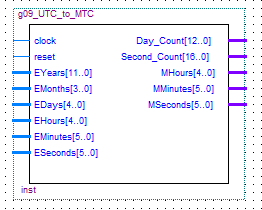
**G09\_UTC\_to\_MTC**

This module basically takes in the earth time and date (UTC time on the prime meridian; coordinated universal time) as input which is expressed in the format Y:M:D:H:M:S and eventually calculates and generates the Mars time of day for the Mars clock (MTC time on the prime meridian) which is expressed in the format H:M:S.

Below is a symbol diagram for this circuit:



The following are the input/output pins along with their VHDL description:

clock : in std\_logic

reset : in std\_logic

EYears : in std\_logic\_vector(11 downto 0)

EMonths: in std\_logic\_vector(3 downto 0)

EDays : in std\_logic\_vector(4 downto 0)

EHours : in std\_logic\_vector(4 downto 0)

EMinutes: in std\_logic\_vector(5 downto 0)

ESeconds: in std\_logic\_vector(5 downto 0)

Day\_Count: out std\_logic\_vector(12 downto 0)

Second\_Count: out std\_logic\_vector(16 downto 0)

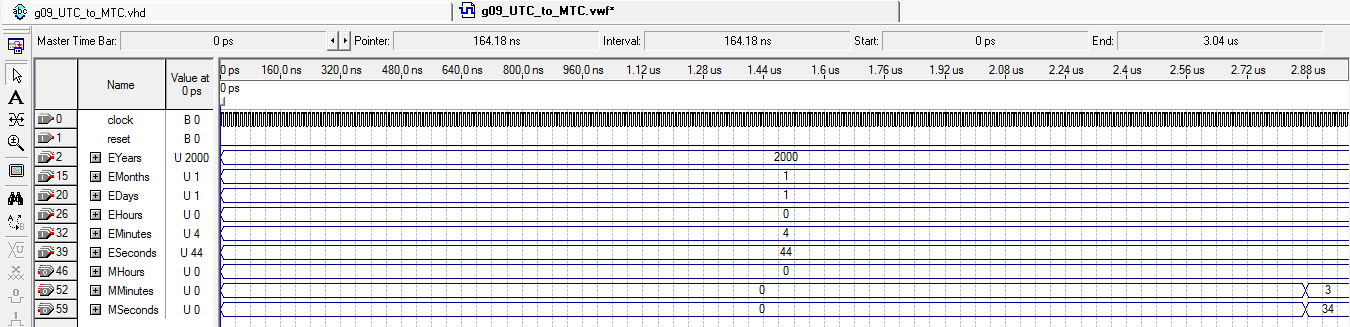
MHours : out std\_logic\_vector(4 downto 0)

MMinutes: out std\_logic\_vector(5 downto 0)

MSeconds: out std\_logic\_vector(5 downto 0)

In the architecture of VHDL code, we described components HMS\_Counter, YMD\_Counter and Seconds\_to\_Days.

To test the UTC\_to\_MTC circuit, we conducted a simulation and achieved the following results as seen in the figure below.



After comparing these values with an online Mars time calculator, we verified these results in the above simulation too.

A summary of the FPGA resource utilization is given below:

