Appendix 2

Tables of transformation parameters

Extract from :

- BIH annual Report for 1984
- BIH annual Report for 1985
- BIH annual Report for 1986
- BIH annual Report for 1987
- IERS Technical Note 1
- Annual Report for 1988

TABLE 3 - TRANSFORMATION BETWEEN THE INDIVIDUAL TERRESTRIAL SYSTEMS AND THE BTS

NETWORK	SSC	T1	T2	T3	D	R1	R2	R3
		cm	cm	cm	10^{-8}	0.001"	0.001"	0.001"
RN	SSC(NGS) 83 R 01	165.2	-94.9	47.1	-4.4	-5.2	8.0	-5.7
RJ	SSC(JPL) 83 R 05	10.1	-36.8	-15.1	2.8	-8.5	-5.0	-7.8
MJ	SSC(JPL) 84 M 01	0.0	0.0	0.0	-4.8	2.1	3.3	-8.8
LC	SSC(CSR) 84 L 01	0.0	0.0	0.0	0.0	-5.9	-2.6	-3.8
DM	SSC(DMA) 77 D 01	10.6	-69.7	-490.1	60.4	1.2	4.7	-813.7

The above parameters are to be used with equation (1), p. A-3.

TABLE 3 - TRANSFORMATION BETWEEN THE INDIVIDUAL TERRESTRIAL SYSTEMS AND THE BTS

	NETWORK	SSC	T1	T2	T3	D	R1	R2	R3	A3
			cm	cm	cm	10^{-9}	0.001"	0.001"	0.001"	0.001"
1	SSC(NGS)	85 R 02	163.1	-98.9	38.7	-3.9	-6.0	9.5	-3.6	-0.2
2	SSC(GSFC)	84 R 01	142.2	-101.3	36.7	-3.6	-5.7	8.2	14.2	0.5
3	SSC(JPL)	83 R 05	16.0	-47.3	-4.0	-5.0	-6.2	-7.7	-5.0	1.1
4	SSC(JPL)	86 M 02	.0	.0	.0	-3.5	4.6	1.3	-9.5	
5	SSC(CSR)	84 L 01	.0	.0	.0	.0	-4.2	-2.7	.8	
6	SSC(DMA)	77 D 01	6.1	-36.3	-473.2	60.4	20.0	1.6	-806.0	

Complementary information concerning the BTS for 1985 is given in this volume, p.D-99.

The above parameters are to be used with equation, p.A-3.

TABLE 3 - TRANSFORMATION BETWEEN THE INDIVIDUAL TERRESTRIAL SYSTEMS AND THE BTS

NETWORK	SSC	T1	T2	T3	D	R1	R2	R3	A3
		CM	CM	CM	10^{-8}	0.001"	0.001"	0.001"	0.001"
SSC(NGS)	87 R 01	10.8	12.5	5.8	-2.4	-4.5	10.3	-1.8	0.6
SSC(GSFC)	87 R 01	153.5	-96.1	45.0	-2.7	-4.1	10.4	10.3	0.9
SSC(JPL)	83 R 05	5.5	-27.6	-15.8	-1.6	-4.8	-2.6	4.9	1.4
SSC(JPL)	87 M 01	.0	.0	.0	-2.2	1.9	3.7	-10.6	
SSC(CSR)	86 L 01	.0	.0	.0	.0	-4.5	3.1	-4.4	
SSC(DGFI)	87 L 01	.3	-3.3	6.2	1.3	8.0	-6.0	120.6	
SSC(DMA)	77 D 01	-16.7	-21.2	-431.4	57.1	36.1	8.4	-795.1	

