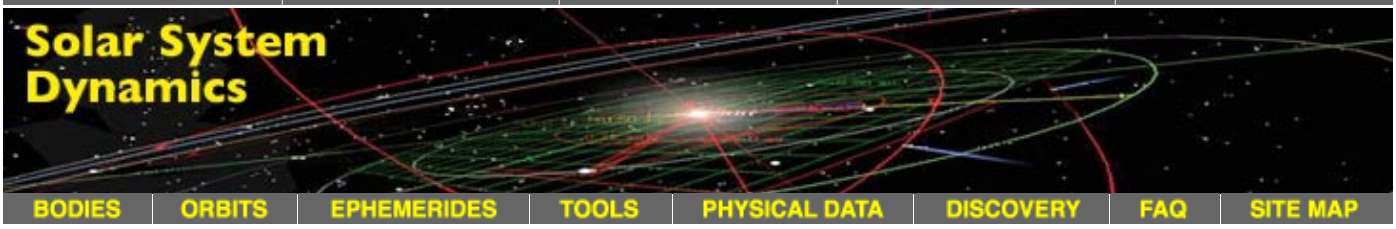

HORIZONS Web-Interface
This tool provides a web-based *limited* interface to JPL's HORIZONS system which can be used to generate ephemerides for solar-system bodies. Full access to HORIZONS features is available via the primary telnet interface. HORIZONS system news shows recent changes and improvements. A web-interface tutorial is available to assist new users.

Current Settings

Ephemeris Type [change] : **VECTORS**
Target Body [change] : **Mars** [499]
Coordinate Origin [change] : **Solar System Barycenter (SSB)** [500@0]
Time Span [change] : Start=**2019-04-27 00:00**, Stop=**2019-04-27 12:00**, Step=**1 d**
Table Settings [change] : *defaults*
Display/Output [change] : *default* (formatted HTML)

Object Data Page

```
Revised: June 21, 2016                Mars                              499 / 4

PHYSICAL DATA (updated 2019-Oct-29):
 Vol. mean radius (km) = 3389.92+-0.04   Density (g/cm^3)      =  3.933(5+-4)
 Mass x10^23 (kg)      =    6.4171       Flattening, f         =  1/169.779
 Volume (x10^10 km^3)  =   16.318        Equatorial radius (km)=  3396.19
 Sidereal rot. period  =   24.622962 hr  Sid. rot. rate, rad/s =  0.0000708822
 Mean solar day (sol)  =   88775.24415 s Polar gravity m/s^2   =  3.758
 Core radius (km)      = ~1700           Equ. gravity  m/s^2   =  3.71
 Geometric Albedo      =    0.150

 GM (km^3/s^2)         = 42828.375214    Mass ratio (Sun/Mars) = 3098703.59
 GM 1-sigma (km^3/s^2) = +- 0.00028      Mass of atmosphere, kg= ~ 2.5 x 10^16
 Mean temperature (K)  =  210            Atmos. pressure (bar) =    0.0056
 Obliquity to orbit    =   25.19 deg     Max. angular diam.    =  17.9"
 Mean sidereal orb per =    1.88081578 y Visual mag. V(1,0)    =  -1.52
 Mean sidereal orb per =  686.98 d       Orbital speed,  km/s  =  24.13
 Hill's sphere rad. Rp =  319.8          Escape speed, km/s    =   5.027
                             Perihelion  Aphelion    Mean
 Solar Constant (W/m^2)      717         493         589
 Maximum Planetary IR (W/m^2)470         315         390
 Minimum Planetary IR (W/m^2)  30          30          30
```

Results

```
*******************************************************************************
Ephemeris / WWW_USER Wed Feb 12 13:34:33 2020 Pasadena, USA      / Horizons
*******************************************************************************
Target body name: Mars (499)                      {source: mar097}
Center body name: Solar System Barycenter (0)     {source: DE431mx}
Center-site name: BODY CENTER
*******************************************************************************
Start time      : A.D. 2019-Apr-27 00:00:00.0000 TDB
Stop  time      : A.D. 2019-Apr-27 12:00:00.0000 TDB
Step-size       : 1440 minutes
*******************************************************************************
Center geodetic : 0.00000000,0.00000000,0.0000000 {E-lon(deg),Lat(deg),Alt(km)}
Center cylindric: 0.00000000,0.00000000,0.0000000 {E-lon(deg),Dxy(km),Dz(km)}
Center radii    : (undefined)
Output units    : AU-D
Output type     : GEOMETRIC cartesian states
Output format   : 3 (position, velocity, LT, range, range-rate)
Reference frame : ICRF/J2000.0
Coordinate systm: Ecliptic and Mean Equinox of Reference Epoch
*******************************************************************************
JDTDB
   X     Y     Z
   VX    VY    VZ
   LT    RG    RR
*******************************************************************************
$$SOE
2458600.500000000 = A.D. 2019-Apr-27 00:00:00.0000 TDB
 X =-3.283646374478960E-01 Y = 1.570623707113252E+00 Z = 4.073331592627085E-02
 VX=-1.317734697685353E-02 VY=-1.672780021837941E-03 VZ= 2.882733450987910E-04
 LT= 9.270276121393157E-03 RG= 1.605098553827400E+00 RR= 1.066233053823191E-03
$$EOE
*******************************************************************************
Coordinate system description:

  Ecliptic and Mean Equinox of Reference Epoch

    Reference epoch: J2000.0
    XY-plane: plane of the Earth's orbit at the reference epoch
              Note: obliquity of 84381.448 arcseconds wrt ICRF equator (IAU76)
    X-axis  : out along ascending node of instantaneous plane of the Earth's
              orbit and the Earth's mean equator at the reference epoch
    Z-axis  : perpendicular to the xy-plane in the directional (+ or -) sense
              of Earth's north pole at the reference epoch.

  Symbol meaning [1 au= 149597870.700 km, 1 day= 86400.0 s]:

    JDTDB    Julian Day Number, Barycentric Dynamical Time
      X      X-component of position vector (au)
      Y      Y-component of position vector (au)
      Z      Z-component of position vector (au)
      VX     X-component of velocity vector (au/day)
      VY     Y-component of velocity vector (au/day)
      VZ     Z-component of velocity vector (au/day)
      LT     One-way down-leg Newtonian light-time (day)
      RG     Range; distance from coordinate center (au)
      RR     Range-rate; radial velocity wrt coord. center (au/day)

Geometric states/elements have no aberrations applied.

 Computations by ...
     Solar System Dynamics Group, Horizons On-Line Ephemeris System
     4800 Oak Grove Drive, Jet Propulsion Laboratory
     Pasadena, CA  91109   USA
     Information: http://ssd.jpl.nasa.gov/
     Connect    : telnet://ssd.jpl.nasa.gov:6775  (via browser)
                  http://ssd.jpl.nasa.gov/?horizons
                  telnet ssd.jpl.nasa.gov 6775    (via command-line)
```

```
     Author     : Jon.D.Giorgini@jpl.nasa.gov
*******************************************************************************
```


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