

## 2-5



- 1.
2. 가
- 3.

### 1. (coordinate system)

1-1 (coordinate system)

가 가

2 3

. 가

(Cartesian coordination system)

(polar coordination system)

system) .

(global)

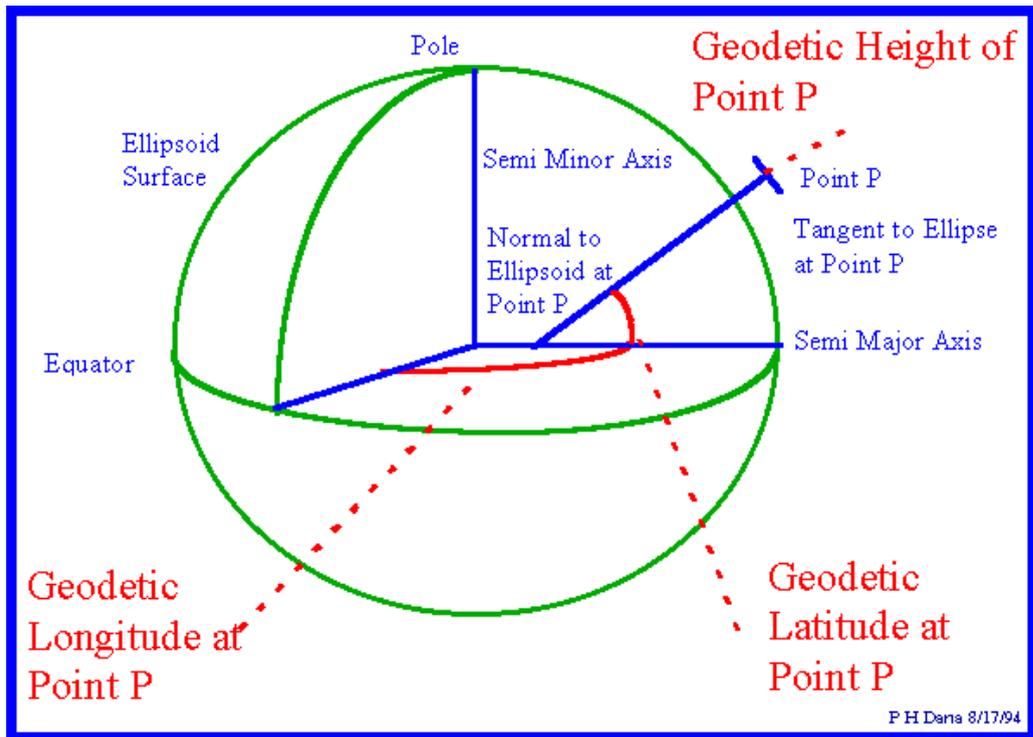
(local )

1-2 (global)

1) - - (latitude - longitude - height system)

- 가 (prime meridian,  
)

- (latitude):
- (longitude):
- (height): 가 (elevation) (ellipsoid height geodetic height) 가

