

## UPS

10xxxxxx.1

### LEGAL RESTRICTIONS:

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

### DESCRIPTION:

UPS is a C language code component that provides conversions between Geodetic coordinates (latitude and longitude) and Universal Polar Stereographic (UPS) projection coordinates (hemisphere, 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 UPS is to provide a reusable component which supports the following coordinate conversions:

- Geodetic coordinates (latitude and longitude in radians) to Universal Polar Stereographic (UPS) projection coordinates (hemisphere, easting in meters, and northing in meters),
- Universal Polar Stereographic (UPS) projection coordinates (hemisphere, easting in meters, and northing in meters) to Geodetic coordinates (latitude and longitude in radians).

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.

#### HARDWARE/ENVIRONMENT CONSTRAINTS:

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

#### FUNCTIONS:

Set\_UPS\_Parameters – This function sets the ellipsoid parameters that are to be used in subsequent coordinate conversion operations.

Get\_UPS\_Parameters – This function returns the current values of the ellipsoid parameters.

Convert\_Geodetic\_To\_UPS – This function converts the specified geodetic coordinates (latitude and longitude in radians) to UPS projection coordinates (hemisphere, easting in meters, and northing in meters) using the current ellipsoid parameters.

Convert\_UPS\_To\_Geodetic – This function converts the specified UPS projection coordinates (hemisphere, easting in meters, and northing in meters) to geodetic coordinates (latitude and longitude in radians) using the current ellipsoid parameters.

#### EXAMPLE APPLICATIONS:

The following example illustrates how UPS can be used to convert Geodetic coordinates to UPS projection coordinates and back again:

Function Call:

```
status = Set_UPS_Parameters (a, b)
```

Inputs:

a	6378137.0
b	6356752.3142

Function Call:

```
status = Convert_Geodetic_To_UPS (Latitude, Longitude, Hemisphere, Easting,  
                                   Northing)
```

Inputs:

Latitude: 87 17 14 S

Longitude: 132 14 52 E

Outputs:

Hemisphere: "S"

Easting: 2222990

Northing: 1797470

Function Call:

```
status = Convert_UPS_To_Geodetic (Hemisphere, Easting, Northing, Latitude,  
                                   Longitude)
```

Inputs:

Hemisphere: "S"

Easting: 2222990

Northing: 1797470

Outputs:

Latitude: 87 17 14 S

Longitude: 132 14 52 E