a}_1 - y_8\,\mathbf{a}_2 - z_8\,\mathbf{a}_3$	=	$-ax_8\,\hat{\mathbf{x}} - ay_8\,\hat{\mathbf{y}} - cz_8\,\hat{\mathbf{z}}$	(16i)	F I
$\mathbf{B_{70}}$	=	$x_8\,\mathbf{a}_1 + y_8\,\mathbf{a}_2 - z_8\,\mathbf{a}_3$	=	$ax_8\,\hat{\mathbf{x}} + ay_8\,\hat{\mathbf{y}} - cz_8\,\hat{\mathbf{z}}$	(16i)	F I
$\mathbf{B_{71}}$	=	$y_8\,\mathbf{a}_1 - x_8\,\mathbf{a}_2 - \left(z_8 - \frac{1}{2}\right)\,\mathbf{a}_3$	=	$ay_8\,\hat{\mathbf{x}} - ax_8\,\hat{\mathbf{y}} - c\left(z_8 - \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(16i)	F I
$\mathbf{B_{72}}$	=	$-y_8\,\mathbf{a}_1 + x_8\,\mathbf{a}_2 - \left(z_8 - \frac{1}{2}\right)\,\mathbf{a}_3$	=	$-ay_8\,\hat{\mathbf{x}} + ax_8\,\hat{\mathbf{y}} - c\left(z_8 - \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(16i)	F I
$\mathbf{B_{73}}$	=	$\left(x_8 + \frac{1}{2}\right)\,\mathbf{a}_1 - \left(y_8 - \frac{1}{2}\right)\,\mathbf{a}_2 + z_8\,\mathbf{a}_3$	=	$a\left(x_8 + \frac{1}{2}\right)\,\hat{\mathbf{x}} - a\left(y_8 - \frac{1}{2}\right)\,\hat{\mathbf{y}} + cz_8\,\hat{\mathbf{z}}$	(16i)	F I

$\mathbf{B}_{74}$	=	$-\left(x_8-\frac{1}{2}\right)\,\mathbf{a}_1+\left(y_8+\frac{1}{2}\right)\,\mathbf{a}_2+z_8\,\mathbf{a}_3$	=	$-a\left(x_8-\frac{1}{2}\right)\,\hat{\mathbf{x}}+a\left(y_8+\frac{1}{2}\right)\,\hat{\mathbf{y}}+cz_8\,\hat{\mathbf{z}}$	(16i)	F I
$\mathbf{B}_{75}$	=	$-\left(y_8-\frac{1}{2}\right)\,\mathbf{a}_1-\left(x_8-\frac{1}{2}\right)\,\mathbf{a}_2+\left(z_8+\frac{1}{2}\right)\,\mathbf{a}_3$	=	$-a\left(y_8-\frac{1}{2}\right)\,\hat{\mathbf{x}}-a\left(x_8-\frac{1}{2}\right)\,\hat{\mathbf{y}}+c\left(z_8+\frac{1}{2}\right)\,\hat{\mathbf{z}}$	(16i)	F I
$\mathbf{B}_{76}$	=	$\left(y_8+\frac{1}{2}\right)\,\mathbf{a}_1+\left(x_8+\frac{1}{2}\right)\,\mathbf{a}_2+\left(z_8+\frac{1}{2}\right)\,\mathbf{a}_3$	=	$a\left(y_8+\frac{1}{2}\right)\,\hat{\mathbf{x}}+a\left(x_8+\frac{1}{2}\right)\,\hat{\mathbf{y}}+c\left(z_8+\frac{1}{2}\right)\,\hat{\mathbf{z}}$	(16i)	F I
$\mathbf{B}_{77}$	=	$x_9\,\mathbf{a}_1+y_9\,\mathbf{a}_2+z_9\,\mathbf{a}_3$	=	$ax_9\,\hat{\mathbf{x}}+ay_9\,\hat{\mathbf{y}}+cz_9\,\hat{\mathbf{z}}$	(16i)	O IV
$\mathbf{B}_{78}$	=	$-x_9\,\mathbf{a}_1-y_9\,\mathbf{a}_2+z_9\,\mathbf{a}_3$	=	$-ax_9\,\hat{\mathbf{x}}-ay_9\,\hat{\mathbf{y}}+cz_9\,\hat{\mathbf{z}}$	(16i)	O IV
$\mathbf{B}_{79}$	=	$-y_9\,\mathbf{a}_1+x_9\,\mathbf{a}_2+\left(z_9+\frac{1}{2}\right)\,\mathbf{a}_3$	=	$-ay_9\,\hat{\mathbf{x}}+ax_9\,\hat{\mathbf{y}}+c\left(z_9+\frac{1}{2}\right)\,\hat{\mathbf{z}}$	(16i)	O IV