TABLE 3 - TRANSFORMATION BETWEEN THE INDIVIDUAL TERRESTRIAL SYSTEMS AND THE BTS

NETWORK	SSC	T1	T2	T3	D	R1	R2	R3	A3
					10^{-8}				
		cm	cm	cm		0.001"	0.001"	0.001"	0.001"
SSC(NGS)	88 R 01	-8.9	14.3	-1.6	0.9	-4.3	9.3	-3.3	-0.5
SSC(GSFC)	88 R 01	167.1	-105.4	40.0	-2.3	-7.2	5.0	-3.6	-0.2
SSC(JPL)	83 R 05	24.2	-12.1	-18.3	-3.9	-1.4	-4.8	-5.7	-0.3
SSC(SHA)	88 R 01	163.8	-97.5	41.7	-0.9	-4.7	5.8	-3.4	-8.0
SSC(JPL)	88 M 01	0.0	0.0	0.0	-1.7	4.0	-0.4	-8.6	
SSC(CERGA)	88 M 01	0.0	0.0	0.0	-2.4	-5.6	-0.8	-3.8	
SSC(SHA)	86 M 01	0.0	0.0	0.0	-3.8	1.4	7.5	-15.5	
SSC(CSR)	88 L 01	0.0	0.0	0.0	0.0	-4.7	2.3	-10.5	
SSC(GSFC)	87 L 14	0.0	0.0	0.0	0.0	-1.8	6.2	-7.5	
SSC(DGFI)	87 L 03	-4.0	0.9	11.9	1.3	-284.2	-44.9	6.8	
SSC(SHA)	87 L 01	-4.3	-4.5	7.2	0.5	-4.3	-2.7	-1.9	
SSC(DUT)	87 L 04	-7.5	4.7	11.9	1.0	0.2	-1.0	-0.0	
SSC(DMA)	77 D 01 (1)	7.1	-50.9	-466.6	58.3	17.9	-0.5	-807.3	
WGS84 (2)		7.1	-50.9	-16.6	-1.7	17.9	-0.5	6.7	

Notes

1 - NSWC 9Z-2

2 - Referred to as SSC(DMA) 87 D 01 in other parts of this report. This terrestrial frame is connected to the BTS as explained in this volume p. D-131.

Remark.

The table lists the values of the parameters which transform the coordinates in the SSC's into the BTS at epoch 1984.0, according to the relationship

$$\begin{pmatrix} X \\ Y \\ Z \end{pmatrix} = \begin{pmatrix} XS \\ YS \\ ZS \end{pmatrix} - \begin{pmatrix} T1 \\ T2 \\ T3 \end{pmatrix} - \begin{pmatrix} D & -R3 & R2 \\ R3 & D & -R1 \\ -R2 & R1 & D \end{pmatrix} \begin{pmatrix} XS \\ YS \\ ZS \end{pmatrix}$$

where X, Y, Z are the coordinates in the BTS, and XS, YS, ZS are the cartesian coordinates in the individual system. T1, T2, T3 are the components of the translation vector, R1, R2, R3 are the rotation angles and D is the excess to 1 of the scale factor.

RESULTS OF ITRF-0

TRANSFORMATION PARAMETERS BETWEEN THE INDIVIDUAL TERRESTRIAL SYSTEMS

SSC	T1	T2	T3	D	R1	R2	R3
	cm	cm	cm	10^{-8}	0.001"	0.001"	0.001"
RN SSC(NGS) 88 R 01	-13.7	17.0	-2.7	1.5	-3.6	9.8	.1
	6.9	6.8	6.5	.9	2.8	2.7	2.2
RG SSC(GSFC) 88 R 01	159.5	-96.4	38.2	-1.2	-5.8	5.2	-1.5
	6.7	6.8	6.3	.9	2.7	2.6	2.2
LC SSC(CSR) 88 L 01	-.3	-.0	1.6	-.2	-4.6	1.9	-11.0
	6.5	6.5	6.0	.9	2.6	2.5	2.2
LG SSC(GSFC) 88 L 01	-1.9	.1	2.1	-.3	-1.7	6.0	-7.7
	6.5	6.5	6.0	.9	2.6	2.5	2.2
SSC(BIH) 88 C 01	.0	.0	.0	.0	.0	.0	.0
(EXTRACT OF BTS87)	.0	.0	.0	.0	.0	.0	.0