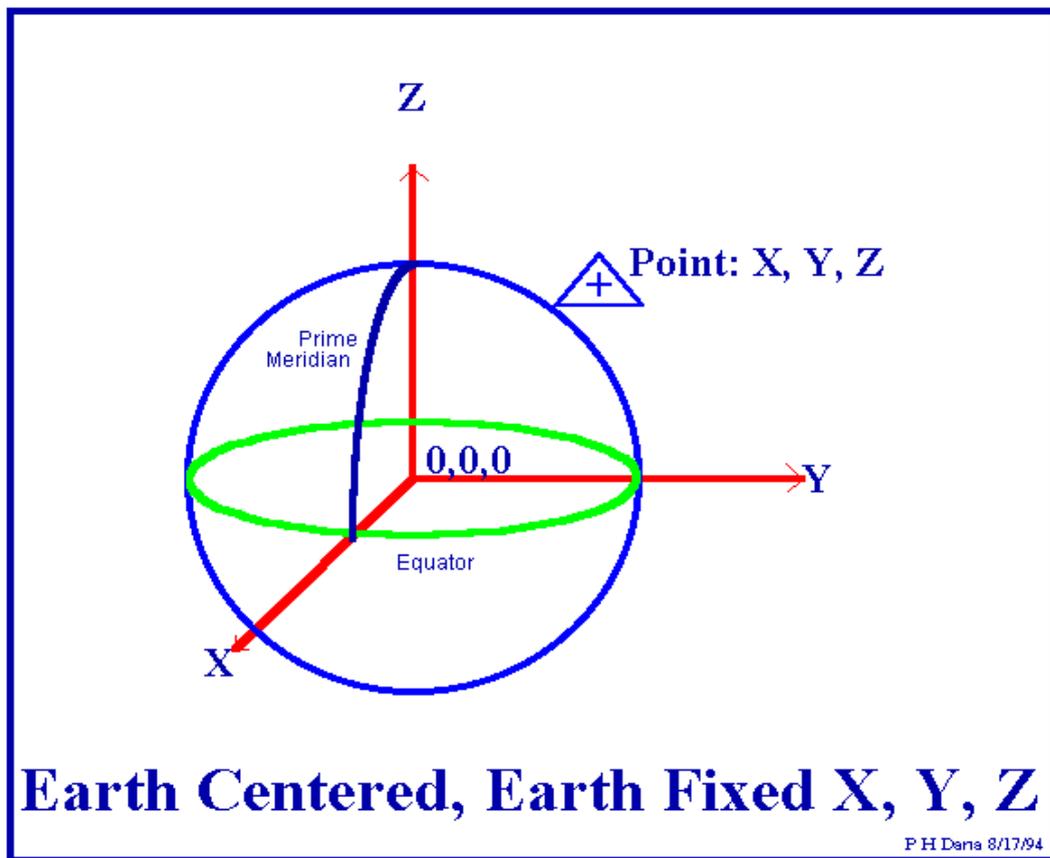


1 - - (latitude - longitude - height system)

2) (ECEF X, Y, Z - Earth Centered, Earth Fixed X, Y, Z)

- 3 Cartesian

- X :
- Y : 90
- Z : 가



2 (ECEF X, Y, Z - Earth Centered, Earth Fixed X, Y, Z)

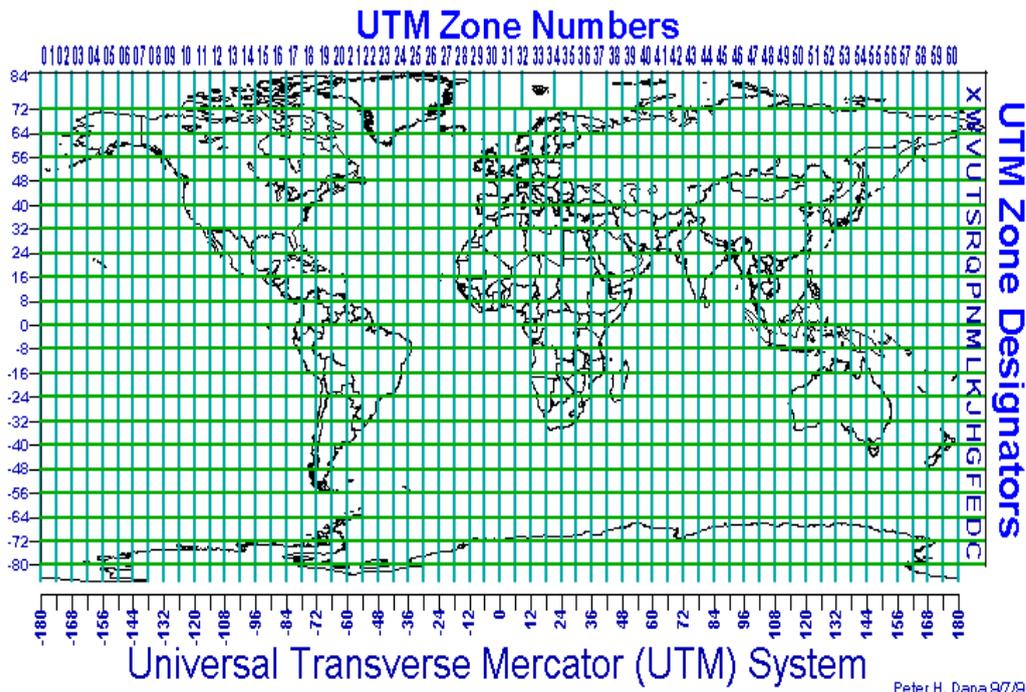
) NAD-83 - XYZ

30:16:28.82 N( ) 97:44:25.19 W( )

