Time correction in GPS SVs

Paul B. Andersen

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$$t = t_{SV} - \Delta t_{SV} \tag{1}$$

where

$\boldsymbol{t}$ = GPS system time at message transmission time (seconds)
- hereafter called ***system time***

$\boldsymbol{t_{SV}}$ = effective SV PRN code phase time at message transmission time (seconds)
- hereafter called ***SV clock time***

$\boldsymbol{\Delta t_{SV}}$ = SV PRN code phase time offset (seconds)
- hereafter called ***SV clock offset***

The ***SV clock offset*** is given by

$$\Delta t_{SV} = a_{f0} + a_{f1}\left(t - t_{oc}\right) + a_{f2}\left(t - t_{oc}\right)^2 + \Delta t_r \tag{2}$$

where

$\boldsymbol{t_{oc}}$ = the clock data reference time in seconds, the GPS system time when the parameters a_{f0}, a_{f1} and a_{f2} were updated

$\boldsymbol{a_{f0}}$ = the *SV clock offset* at the time t_{oc}, $(seconds)$ maximum value ca 1 ms

$\boldsymbol{a_{f1}}$ = the SV clock rate error, (sec/sec)

$\boldsymbol{a_{f2}}$ = the rate of change of the SV clock rate error, (sec/sec^2)

$\boldsymbol{\Delta t_r}$ = the relativistic correction term, $(seconds)$

$$\Delta t_r = Fe\sqrt{A}\sin E_k \tag{3}$$

where

$\boldsymbol{F}$ = a constant $= -4.442807633 \cdot 10^{-10}\ \frac{sec}{\sqrt{meter}}$

$\boldsymbol{e}$ = the eccentricity of the orbit, given in the ephemeris, $(dimensionless)$

$\boldsymbol{\sqrt{A}}$ = square root of the semi major axis, given in the ephemeris, $(\sqrt{metres})$

$\boldsymbol{E_k}$ = Eccentric Anomaly, calculated from the ephemeris, $(radians)$

The relativistic correction Δt_r is due to the eccentricity of the orbit. The radius of the orbit will vary around the orbit, and the relativistic correction will deviate from the nominal value $-4.4647 \cdot 10^{-10}$ around the orbit.