$\mathbf{B}_{80}$	=	$y_9\,\mathbf{a}_1-x_9\,\mathbf{a}_2+\left(z_9+\frac{1}{2}\right)\,\mathbf{a}_3$	=	$ay_9\,\hat{\mathbf{x}}-ax_9\,\hat{\mathbf{y}}+c\left(z_9+\frac{1}{2}\right)\,\hat{\mathbf{z}}$	(16i)	O IV
$\mathbf{B}_{81}$	=	$-\left(x_9-\frac{1}{2}\right)\,\mathbf{a}_1+\left(y_9+\frac{1}{2}\right)\,\mathbf{a}_2-z_9\,\mathbf{a}_3$	=	$-a\left(x_9-\frac{1}{2}\right)\,\hat{\mathbf{x}}+a\left(y_9+\frac{1}{2}\right)\,\hat{\mathbf{y}}-cz_9\,\hat{\mathbf{z}}$	(16i)	O IV
$\mathbf{B}_{82}$	=	$\left(x_9+\frac{1}{2}\right)\,\mathbf{a}_1-\left(y_9-\frac{1}{2}\right)\,\mathbf{a}_2-z_9\,\mathbf{a}_3$	=	$a\left(x_9+\frac{1}{2}\right)\,\hat{\mathbf{x}}-a\left(y_9-\frac{1}{2}\right)\,\hat{\mathbf{y}}-cz_9\,\hat{\mathbf{z}}$	(16i)	O IV
$\mathbf{B}_{83}$	=	$\left(y_9+\frac{1}{2}\right)\,\mathbf{a}_1+\left(x_9+\frac{1}{2}\right)\,\mathbf{a}_2-\left(z_9-\frac{1}{2}\right)\,\mathbf{a}_3$	=	$a\left(y_9+\frac{1}{2}\right)\,\hat{\mathbf{x}}+a\left(x_9+\frac{1}{2}\right)\,\hat{\mathbf{y}}-c\left(z_9-\frac{1}{2}\right)\,\hat{\mathbf{z}}$	(16i)	O IV
$\mathbf{B}_{84}$	=	$-\left(y_9-\frac{1}{2}\right)\,\mathbf{a}_1-\left(x_9-\frac{1}{2}\right)\,\mathbf{a}_2-\left(z_9-\frac{1}{2}\right)\,\mathbf{a}_3$	=	$-a\left(y_9-\frac{1}{2}\right)\,\hat{\mathbf{x}}-a\left(x_9-\frac{1}{2}\right)\,\hat{\mathbf{y}}-c\left(z_9-\frac{1}{2}\right)\,\hat{\mathbf{z}}$	(16i)	O IV
$\mathbf{B}_{85}$	=	$-x_9\,\mathbf{a}_1-y_9\,\mathbf{a}_2-z_9\,\mathbf{a}_3$	=	$-ax_9\,\hat{\mathbf{x}}-ay_9\,\hat{\mathbf{y}}-cz_9\,\hat{\mathbf{z}}$	(16i)	O IV
$\mathbf{B}_{86}$	=	$x_9\,\mathbf{a}_1+y_9\,\mathbf{a}_2-z_9\,\mathbf{a}_3$	=	$ax_9\,\hat{\mathbf{x}}+ay_9\,\hat{\mathbf{y}}-cz_9\,\hat{\mathbf{z}}$	(16i)	O IV
$\mathbf{B}_{87}$	=	$y_9\,\mathbf{a}_1-x_9\,\mathbf{a}_2-\left(z_9-\frac{1}{2}\right)\,\mathbf{a}_3$	=	$ay_9\,\hat{\mathbf{x}}-ax_9\,\hat{\mathbf{y}}-c\left(z_9-\frac{1}{2}\right)\,\hat{\mathbf{z}}$	(16i)	O IV
$\mathbf{B}_{88}$	=	$-y_9\,\mathbf{a}_1+x_9\,\mathbf{a}_2-\left(z_9-\frac{1}{2}\right)\,\mathbf{a}_3$	=	$-ay_9\,\hat{\mathbf{x}}+ax_9\,\hat{\mathbf{y}}-c\left(z_9-\frac{1}{2}\right)\,\hat{\mathbf{z}}$	(16i)	O IV
$\mathbf{B}_{89}$	=	$\left(x_9+\frac{1}{2}\right)\,\mathbf{a}_1-\left(y_9-\frac{1}{2}\right)\,\mathbf{a}_2+z_9\,\mathbf{a}_3$	=	$a\left(x_9+\frac{1}{2}\right)\,\hat{\mathbf{x}}-a\left(y_9-\frac{1}{2}\right)\,\hat{\mathbf{y}}+cz_9\,\hat{\mathbf{z}}$	(16i)	O IV