-> X = -742507.1 Y = -5462738.5 Z = 3196706.5

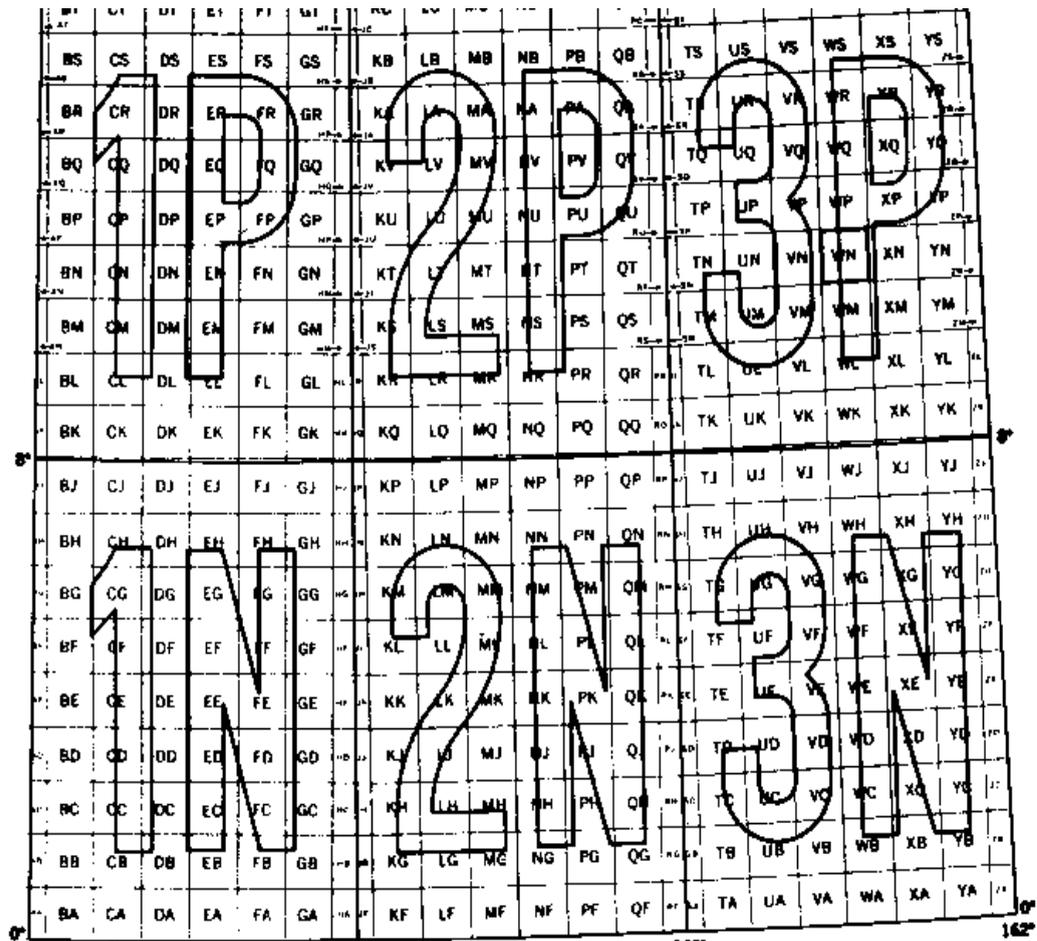
3) UTM (Universal Transverse Mercator)

- 2 UTM (zone)
- 6 UTM 가 180  
1 60  
80 84 C
- X I O 1,0
- UTM zone 14  
96 102 99 ( )
- (easting)
- (northing)
- 500km
- 가 (false easting)
- 가 0  
(northing) 10,000km
- 가 (false northing)



3 UTM ( 가 )





100,000 Meter MGRS Square Designators

4 MGRS ( UTM )

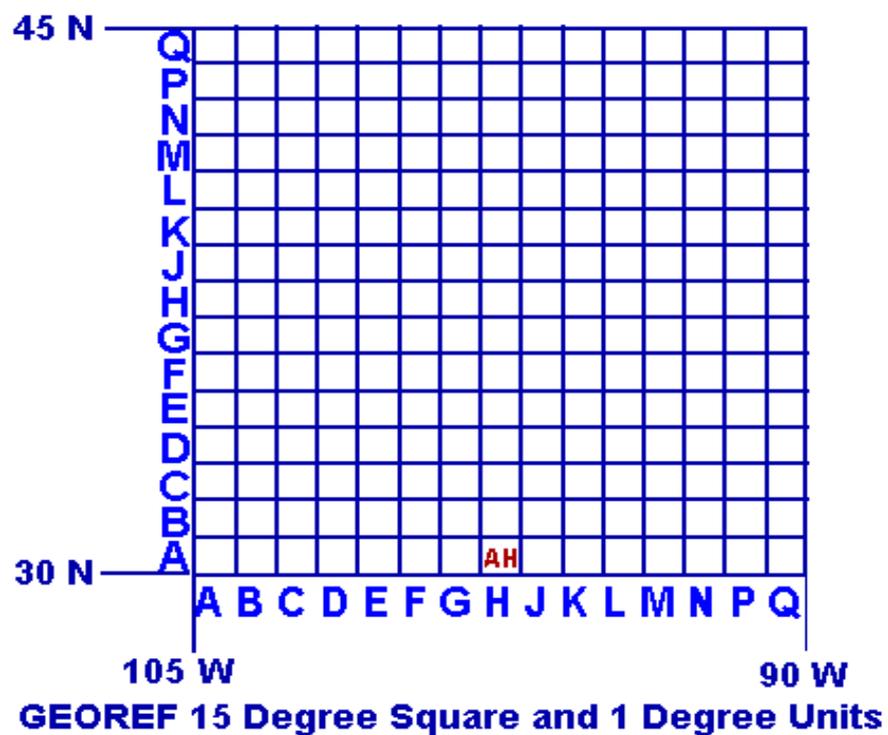
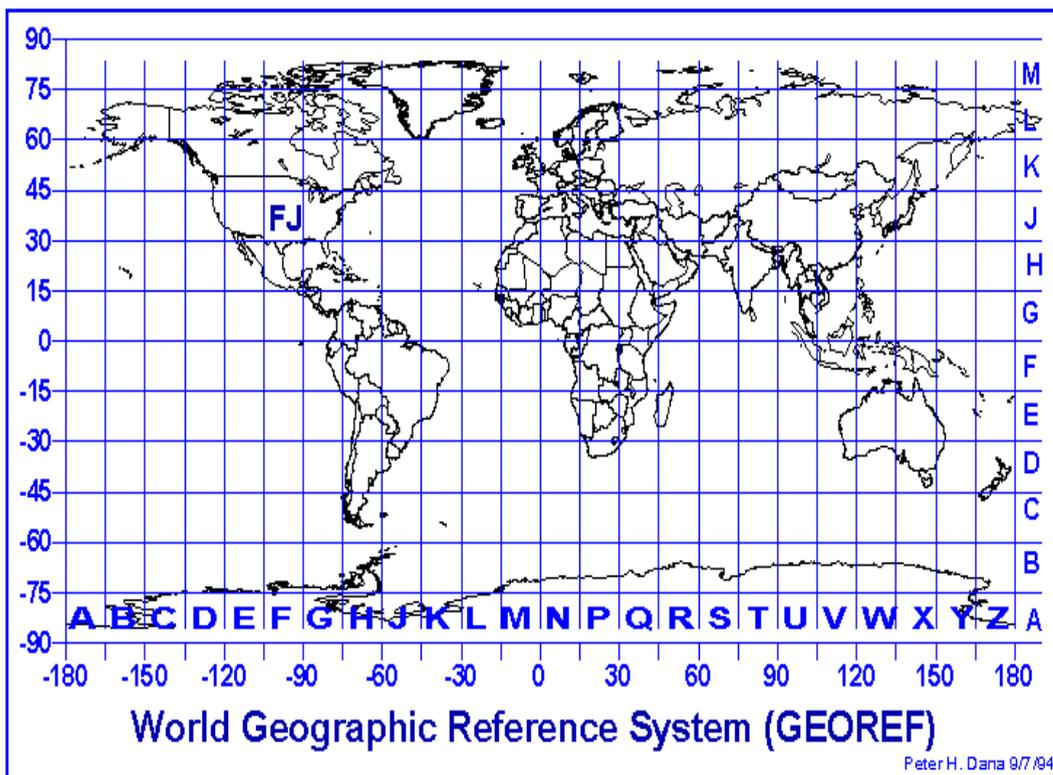
5) GEOREF (World Geographic Reference System)

