

## MGRS

10xxxxxx.1

### LEGAL RESTRICTIONS:

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

### DESCRIPTION:

MGRS is a C language code component that provides conversions between Geodetic coordinates (latitude and longitude), Universal Transverse Mercator (UTM) coordinates, Universal Polar Stereographic (UPS) coordinates, and Military Grid Reference System (MGRS) coordinates.

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

- Semi-Major Axis (a): Radius (in meters) at the equator,
- Semi-Minor Axis (b): Radius (in meters) at a pole, and
- Ellipsoid Code Standard 2-letter ellipsoid code.

### 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 MGRS is to provide a reusable component which supports the following coordinate conversions:

- Geodetic coordinates (latitude and longitude in radians) to Military Grid Reference System (MGRS) coordinate string, and
- Military Grid Reference System (MGRS) coordinate string to Geodetic coordinates (latitude and longitude in radians).
- Universal Transverse Mercator (UTM) coordinates (zone, hemisphere, easting and northing in meters) to MGRS coordinate string.
- MGRS coordinate string to Universal Transverse Mercator (UTM) coordinates (zone, hemisphere, easting and northing in meters).
- Universal Polar Stereographic (UPS) coordinates (hemisphere, easting and northing in meters) to MGRS coordinate string.
- MGRS coordinate string to Universal Polar Stereographic (UPS) coordinates (hemisphere, easting and northing in meters).

#### HARDWARE/ENVIRONMENT CONSTRAINTS:

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

#### FUNCTIONS:

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

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

Convert\_Geodetic\_To\_MGRS – This function converts the specified geodetic coordinates (latitude and longitude in radians) to the corresponding MGRS coordinate string with the specified level of precision.

Convert\_MGRS\_To\_Geodetic – This function converts the specified MGRS coordinate string to geodetic coordinates (latitude and longitude in radians).

Convert\_UTM\_To\_MGRS – This function converts the specified UTM coordinates (zone, hemisphere, easting and northing in meters) to the corresponding MGRS coordinate string with the specified level of precision.

Convert\_MGRS\_To\_UTM – This function converts the specified MGRS coordinate string to UTM coordinates (zone, hemisphere, easting and northing in meters).

Convert\_UPS\_To\_MGRS – This function converts the specified UPS coordinates (hemisphere, easting and northing in meters) to the corresponding MGRS coordinate string with the specified level of precision.

Convert\_MGRS\_To\_UPS – This function converts the specified MGRS coordinate string to UPS coordinates (hemisphere, easting and northing in meters).

#### EXAMPLE APPLICATIONS:

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

Function Call:

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

Inputs:

a	6378137.0
b	6356752.3142

Function Call:

```
status = Convert_Geodetic_To_MGRS (Latitude, Longitude, Precision, MGRS)
```

Inputs:

Latitude:	35.0
Longitude:	-75.0
Precision	5

Outputs:

MGRS:	18SWD0000073042
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Function Call:

```
status = Convert_MGRS_To_Geodetic (MGRS, Latitude, Longitude)
```

Inputs:

MGRS: 18SWD0000073042

Outputs:

Latitude: 35.0

Longitude: -75.0