# clock.xce

## Attributes

```
main_vars: y
iparms: i0=0
rparms: t1=1 t2=2 t0=0 x_high=1 dt1=0.01 dt2=0.01
```

## Description

`clock.xce` is a square wave source with `y` as the output. The parameters have the following meaning:

`t1:` The first part of one period. `y` is equal to 0 in this interval if `i0`=0 and `x_high` if `i0`=1.

`t2:` The second part of one period.

`t0:` An "offset" time interval. Its meaning will become clear in the following example.

`dt1:` Width of the transition at the beginning of the `t1` phase.

`dt2:` Width of the transition at the beginning of the `t2` phase.

Note that the transition width is included in `t1` or `t2`. For example, if `t1`=10, `dt1`=1.5, and `i0`=1, then the `t1` phase consists of a rising edge for 1.5 s and an interval of 8.5 s with a constant level equal to `x_high`.

AC behaviour is not implemented.

The effect of the various paramters of `clock.xce` on the waveforms is shown in Fig. 1. The corresponding circuit file is given below.

```
begin_circuit
   xelement type=clock y=y1 x_high=1
+     t1=10 t2=20 dt1=1 dt2=1 i0=0 t0=0
   xelement type=clock y=y2 x_high=1
+     t1=10 t2=20 dt1=2 dt2=4 i0=1 t0=0
   xelement type=clock y=y3 x_high=1
+     t1=10 t2=20 dt1=0.1 dt2=0.1 i0=0 t0=15

   outvar:
+    y1=xvar_of_y1
+    y2=xvar_of_y2
+    y3=xvar_of_y3
end_circuit

begin_solve
   solve_type=trns
   begin_output
      filename=clock_xce.dat
      variables: y1 y2 y3
   end_output
   method: forward_euler=yes
+    t_start=0 t_end=100 delt_const_x=1
end_solve
```

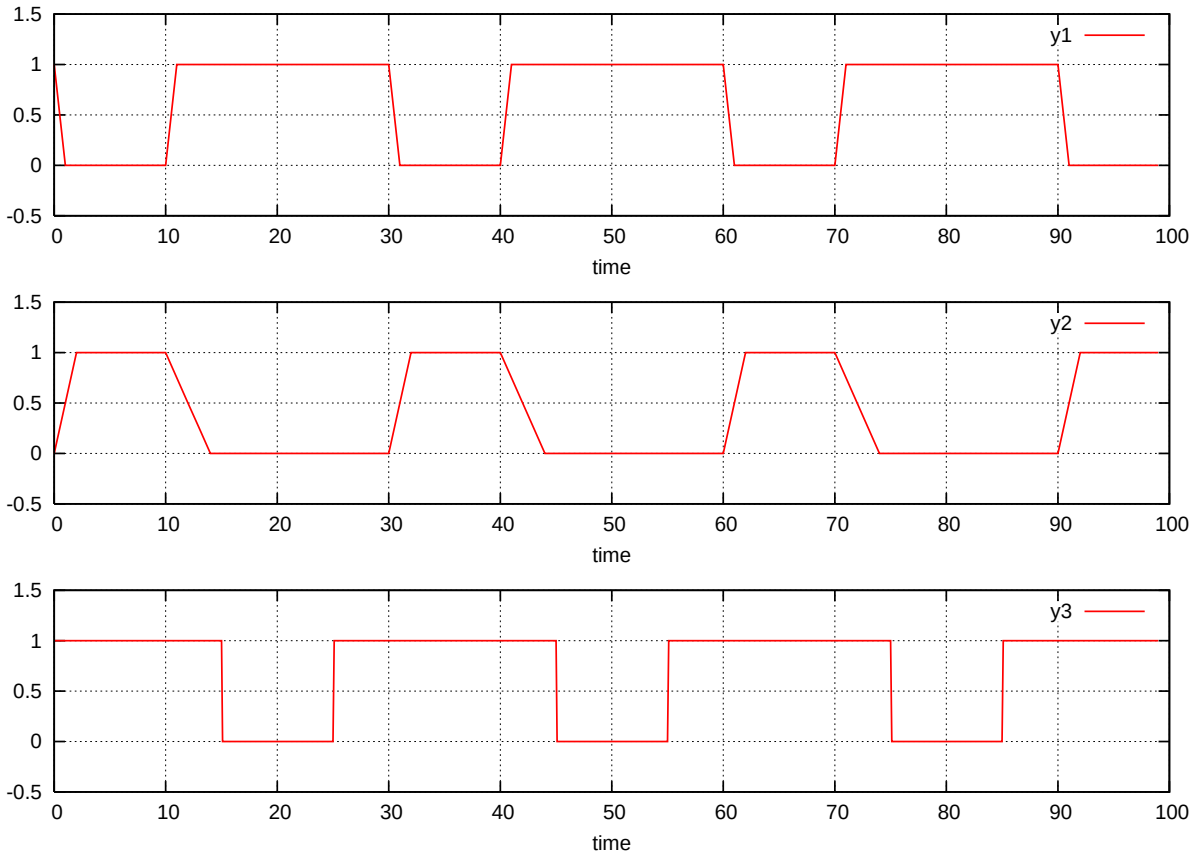


Figure 1: Waveforms obtained with `clock.xce`: (a) `x_high`=1, `t1=10`, `t2=20`, `dt1=1`, `dt2=1`, `i0=0`, `t0=0`, (b) `x_high=1`, `t1=10`, `t2=20`, `dt1=2`, `dt2=4`, `i0=1`, `t0=0`, (c) `x_high=1`, `t1=10`, `t2=20`, `dt1=0.1`, `dt2=0.1`, `i0=0`, `t0=15`.