-  
 - 15 24 , 12  
 1 15 가

) NAD-83 - GEOREF

30:16:28.82 N 97:44:25.19 W

-> FJHA1516

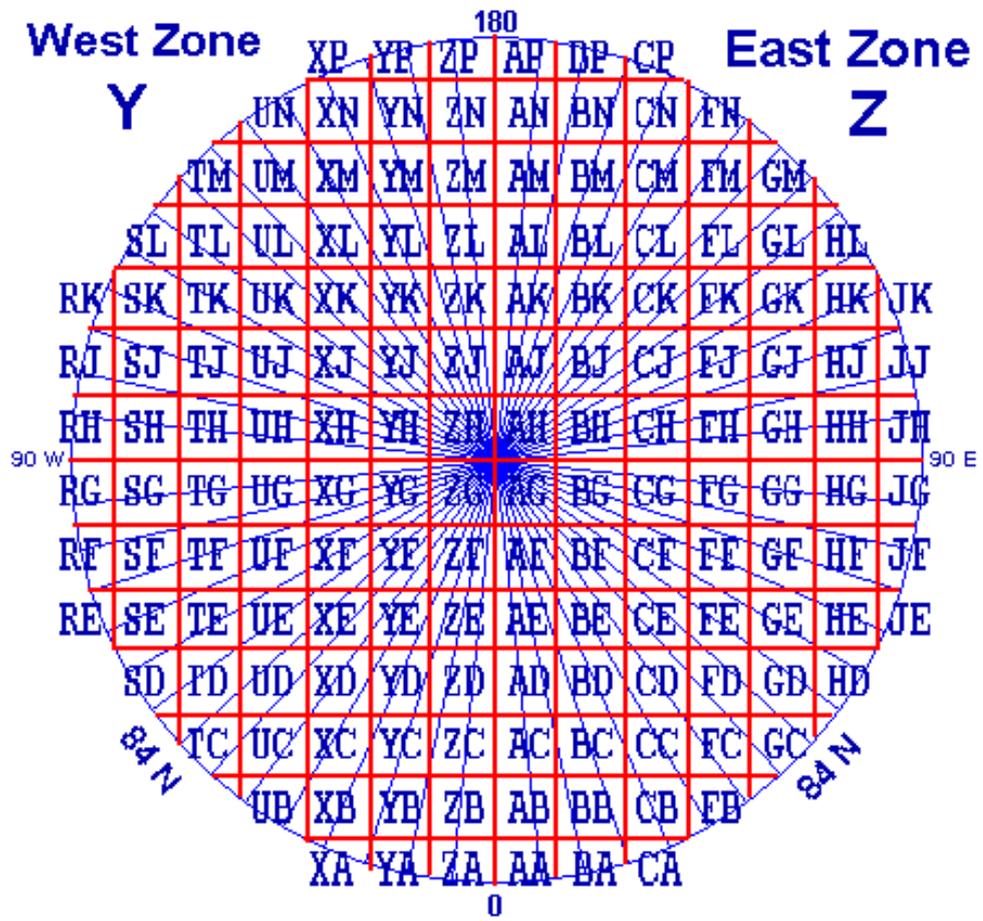


5 GEOREF (World Geographic Reference System)

1-3 (local regional)

