

## POLAR STEREOGRAPHIC

10xxxxxx.1

### LEGAL RESTRICTIONS:

This Reusable Software Component (RSC) contains data with Unlimited Government Rights.

### DESCRIPTION:

POLAR STEREOGRAPHIC is a C language code component that provides conversions between Geodetic (latitude and longitude) and Polar Stereographic projection coordinates (easting and northing).

### CERTIFICATION LEVEL:

This RSC has been certified at level 4. A level 4 component satisfies the criteria for reliability, testing, and documentation for the Army Reuse Center (ARC). The component comes with test materials and a Reuse Manual that aids in integrating the component into a software system.

### LEVEL OF TESTING/ACCEPTANCE:

Unit and integration testing have been performed for the functions contained in this component.

### PURPOSE/INTENDED USE:

The purpose of POLAR STEREOGRAPHIC is to provide a reusable component which supports the following coordinate conversions:

- Geodetic (latitude and longitude) coordinates to Polar Stereographic projection coordinates (easting and northing),
- Polar Stereographic projection coordinates (easting and northing) to geodetic (latitude and longitude) coordinates.

A particular ellipsoid is specified in terms of the following parameters:

- Semi-Major Axis (a): Radius (in meters) at the equator, and
- Semi-Minor Axis (b): Radius (in meters) at a pole.

A particular variation of the Polar Stereographic projection is specified in terms of the following parameters:

- Longitude Down From Pole – Longitude (in radians) along the negative Y axis of the projection coordinate system,
- Latitude of True Scale – Latitude (in radians) where the scale factor is 1.0, and also specifies the hemisphere (north or south),
- False Easting – A coordinate value (in meters) assigned to the pole to avoid the inconvenience of using negative coordinates, and
- False Northing – A coordinate value (in meters) assigned to the pole to avoid the inconvenience of using negative coordinates.

#### HARDWARE/ENVIRONMENT CONSTRAINTS:

There are no hardware or environment constraints. There are no limitations.

#### FUNCTIONS:

`Set_Polar_Stereographic_Parameters` – This function sets the ellipsoid parameters and Polar Stereographic projection parameters that are to be used in subsequent coordinate conversion operations.

`Get_Polar_Stereographic_Parameters` – This function returns the current values of the ellipsoid parameters and Polar Stereographic projection parameters.

`Convert_Geodetic_To_Polar_Stereographic` – This function converts the specified geodetic coordinates (latitude and longitude in radians) to Polar Stereographic coordinates (easting and northing in meters) using the current ellipsoid and Polar Stereographic projection parameters.

`Convert_Polar_Stereographic_To_Geodetic` – This function converts the specified Polar Stereographic projection coordinates (easting and northing in meters) to geodetic coordinates (latitude and longitude in radians) using the current ellipsoid and Polar Stereographic projection parameters.

## EXAMPLE APPLICATIONS:

The following example illustrates how POLAR STEREOGRAPHIC is used to convert between geodetic coordinates and polar stereographic projection coordinates:

Function Call:

```
status = Set_Polar_Stereographic_Parameters (a, b, Latitude_of_True_Scale,  
Longitude_Down_from_Pole, False_Easting, False_Northing,)
```

Inputs:

a	6378137.0
b	6356752.3
Latitude_of_True_Scale	90.0
Longitude_Down_from_Pole	0.0
False_Easting	0.0
False_Northing	0.0

Function Call:

```
status = Convert_Geodetic_To_Polar_Stereographic (Latitude, Longitude, Easting,  
Northing)
```

Inputs:

Latitude:	-35.0
Longitude:	75.0

Outputs:

Easting:	11789412
Northing:	-3158963

Function Call:

```
status = Convert_Polar_Stereographic_To_Geodetic (Easting, Northing, Latitude,  
Longitude)
```

Inputs:

Easting: 11789412

Northing: -3158963

Outputs:

Latitude: -35.0

Longitude: 75.0