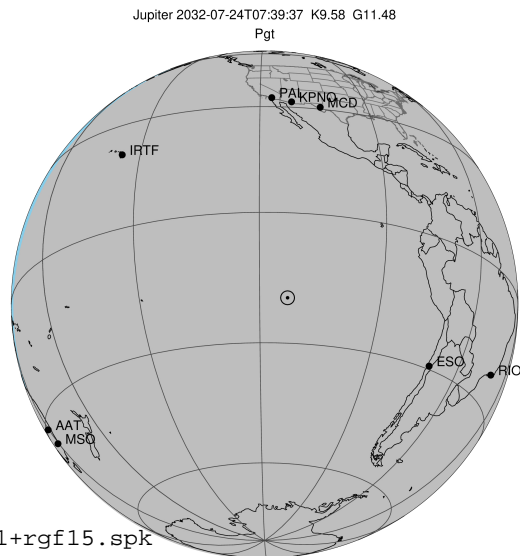


target : Jupiter
 target radius (km) : 71492.00
 C/A epoch : 2032-07-24T07:39:37.710
 Event type : Pgt
 : Jupiter occs: geocentric, topocentric
 : Not a ringed target
 Gaia source ID : 6865232685512575232
 2Mass ID (if available) : 19525541-2123127

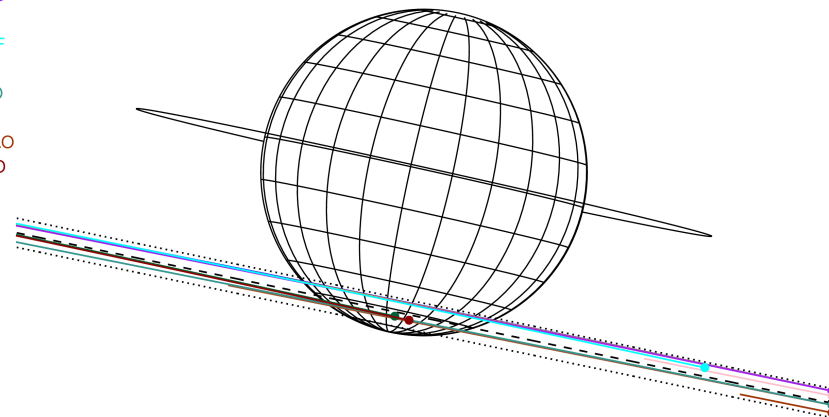
Jupiter 2032-07-24T07:39:37 K9.58 G11.48 Pgt

ICRS Star Coord at Epoch: 19h 52m 55.43530s -21:23:12.93344s

RUWE (>1.4 is poor) : 1.62
 K magnitude : 9.578
 G magnitude : 11.485
 RP magnitude : 10.856
 BP magnitude : 11.940
 DUPflag : 0
 Distance (au) : 4.124
 f0 (km) : 0.00
 g0 (km) : 0.00
 skyplane vel. (km/s) : -15.96
 Sun-Target sep (deg) : 174.59
 Sun-Moon sep (deg) : 27.67
 B (ring opening deg) : -1.00
 PA of pole (deg) : -12.50
 Pole direction: RA (deg): 268.05662
 Dec (deg): 64.49655
 C/A sky separation (") : 20.845
 C/A sky separation (km) : 62341.2
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk



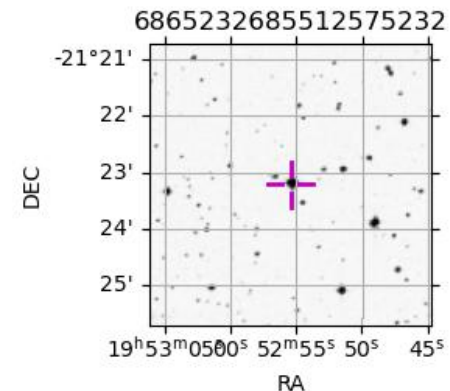
Earth
 PAL
 KPNO
 MCD
 TEN
 IRTF
 RIO
 ESO
 AAT
 SAAO
 MSO



2032-07-24T07:39:37.7100 a: 19 52 55.4353 & -21 23 12.933 C/A ***** PA 348.20 deg v_sky -15.96 km/s D 04.12 AU
 Credit: Styled after SORA/Lucky Star