TABLE T-5 TRANSFORMATION PARAMETERS FROM ITRF88 TO INDIVIDUAL SYSTEMS
(TO BE USED USING THE FORMULA BELOW)

NETWORK	T1 cm	T2 cm	T3 cm	D (10**-8)	R1 .001"	R2 .001"	R3 .001"
SSC(NGS) 89 R 01	-6.0	12.0	-1.9	1.9	-3.1	8.0	1.2
	1.7	1.7	1.7	0.2	0.7	0.7	0.5
SSC(GSFC) 89 R 01	160.4	-82.9	57.0	-1.5	2.5	2.0	1.4
	1.7	1.7	1.6	0.2	0.7	0.7	0.5
SSC(GSFC) 89 R 03	160.7	-84.7	55.3	-1.5	1.7	1.8	1.4
	1.7	1.7	1.6	0.2	0.7	0.7	0.5
SSC(JPL) 89 R 02	-4.3	1.9	-20.4	-3.5	-0.6	-1.1	7.9
	1.8	1.8	1.8	0.2	0.8	0.7	0.6
SSC(NAOMZ) 89 R 01	-10.1	17.2	-2.7	1.1	-3.6	8.5	-0.2
	8.2	8.0	6.8	1.0	3.0	3.1	2.2
SSC(SHA) 89 R 01	158.6	-98.5	47.8	-1.0	-4.6	11.3	-1.5
	23.4	12.4	17.4	1.4	6.3	9.6	3.9
SSC(JPL) 89 M 01	-9.2	5.6	4.9	-2.0	5.6	1.4	-12.1
	3.3	3.7	3.5	0.4	1.7	1.3	1.0
SSC(CERGA) 89 M 01	-9.3	-3.7	-4.9	-5.2	-4.4	1.6	-12.2
	3.4	4.0	3.5	0.4	1.9	1.3	1.0
SSC(UTXMO) 89 M 01	-4.0	-2.4	-14.8	-3.9	-3.9	4.9	-2337.2
	9.8	11.4	10.2	1.3	5.4	3.7	2.8
SSC(SHA) 86 M 01	0.0	0.0	0.0	-2.7	5.3	-0.6	-7.5
	0.0	0.0	0.0	1.0	2.4	3.2	2.8
SSC(CSR) 89 L 02	1.2	1.8	3.5	-0.5	-3.4	4.4	-16.3
	1.7	1.7	1.6	0.2	0.7	0.7	0.5
SSC(GSFC) 89 L 01	-0.3	2.1	6.2	-0.6	-0.6	5.6	-8.2
	1.7	1.7	1.6	0.2	0,7	0.6	0.5
SSC(ZIPE) 89 L 01	12.3	1.2	-19.5	-1.5	-0.2	-3.1	-1.5
	3.4	3.3	3.2	0.5	1.4	1.4	1.1
SSC(SHA) 88 L 01	-1.7	5.1	6.1	1.0	-0.1	-1.0	-6.5
	3.3	3.3	3.2	0.5	1.3	1.3	1.1
SSC(DUT) 89 L 01	0.5	3.0	-1.3	-1.6	1.2	0.4	-4.5
	1.7	1.7	1.6	0.2	0.7	0.7	0.5

$$\begin{bmatrix} XS \\ YS \\ ZS \end{bmatrix} = \begin{bmatrix} X \\ Y \\ Z \end{bmatrix} + \begin{bmatrix} T1 \\ T2 \\ T3 \end{bmatrix} + \begin{bmatrix} D & -R3 & R2 \\ R3 & D & -R1 \\ -R2 & R1 & D \end{bmatrix} \begin{bmatrix} X \\ Y \\ Z \end{bmatrix}$$

WHERE X,Y,Z ARE THE COORDINATES IN THE ITRF SYSTEM, AND XS,YS,ZS ARE THE COORDINATES IN THE INDIVIDUAL SYSTEM.