1) UPS (Universal Polar Stereographic)

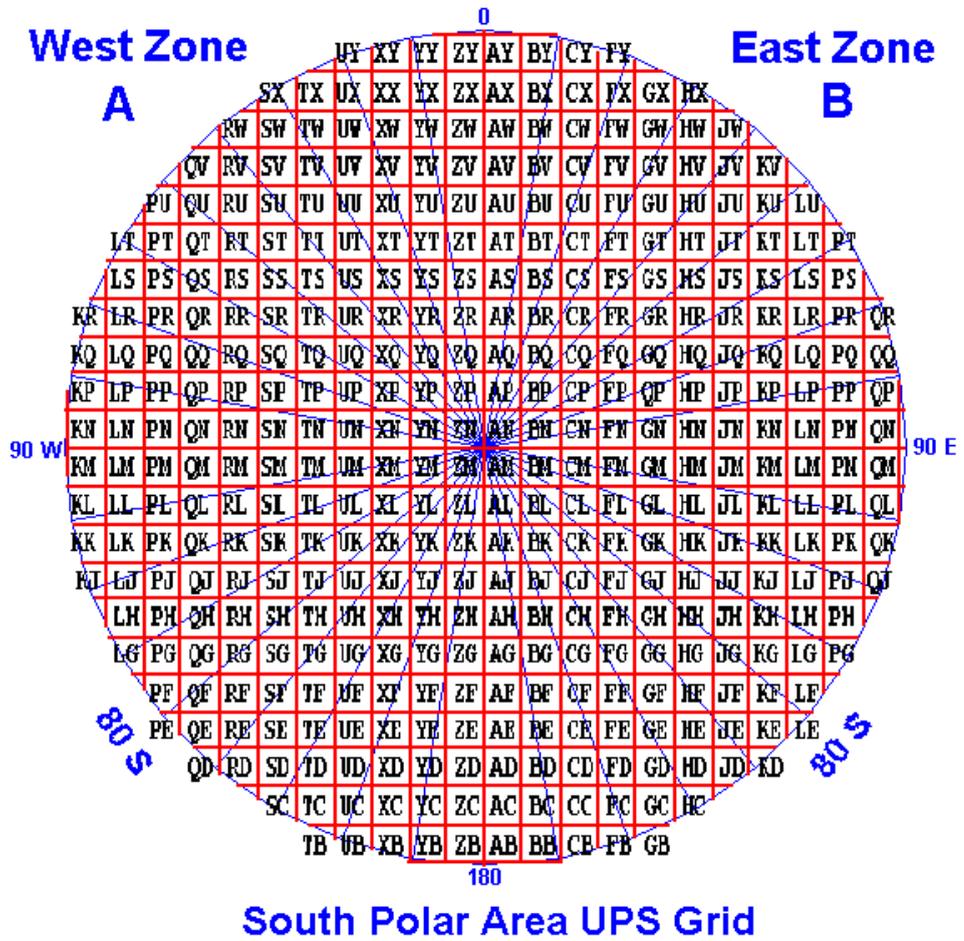
- 84 , 80
- (polar aspect stereographic)
- (zone) 가 , 가