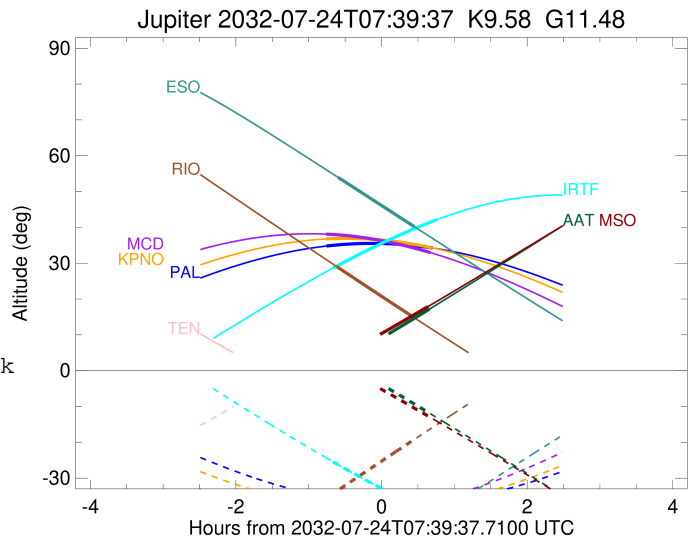
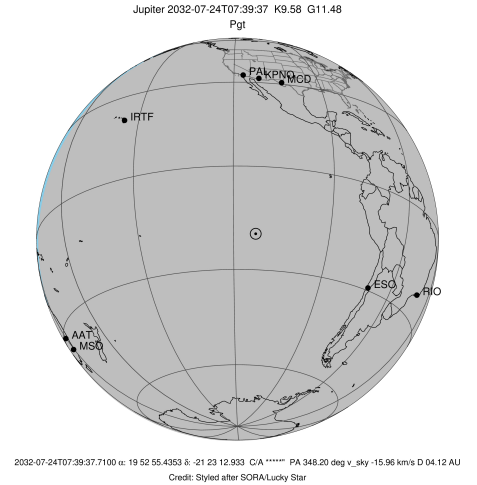
Observable events with sun below -5 deg and altitude above 5 deg

| Obs | Location | lat | Elon | Target | Observed Events Interval | OCode |
|------|-----------------------------------|-------|-------|--------|-----------------------------|-------|
| PIC | Pic du Midi | 42.9 | 0.1 | | | Pnn |
| PAL | Palomar Mt (200") | 33.4 | 243.1 | + + | JUL 24 06:54 - JUL 24 08:21 | Pie |
| PMO | Purple Mtn Obs. Nanking | 32.1 | 118.8 | | | Pnn |
| KPNO | Kitt Peak Natl Obs | 32.0 | 248.4 | + + | JUL 24 06:54 - JUL 24 08:20 | Pie |
| MCD | McDonald Obs. 2.7m | 30.7 | 256.0 | + + | JUL 24 06:53 - JUL 24 08:19 | Pie |
| TEN | Teide Obs./Tenerife | 28.3 | 343.5 | | | Pnn |
| IRTF | Mauna Kea/IRTF | 19.8 | 204.5 | + + | JUL 24 06:59 - JUL 24 08:25 | Pie |
| KAV | Kavalur Observatory | 12.6 | 78.8 | | | Pnn |
| RIO | Rio de Janeiro | -22.9 | 316.8 | + + | JUL 24 07:03 - JUL 24 08:04 | Pie |
| ESO | European Southern Obs. (3.6m) | -29.3 | 289.3 | + + | JUL 24 07:03 - JUL 24 08:06 | Pie |
| AAT | Siding Spring (AAT) | -31.3 | 149.1 | + + | JUL 24 08:19 - JUL 24 08:19 | Pne |
| SAAO | So. Afr. Astro. Obs. (Sutherland) | -32.4 | 20.8 | | | Pnn |
| MSO | Mt. Stromlo Observatory | -35.3 | 149.0 | + + | JUL 24 08:18 - JUL 24 08:18 | Pne |



```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2032-07-24T07:38:03.040
Event type          : Pgt
                    : Jupiter occs: geocentric, topocentric
                    : Not a ringed target
Observer code       : PAL
Location            : Palomar Mt (200")
Latitude (deg)      : 33.35622
E. Longitude (deg)  : 243.13601
Altitude (km)       : 1.706
Gaia source ID      : 6865232685512575232
2Mass ID (if available) : 19525541-2123127
ICRS Star Coord at Epoch: 19h 52m 55.43530s -21:23:12.93344s
RUWE (>1.4 is poor) : 1.62
K magnitude          : 9.578
G magnitude          : 11.485
RP magnitude         : 10.856
BP magnitude         : 11.940
DUPflag             : 0
Distance (au)       : 4.124
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -15.96
Sun-Target sep (deg) : 174.59
Sun-Moon sep (deg)  : 27.65
B (ring opening deg) : -1.00
PA of pole (deg)    : -12.50
Pole direction: RA (deg): 268.05662
Dec (deg): 64.49655
C/A sky separation ("): 19.159
C/A sky separation (km) : 57297.8
NAIF SPICE kernels  : RAJobs_U111+rgf15.spk
URKALLv1.spk
naif0012.tls
nep097.bsp
nep101.bsp
sat4401.bsp
de440.bsp
earth_720101_070426.bpc
jup365.bsp
urall6.bsp
IAU_SATURN_for_RINGFIT.tpc
pck00010.tpc
earth_200101_990628_predict.bpc
uranus_ringframes_rfrench20220627_v1.tf
neptune_ringframes_rfrench20220702a_v1.tf
earth_flat_IAU.spk
    
```

