Mission To Venus
--Propulsion Proposal Draft V1.1

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Brief Summary:

Launch Vehicle: Delta II-7925H
Single Craft System
Voyage time: ~539 days.

Statistics:

Venus Diameter: 12104 km
Earth Diameter: 12753 km
Sun Diameter: 1.4 million km

Perihelion: 146 million km

Minimum Distance from Venus to Earth: 40 million km

http://wiki.answers.com/Q/What_is_the_distance_of_all_planets_from_the_sun

Average Venus to Sun Distance: 108 million km
Venus travels at $1.6°/day$ around the Sun
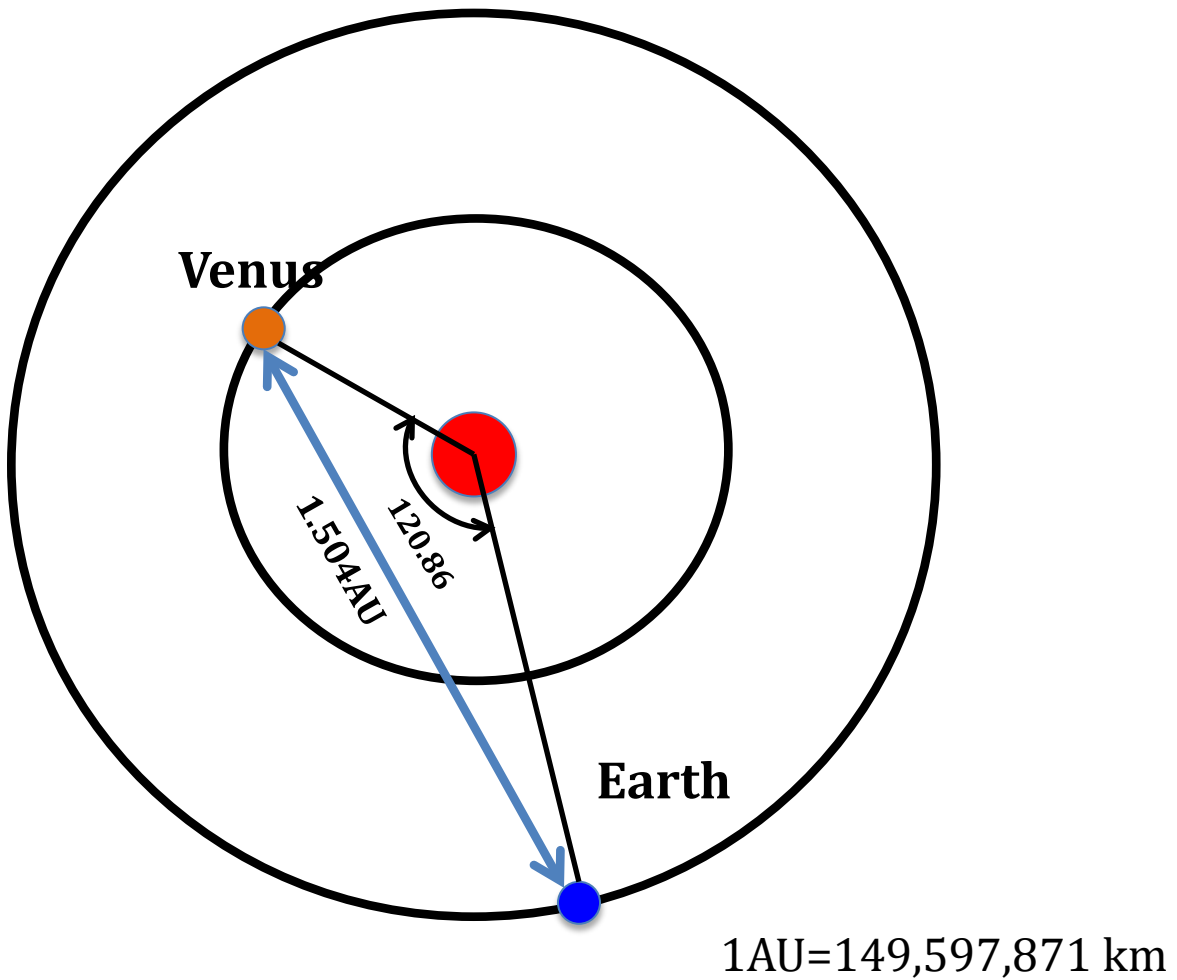
Average Earth to Sun Distance: 149.6 million km
Venus travels at $0.986°/day$ around the Sun

Planet	Semimajor Axis (AU)	Orbital Period (yr)	Orbital Speed (km/s)	Orbital Eccentricity (e)	Inclination of Orbit to Ecliptic (°)	Rotation Period (days)	Inclination of Equator to Orbit (°)
Mercury	0.3871	0.2408	47.9	0.206	7.00	58.65	0
Venus	0.7233	0.6152	35.0	0.007	3.39	-243.01[*]	177.3
Earth	1.000	1	29.8	0.017	0.00	0.997	23.4
Mars	1.5273	1.8809	24.1	0.093	1.85	1.026	25.2
Jupiter	5.2028	11.862	13.1	0.048	1.31	0.410	3.1
Saturn	9.5388	29.458	9.6	0.056	2.49	0.426	26.7
Uranus	19.1914	84.01	6.8	0.046	0.77	-0.746[*]	97.9

