UTM

10xxxxxx.1

LEGAL RESTRICTIONS:

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

DESCRIPTION:

UTM is a C language code component that provides conversions between Geodetic coordinates (latitude and longitude) and Universal Transverse Mercator (UTM) projection coordinates (zone, 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 UTM is to provide a reusable component which supports the following coordinate conversions:

- Geodetic coordinates (latitude and longitude in radians) to Universal Transverse Mercator (UTM) projection coordinates (zone, hemisphere, easting in meters, and northing in meters), with an option to specify the zone,

- Universal Transverse Mercator (UTM) projection coordinates (zone, 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_UTM_Parameters – This function sets the ellipsoid parameters, and optional zone override parameter, that are to be used in subsequent coordinate conversion operations.

Get_UTM_Parameters – This function returns the current values of the ellipsoid parameters, and optional zone override parameter.

Convert_Geodetic_To_UTM – This function converts the specified geodetic coordinates (latitude and longitude in radians) to UTM projection coordinates (zone, hemisphere, easting in meters, and northing in meters) using the current ellipsoid parameters and optional zone override parameter.

Convert_UTM_To_Geodetic – This function converts the specified UTM projection coordinates (zone, 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 UTM can be used to convert Geodetic coordinates to UTM projection coordinates and back again:

Function Call:

status = Set_UTM_Parameters (a, b, Override_Zone)

Inputs:

a	6378137.0

b 6356752.3142

Override_Zone 0 (no override specified)

Function Call:

status = Convert_Geodetic_To_UTM (Latitude, Longitude, Zone, Hemisphere, Easting, Northing)

Inputs:

Latitude: 35.0

Longitude: -75.0

Outputs:

Zone: 18

Hemisphere: ‘N’

Easting: 500000

Northing: 3873042

Function Call:

status = Convert_UTM_To_Geodetic (Zone, Hemisphere, Easting, Northing, Latitude, Longitude)

Inputs:

Zone: 18

Hemisphere: ‘N’

Easting: 500000

Northing: 3873042

Outputs:

Latitude: 35.0

Longitude: -75.0