$\mathbf{B}_{90}$	=	$-\left(x_9-\frac{1}{2}\right)\,\mathbf{a}_1+\left(y_9+\frac{1}{2}\right)\,\mathbf{a}_2+z_9\,\mathbf{a}_3$	=	$-a\left(x_9-\frac{1}{2}\right)\,\hat{\mathbf{x}}+a\left(y_9+\frac{1}{2}\right)\,\hat{\mathbf{y}}+cz_9\,\hat{\mathbf{z}}$	(16i)	O IV
$\mathbf{B}_{91}$	=	$-\left(y_9-\frac{1}{2}\right)\,\mathbf{a}_1-\left(x_9-\frac{1}{2}\right)\,\mathbf{a}_2+\left(z_9+\frac{1}{2}\right)\,\mathbf{a}_3$	=	$-a\left(y_9-\frac{1}{2}\right)\,\hat{\mathbf{x}}-a\left(x_9-\frac{1}{2}\right)\,\hat{\mathbf{y}}+c\left(z_9+\frac{1}{2}\right)\,\hat{\mathbf{z}}$	(16i)	O IV
$\mathbf{B}_{92}$	=	$\left(y_9+\frac{1}{2}\right)\,\mathbf{a}_1+\left(x_9+\frac{1}{2}\right)\,\mathbf{a}_2+\left(z_9+\frac{1}{2}\right)\,\mathbf{a}_3$	=	$a\left(y_9+\frac{1}{2}\right)\,\hat{\mathbf{x}}+a\left(x_9+\frac{1}{2}\right)\,\hat{\mathbf{y}}+c\left(z_9+\frac{1}{2}\right)\,\hat{\mathbf{z}}$	(16i)	O IV
$\mathbf{B}_{93}$	=	$x_{10}\,\mathbf{a}_1+y_{10}\,\mathbf{a}_2+z_{10}\,\mathbf{a}_3$	=	$ax_{10}\,\hat{\mathbf{x}}+ay_{10}\,\hat{\mathbf{y}}+cz_{10}\,\hat{\mathbf{z}}$	(16i)	O V
$\mathbf{B}_{94}$	=	$-x_{10}\,\mathbf{a}_1-y_{10}\,\mathbf{a}_2+z_{10}\,\mathbf{a}_3$	=	$-ax_{10}\,\hat{\mathbf{x}}-ay_{10}\,\hat{\mathbf{y}}+cz_{10}\,\hat{\mathbf{z}}$	(16i)	O V
$\mathbf{B}_{95}$	=	$-y_{10}\,\mathbf{a}_1+x_{10}\,\mathbf{a}_2+\left(z_{10}+\frac{1}{2}\right)\,\mathbf{a}_3$	=	$-ay_{10}\,\hat{\mathbf{x}}+ax_{10}\,\hat{\mathbf{y}}+c\left(z_{10}+\frac{1}{2}\right)\,\hat{\mathbf{z}}$	(16i)	O V
$\mathbf{B}_{96}$	=	$y_{10}\,\mathbf{a}_1-x_{10}\,\mathbf{a}_2+\left(z_{10}+\frac{1}{2}\right)\,\mathbf{a}_3$	=	$ay_{10}\,\hat{\mathbf{x}}-ax_{10}\,\hat{\mathbf{y}}+c\left(z_{10}+\frac{1}{2}\right)\,\hat{\mathbf{z}}$	(16i)	O V
$\mathbf{B}_{97}$	=	$-\left(x_{10}-\frac{1}{2}\right)\,\mathbf{a}_1+\left(y_{10}+\frac{1}{2}\right)\,\mathbf{a}_2-z_{10}\,\mathbf{a}_3$	=	$-a\left(x_{10}-\frac{1}{2}\right)\,\hat{\mathbf{x}}+a\left(y_{10}+\frac{1}{2}\right)\,\hat{\mathbf{y}}-cz_{10}\,\hat{\mathbf{z}}$	(16i)	O V
$\mathbf{B}_{98}$	=	$\left(x_{10}+\frac{1}{2}\right)\,\mathbf{a}_1-\left(y_{10}-\frac{1}{2}\right)\,\mathbf{a}_2-z_{10}\,\mathbf{a}_3$	=	$a\left(x_{10}+\frac{1}{2}\right)\,\hat{\mathbf{x}}-a\left(y_{10}-\frac{1}{2}\right)\,\hat{\mathbf{y}}-cz_{10}\,\hat{\mathbf{z}}$	(16i)	O V
$\mathbf{B}_{99}$	=	$\left(y_{10}+\frac{1}{2}\right)\,\mathbf{a}_1+\left(x_{10}+\frac{1}{2}\right)\,\mathbf{a}_2-\left(z_{10}-\frac{1}{2}\right)\,\mathbf{a}_3$	=	$a\left(y_{10}+\frac{1}{2}\right)\,\hat{\mathbf{x}}+a\left(x_{10}+\frac{1}{2}\right)\,\hat{\mathbf{y}}-c\left(z_{10}-\frac{1}{2}\right)\,\hat{\mathbf{z}}$	(16i)	O V