Neptune	30.0611	164.79	5.4	0.010	1.77	0.718	29.6

Current Relative Position between Venus and Earth

Daily update: http://www.fourmilab.ch/cgi-bin/Solar

Venus

1.504AU

120.86

Earth

1AU=149,597,871 km

Line of sight Calculation--

Theta=25.2°
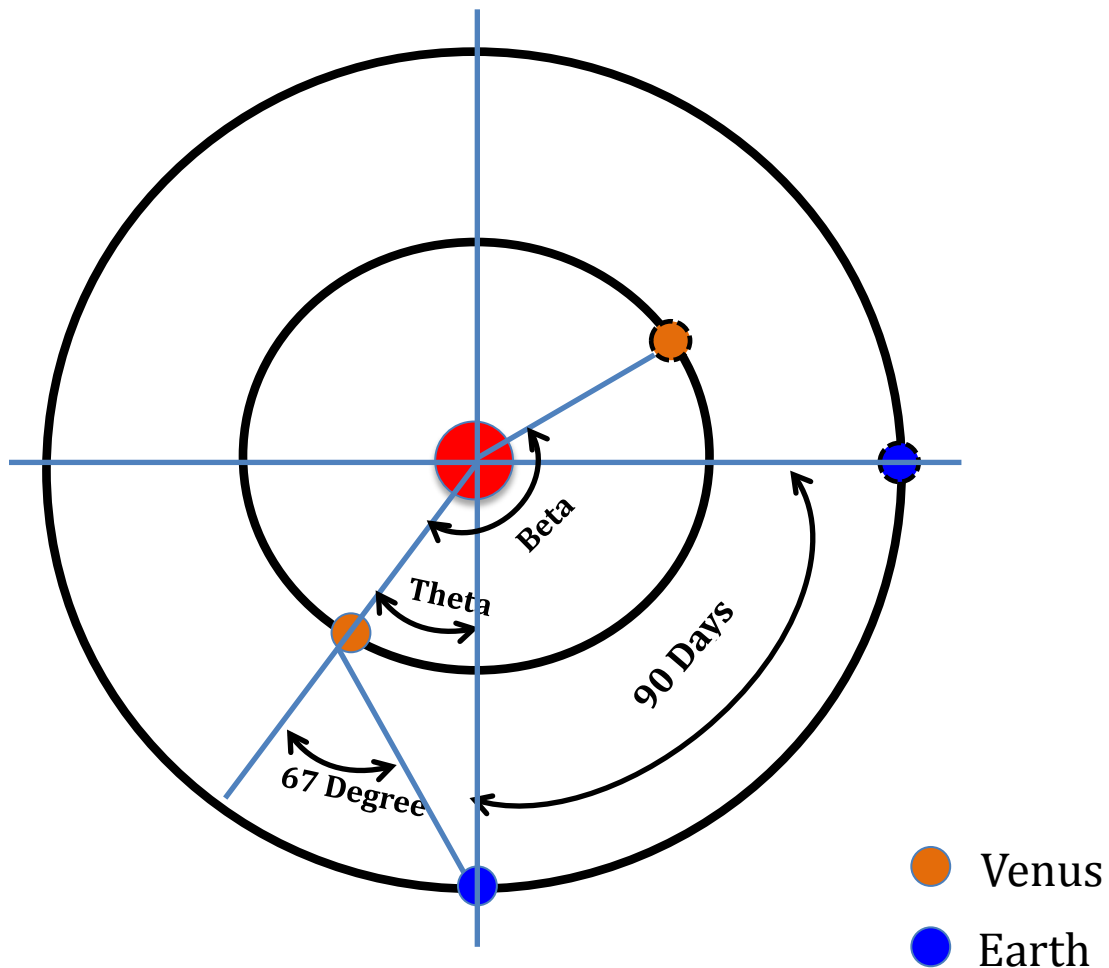
Total 90-day angle for Venus= $2 \times 25.02° + 90 = 140°$