6a UPS

) NAD-83 - UPS

85:40:30.0 N 85:40:30.0 W -> ZGG7902863771



6b UPS

) NAD-83 - UPS

85:40:30.0 S 85:40:30.0 W -> ATN2097136228

2) National Grid System

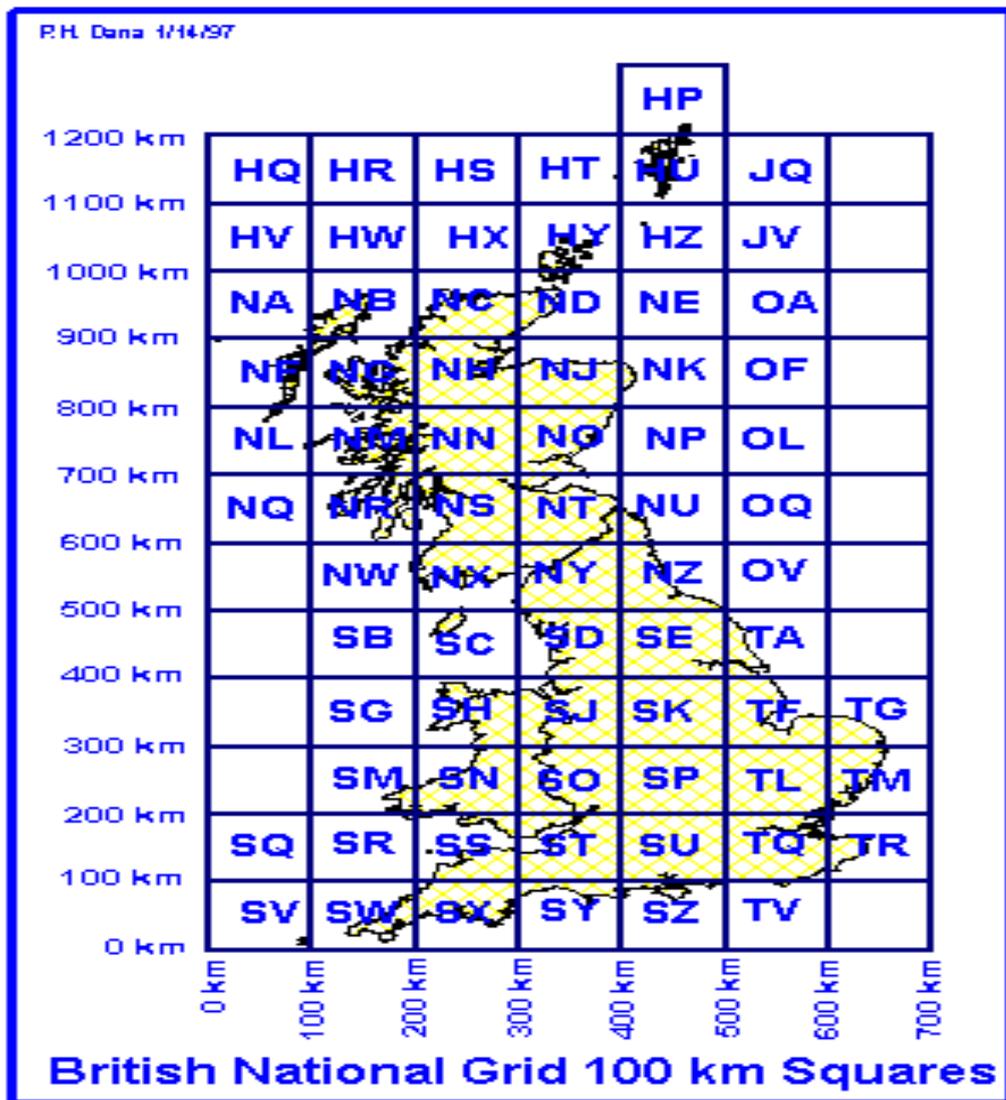
. (Australia, Belgium, Great Britain, Finland, Ireland, Italy, The Netherlands, New Zealand, Sweden)

British National Grid (BNG)

- Mercator OS(Ordnance Survey) Great Britain (1936)

2-5

- 49 , 2 가 400km, 가 100km  
 0.9996012717  
 - 1 500km , 2  
 100km



7 British National Grid (BNG)

) NAD-83 - BNG

54:30:52.55 N 1:27:55.75 W -> NZ3460013400

Irish National Grid

- Mercator OS(Ordnance Survey) Great Britain (1936) Ireland (1965)
  - 53 30 , 8 가 200km, 가 250 km . 1.000035 .

3) SPC (State Plane Coordinates)

- North American Datum 1927 (NAD27), North American Datum 1983 (NAD83) - State Plane System 1983
- (zone)

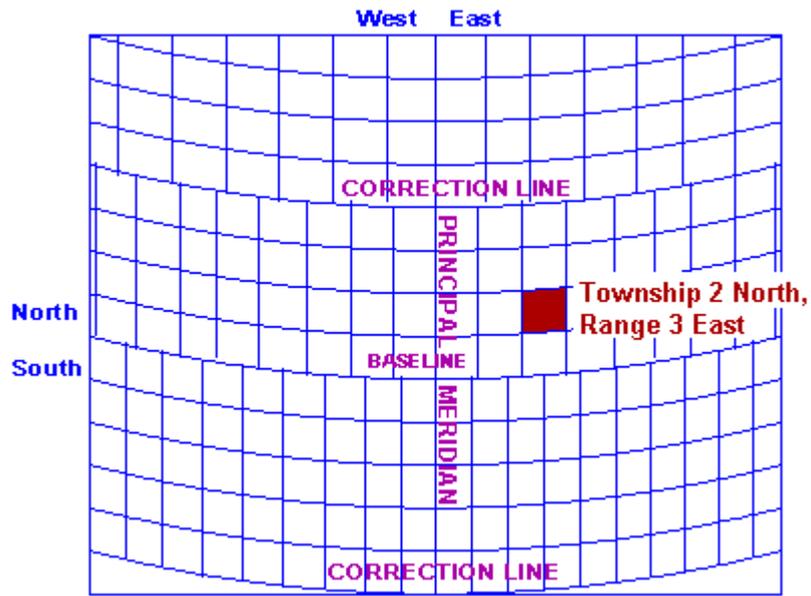
- Lambert (conformal conic) :
- (transverse) Mercator :
- (oblique) Mercator : ( : )



8 SPC ( )

4) Public Land Rectangular Surveys (PLRS PLS)

- ( ) 1790  
(principal meridian) (baselines)
- 6 (township) 가 ,  
6 (range) 가 .