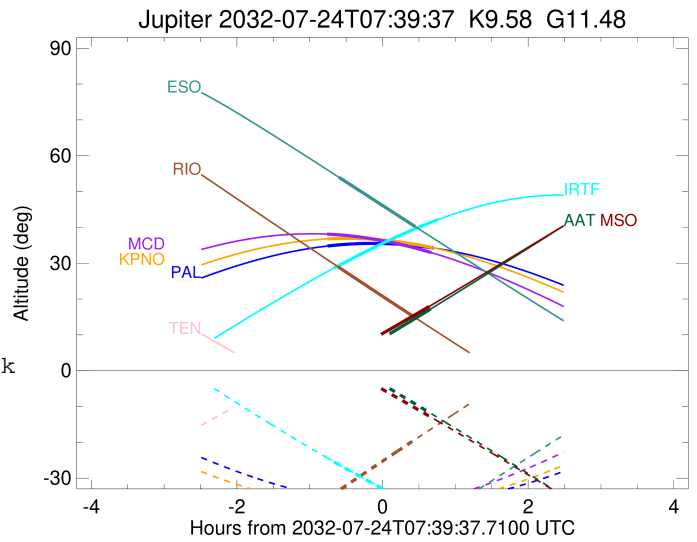
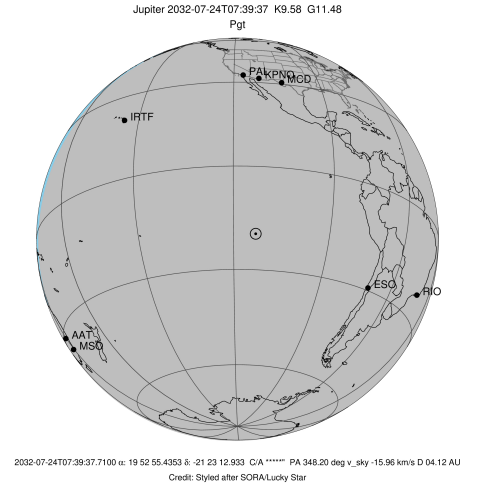


x: target alt < 5.0 deg or sun > -5.0 deg

| Target | I/E | UTC | alt | alt-sun | radius | lat-geo | lat-geodetic |
|---------|-----|-------------------------|-------|---------|---------|---------|--------------|
| Jupiter | I | 2032-07-24T06:54:29.798 | 34.80 | -35.23 | 71491.1 | -52.31 | -55.81 |
| Jupiter | E | 2032-07-24T08:21:37.890 | 34.24 | -36.70 | 71491.1 | -54.30 | -57.70 |

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2032-07-24T07:37:31.580
Event type            : Pgt
: Jupiter occs: geocentric, topocentric
: Not a ringed target
Observer code         : KPNO
Location              : Kitt Peak Natl Obs
Latitude (deg)        : 31.96333
E. Longitude (deg)    : 248.40000
Altitude (km)         : 2.120
Gaia source ID        : 6865232685512575232
2Mass ID (if available) : 19525541-2123127
ICRS Star Coord at Epoch: 19h 52m 55.43530s -21:23:12.93344s
RUWE (>1.4 is poor) : 1.62
K magnitude           : 9.578
G magnitude           : 11.485
RP magnitude          : 10.856
BP magnitude          : 11.940
DUPflag              : 0
Distance (au)         : 4.124
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -15.96
Sun-Target sep (deg) : 174.59
Sun-Moon sep (deg)   : 27.60
B (ring opening deg) : -1.00
PA of pole (deg)     : -12.50
Pole direction: RA (deg): 268.05662
Dec (deg): 64.49655
C/A sky separation ("): 19.226
C/A sky separation (km): 57499.8
NAIF SPICE kernels   : RAJobs_U111+rgf15.spk
URKALLv1.spk
naif0012.tls
nep097.bsp
nep101.bsp
sat4401.bsp
de440.bsp
earth_720101_070426.bpc
jup365.bsp
urall6.bsp
IAU_SATURN_for_RINGFIT.tpc
pck00010.tpc
earth_200101_990628_predict.bpc
uranus_ringframes_rfrench20220627_v1.tf
neptune_ringframes_rfrench20220702a_v1.tf
earth_flat_IAU.spk
    