Beta=140°

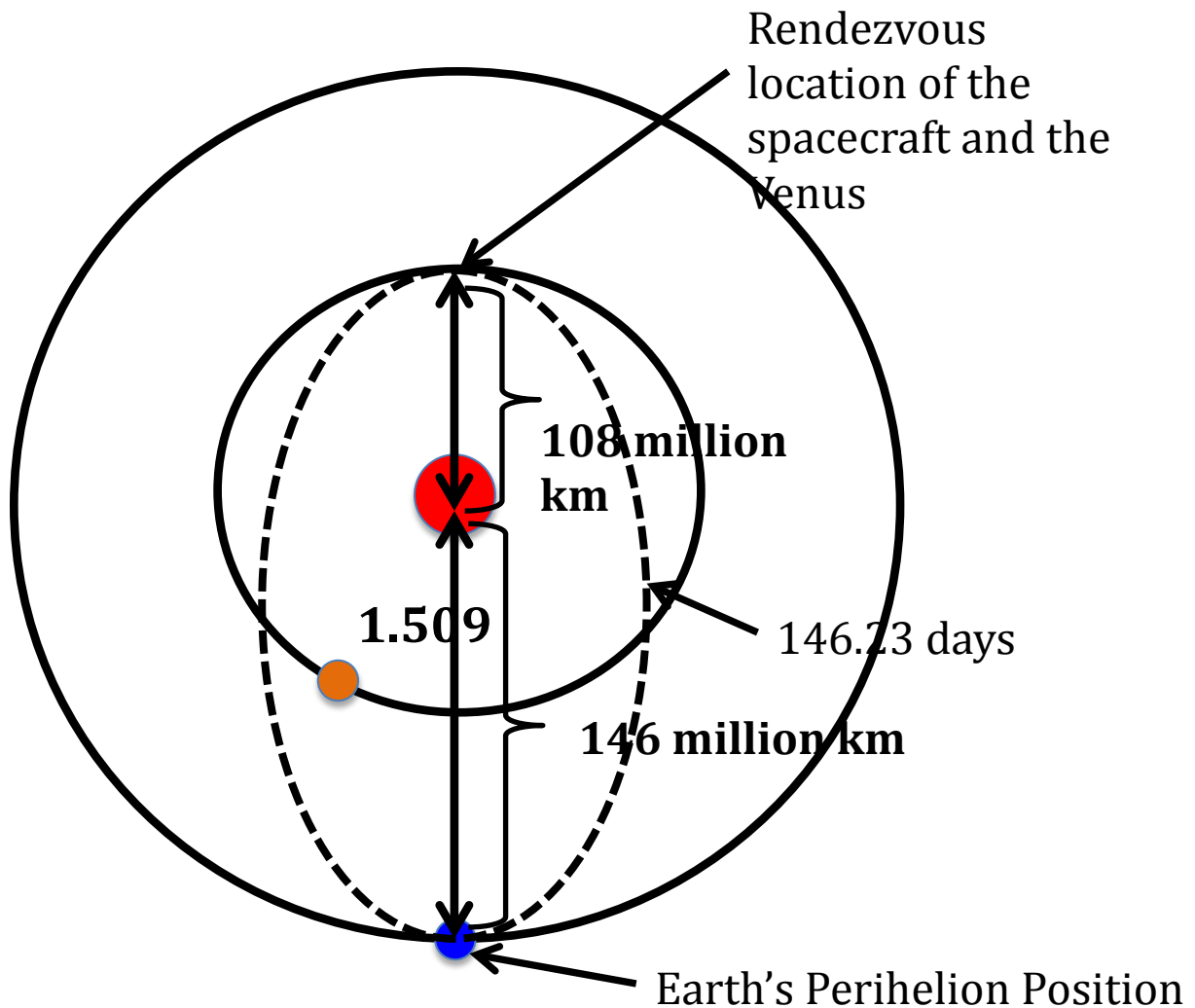The angle that Venus actually travels in 90 days:

$$\gamma = \frac{90}{0.6159 * 365} * 360° = 144.1°$$

We would like gamma to be less than angle beta. In our case, they are approximately the same. We would around two and half day of communication to be exact.

Venus

Earth

Launching and Landing Plan

Rendezvous location of the spacecraft and the Venus

108 million km

1.509

146.23 days

146 million km

Earth's Perihelion Position

Stage 1: From Earth (perihelion) to Venus's Orbit around the Sun clockwise. Meet Venus. Takes about 146.23 days.
Stage 2: Orbit around Venus until it's within Theta degree with the Earth(AKM)
Stage 3: Descend and Land on the day when Venus and Earth are in the Theta Angle

launch_date =

01-Jul-2017

date_of_rendezvous =

24-Nov-2017

land_date =

21-Dec-2018

voyage_days =

 538.2343

Launch Vehicle:

Delta II-7925H: 3 Stage rocket

Boosters (7000 Heavy) - GEM 46	
N° boosters	9
Engines	1 solid
Thrust	628.3 kN (141,250 lb$_f$)
Specific impulse	278 sec
Burn time	75 seconds
Fuel	solid
First stage - Thor/Delta XLT(-C)	
Engines	1 RS-27 (6000 series) or RS-27A(7000 series)[2]
Thrust	1,054.2 kN (237,000 lb$_f$)
Specific impulse	302 sec

Burn time	265 seconds
Fuel	RP-1/LOX

Second stage - Delta K

Engines	1 AJ-10
Thrust	43.6 kN (9,800 lb$_f$)
Specific impulse	319 sec
Burn time	431 seconds
Fuel	Dinitrogen tetroxide/Aerozine

Third stage - PAM-D (optional)

Engines	1 Star 48B
Thrust	66.0 kN (14,837 lb$_f$)
Specific impulse	286 sec
Burn time	87 seconds
Fuel	Solid

Use Thiokol Star-48B solid rocket motor for orbit transfer in the third stage.

Source: http://en.wikipedia.org/wiki/Delta_II