$\mathbf{B}_{100}$	=	$-\left(y_{10}-\frac{1}{2}\right)\,\mathbf{a}_1-\left(x_{10}-\frac{1}{2}\right)\,\mathbf{a}_2-\left(z_{10}-\frac{1}{2}\right)\,\mathbf{a}_3$	=	$-a\left(y_{10}-\frac{1}{2}\right)\,\hat{\mathbf{x}}-a\left(x_{10}-\frac{1}{2}\right)\,\hat{\mathbf{y}}-c\left(z_{10}-\frac{1}{2}\right)\,\hat{\mathbf{z}}$	(16i)	O V
$\mathbf{B}_{101}$	=	$-x_{10}\,\mathbf{a}_1-y_{10}\,\mathbf{a}_2-z_{10}\,\mathbf{a}_3$	=	$-ax_{10}\,\hat{\mathbf{x}}-ay_{10}\,\hat{\mathbf{y}}-cz_{10}\,\hat{\mathbf{z}}$	(16i)	O V
$\mathbf{B}_{102}$	=	$x_{10}\,\mathbf{a}_1+y_{10}\,\mathbf{a}_2-z_{10}\,\mathbf{a}_3$	=	$ax_{10}\,\hat{\mathbf{x}}+ay_{10}\,\hat{\mathbf{y}}-cz_{10}\,\hat{\mathbf{z}}$	(16i)	O V
$\mathbf{B}_{103}$	=	$y_{10}\,\mathbf{a}_1-x_{10}\,\mathbf{a}_2-\left(z_{10}-\frac{1}{2}\right)\,\mathbf{a}_3$	=	$ay_{10}\,\hat{\mathbf{x}}-ax_{10}\,\hat{\mathbf{y}}-c\left(z_{10}-\frac{1}{2}\right)\,\hat{\mathbf{z}}$	(16i)	O V
$\mathbf{B}_{104}$	=	$-y_{10}\,\mathbf{a}_1+x_{10}\,\mathbf{a}_2-\left(z_{10}-\frac{1}{2}\right)\,\mathbf{a}_3$	=	$-ay_{10}\,\hat{\mathbf{x}}+ax_{10}\,\hat{\mathbf{y}}-c\left(z_{10}-\frac{1}{2}\right)\,\hat{\mathbf{z}}$	(16i)	O V

$\mathbf{B_{105}}$	=	$\left(x_{10}+\frac{1}{2}\right)\,\mathbf{a}_1-\left(y_{10}-\frac{1}{2}\right)\,\mathbf{a}_2+z_{10}\,\mathbf{a}_3$	=	$a\left(x_{10}+\frac{1}{2}\right)\,\hat{\mathbf{x}}-a\left(y_{10}-\frac{1}{2}\right)\,\hat{\mathbf{y}}+cz_{10}\,\hat{\mathbf{z}}$	(16i)	O V
$\mathbf{B_{106}}$	=	$-\left(x_{10}-\frac{1}{2}\right)\,\mathbf{a}_1+\left(y_{10}+\frac{1}{2}\right)\,\mathbf{a}_2+z_{10}\,\mathbf{a}_3$	=	$-a\left(x_{10}-\frac{1}{2}\right)\,\hat{\mathbf{x}}+a\left(y_{10}+\frac{1}{2}\right)\,\hat{\mathbf{y}}+cz_{10}\,\hat{\mathbf{z}}$	(16i)	O V
$\mathbf{B_{107}}$	=	$-\left(y_{10}-\frac{1}{2}\right)\,\mathbf{a}_1-\left(x_{10}-\frac{1}{2}\right)\,\mathbf{a}_2+\left(z_{10}+\frac{1}{2}\right)\,\mathbf{a}_3$	=	$-a\left(y_{10}-\frac{1}{2}\right)\,\hat{\mathbf{x}}-a\left(x_{10}-\frac{1}{2}\right)\,\hat{\mathbf{y}}+c\left(z_{10}+\frac{1}{2}\right)\,\hat{\mathbf{z}}$	(16i)	O V
$\mathbf{B_{108}}$	=	$\left(y_{10}+\frac{1}{2}\right)\,\mathbf{a}_1+\left(x_{10}+\frac{1}{2}\right)\,\mathbf{a}_2+\left(z_{10}+\frac{1}{2}\right)\,\mathbf{a}_3$	=	$a\left(y_{10}+\frac{1}{2}\right)\,\hat{\mathbf{x}}+a\left(x_{10}+\frac{1}{2}\right)\,\hat{\mathbf{y}}+c\left(z_{10}+\frac{1}{2}\right)\,\hat{\mathbf{z}}$	(16i)	O V

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