**The GPRMC Sentence**

This sentence, known as the "Recommended Minimum" sentence, is the most common sentence transmitted by GPS devices. This one sentence contains nearly everything a GPS application needs: latitude, longitude, speed, bearing, satellite-derived time, fix status and magnetic variation.

**Sentence Example**

$GPRMC,040302.663,A,3939.7,N,10506.6,W,0.27,358.86,200804,,\*1A

**Sentence Contents**

The GPRMC sentence consists of twelve comma-delimited words:

**The Command Word**

**$GPRMC**,040302.663,A,3939.7,N,10506.6,W,0.27,358.86,200804,,\*1A

The command word indicates that the sentence is to be interpreted as a recommended minimum message.

**Satellite-Derived Time**

$GPRMC,**040302.663**,A,3939.7,N,10506.6,W,0.27,358.86,200804,,\*1A

GPS devices are able to calculate the current date and time using GPS satellites (and not the computer's own clock, making it useful for synchronization). This word stores the current time, in UTC, in a compressed form "HHMMSS.XXX," where HH represents hours, MM represents minutes, SS represents seconds, and XXX represents milliseconds. The above value represents 04:03:02.663 AM UTC.

**Satellite Fix Status**

$GPRMC,040302.663,**A**,3939.7,N,10506.6,W,0.27,358.86,200804,,\*1A

When the signals of at least three GPS satellites become stable, the device can use the signals to calculate the current location. The device is said to be "fixed" when calculations of the current location are taking place. Similarly, the phrases "obtaining a fix" or "losing a fix" speak of situations where three signals become stable or obscured, respectively.  
  
A value of "A" (for "active") indicates that a fix is currently obtained, whereas a value of "V" (for "inValid") indicates that a fix is not obtained.

**Latitude Decimal Degrees**

$GPRMC,040302.663,A,**3939.7**,N,10506.6,W,0.27,358.86,200804,,\*1A

The latitude represents the current distance north or south of the equator. This word is in the format "HHMM.M" where HH represents hours and MM.M represents minutes. A comma is implied after the second character. This value is used in conjunction with the longitude to mark a specific point on Earth's surface. This sentence says that the current latitude is "39°39.7'N".

**Latitude Hemisphere**

$GPRMC,040302.663,A,3939.7,**N**,10506.6,W,0.27,358.86,200804,,\*1A

This word indicates if the latitude is measuring a distance north or south of the equator. A value of "N" indicates north and "S" indicates south. This sentence says that the current latitude is "39°39.7'N".

**Longitude Decimal Degrees**

$GPRMC,040302.663,A,3939.7,N,**10506.6**,W,0.27,358.86,200804,,\*1A

The longitude represents the current distance east or west of the Prime Meridian. This word is in the format "HHHMM.M" where HHH represents hours and MM.M represents minutes. A comma is implied after the third character. This value is used in conjunction with the latitude to mark a specific point on Earth's surface. This sentence says that the current longitude is "105°06.6'W".

**Longitude Hemisphere**

$GPRMC,040302.663,A,3939.7,N,10506.6,**W**,0.27,358.86,200804,,\*1A

This word indicates if the longitude is measuring a distance east or west of the Prime Meridian. A value of "E" indicates east and "W" indicates west. This sentence says that the current longitude is "105°06.6'W".

**Speed**

$GPRMC,040302.663,A,3939.7,N,10506.6,W,**0.27**,358.86,200804,,\*1A

This word indicates the current rate of travel over land, measured in knots.

**Bearing**

$GPRMC,040302.663,A,3939.7,N,10506.6,W,0.27,**358.86**,200804,,\*1A

This word indicates the current direction of travel over, measured as an "azimuth." An azimuth is a horizontal angle around the horizon measure in degrees between 0 and 360, where 0 represents north, 90 represents east, 180 represents south, and 270 represents west. This word indicates that the direction of travel is 358.86°, or close to north.

**UTC Date**

$GPRMC,040302.663,A,3939.7,N,10506.6,W,0.27,358.86,**200804**,,\*1A

GPS devices maintain their own date and time calculated from GPS satellite signals. This makes GPS devices useful for clock synchronization since the date and time are independent of the local machine's internal clock. This word contains two-digit numbers for days, followed by months and years. In the example above, the date is August (08) 20th (20), 2004 (04). The two-digit year is added to 2000 to make a full year value.

**The Checksum**

$GPRMC,040302.663,A,3939.7,N,10506.6,W,0.27,358.86,200804,,**\*1A**

The checksum is used to identify errors in the data which may have occurred during transmission. For more information on NMEA checksums, please refer to [Calculating and Validating NMEA Checksums](http://www.codepedia.com/1/Calculating+and+Validating+NMEA+Checksums).

**Further Reading**

**"Writing Your Own GPS Applications"** by Jon Person <http://www.programmersheaven.com/2/Writing-Your-Own-GPS-Applications>  
  
If you need help with this page, please feel free to contact Jon Person at info@geoframeworks.com.

Source: <http://www.codepedia.com/1/The+GPRMC+Sentence>

Code Check Sum

// Calculates the checksum for a sentence

string GetChecksum(string sentence)

{

// Loop through all chars to get a checksum

char Character;

int Checksum;

foreach(char Character in sentence)

{

switch(Character)

{

case "$":

// Ignore the dollar sign

break;

case "\*":

// Stop processing before the asterisk

continue;

default:

// Is this the first value for the checksum?

if (Checksum == 0)

{

// Yes. Set the checksum to the value

Checksum = Convert.ToByte(Character);

}

else

{

// No. XOR the checksum with this character's value

Checksum = Checksum ^ Convert.ToByte(Character);

}

break;

}

}

// Return the checksum formatted as a two-character hexadecimal

return Checksum.ToString("X2");

}