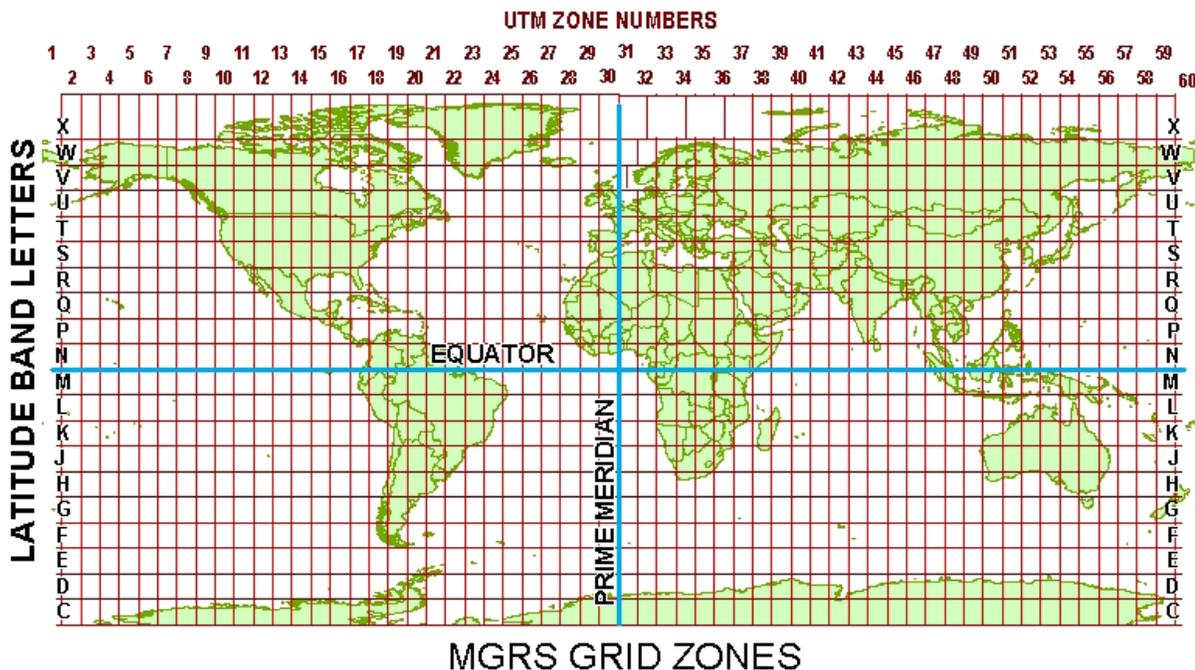


## MGRS

The Military Grid Reference System (MGRS) is an alpha-numeric system for expressing UTM / UPS coordinates. A single alpha-numeric value references an area that is unique for the entire earth. The components of MGRS values are as follows:

(Example: 15SWC8081751205)

- The first two characters represent the 6° wide UTM zone. \*There are a few exceptions to the 6° wide grid zone rule in UTM zones 31-37 in the band letters V, W, and X. See graphic below.
  - Leading zeroes are included so that Zone 9 is “09”.
  - For polar areas outside the UTM area, these characters are omitted.
- The third character is a letter designating a band of latitude.
  - Beginning at 80°S and proceeding northward, the 20 bands are lettered C through X, omitting I and O.
  - The bands are all 8° high except band X, which is 12° high.
  - Outside the UTM area, A and B are used near the south pole, Y and Z near the north pole.



- The vertical UTM boundaries and horizontal latitudinal band boundaries form (generally) 6° X 8° **Grid Zones**. Hence, the first

three letters of the MGRS value, e.g. “15S”, are referred to as the **Grid Zone Designation (GZD)**.

- The fourth and fifth characters are a pair of letters designating one of the 100,000-meter grid squares within the grid zone (or UPS area). See Figure 6.