```

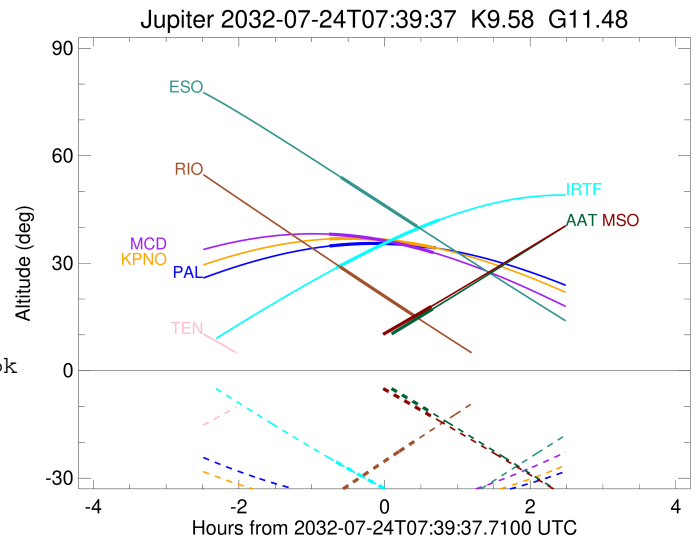
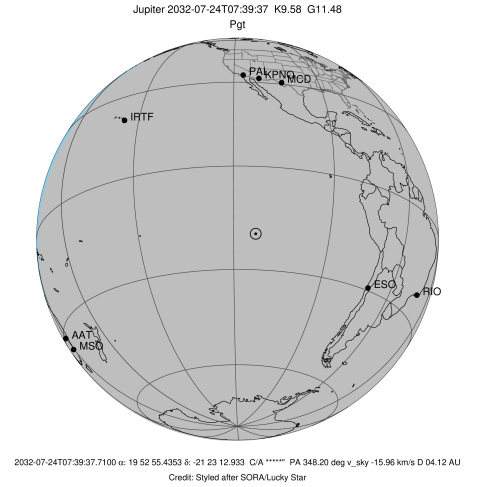


x: target alt < 5.0 deg or sun > -5.0 deg

| Target | I/E | UTC | alt | alt-sun | radius | lat-geo | lat-geodetic |
|---------|-----|-------------------------|-------|---------|---------|---------|--------------|
| Jupiter | I | 2032-07-24T06:54:15.543 | 36.77 | -37.66 | 71491.1 | -52.54 | -56.02 |
| Jupiter | E | 2032-07-24T08:20:50.278 | 34.32 | -37.24 | 71491.1 | -54.61 | -58.00 |

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2032-07-24T07:36:46.130
Event type            : Pgt
: Jupiter occs: geocentric, topocentric
: Not a ringed target
Observer code         : MCD
Location              : McDonald Obs. 2.7m
Latitude (deg)        : 30.67158
E. Longitude (deg)    : 255.97844
Altitude (km)         : 2.075
Gaia source ID        : 6865232685512575232
2Mass ID (if available) : 19525541-2123127
ICRS Star Coord at Epoch: 19h 52m 55.43530s -21:23:12.93344s
RUWE (>1.4 is poor) : 1.62
K magnitude           : 9.578
G magnitude           : 11.485
RP magnitude          : 10.856
BP magnitude          : 11.940
DUPflag              : 0
Distance (au)         : 4.124
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -15.96
Sun-Target sep (deg)  : 174.59
Sun-Moon sep (deg)   : 27.50
B (ring opening deg) : -1.00
PA of pole (deg)     : -12.50
Pole direction: RA (deg): 268.05662
Dec (deg): 64.49655
C/A sky separation (") : 19.319
C/A sky separation (km) : 57777.0
NAIF SPICE kernels   : RAJobs_U111+rgf15.spk
URKALLv1.spk
naif0012.tls
nep097.bsp
nep101.bsp
sat4401.bsp
de440.bsp
earth_720101_070426.bpc
jup365.bsp
urall6.bsp
IAU_SATURN_for_RINGFIT.tpc
pck00010.tpc
earth_200101_990628_predict.bpc
uranus_ringframes_rfrench20220627_v1.tf
neptune_ringframes_rfrench20220702a_v1.tf
earth_flat_IAU.spk
    
```

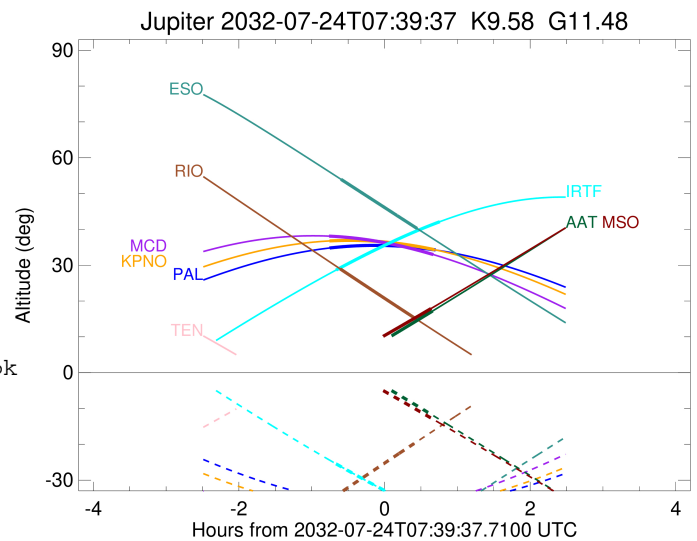
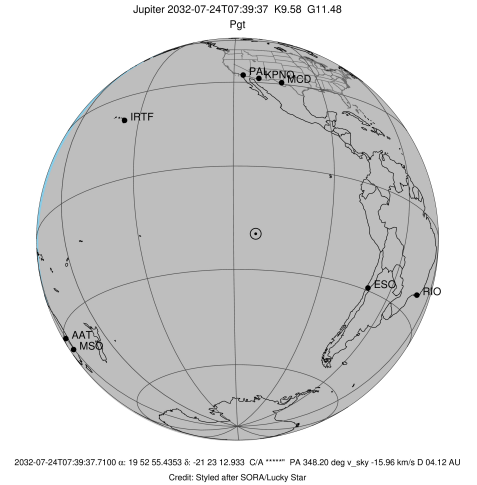


