

Ellipsoid **International(Hayford)**

Semi-major Axis 6378388

Flattening (1/f) 297.000

} ref. Trig. List &
Base Record
& Pwtko encl. ①

Name : **Seven Parameter Datum (7-P)**

X Translation (meters) 168.394947462

Y Translation (meters) 297.7654150668

Z Translation (meters) 137.8636934169

X Rotation (seconds) -0.8330898361

Y Rotation (seconds) -2.4843350686

Z Rotation (seconds) -1.5697466125

Scale factor -0.1478ppm

} ref. Pwtko encl. ①

↑
0.999 999 8522 0002

Grids **Hong kong 80 Grid**

Projection Transverse Mercator

Central Meridian 114°10'42.8000"E

Reference latitude 22°18'43.68"N

Scale factor 1.000

False Easting (X) 836694.050

False Northing (Y) 819069.800

} ref. Trig. List &
Base Record
& Pwtko encl. ①

Geodetic Datum Transformation and Map Projection Parameter Set for Computation between ITRF96 Geodetic Coordinates (or Cartesian Coordinates) and HK1980 Grid Coordinates

Name of Parameter Set : 7P_ITRF96_HK80_V1.0 (Date : 1 March 2002)

Datum Transformation Parameters

	From : ITRF96 (at epoch 1998:121) To: HK80 Geodetic Datum	From : HK80 Geodetic Datum To : ITRF96 (at epoch 1998:121)
Shift along x-axis	162.619 m	-162.619 m
Shift along y-axis	276.961 m	-276.959 m
Shift along z-axis	161.763 m	-161.764 m
Rotation about x-axis	0.067741 "	-0.067753 "
Rotation about y-axis	-2.243649 "	2.243648 "
Rotation about z-axis	-1.158827 "	1.158828 "
Scale factor	1.094239 ppm	-1.094246 ppm

Datum Transformation Equation

$$\begin{bmatrix} X \\ Y \\ Z \end{bmatrix}_{\text{new}} = \begin{bmatrix} \Delta X \\ \Delta Y \\ \Delta Z \end{bmatrix} + \begin{bmatrix} (1+S) & \theta_z & -\theta_y \\ -\theta_z & (1+S) & \theta_x \\ \theta_y & -\theta_x & (1+S) \end{bmatrix} \begin{bmatrix} X \\ Y \\ Z \end{bmatrix}_{\text{old}}$$

Where

ΔX : Shift along x-axis
 ΔY : Shift along y-axis
 ΔZ : Shift along z-axis
 θ_x : Rotation about x-axis
 θ_y : Rotation about y-axis
 θ_z : Rotation about z-axis
 S : Scale factor

$\begin{bmatrix} X \\ Y \\ Z \end{bmatrix}_{\text{new}}$: 3D Cartesian Coordinate in New Geodetic Datum
 $\begin{bmatrix} X \\ Y \\ Z \end{bmatrix}_{\text{old}}$: 3D Cartesian Coordinate in Old Geodetic Datum

Map Projection Parameters of the Hong Kong 1980 Grid Coordinates

Geodetic Datum : Hong Kong 1980 Geodetic Datum	Coordinates of Map Projection Centre
Projection : Transverse Mercator	HK1980 Geodetic Coordinates :
Reference Ellipsoid : International 1910	Latitude : 22°18'43.68" N
Semi-Major axis (a) : 6378388m	Longitude : 114°10'42.80" E
Flattening (f) : 1 / 297	HK1980 Grid Coordinates :
Scale factor along central meridian : 1	Northing : 819 069.80 mN
	Easting : 836 694.05 mE

Numerical Data for Checking the Transformation Computation

Users can use the following data to verify the formulae and parameters used.

ITRF96 Geodetic Coordinates	HK1980 Grid Coordinates
Latitude : 22° 29' 8.777176" N	Northing : 838 477.970 m
Longitude : 114° 00' 1.079932" E	Easting : 818 097.267 m

Enquiry about the map projection and transformation parameters can be made to :

Geodetic Survey Section, Survey and Mapping Office, Lands Department, 24/F, 333 Java Road, North Point, Hong Kong

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