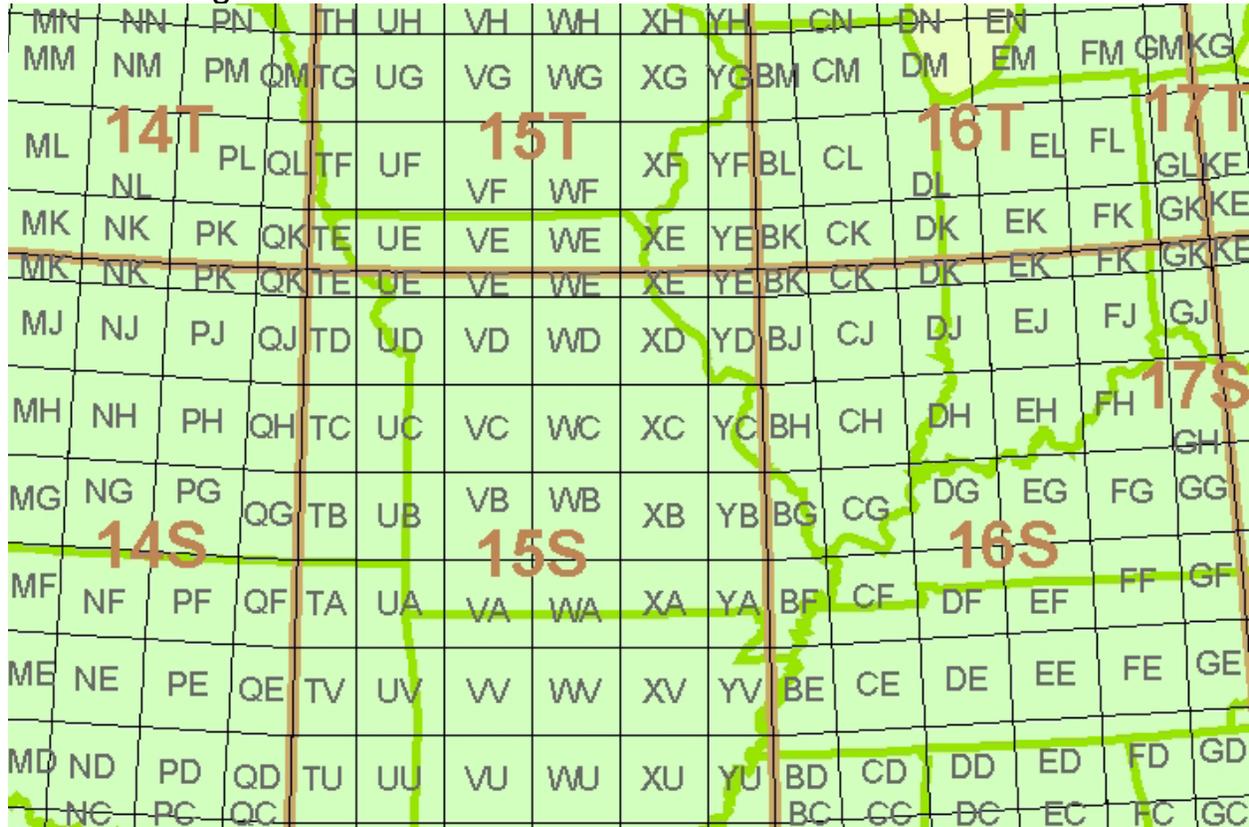


Figure 6.

In this sample area, the Grid Zone Designators are shown in brown. The smaller gray letters are the 100,000-meter grid square designators. The example point “15SWC8081751205” is located in square “WC” near the center of the figure.

- The remaining characters consist of the numeric Easting and Northing values within the 100,000-meter grid square (Figure 7).
- MGRS coordinates may be truncated to reflect lesser precision level. For example:
  - 15SWC8081751205 is at one-meter refinement.
  - 15SWC80815120 is at 10-meter refinement.
  - 15SWC808512 is at 100-meter refinement.
  - 15SWC8051 is at 1000-meter refinement.

- There are two lettering schemes for the 100,000-meter grid square designators. Generally, one scheme is used for WGS-84, and the other is used for older ellipsoids associated with local datums. Example:

15SWC8081751205

is on WGS-84. When converted to NAD-27 datum, Clarke 1866 ellipsoid, its value is:

15SWN8083350993

The 100,000-meter grid square “WC” for WGS-84 generally coincides with the grid square “WN” for Clarke 1866.

See the section on USNG for further guidance.

Figure 7.

Magenta arrows show how MGRS easting and northing values are determined from within the 100,000-meter grid square. The MGRS value of this position is 15SWC8081751205.



## **THE LETTER AFTER THE UTM ZONE NUMBER: IS THAT A HEMISPHERE OR A LATITUDINAL BAND?**

Since the creation of UTM, developers have interpreted the rules for expressing an earth-wide unique UTM position in one of two ways:

1. By including an “N” or “S” after the zone number to specify a hemisphere.
2. By including the 8° latitudinal band designator after the zone number.

Example: The position at 92°W, 38°N, expressed in UTM coordinates, is:  
587798m E, 4206287m N, Zone 15.

This reference is valid for two positions on the earth. In order to make it unique for only one position worldwide, i.e. 92°W, 38°N:

- Developer #1 includes an “N” to specify northern hemisphere:

15N 587798 4206287

- Developer #2 includes the 8° latitudinal band designator:

15S 587798 4206287

This situation is causing confusion among users and developers. The two 8° latitudinal bands, from 0° to 8°N and from 32°N to 40°N, are assigned the designations “N” and “S”, respectively. These designations are often mistaken for hemisphere designations.

Technical Manual 8358.1 contains the authoritative definition of UTM. NGA will soon publish an updated version of TM 8358.1, which will provide clarification on this issue.

**For additional guidance and assistance contact NGA's  
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