x: target alt < 5.0 deg or sun > -5.0 deg

| Target | I/E | UTC | alt | alt-sun | radius | lat-geo | lat-geodetic |
|---------|-----|-------------------------|-------|---------|---------|---------|--------------|
| Jupiter | I | 2032-07-24T06:53:52.526 | 38.11 | -39.73 | 71491.1 | -52.85 | -56.32 |
| Jupiter | E | 2032-07-24T08:19:43.866 | 32.97 | -36.48 | 71491.1 | -55.05 | -58.41 |

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2032-07-24T07:42:28.900
Event type           : Pgt
: Jupiter occs: geocentric, topocentric
: Not a ringed target
Observer code        : IRTF
Location             : Mauna Kea/IRTF
Latitude (deg)       : 19.82622
E. Longitude (deg)   : 204.52800
Altitude (km)        : 4.168
Gaia source ID       : 6865232685512575232
2Mass ID (if available) : 19525541-2123127
ICRS Star Coord at Epoch: 19h 52m 55.43530s -21:23:12.93344s
RUWE (>1.4 is poor) : 1.62
K magnitude          : 9.578
G magnitude          : 11.485
RP magnitude         : 10.856
BP magnitude         : 11.940
DUPflag             : 0
Distance (au)        : 4.124
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -15.96
Sun-Target sep (deg) : 174.59
Sun-Moon sep (deg)   : 28.22
B (ring opening deg) : -1.00
PA of pole (deg)     : -12.50
Pole direction: RA (deg): 268.05662
Dec (deg): 64.49655
C/A sky separation (") : 19.367
C/A sky separation (km) : 57921.6
NAIF SPICE kernels   : RAJobs_U111+rgf15.spk
URKALLv1.spk
naif0012.tls
nep097.bsp
nep101.bsp
sat4401.bsp
de440.bsp
earth_720101_070426.bpc
jup365.bsp
urall6.bsp
IAU_SATURN_for_RINGFIT.tpc
pck00010.tpc
earth_200101_990628_predict.bpc
uranus_ringframes_rfrench20220627_v1.tf
neptune_ringframes_rfrench20220702a_v1.tf
earth_flat_IAU.spk
    
```

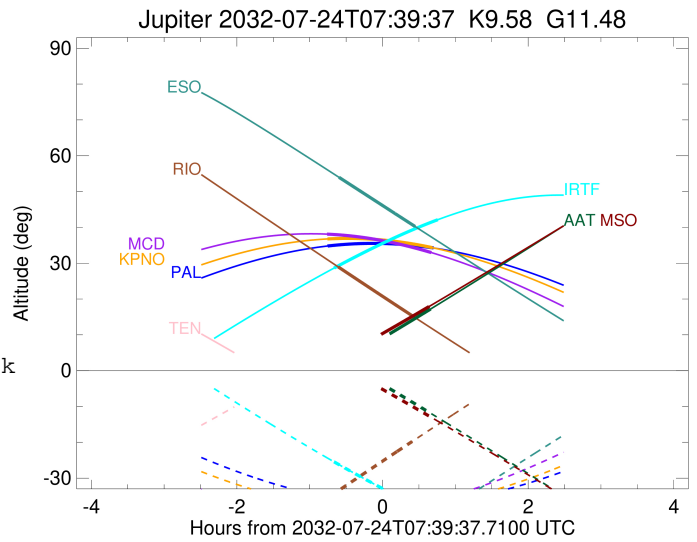
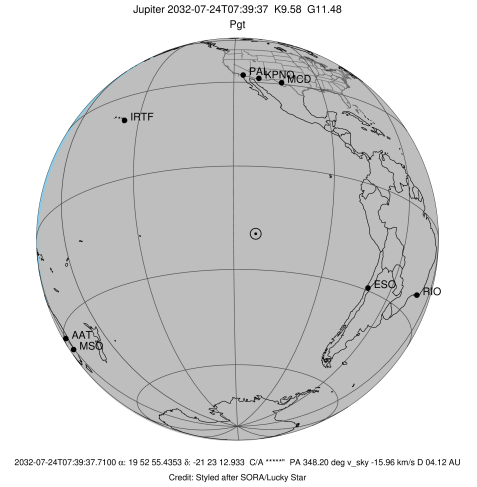


x: target alt < 5.0 deg or sun > -5.0 deg

| Target | I/E | UTC | alt | alt-sun | radius | lat-geo | lat-geodetic |
|---------|-----|-------------------------|-------|---------|---------|---------|--------------|
| Jupiter | I | 2032-07-24T06:59:42.337 | 28.64 | -25.45 | 71491.1 | -53.53 | -56.97 |
| Jupiter | E | 2032-07-24T08:25:09.073 | 42.13 | -40.35 | 71491.1 | -54.80 | -58.18 |

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch            : 2032-07-24T07:33:30.030
Event type          : Pgt
                    : Jupiter occs: geocentric, topocentric
                    : Not a ringed target
Observer code       : RIO
Location            : Rio de Janeiro
Latitude (deg)      : -22.89506
E. Longitude (deg)  : 316.77708
Altitude (km)       : 0.033
Gaia source ID      : 6865232685512575232
2Mass ID (if available) : 19525541-2123127
ICRS Star Coord at Epoch: 19h 52m 55.43530s -21:23:12.93344s
RUWE (>1.4 is poor) : 1.62
K magnitude          : 9.578
G magnitude          : 11.485
RP magnitude         : 10.856
BP magnitude         : 11.940
DUPflag             : 0
Distance (au)       : 4.124
f0 (km)              : 0.00
g0 (km)              : 0.00
skyplane vel. (km/s) : -15.96
Sun-Target sep (deg) : 174.59
Sun-Moon sep (deg)  : 27.18
B (ring opening deg) : -1.00
PA of pole (deg)    : -12.50
Pole direction: RA (deg): 268.05662
Dec (deg): 64.49655
C/A sky separation ("): 21.798
C/A sky separation (km): 65190.4
NAIF SPICE kernels  : RAJobs_U111+rgf15.spk
URKALLv1.spk
naif0012.tls
nep097.bsp
nep101.bsp
sat4401.bsp
de440.bsp
earth_720101_070426.bpc
jup365.bsp
urall6.bsp
IAU_SATURN_for_RINGFIT.tpc
pck00010.tpc
earth_200101_990628_predict.bpc
uranus_ringframes_rfrench20220627_v1.tf
neptune_ringframes_rfrench20220702a_v1.tf
earth_flat_IAU.spk
    
```