9 PLS ( , , , )

- 4 가 .
- 6 36 1 (section) 가 , 4 (quarter section) , 40 (acre) - (quarter-quarter section) ( - 10 ).



2-5

- 3 . y 38 ° .
- : 38 N, 125 E, : 38 N, 127 E, : 38 N, 129 E
- 
- 가 , : (X-0m, Y-0m)
- , : (X-500,000m, Y -200,000m)
- : 1.0000
- : (X=550,000m, Y=200,000),
- 38 N, 131 E . 5 .
- 3 ( )
- 가 가 .
- 
- ( +10.405 ")
- UTM .

## 2. 가

2-1

- 가 가 , GPS
- ( , , - , )

2-5

2-2

1) : (ITRF , ECEF )

- ITRF2000

- 1991 IAG IGS , , ITRF 88, 89, 90, 91, 92, 93, 94, 96, 97, 2000 . ,

2) :

- : GRS80

- IAG IERS92 Standard .
- WGS84 0.11mm, 0.0000003 .

1 GRS80 WGS84

	GRS80	WGS84
	6,378,137.0m	6,378,137.0m
	1/298.257222101	1/298.257223563

3) :

2-3 가

- 가 KTRF(Korean Terrestrial Reference Frame) .

- 1 : VLBI GPS .

-> , ,

- 2 : 가 가 .

- 20Km ~ 30Km

( 가 )

2-5

- 가 .
- .
- : 20Km 200
- : (EGM96)( ), GPS (1,500 )( ), (3,000 )( ) .
- : 10Cm
- : 2003 .

2-4 ( )

- : Mercator 0.9996 .
- : ±3° ,
- : 127°30 , ( 0 )
- : N , E 가 (false N) +0.000m, 가 (false E) +500,000.000m .