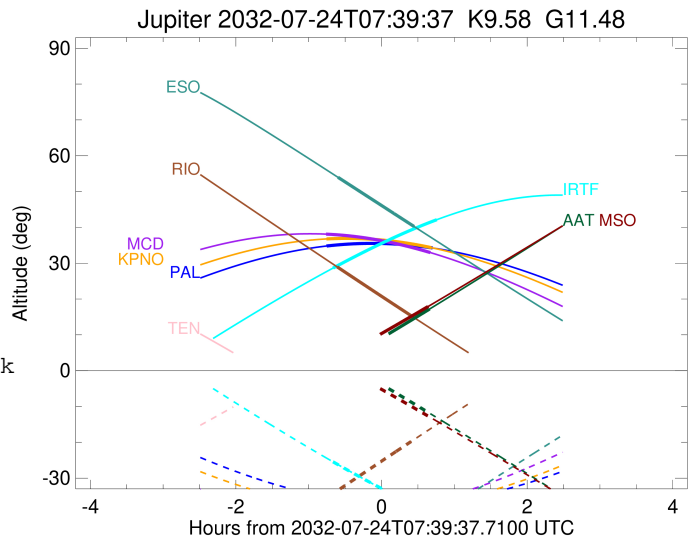
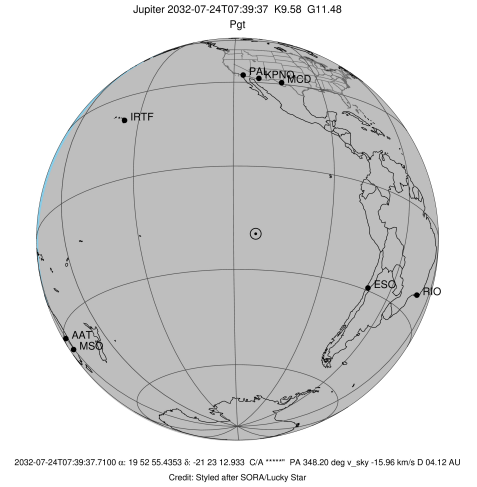


x: target alt < 5.0 deg or sun > -5.0 deg

| Target | I/E | UTC | alt | alt-sun | radius | lat-geo | lat-geodetic |
|---------|-----|-------------------------|-------|---------|---------|---------|--------------|
| Jupiter | I | 2032-07-24T07:03:03.827 | 28.98 | -33.55 | 71490.9 | -64.43 | -67.15 |
| Jupiter | E | 2032-07-24T08:04:02.859 | 15.34 | -19.77 | 71490.8 | -67.04 | -69.54 |

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2032-07-24T07:35:07.140
Event type            : Pgt
: Jupiter occs: geocentric, topocentric
: Not a ringed target
Observer code         : ESO
Location              : European Southern Obs. (3.6m)
Latitude (deg)        : -29.26097
E. Longitude (deg)    : 289.26831
Altitude (km)         : 2.400
Gaia source ID        : 6865232685512575232
2Mass ID (if available) : 19525541-2123127
ICRS Star Coord at Epoch: 19h 52m 55.43530s -21:23:12.93344s
RUWE (>1.4 is poor) : 1.62
K magnitude           : 9.578
G magnitude           : 11.485
RP magnitude          : 10.856
BP magnitude          : 11.940
DUPflag              : 0
Distance (au)         : 4.124
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -15.96
Sun-Target sep (deg) : 174.59
Sun-Moon sep (deg)   : 27.55
B (ring opening deg) : -1.00
PA of pole (deg)     : -12.50
Pole direction: RA (deg): 268.05662
Dec (deg): 64.49655
C/A sky separation (") : 21.621
C/A sky separation (km) : 64662.7
NAIF SPICE kernels   : RAJobs_U111+rgf15.spk
URKALLv1.spk
naif0012.tls
nep097.bsp
nep101.bsp
sat4401.bsp
de440.bsp
earth_720101_070426.bpc
jup365.bsp
urall6.bsp
IAU_SATURN_for_RINGFIT.tpc
pck00010.tpc
earth_200101_990628_predict.bpc
uranus_ringframes_rfrench20220627_v1.tf
neptune_ringframes_rfrench20220702a_v1.tf
earth_flat_IAU.spk
    
```

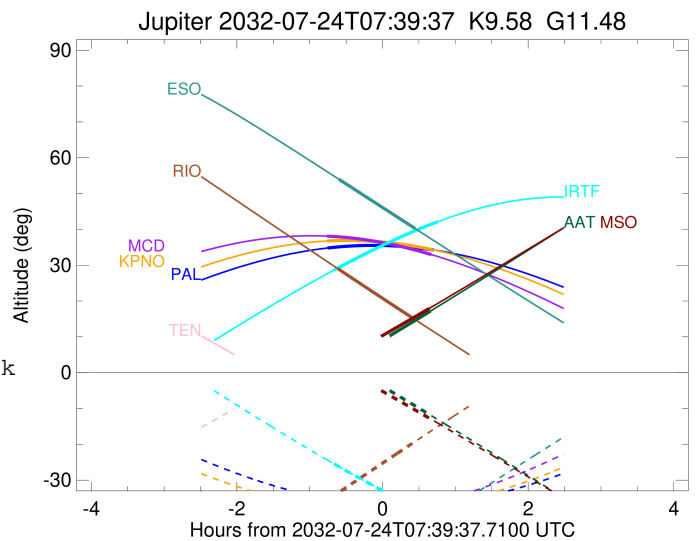
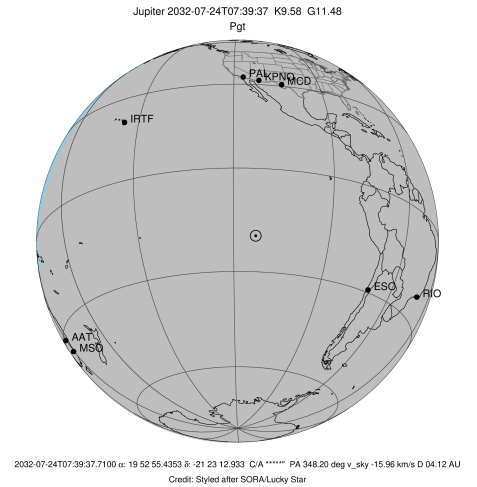


x: target alt < 5.0 deg or sun > -5.0 deg

| Target | I/E | UTC | alt | alt-sun | radius | lat-geo | lat-geodetic |
|---------|-----|-------------------------|-------|---------|---------|---------|--------------|
| Jupiter | I | 2032-07-24T07:03:49.473 | 53.96 | -58.14 | 71490.9 | -63.47 | -66.28 |
| Jupiter | E | 2032-07-24T08:06:30.098 | 40.23 | -44.50 | 71490.8 | -66.02 | -68.61 |

```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2032-07-24T07:46:27.980
Event type            : Pgt
: Jupiter occs: geocentric, topocentric
: Not a ringed target
Observer code         : AAT
Location              : Siding Spring (AAT)
Latitude (deg)       : -31.27703
E. Longitude (deg)   : 149.06608
Altitude (km)        : 1.164
Gaia source ID       : 6865232685512575232
2Mass ID (if available) : 19525541-2123127
ICRS Star Coord at Epoch: 19h 52m 55.43530s -21:23:12.93344s
RUWE (>1.4 is poor) : 1.62
K magnitude           : 9.578
G magnitude           : 11.485
RP magnitude          : 10.856
BP magnitude          : 11.940
DUPflag               : 0
Distance (au)         : 4.124
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -15.96
Sun-Target sep (deg) : 174.59
Sun-Moon sep (deg)   : 28.62
B (ring opening deg) : -1.00
PA of pole (deg)     : -12.50
Pole direction: RA (deg): 268.05662
Dec (deg): 64.49655
C/A sky separation (") : 21.476
C/A sky separation (km) : 64227.4
NAIF SPICE kernels   : RAJobs_U111+rgf15.spk
URKALLv1.spk
naif0012.tls
nep097.bsp
nep101.bsp
sat4401.bsp
de440.bsp
earth_720101_070426.bpc
jup365.bsp
urall6.bsp
IAU_SATURN_for_RINGFIT.tpc
pck00010.tpc
earth_200101_990628_predict.bpc
uranus_ringframes_rfrench20220627_v1.tf
neptune_ringframes_rfrench20220702a_v1.tf
earth_flat_IAU.spk
    