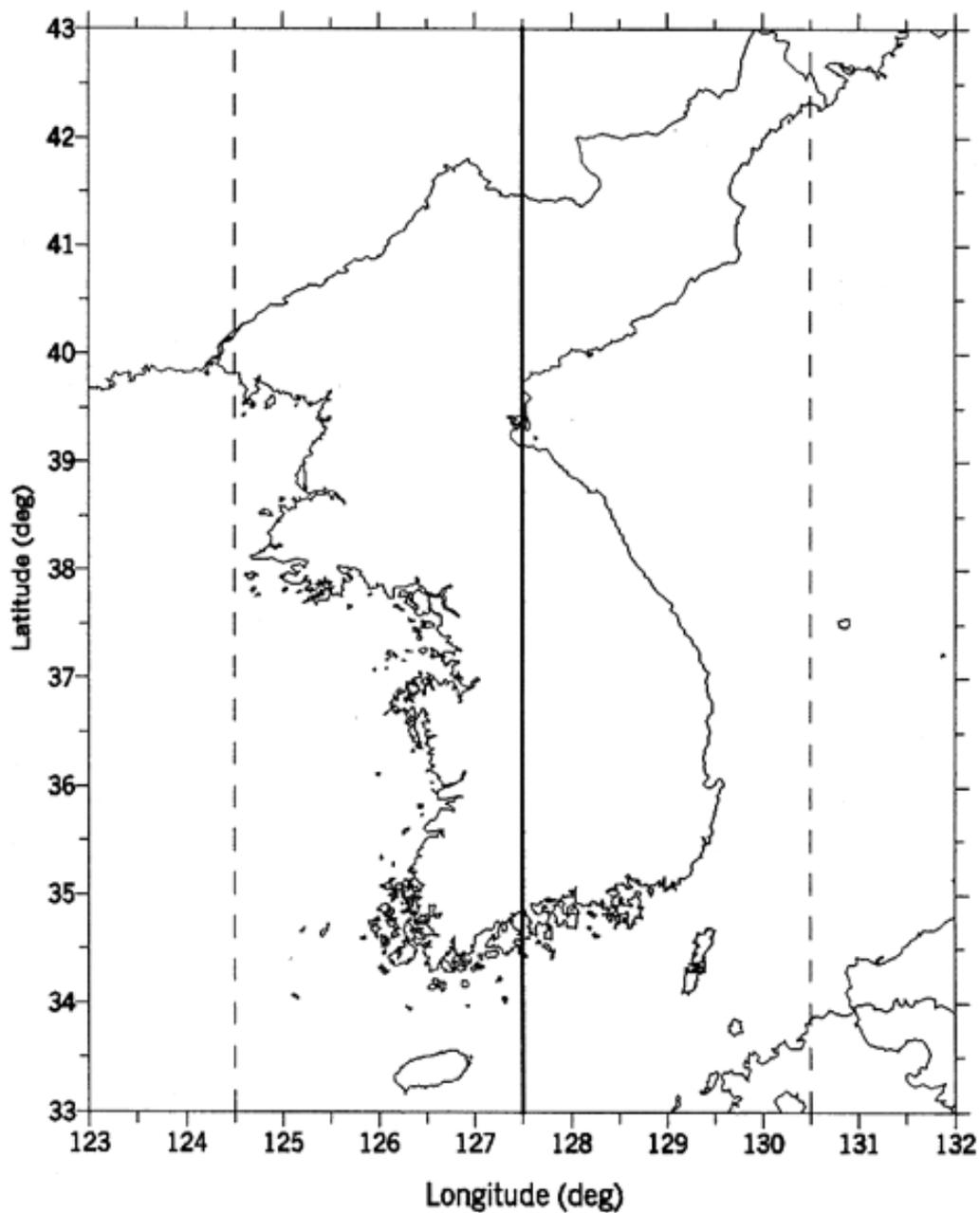
2-5

- 가 .
- .
- .

2-6

- 1) ( -> ) :
  - .
  - (ITRF2000, VLBI -Epoch2002.0 ) .
  - (1910 ) (Bessel) 10.405 .

- Bursa-Wolf 7 .  
- : 1/10,000  
(1/5,000 ( 1-2m )) .



11 ( )

2)

(m)			( )			(ppm)
x	y	z	Rx	Ry	Rz	
-115.80	+474.99	+674.11	-1.16	+2.31	+1.63	+6.43

-

$$\begin{bmatrix} X_2 \\ Y_2 \\ Z_2 \end{bmatrix} = (1 + \mathbf{I}) \begin{bmatrix} 1 & R_z & -R_y \\ -R_z & 1 & R_x \\ R_y & -R_x & 1 \end{bmatrix} \begin{bmatrix} X_1 \\ Y_1 \\ Z_1 \end{bmatrix} + \begin{bmatrix} \Delta X \\ \Delta Y \\ \Delta Z \end{bmatrix}$$

3)

- ( ) 1/10,000  
 ,  
 - 가  
 가  
 - ( ) ( )  
 .  
 -  
 ( , 2002 , : 21 9 )

3.

3-1 - -

1) -f, -?, -h (X,Y,Z)

$$X = (v + h) \cos j \cos l$$

$$Y = (v + h) \cos j \sin l$$

$$Z = ((1 - e^2)v + h) \sin j$$

$$v = \frac{a}{\sqrt{1 - e^2 \sin^2 j}}$$

a : , b :

$$e^2 = \frac{(a^2 - b^2)}{a^2} = 2f - f^2$$

f : ,  $1/f = a/(a-b)$ , h : (ellipsoid height)

(h) GPS

(H,

)

(N,

)

2) (X,Y,Z) -f , -? , -h

$$j = \arctan\left(\frac{Z + e^2 \cdot v \cdot \sin j}{\sqrt{X^2 + Y^2}}\right) \text{ ( , iteration)}$$

$$l = \arctan(Y / X)$$

$$h = X \sec l \sec j - v$$

3-2 ( 1)

가

가

가

$$X_t = X_s + dX$$

$$Y_t = Y_s + dY$$

$$Z_t = Z_s + dZ$$

, t : , s :

3-3 Molodensky (3-parameter )

5m

$$d\mathbf{j} = (-dX \sin \mathbf{j} \cos \mathbf{l} - dY \sin \mathbf{j} \sin \mathbf{l} + dZ \cos \mathbf{j} + (f \cdot da + a \cdot df) \sin 2\mathbf{j}) / \mathbf{r}$$

$$d\mathbf{l} = (-dX \sin \mathbf{l} + dY \cos \mathbf{l}) / (\mathbf{n} \cos \mathbf{j})$$

$$dh = dX \cos \mathbf{j} \cos \mathbf{l} + dY \cos \mathbf{j} \sin \mathbf{l} + dZ \sin \mathbf{j} + (a \cdot df + f \cdot da) \sin^2 \mathbf{j} \cdot da$$

, a : , da :

f : , df :

h : , ? :

? :

$$v = \frac{a}{\sqrt{1 - e^2 \sin^2 \mathbf{j}}}$$

3-4 Hermert (7-parameter )

3

. 3 X,Y,Z ,

2 X,Y ,

$$\begin{pmatrix} X_t \\ Y_t \\ Z_t \end{pmatrix} = M \times \begin{pmatrix} 1 & -R_z & R_x \\ R_z & 1 & -R_x \\ -R_y & R_x & 1 \end{pmatrix} \times \begin{pmatrix} X_s \\ Y_s \\ Z_s \end{pmatrix} + \begin{pmatrix} dX \\ dY \\ dZ \end{pmatrix}$$

, (dX, dY, dZ) :

(R\_x, R\_y, R\_z) : , 가

M : ( + ) ( ).  
,  $M = (1 + dS \times 10^{-6})$ , dS :

- 1.
2. UTM , 가
- 3.
- 4.
5. Molodensky