```

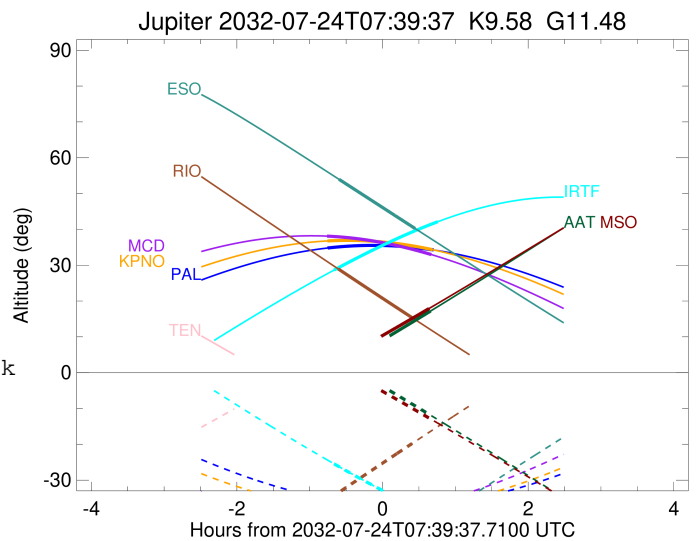
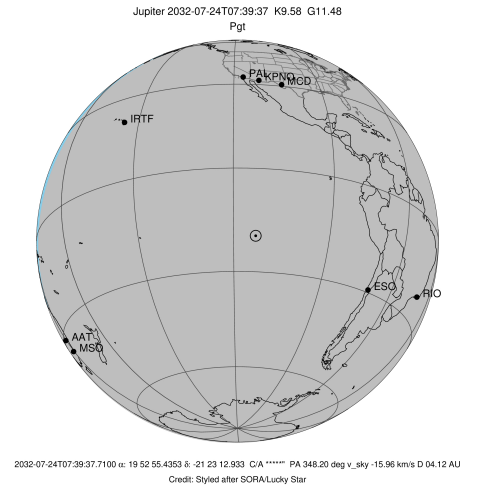


x: target alt < 5.0 deg or sun > -5.0 deg

| Target | I/E | UTC | alt | alt-sun | radius | lat-geo | lat-geodetic |
|---------|-----|-------------------------|-------|---------|---------|---------|--------------|
| Jupiter | I | 2032-07-24T07:13:42.254 | 3.88x | 1.30x | 71490.9 | -63.76 | -66.54 |
| Jupiter | E | 2032-07-24T08:19:06.796 | 17.18 | -11.85 | 71490.9 | -64.14 | -66.89 |


```

target                : Jupiter
target radius (km)   : 71492.00
C/A epoch             : 2032-07-24T07:46:16.080
Event type            : Pgt
: Jupiter occs: geocentric, topocentric
: Not a ringed target
Observer code         : MSO
Location              : Mt. Stromlo Observatory
Latitude (deg)        : -35.32000
E. Longitude (deg)    : 149.00833
Altitude (km)         : 0.770
Gaia source ID       : 6865232685512575232
2Mass ID (if available) : 19525541-2123127
ICRS Star Coord at Epoch: 19h 52m 55.43530s -21:23:12.93344s
RUWE (>1.4 is poor) : 1.62
K magnitude           : 9.578
G magnitude           : 11.485
RP magnitude          : 10.856
BP magnitude          : 11.940
DUPflag               : 0
Distance (au)         : 4.124
f0 (km)               : 0.00
g0 (km)               : 0.00
skyplane vel. (km/s) : -15.96
Sun-Target sep (deg) : 174.59
Sun-Moon sep (deg)   : 28.61
B (ring opening deg) : -1.00
PA of pole (deg)     : -12.50
Pole direction: RA (deg): 268.05662
Dec (deg): 64.49655
C/A sky separation ("): 21.608
C/A sky separation (km): 64622.6
NAIF SPICE kernels   : RAJobs_U111+rgf15.spk
URKALLv1.spk
naif0012.tls
nep097.bsp
nep101.bsp
sat4401.bsp
de440.bsp
earth_720101_070426.bpc
jup365.bsp
urall6.bsp
IAU_SATURN_for_RINGFIT.tpc
pck00010.tpc
earth_200101_990628_predict.bpc
uranus_ringframes_rfrench20220627_v1.tf
neptune_ringframes_rfrench20220702a_v1.tf
earth_flat_IAU.spk
    
```



x: target alt < 5.0 deg or sun > -5.0 deg

| Target | I/E | UTC | alt | alt-sun | radius | lat-geo | lat-geodetic |
|---------|-----|-------------------------|-------|---------|---------|---------|--------------|
| Jupiter | I | 2032-07-24T07:14:21.728 | 5.50 | -0.43x | 71490.9 | -64.47 | -67.19 |
| Jupiter | E | 2032-07-24T08:18:04.169 | 17.92 | -12.68 | 71490.9 | -64.90 | -67.58 |